Environmental GEO-Technologies, LLC

November 4, 2014

Mr. Allan Batka
United States Environmental Protection Agency
Region 5 (WU-16J)
77 West Jackson Blvd.
Chicago, Illinois 60604

Re: EGT MITs (in conformance with MI-163-1W-C010 & MI-163-1W-C011, section I.H.2)

Dear Mr. Batka:

Environmental Geo-Technologies, LLC ("EGT") hereby submits its Mechanical Integrity Test of EGT Wells #s 1-12 & 2-12, as prepared by Subsurface Technology, Inc. in conformance with the EPA-interpreted requirements of its two EPA UIC permits (#s MI-163-1W-C010 & MI-163-1W-C011, most notably Section I.H.2 of both permits).

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, 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.

We trust that you find this submission satisfactory, however, if you have any questions or comments, please feel free to contact us.

Sincerely,

Richard J. Powals, P.E.
Chief Operating Officer

cc: J. Frost (EGT), S .Papas (EGT), T. Athans (HH)

att.

rjp110414/EGTEPAMITs-2014

P 734-946-1000 F 734-946-1002 - 28470 Citrin Drive. Romulus, Michigan 48174
www.envgeotech.com

SUBSURFACE

REPORT OF MECHANICAL INTEGRITY OF INJECTION WELL #1-12

ENVIRONMENTAL GEO-TECHNOLOGIES, LLC

Romulus, Michigan

Subsurface Project No. 185811-7092

OCTOBER 2014

Prepared By:

SUBSURFACE TECHNOLOGY, INC.

A PARSONS BRINCKERHOFF COMPANY

54520 Northern Avenue, Unit A

South Bend, Indiana 46635

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FIGURE

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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-CO10 granted to Environmental Geo-Technologies, LLC (EGT) and with the State of Michigan permit number M-452, an annulus pressure test, temperature survey and radioactive tracer was needed to be run on Well #1-12 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.

2.0 SUMMARY OF RESULTS

An annulus pressure test (APT) was performed on October 21, 2014 to demonstrate that there is no significant leak in the tubing, casing or packer. The fluid-filled annulus was pressurized to 916-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 0.6% change in pressure.

A Radioactive Tracer Survey (RTS) was run on October 21, 2014 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. Jack Lanigan of the Michigan Department of Environmental Quality (MDEQ), John Frost with EGT, and Richard Schildhouse with Subsurface Technology, Inc., witnessed the APT. The tracer survey was witnessed by John Frost with EGT and Richard Schildhouse with Subsurface Technology, Inc.

3.0 ANNULUS PRESSURE TESTING

The APT was performed on Well #1-12 on October 21, 2014. This test was based on the procedures contained in Appendix A. The annulus would be pressurized for a one (1) hour period. The purpose of the test is to 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 found in Appendix C.

3.1 Annulus Pressure Test Procedures

The procedure for testing the integrity of the annulus was performed in accord to procedures, as sent to the EPA, and provided in Appendix A. The annulus pressure was raised to 916-psi and was monitored for a one (1) hour period and recorded at 10-minute intervals.

3.2 Annulus Pressure Test Results

The annulus pressure test on Well 1-12 was run on October 21, 2014. The gauge that was used was APG Digital Model PG 3000; SN Z3339, 0-2000 psi capacity, calibrated March 10, 2014. During the test, the annulus had 916-psi applied pressure and lost 6-psi during the one (1) hour period. Based on the applied pressure of 916, an allowed loss of 27.5 psi (3% of applied), and since the 6 psi loss is only 0.6% of the applied, the well successfully passed the APT.

4.0 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.

4.1 Radioactive Tracer Survey Procedures

An RTS was run between 4147 feet and 3085 feet in injection Well #1-12 on October 21, 2014.

A. First Base Log: 4145 feet to 3086 feet

B. Five (5) minute statistical check at 3955 feet
Five (5) minute statistical check at 3802 feet

C. First radioactive slug ejected at 3100 feet. The following table contains the depth of the top and bottom of each pass and the depth of the peak.

	START	STOP	PEAK DEPTH	FLOW GPM
1	3254	3150	3178	30
2	3350	3242	3282	30
3	3449	3360	3406	30
4	3598	3521	3557	30
5	3802	3668	3731	30
6	4003	3886	3947	30
7	4099	4026	4071	30
8	4144	4039	4110	30
9	4148	4039	4130	30

D. Second radioactive slug ejection at 3730 feet
   Stationary time drive sequence
   Fluid pump rate – 30 GPM
   Bottom detector set at 4080 feet
   Top detector set at 4071.5 feet
   Monitored for 30 minutes

E. Final Base Log 4145 feet to 3086 feet

4.2 Radioactive Tracer Survey Results

The radioactive tracer run in Well #1-12 on October 24, 2014 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.

5.0 CONCLUSIONS

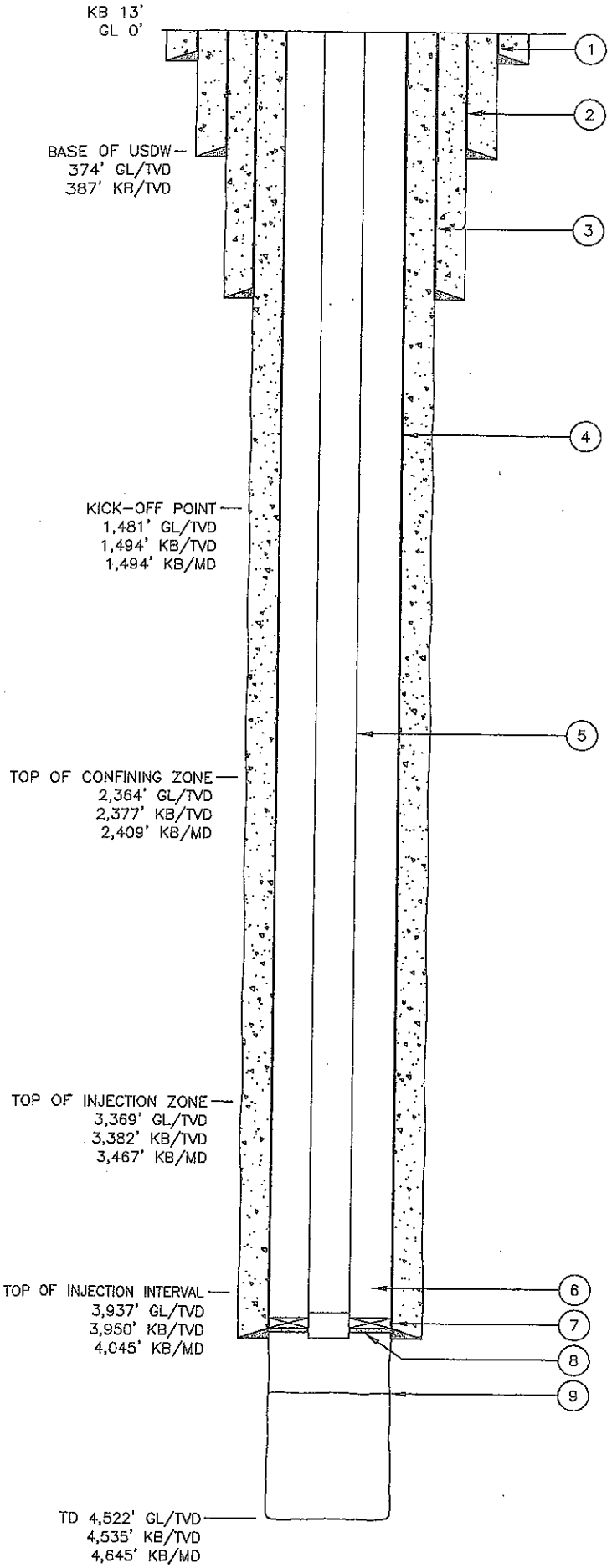
In conclusion, the Environmental Geo-Technologies, LLC Well #1-12 has displayed internal and external mechanical integrity. All procedures and evaluations have been done in accordance with state and federal requirements mandated in regard to U.S. EPA Permit MI-163-1W-C010 and Michigan Permit M-452.

- There is no significant leak in the casing, tubing or packer as evidenced by an amplified annulus pressure test conducted on October 21, 2014.

- The cement at the top of the injection interval and around the casing shoe has integrity. The tracer survey that was run on October 21, 2014 indicated that all fluids left the injection string and entered into the formation and showed no indication of upward movements.

FIGURE

SUBSURFACE



BELOW GROUND DETAILS

1. CONDUCTOR CASING: 20" O.D., 94 lb/ft, SET AT 119' KB/MD, 119' KB/TVD IN 24" HOLE AND CEMENTED TO SURFACE
2. SURFACE CASING: 13⅜" O.D., 48 lb/ft, H-40 SET AT 396' KB/MD, 396' KB/TVD IN 17½" HOLE AND CEMENTED TO SURFACE
3. INTERMEDIATE CASING: 9⅝" O.D., 36 lb/ft, J-55 SET AT 824' KB/MD, 824' KB/TVD IN 12¼" HOLE AND CEMENTED TO SURFACE
4. LONG STRING CASING: 7" O.D., 26 lb/ft, J-55 SET AT 4,080' KB/MD, 3,984' KB/TVD IN 8¾" HOLE AND CEMENTED TO SURFACE
5. INJECTION TUBING: 4-1/2" O.D. FIBERGLASS TO 4,050' KB/MD, 3,955' KB/TVD
6. ANNULUS FLUID: OIL BASED FLUID
7. PACKER AND SEAL ASSEMBLY: 4-1/2" X 7" GPS PACKER, TOP AT 4,050' KB/MD, 3,955' KB/TVD. BOTTOM AT 4,055' KB/MD, 3,960' KB/TVD
8. DIESEL PAD UNDER PACKER
9. TOP OF FILL AT 4,246' KB/MD, 4,147' KB/TVD

NOTE: TRUE BOTTOM OF WELL IS 211' SOUTH AND 754' WEST OF SURFACE LOCATIONS

SUBSURFACE

HOUSTON, TX.
SOUTH BEND, IN.
BATON ROUGE, LA.

FIGURE 1

ENVIRONMENTAL GEO-TECHNOLOGIES, LLC
ROMULUS, MICHIGAN

EGT #1-12 WELL SCHEMATIC

DATE: 10/27/14	CHECKED BY: RWS	JOB NO: 185811-7092
DRAWN BY: CRB	APPROVED BY: RWS	DWG. NO:

APPENDICES

SUBSURFACE

APPENDIX A

REGULATORY CORRESPONDENCE

SUBSURFACE

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

OCT 06 2014

REPLY TO THE ATTENTION OF:
WU-16J

CERTIFIED MAIL 7009 1680 0000 7675 7027
RETURN RECEIPT REQUESTED

Richard J. Powals
Chief Operating Officer
Environmental Geo-Technologies, LLC
28470 Citrin Drive
Romulus, Michigan 48174

Subject: Approval of Proposed Procedures for Testing in the Environmental Geo-Technologies #1-12 and #2-12 Wells, U.S. Environmental Protection Agency Underground Injection Control Permit #MI-163-1W-C010 and #MI-163-1W-C011, October 2014

Dear Mr. Powals:

The U.S. Environmental Protection Agency has reviewed and hereby approves the procedures proposed in your letter of October 3, 2014, for the testing referenced above with several conditions.

1. A copy of the pressure gauge calibration certificate for each gauge used during the testing (Standard Annulus Pressure Test and Ambient Reservoir Pressure Monitoring) should be submitted.
2. During the Radioactive Tracer Survey in Well #2-12, please run the final base log over the same portion of the well you propose for the initial base log (4300' to 3093').
3. During the Ambient Reservoir Pressure Monitoring, please ensure that the well not being tested, e.g., the #2-12 well when the test is being conducted in the #1-12 well, maintains as steady an injection rate as possible; being shut-in is optimal. As written, your proposal says that the well being tested will be shut down at least four hours prior to and during the fall off portion of the test. This is not correct.

I am enclosing information sheets that we request you fill in and return with the test results and interpretation and up-to-date well schematics. This will help ensure that all the information we require for interpretation of the test will be included in your submission. Please remember to submit the digital data either on CD or by email when you submit your report. Please note that if the tests do not provide definitive information concerning the conditions which they are designed to ascertain, or approved procedures are not followed, you will be required to rerun them.

It is our practice that testing be witnessed by an EPA staff member or our contract field inspector to the extent possible. Please contact Jeff McDonald at (312) 353-6288 to schedule the witnessing of this test. Unwitnessed tests are only acceptable if it is impossible for an EPA staff member or the field inspector to be present.

If you have any questions or comments about the contents of this letter or if you find during the test that you are unable to follow the approved procedures, please contact Stephen Roy of my staff by phone at (312) 886-6556 or by email to roy.stephen@epa.gov.

Sincerely,

Stephen M. Jann, Chief
Underground Injection Control Branch

Enclosures

cc: Sam Williams (email only with procedure)
Ray Vugrinovich, Michigan Department of Environmental Quality (email only)
Rich Schildhouse, Subsurface (email only)

BACKGROUND INFORMATION FOR REVIEW OF RADIOACTIVE TRACER SURVEYS FOR CEMENT INTEGRITY

Facility Name: Romulus Facility		Operator: Environmental Geo-Technologies, LLC	
Well Name: Well 1-12		USEPA Permit Number: MI-163-1W-C010	Witness
State: Michigan	Test Date	Logging Company	

Well and Operational Information

Long String Csg Mater: Steel and Hastelloy	Long String Casing OD: 7	Casing weight, #/ft: 26	Casing ID, ins:	Long String Casing Length, ft: 4080	
Tubing Material: Fiberglass	Tubing OD, ins: 4.5	0	Tubing ID, ins: #N/A	Tubing Length, ft: 4050	
Tail Pipe Material: 0	Tail Pipe OD, ins: 0	Tail Pipe weight#/ft: 0	Tail Pipe ID, ins: 0.00	Tail Pipe Length, ft: 0	Tail Pipe Depth: 4070
	OpenHole diameter, in: 8.75	TD, ft: 4645	PBTD, ft: N/A	Top of Open Interval, ft: 4045	
Packer Model: GPS	Packer Type: 0	Top of Packer, ft: 4050	Bottom of Packer, ft: 4055		

Geological Information

Lowermost USDW Name: Dundee Limestone	Fms in Arrestment Interval: Utica Shale and Trenton Limestone	Fms in Injection Intervalt: Franconia, Eau Claire, Mt. Simon
Base of USDW, ft: 387	Depth to top of Arrestment Interval, ft: 2409	Injection Interval Top, ft: 4045

TOOL INFORMATION

Ejector, ft above BDET	TDET, ft above BDET	MDET, ft above BDET			

CALIBRATION INFORMATION

Depth BDET, ft	Depth TDET, ft	BDET CPSPI	Shaly zone	Maximum Reading, LD	Minimum Reading, LD
Depth BDET, ft	Depth TDET, ft	BDET CPSPI	Clean zone	Maximum Reading, LD	Minimum Reading, LD

BACKGROUND LOG (BDET) BEFORE TESTS

Appearance of Log, lithology discernible, extremely suppressed, noisy, etc. Is calibration the same as for statistical checks?

FIRST SLUG TRACKING SEQUENCE

Flow Rate, gpm	Velocity in tubing, fps	Depth of deflection on	Deflection on 1st pass	Deflection/Background	Passes Through Slug
Slug Split? yes or no	Depth of Split, ft	Moved up, yes or no	Minimum Slug Depth,	Distance above shoe,	Maximum Slug Depth, ft

FIRST STATIONARY TEST

Depth of BDET, ft	Depth of TDET, ft	BDET to open interval	Time at station, mins	Injection Rate, gpm	Log Divisions per Minute
Depth at Injection, ft		BDET above end of tubing or casing, ft	Reached BDET up, LD	Reach UDET up, LD	Velocity Up, ft/min
2nd Setting Depth, ft	Time of reset	Slug already passed BDET?	Reached BDET up, LD	Slug arrival time	
3rd Setting Depth	Time of reset	Slug already passed BDET?	Reached BDET up, LD	Slug arrival time	
4th setting depth, ft	Time of reset	Slug already passed BDET?	Reached BDET up, LD	Slug arrival time	Upper Limit of Movement, ft

SUBSURFACE

October 2, 2014

Mr. Lee Papas
Environmental Geo-Technologies
28470 Citrin Drive
Romulus, Michigan 48174

RE: Proposal to Conduct the 2014 Mechanical Integrity Testing on Well #1-12 and Well # 2-12
28470 Citrin Drive; Romulus, Michigan

Dear Mr. Papas:

Subsurface Technology, Inc. is pleased to provide the costing and procedures for the Mechanical Integrity Tests for Well #1-12 and Well #2-12 for Environmental Geo-Technologies in Romulus, Michigan. This test will include an annulus test, radioactive tracer survey, and a build-up fall off test on both wells.

The procedures should be sent to both the EPA and MDEQ prior to running the tests. Ray Vugrinovich with the MDEQ should be called to witness the Annulus Pressure Test, and Jeff McDonald with the EPA should be contacted about an EPA field inspector witnessing the tests.

The work is tentatively scheduled for a mid-November start date and should take two (2) to three (3) days to complete.

Thank you in advance for the opportunity to be of service and please feel free to call me @ (574) 287-2282 if you should have any questions.

Sincerely,

Subsurface

Richard W. Schildhouse
Senior Engineer

RWS/rv

Attachments

GENERAL DESCRIPTION OF EGT WELL #1-12

Location: Wayne County / Romulus, Michigan
Section: 12 / Township: 35 / Range: 9B

Ground Level Elevation: 626'
K.B.: 13' / Drilling measured from K.B Elev. 639'

Conductor: 20"- 94# Surface to 119'
Protection Casing: 13-3/8" - 48# Surface to 396'
Intermediate Casing: 9-5/8" - 36# Surface to 825'
Long String Casing: 7" - 26# Surface to 4079'
Injection String: 4-1/2" Fiberglass Surface to 4060'

Packer:	4067'
Bottom of Tailpipe:	4080'
T.D.:	4649'

SUBSURFACE

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

- Record last date of injection
- 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)
- Return annulus to normal stand-by pressure
- Put WAMS system back on line
- Return well to operator control

SUBSURFACE

PROCEDURES FOR RUNNING RADIOACTIVE TRACER SURVEY ON EGT WELL #1-12

- 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 4400' (or deepest attainable) to 3090' (sensitivity at 40 counts per second per inch (CPSPI)
- Run first 5-minute stat with bottom detector at 3955'
- Run second 5-minute stat with bottom detector at 3802'
- Start injection at a stable rate of 30-35 gpm
- Release first slug at 3730'
- Run 30-minute time drive with bottom detector at 4080'
- Release second slug at 3100'
- Chase slug with a minimum of two (2) chases in tubing (as many as practical)
- Run final base bottom-up from 4400' to 3090' (same interval as base run)
- Rig down wireline
- Turn over to operator

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APPENDIX B

CHRONOLOGY OF FIELD ACTIVITIES

SUBSURFACE

CHRONOLOGY OF FIELD ATIVITIES

ENVIRONMENTAL-GEO TECHNOLOGIES, LLC

TUESDAY, OCTOBER 21, 2014

- Rig-up and perform Annulus pressure test on Well #1-12
- Rig-up and perform annulus pressure test on Well #2-12
- Rig up and run radioactive tracer survey on Well #1-12

WEDNESDAY, OCTOBER 22, 2014

- Rig up and run radioactive tracer survey on Well #2-12

SUBSURFACE

APPENDIX C

ANNULUS PRESSURE TEST DATA AND CALIBRATION

SUBSURFACE

DEQ

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY – OFFICE OF GEOLOGICAL SURVEY

ANNULAR PRESSURE TEST

By authority of Part 615 or Part 625 of Act 451 PA 1994, as amended. Non-submission and/or falsification of this information may result in fines and/or imprisonment.

Permit Number: M452 MI-163-1W-C0007

Well name & No.: EDS 1-12

Surface location: SW 1/4 of NW 1/4 of SE 1/4, Section 12 T 03S R 09E

Name and address of permittee:
Environmental Disposal Systems
28470 Citrin Drive
Romulus, MI 48174

Township: Romulus

County: Wayne

Well type:
Part 615 ☐ Secondary recovery ☐ Brine disposal
Part 625 ☒ Waste disposal ☐ Solution mining

Date of test: 21 October 2014

Casing: 7" at 4080 feet

Tubing: 4 1/2 inch fiberglass

Type of gauge: ~~Ashcroft T-150-1/c~~ PG-3000 #3359

inch face psi range: 2000 psi

Packer type/model: GPS Model 12

Packer depth: 4066 feet

New gauge ☐ Yes ☑ No

If no, enter date of test calibration: 10 March 2014

Type of non-corrosive liquid in the annulus: Diesel Fuel & Brine

Average rate during injection: NA

Maximum allowed injection pressure: 765 psi

TEST DATA

Pressure readings (psig)

Time	Annulus	tubing	Time	Annulus	tubing
9:15	916				
9:25	914				
9:35	913				
9:45	912				
9:55	911				
10:05	910				
10:15	910				

Comments: Well demonstrated mechanical integrity
witnessed successful test of emergency shut off - differential pressure of 150 psi.

Certification if witnessed by DEQ representative:

Signature of DEQ employee: [signature] Date: 21 October 2014

Certification if not witnessed by DEQ representative: "I state that I am authorized by said owner. This report was prepared under my supervision and direction. The facts stated herein are true, accurate and complete to the best of my knowledge."

Signature: Date:

MAIL TO: OFFICE OF GEOLOGICAL SURVEY
MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
PO BOX 30256
LANSING MI 48909-7756

EQP 7606 (rev. 8/2004)

APG
1025 West 1700 North
Logan, UT 84321
Tel: 435-753-7300
Fax: 435-753-7490
www.apgsensors.com

NIST CALIBRATION DATA

Certificate Number: 420312	RANGE 2000 PSI S	RATED ACCURACY +/- 0.25 % FS BFSL	OUTPUT
MODEL NUMBER: PG-3000		ACTUAL LINEARITY 0.03 % FS	ACTUAL HYST. 0.05 % FS
PART NUMBER 548010-0722	SERIAL NUMBER Z3339		

WORK PERFORMED:

- [x] CALIBRATE TO MFG. SPEC. IN ACCORDANCE WITH 9001749
- [x] CALIBRATE IN COMPLIANCE WITH ANSI / NCSL Z540.1
- [x] REPAIR
- [ ] NEW ITEM

REMARKS:

	CALIBRATION RESULTS DISPLAY	PRESSURE	OUTPUT
Increasing	0	0	N / A
	400	400	N / A
	800	800	N / A
	1201	1200	N / A
	1601	1600	N / A
	1999	1999	N / A
Decreasing	1601	1600	N / A
	1201	1200	N / A
	801	800	N / A
	400	400	N / A
	0	0	N / A

P.O. NUMBER	SALES ORDER NUMBER	CUSTOMER I.D.	DATE OF TEST	DUE DATE
70-15965	212331		3/10/2014	

The calibration 'Due Date' has purposely been left blank, as APG will not dictate to our customers when they should re-calibrate their instruments.

STANDARD USED

MFG.	MODEL	INSTRUMENT	SERIAL #	ACCURACY	CAL.DATE	RECAL DATE	CERT NUMBER	SOURCE
AMETEK	T-150-1/C	Dead Weight	98097	+/-0.025%	12/19/2013	1/6/2015	6339683	Simco

ENVIRONMENT TEMP. 70 DEG.F HUMIDITY 27 %

PERFORMED BY: Daniel Bardwell DB

Technician Name and Stamp

CALIBRATION REPORT - STATEMENT OF TRACEABILITY

This instrument has been checked for accuracy, recalibrated to manufacturer's specifications using Best Fit Straight Line (BFSL), and found to be within the specified tolerance (unless otherwise noted The instruments used in this calibration are traceable to the National Institute of Standards and Technology (NIST) through certification documents on file at APG. APG is in compliance with ANSI/NCSL Z540.1

APPENDIX D

RADIOACTIVE TRACER SURVEY

SUBSURFACE

BAKER HUGHES

Baker Atlas

Nuclear Tracer Log

File No:	Company	ENVIROMENTAL GEOTECH TECHNOLOGIES	
	Well	EGT #1-12	
API No:	Field	ROMULUS STORAGE	
	County	WAYNE	State MICHIGAN

THANK YOU!

Location
1670'FSL & 2372'FEL

SEC 12 TWP 3S RGE 9E

Other Services
NONE

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	21-OCT-2014		
Run	SUB		
Service Order	091352		
Depth Driller	4645 ft		
Depth Logger	4145 ft		
Bottom Logged Interval	4144 ft		
Top Logged Interval	3090 ft		
Time Started	10:30		
Time Finished	16:30		
Operator Rig Time	PRODUCTION LOGGER		
Type of Fluid in Hole	WATER		
Mud Density	N/A		
Viscosity	N/A		
Fluid Level	INJECTION		
Logged Cement Top	N/A		
Wellhead Pressure	N/A		
Maximum Hole Deviation	N/A		
Nominal Logging Speed	30 fpm		
Maximum Recorded Temperature	N/A		
Reference Log	TRACER		
Reference Log Date	26-JUNE-2013		
Equipment No. / Location	9745	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.

Casing Record

Size	Weight	Grade	From	To
20 in	94 lbm/ft		0 ft	119 ft
13.375 in	48 lbm/ft	H-40	0 ft	396 ft
9.625 in	36 lbm/ft		0 ft	824 ft
7 in	26 lbm/ft		0 ft	4080 ft
4.5 in		FGL	0 ft	4050 ft

Borehole Record

Bit Size	From	To

Remarks

BAKER HUGHES CREW: C.BREWER

PACKER TOP @ 4050'

AFTER BASE GR APPEARED TO BE WARMER DUE TO MATERIAL STICKING INSIDE TUBING WALL

TOOL WAS CHECKED FOR CONTAMINATION AFTER SURVEY IN WHICH DETECTORS CHECKED OUT

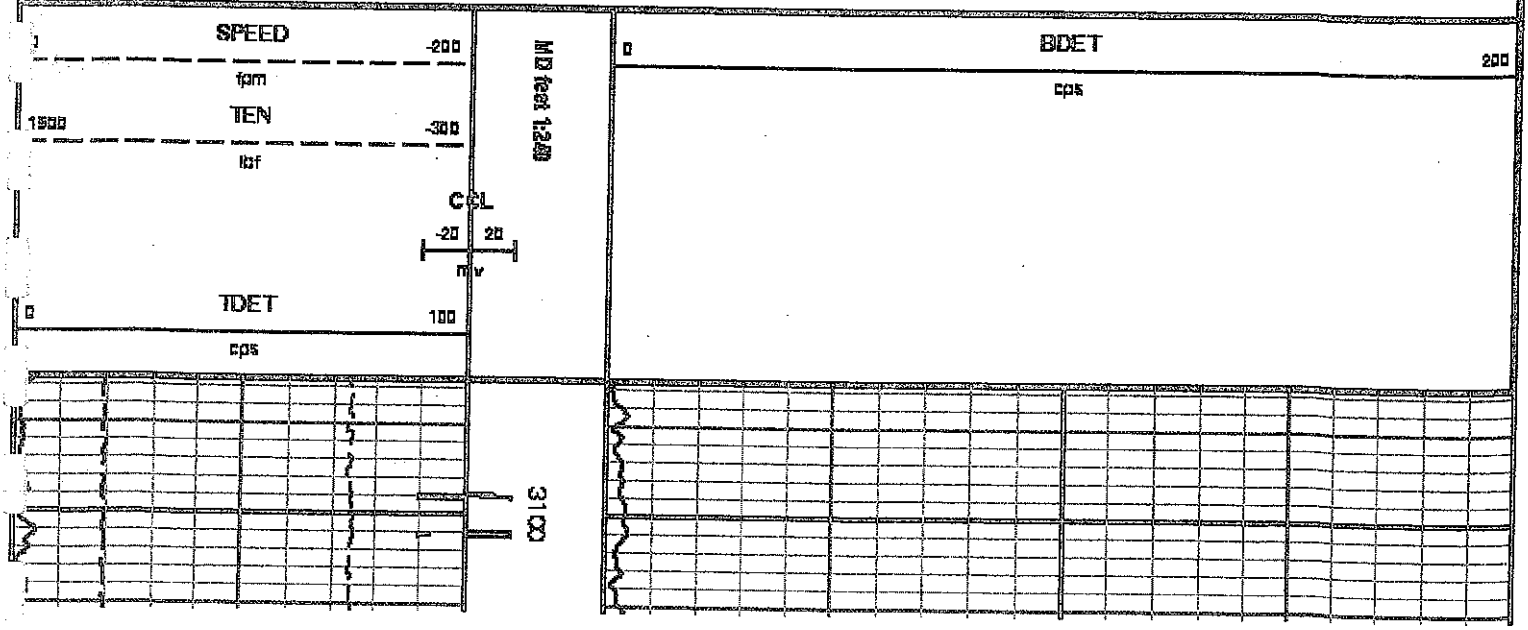
FSE

BASE GAMMA RAY
NO FLOW

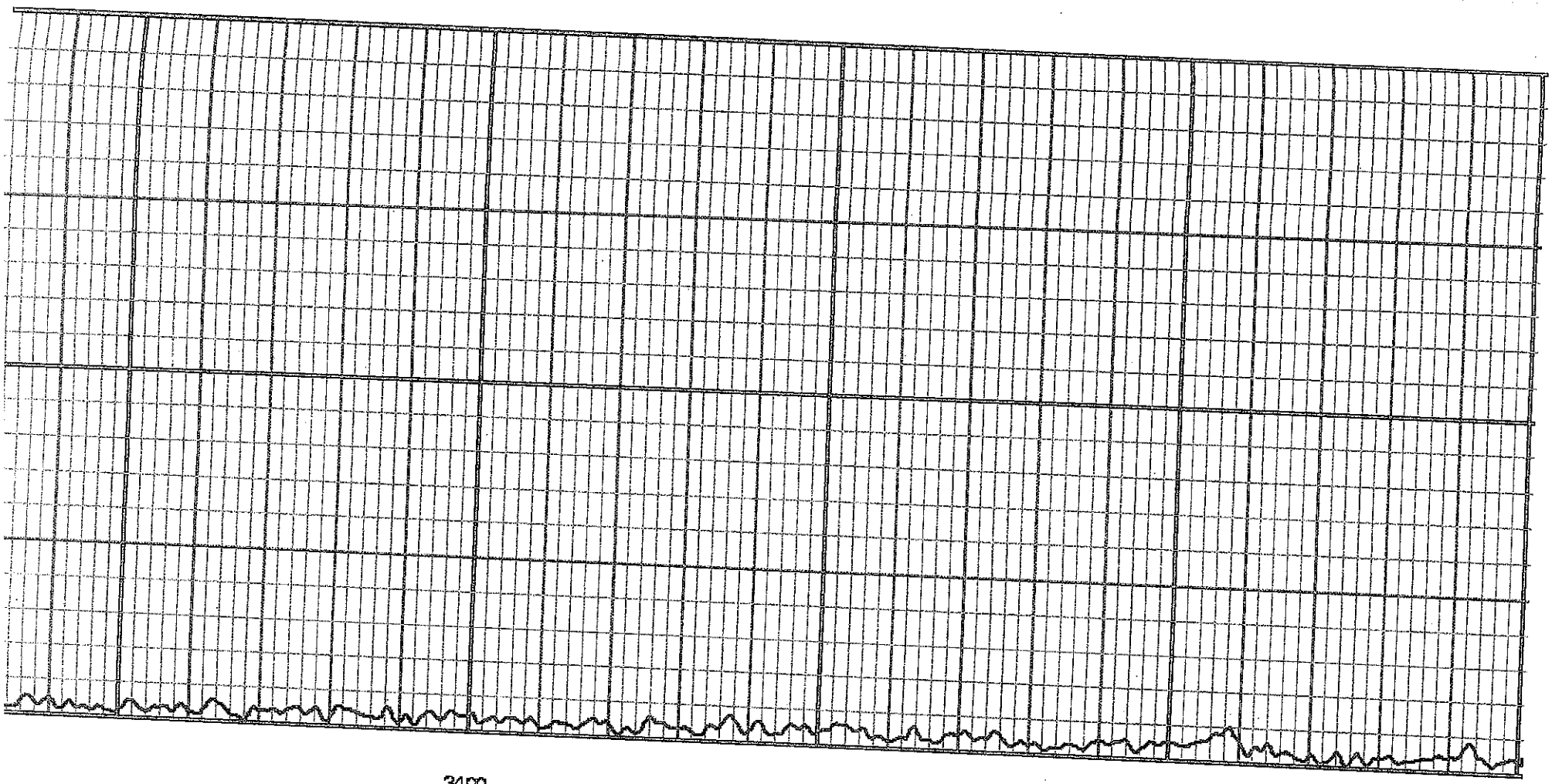
DEPTH OFFSETS
(for Acquired Curves)

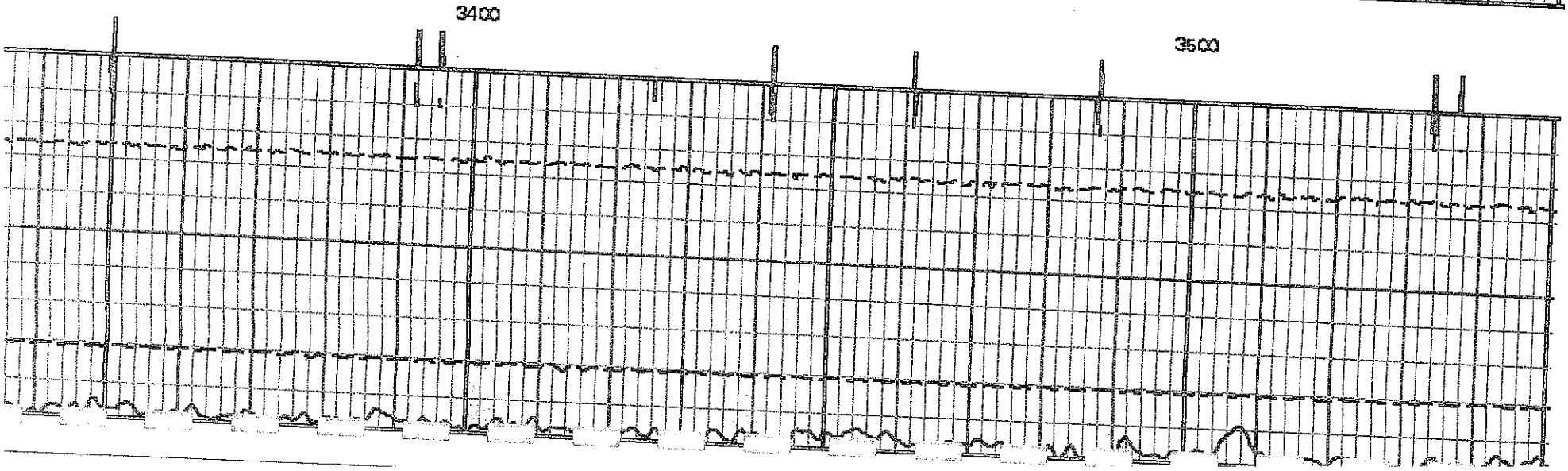
SERIES	DEPTH OFFSET	ACQUIRED CURVES	
2324NA	-10.500	CCL	ACCL
8219XA	-8.500	TDET	TDETBU
8219XA	0.000	BDET	BDETBU
SYSTEM	0.000	TEN	TTEN

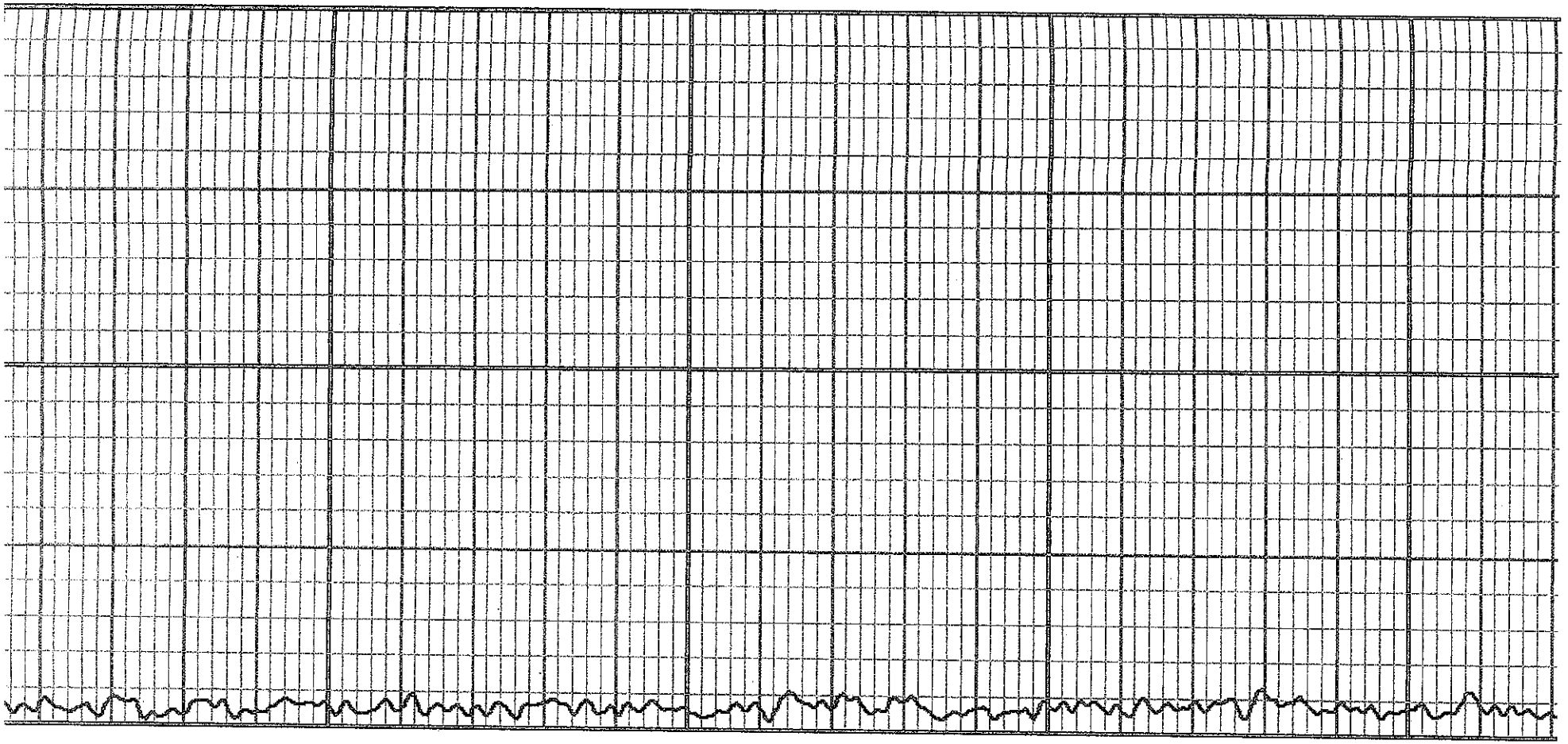
Created by : CNT, v4.07.00
Plotted by : PlotMgr, v5.4.504
Company : EGT
Well : 1-12
File Name : d:\welldata\91352\tr02.xtf
Mode : PlotMgr5.4.504
Interval : 3085.00 - 4147.00 feet UP
Created : 10/21/2014 11:33:20 AM

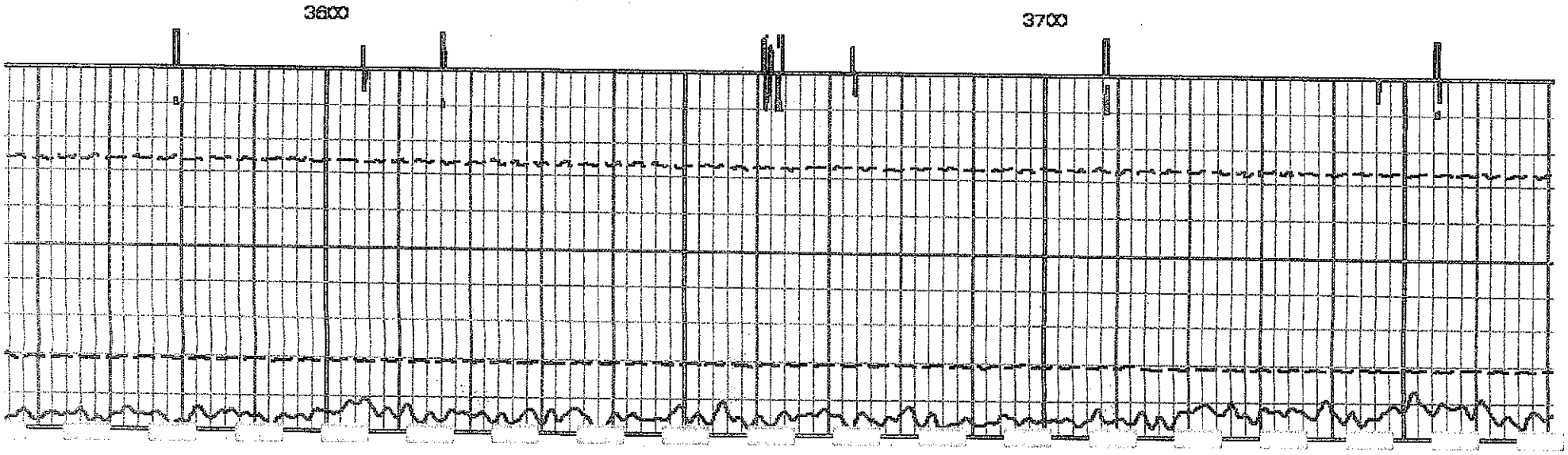


3200
3300

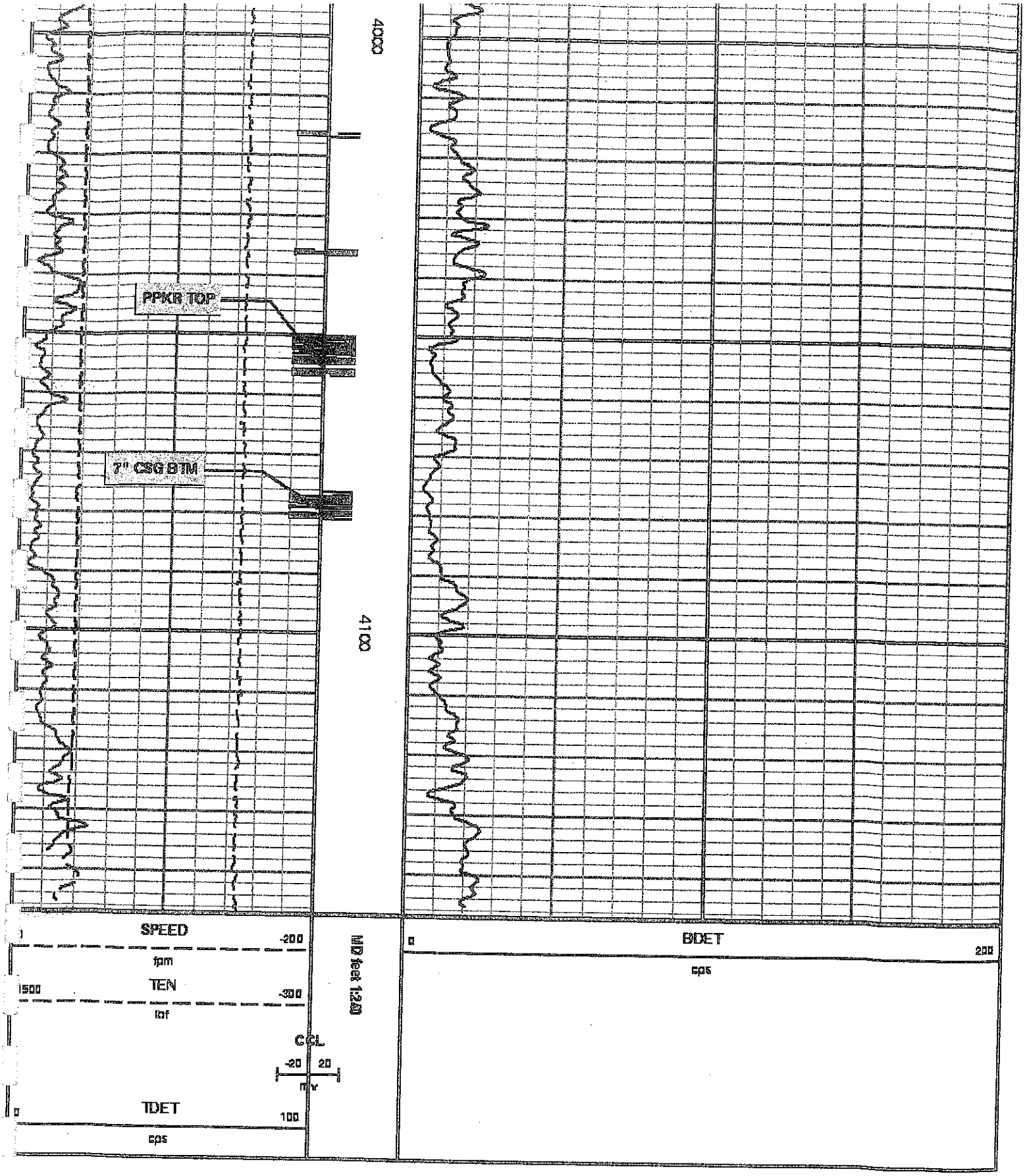



3400
3500




3600
3700

3800
3800



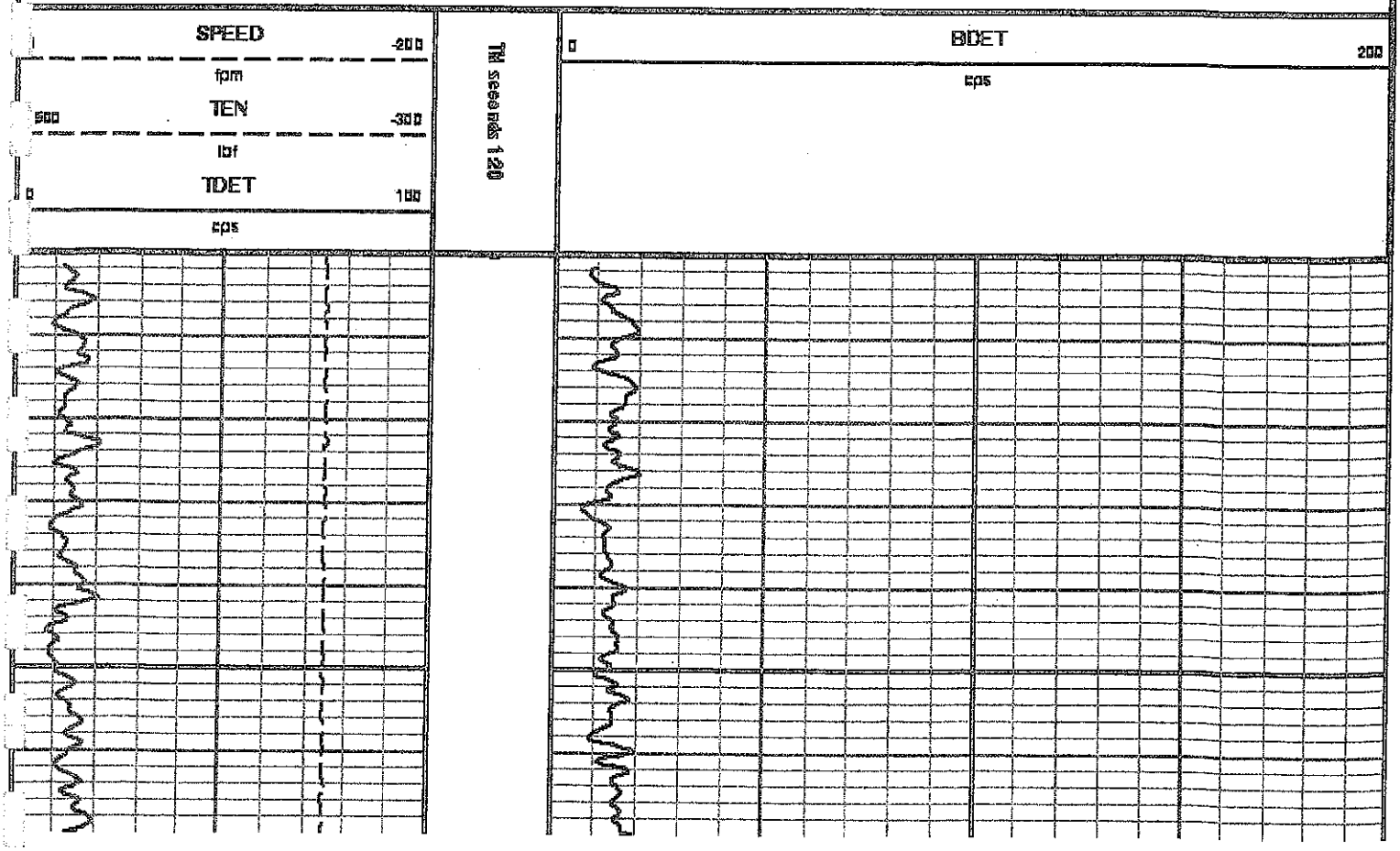
STAT CHECK @ 3055'

5 MIN

DEPTH OFFSETS
(for Acquired Curves)

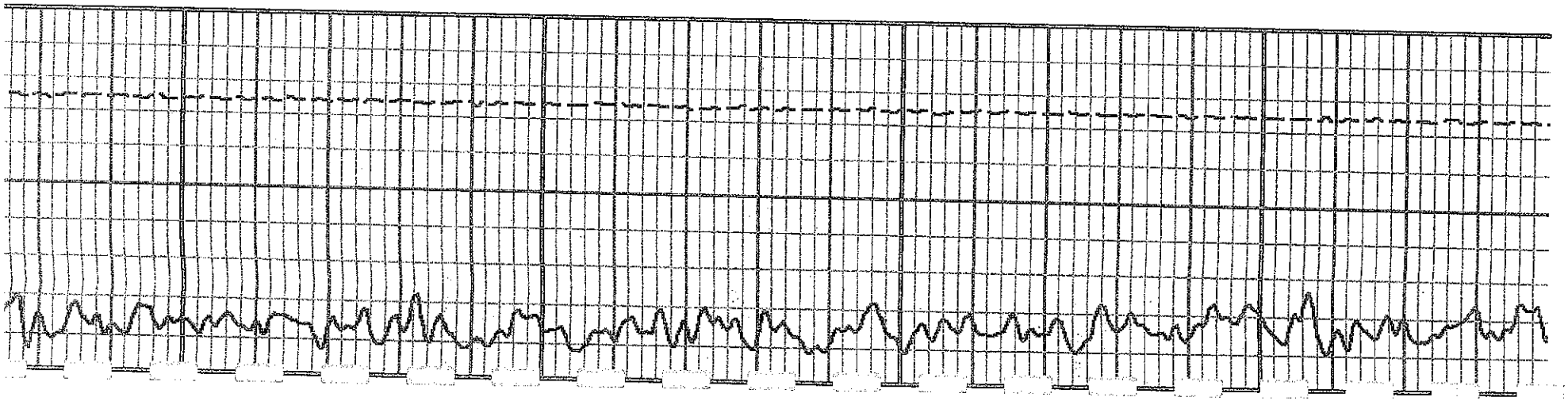
SERIES	DEPTH OFFSET	ACQUIRED CURVES	
2324NA	-10.500	CCL	ACCL
8219XA	-8.500	TDET	TDETBU
8219XA	0.000	BDET	BDETBU
SYSTEM	0.000	TEN	TTEN

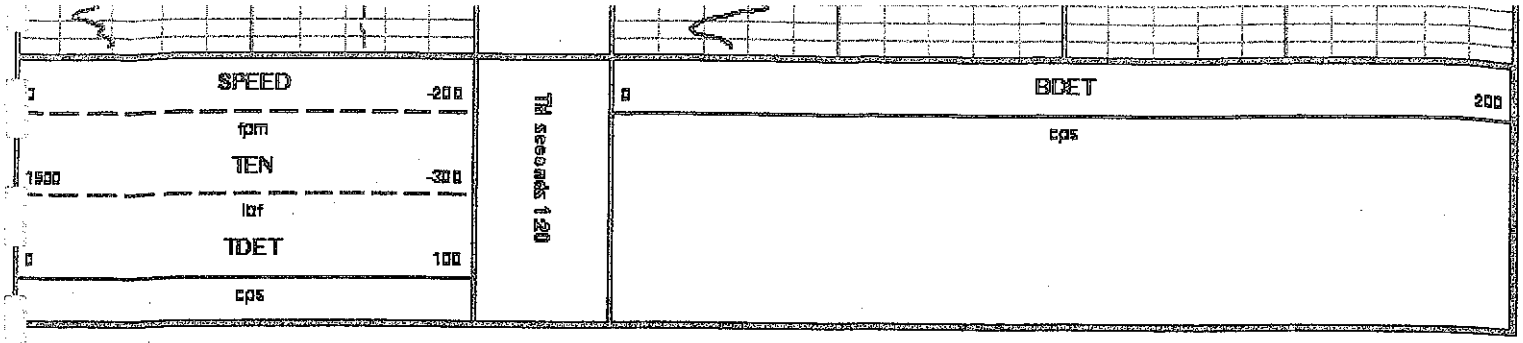
Created by : CNT. v4.07.00
Plotted by : PlotMgr. v5.4.504
Company : EGT
Well : 1-12
File Name : d:welldata\91352\r103.xtf
Mode : PlotMgr5.4.504
Interval : 0 to 300
Created : 10/21/2014 12:06:28 PM



100

200





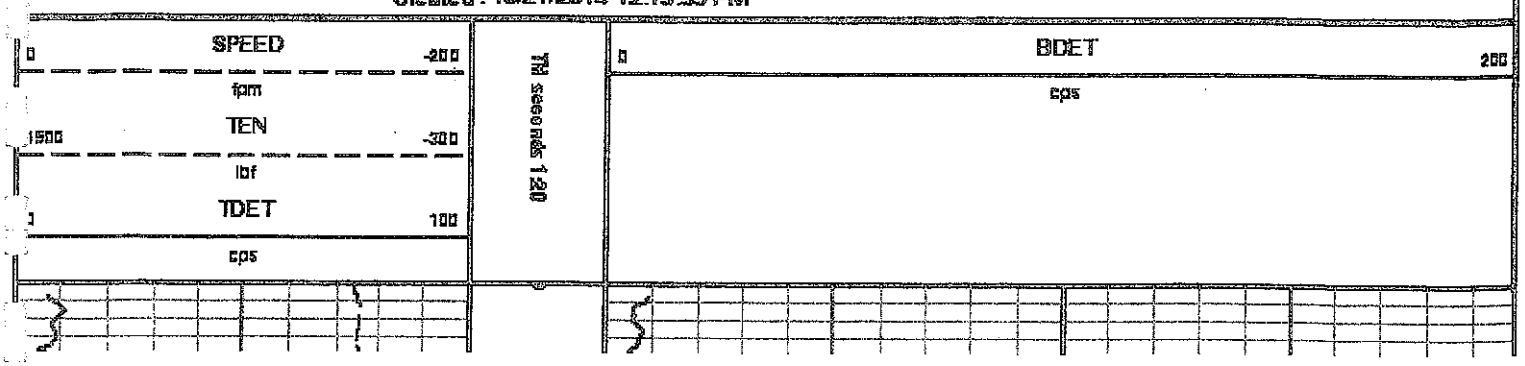
STAT CHECK @ 3802'
5 MIN

DEPTH OFFSETS
(for Acquired Curves)

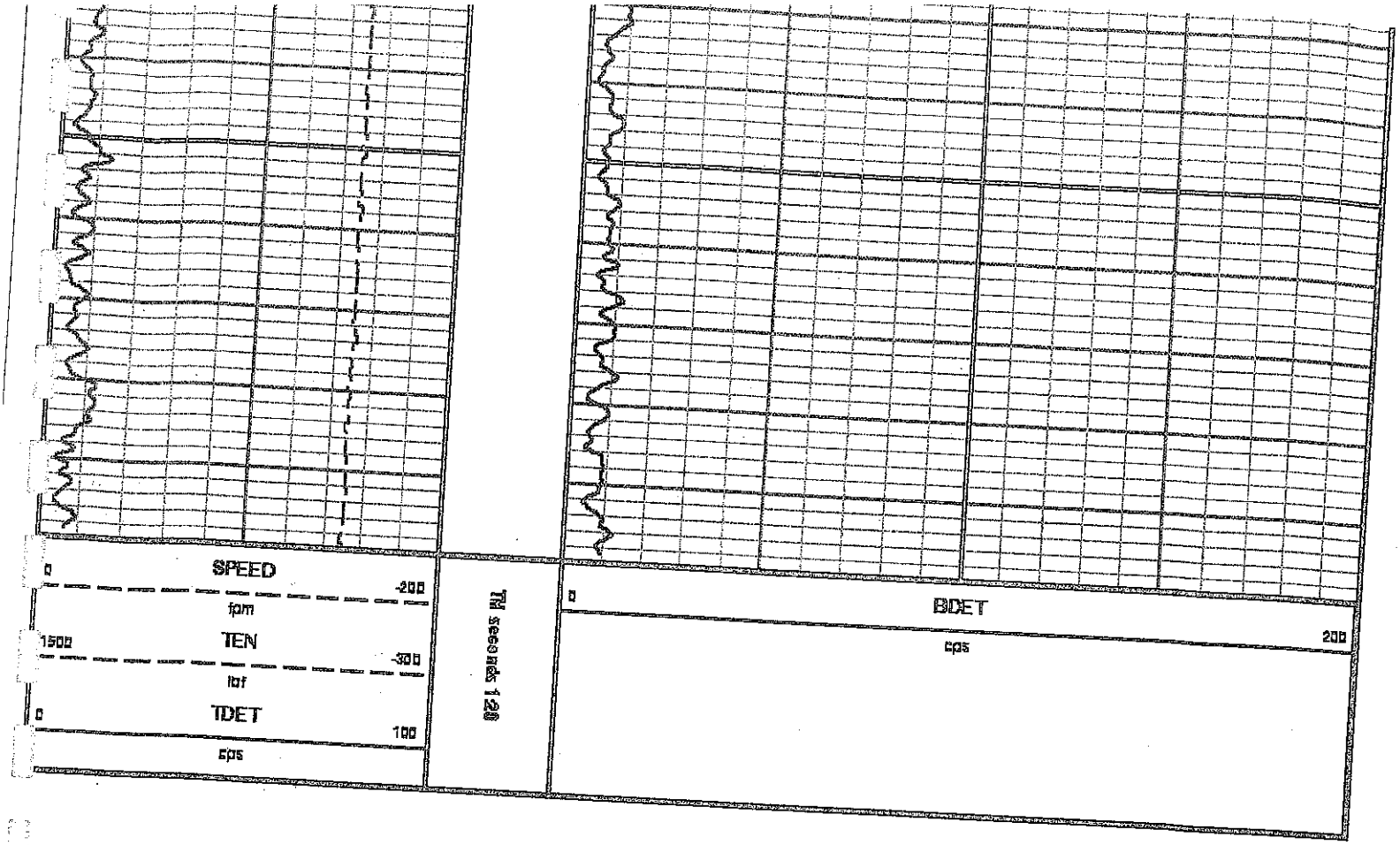
SERIES	DEPTH OFFSET	ACQUIRED CURVES	
2324NA	-10.500	CCL	ACCL
8219XA	-8.500	TDET	TDETBU
8219XA	0.000	BDET	BDETBU
SYSTEM	0.000	TEN	TTEN

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

Company : EGT
Well : 1-12
File Name : D:\WELLDATA\91352\TRL04.XTF
Mode : PlotMgr5.4.504
Interval : 0 to 300
Created : 10/21/2014 12:13:39 PM



100
200



RELEASE SLUG @ 3100'
35 GPM
FILES 5-13

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 : CMT. v4.07.00

Plotted by : PlotMgr. v5.4.504

Company : EGT

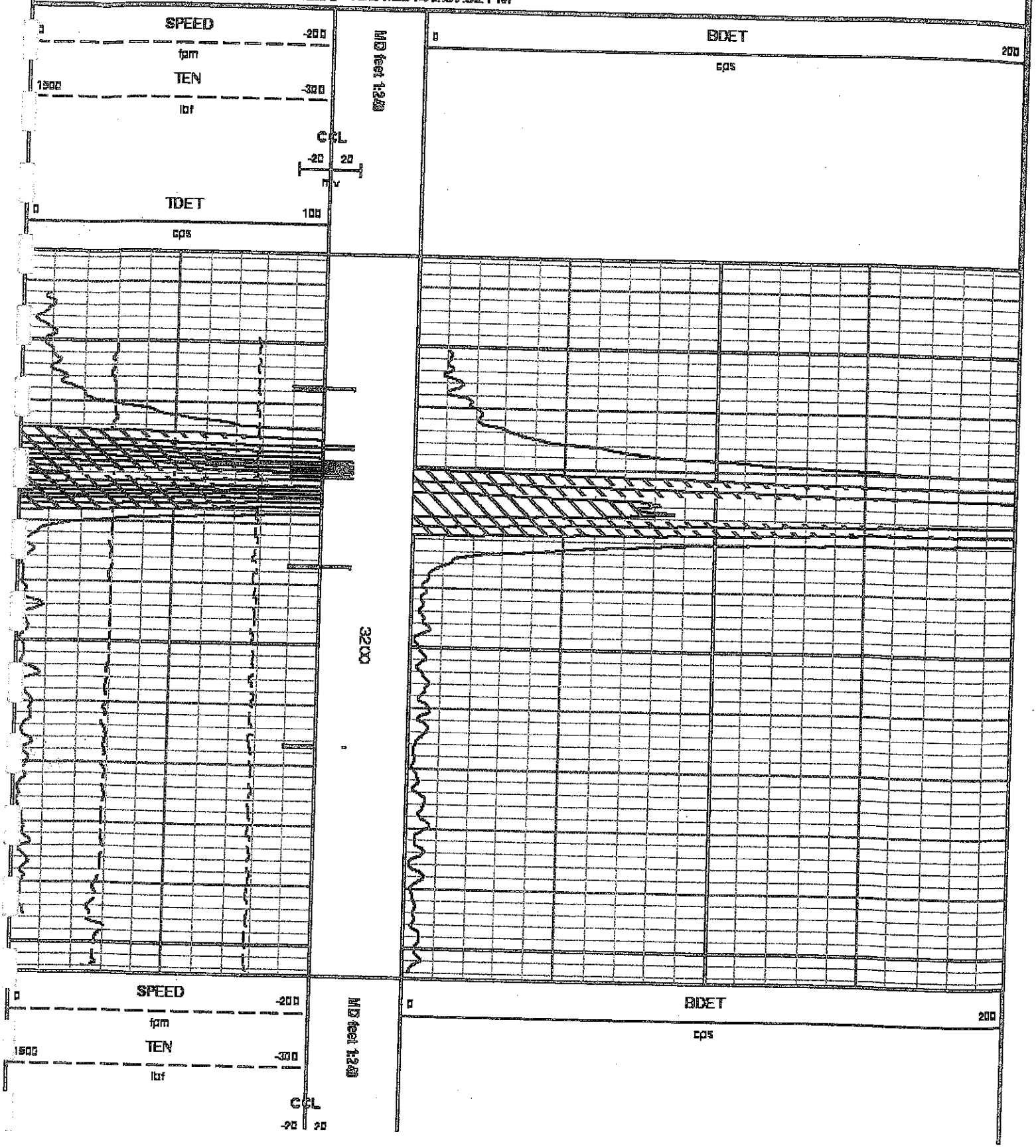
Well : 1-12

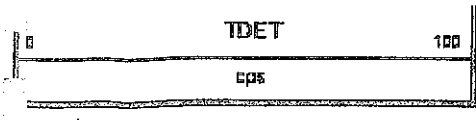
File Name : D:\WELLDATA\91352\TRL05.XTF

Mode : PlotMgr 5.4.504

Interval : 3135.00 - 3255.00 feet UP

Created : 10/21/2014 2:37:52 PM

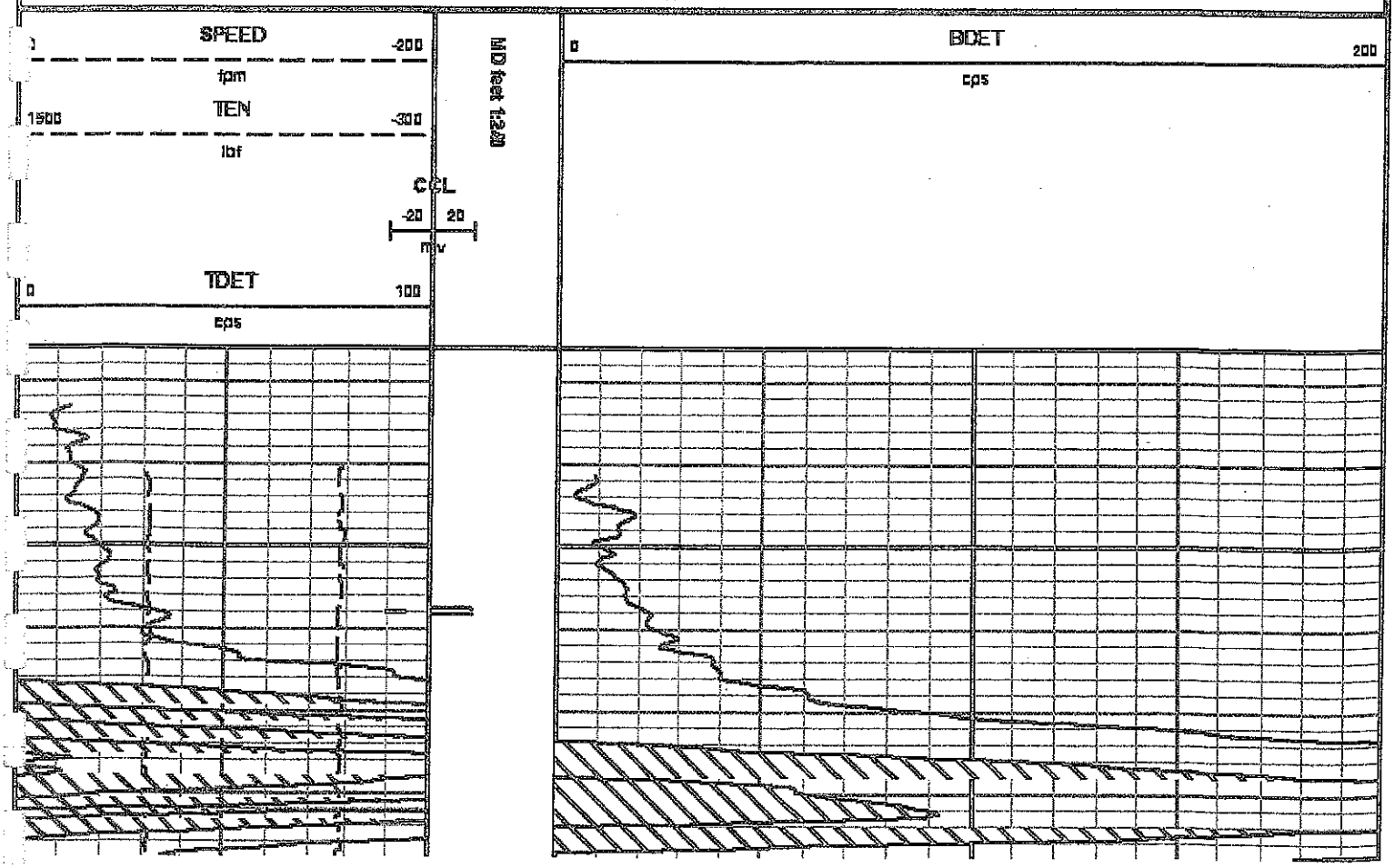


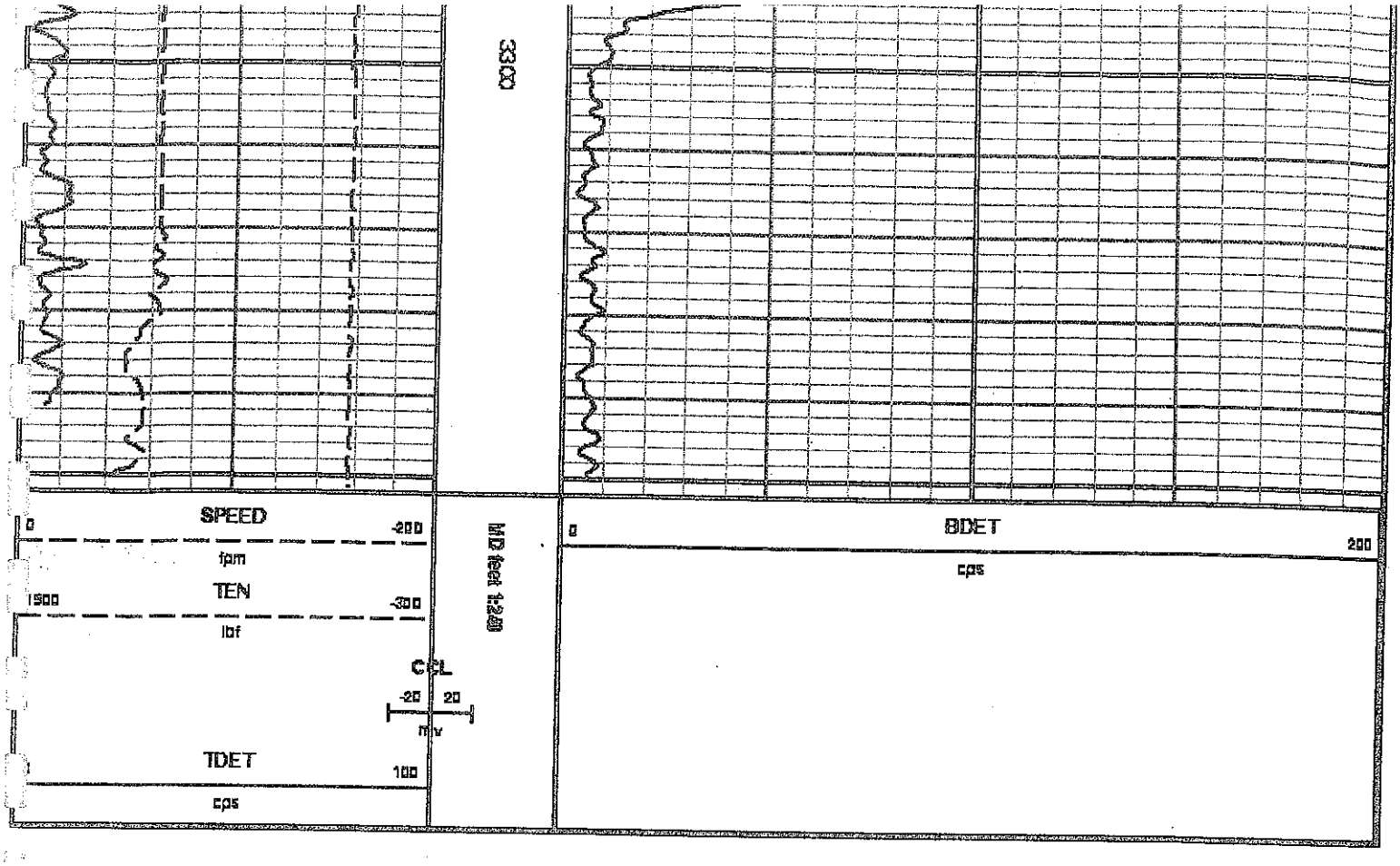


DEPTH OFFSETS
(for Acquired Curves)

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 : 1-12
File Name : D:\WELLDATA\913521TRL05.XTF
Mode : PlotMgr 5.4.504
Interval : 3226.00 - 3352.00 feet UP
Created : 10/21/2014 2:40:33 PM





DEPTH OFFSETS

(for Acquired Curves)

SERIES	DEPTH OFFSET
2324NA	-10.500
8219XA	-8.500
8219XA	0.000
SYSTEM	0.000

ACQUIRED CURVES	
CCL	ACCL
TDET	TDETBU
BDET	BDETBU
TEN	TTEN

Created by : CNT. v4.07.00

Plotted by : PlotMgr. v5.4.504

Company : EGT

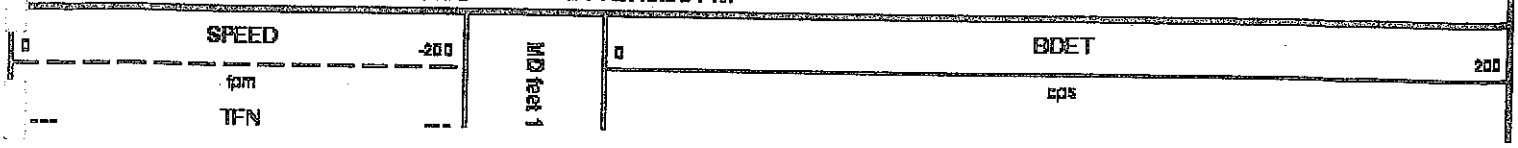
Well : 1-12

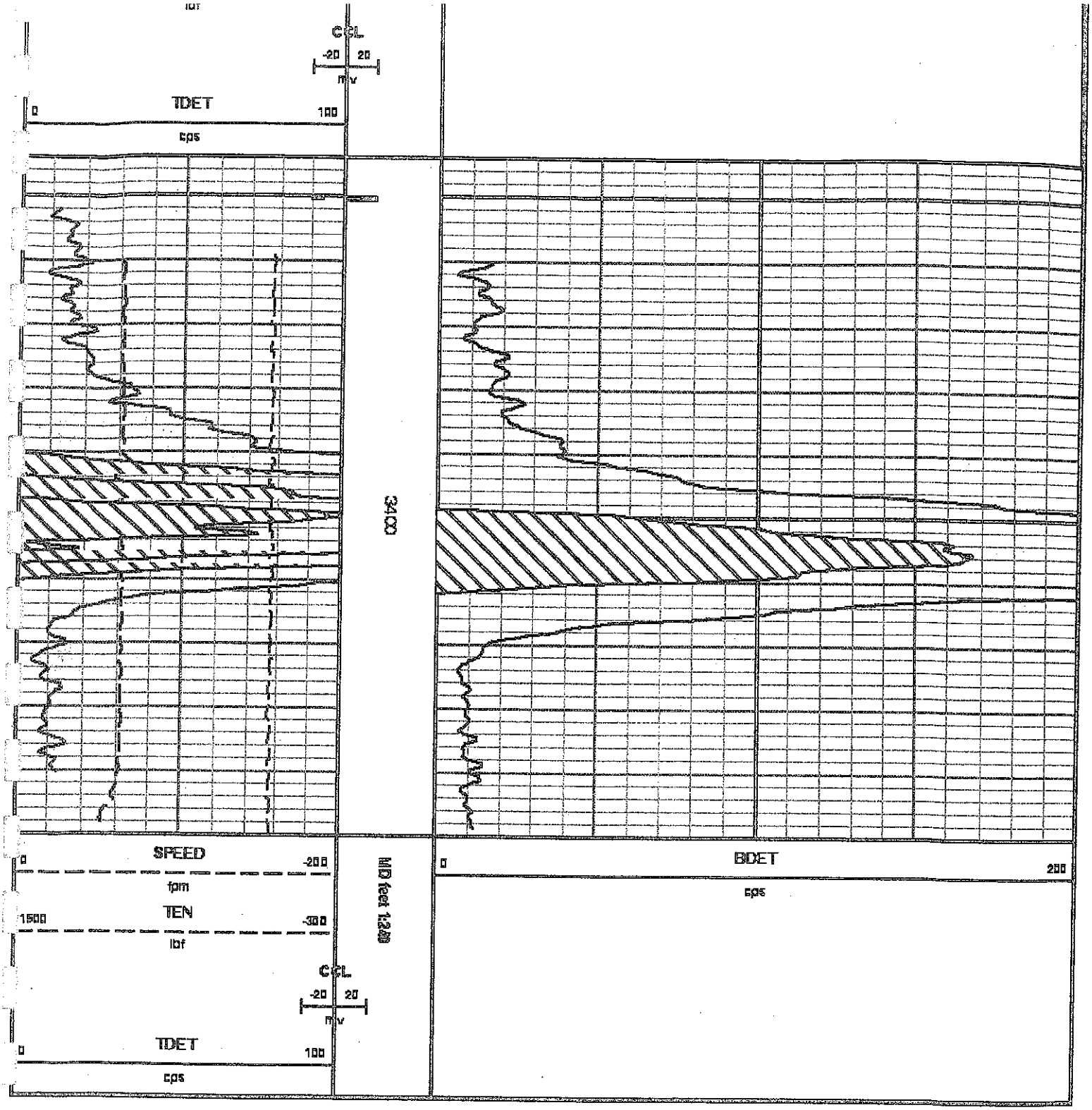
File Name : D:\WELLDATA\91352\TRL07.XTF

Mode : PlotMgr 5.4.504

Interval : 3344.00 -3450.00 feet UP

Created : 10/21/2014 2:43:39 PM





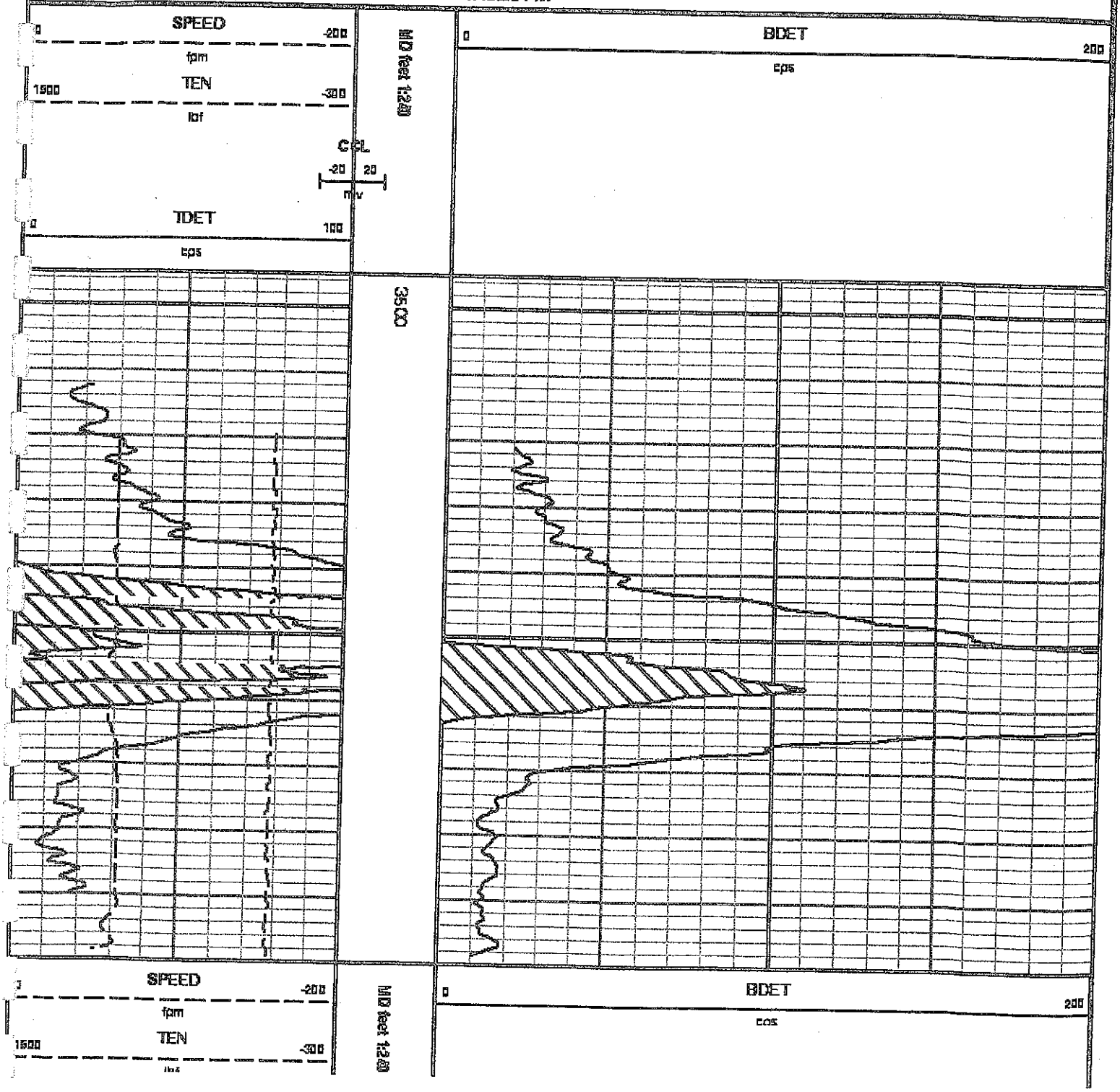
DEPTH OFFSETS

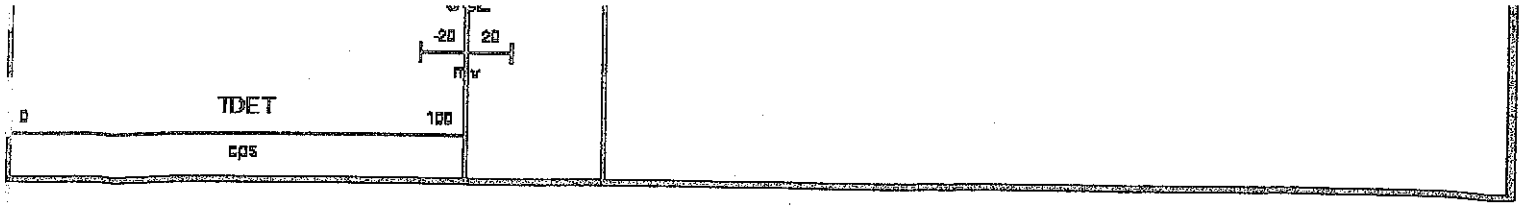
(for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES
2324NA	-10.500	CCL ACCL

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 : 1-12
File Name : D:\WELLDATA\91352\TRL08.XTF
Mode : PlotMgr5.4.504
Interval : 3495.00 - 3600.00 feet UP
Created : 10/21/2014 2:46:20 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

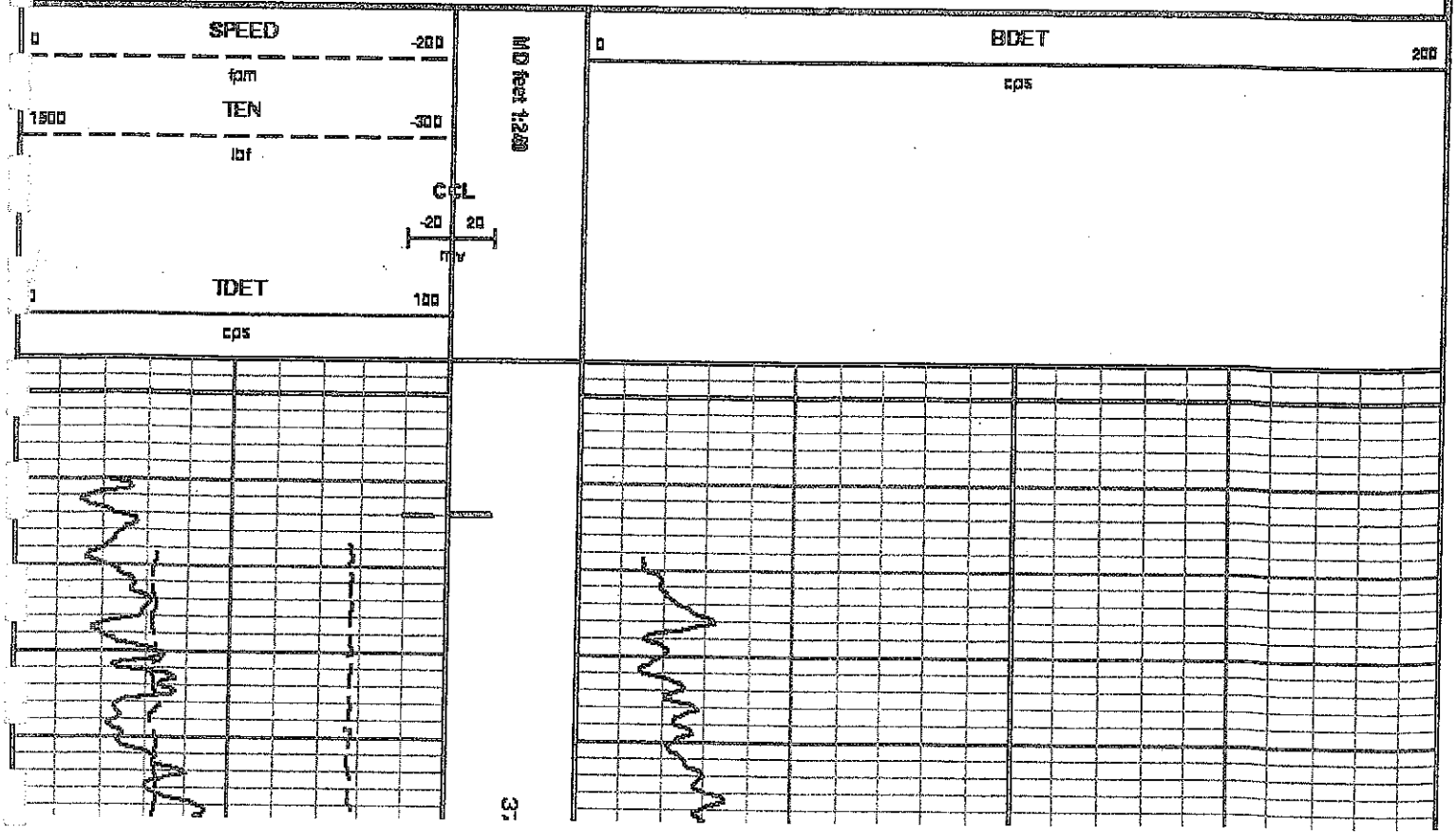
Well : 1-12

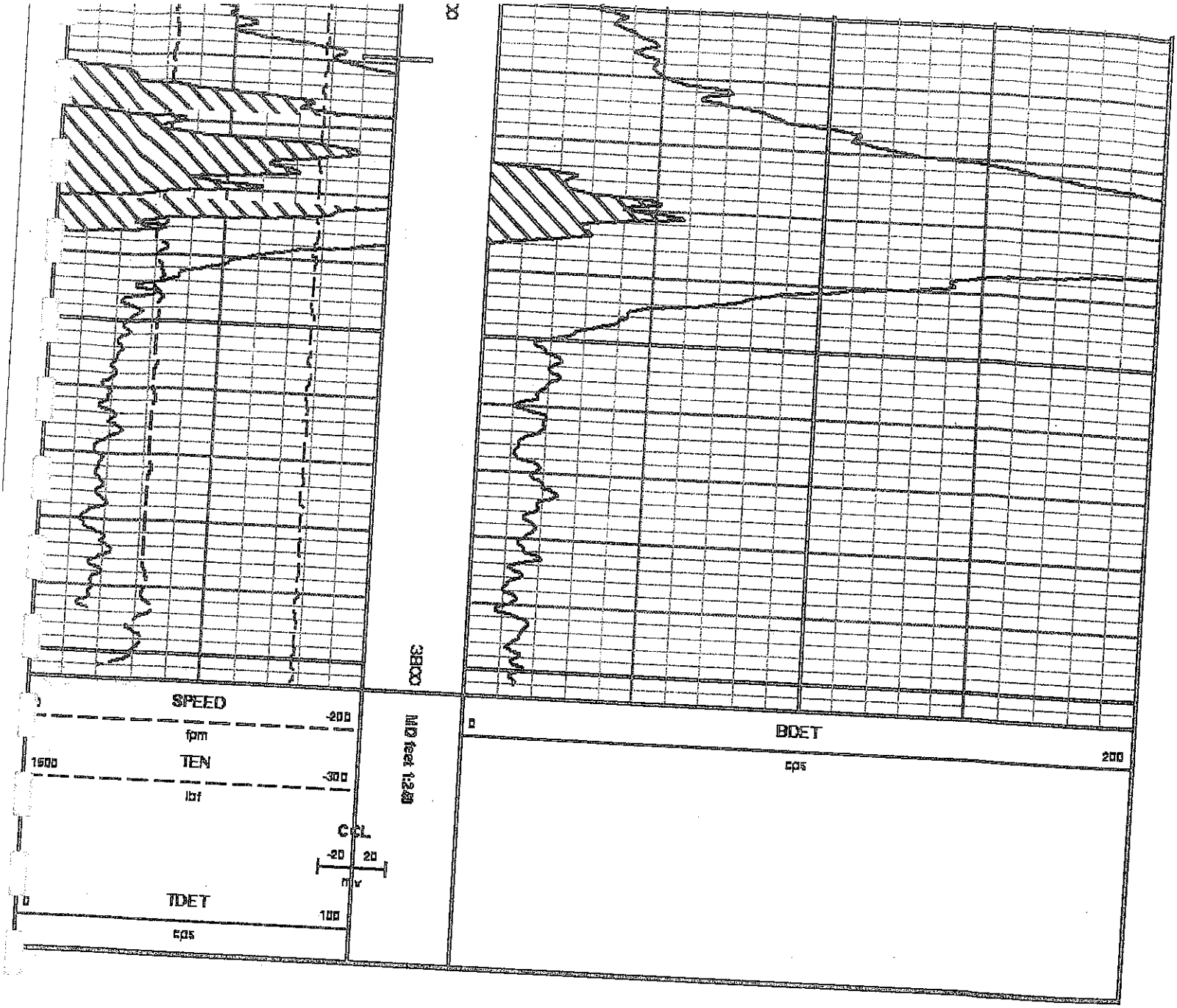
File Name : D:\WELLDATA\1352\TRL09.XTF

Mode : PlotMgr5.4.504

Interval : 3846.00 - 3804.00 feet UP

Created : 10/21/2014 2:48:58 PM





DEPTH OFFSETS

(for Acquired Curves)

SERIES	DEPTH OFFSET
2324NA	-10.500
8219XA	-8.500
8219XA	0.000
SYSTEM	0.000

ACQUIRED CURVES	
CCL	ACCL
TDET	TDETBU
BDET	BDETBU
TEN	TTEN

Created by : CNT. v4.07.00

Company : EGT

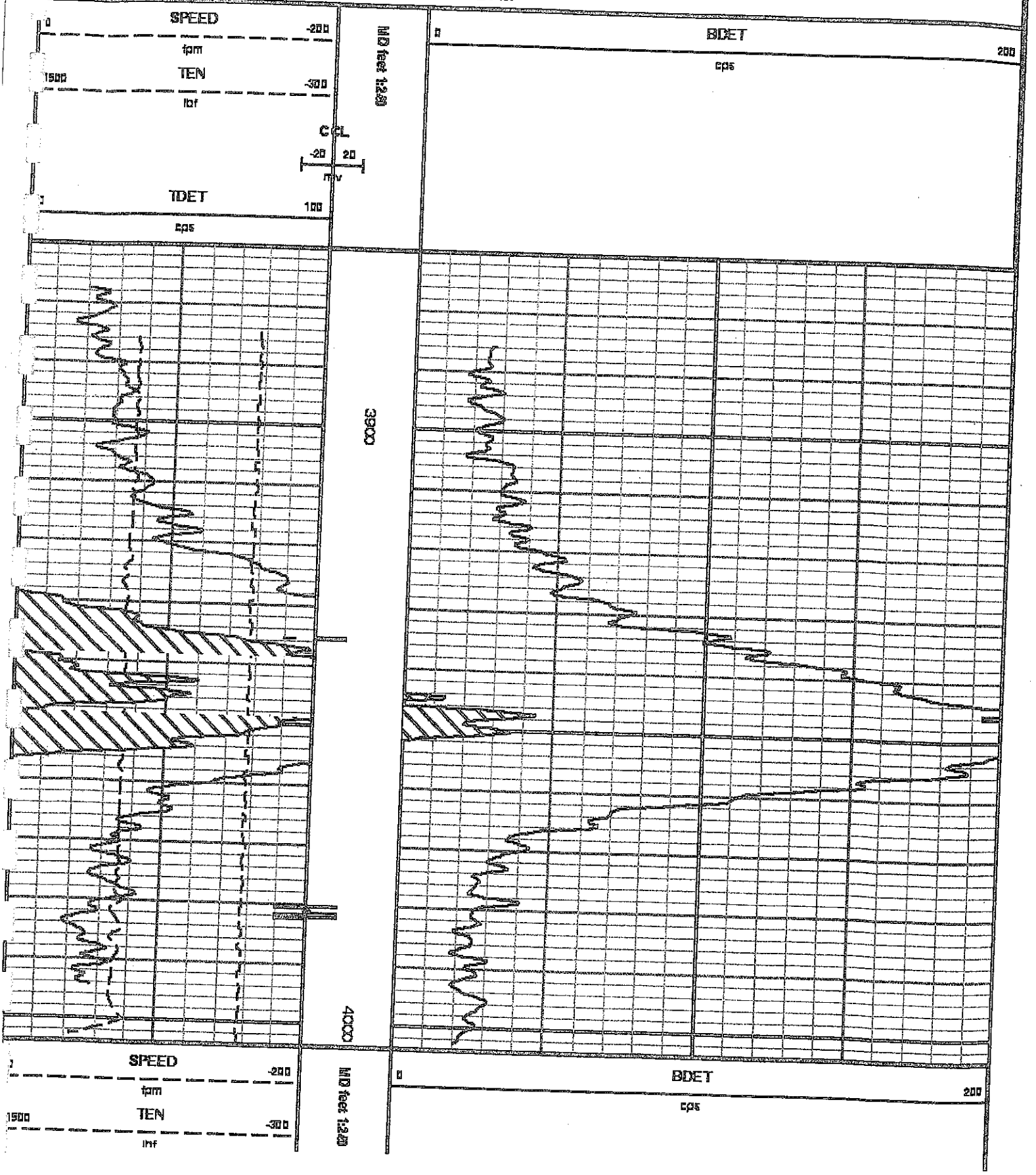
Well : 1-12

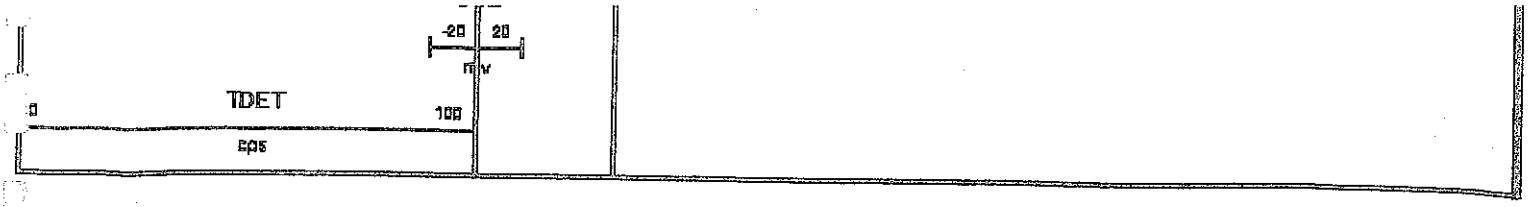
File Name : D:\WELLDATA\91352\TRL10.XTF

Mode : PlotMgr 5.4.504

Interval : 3970.00 - 4004.00 Feet UP

Created : 10/21/2014 2:53:12 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

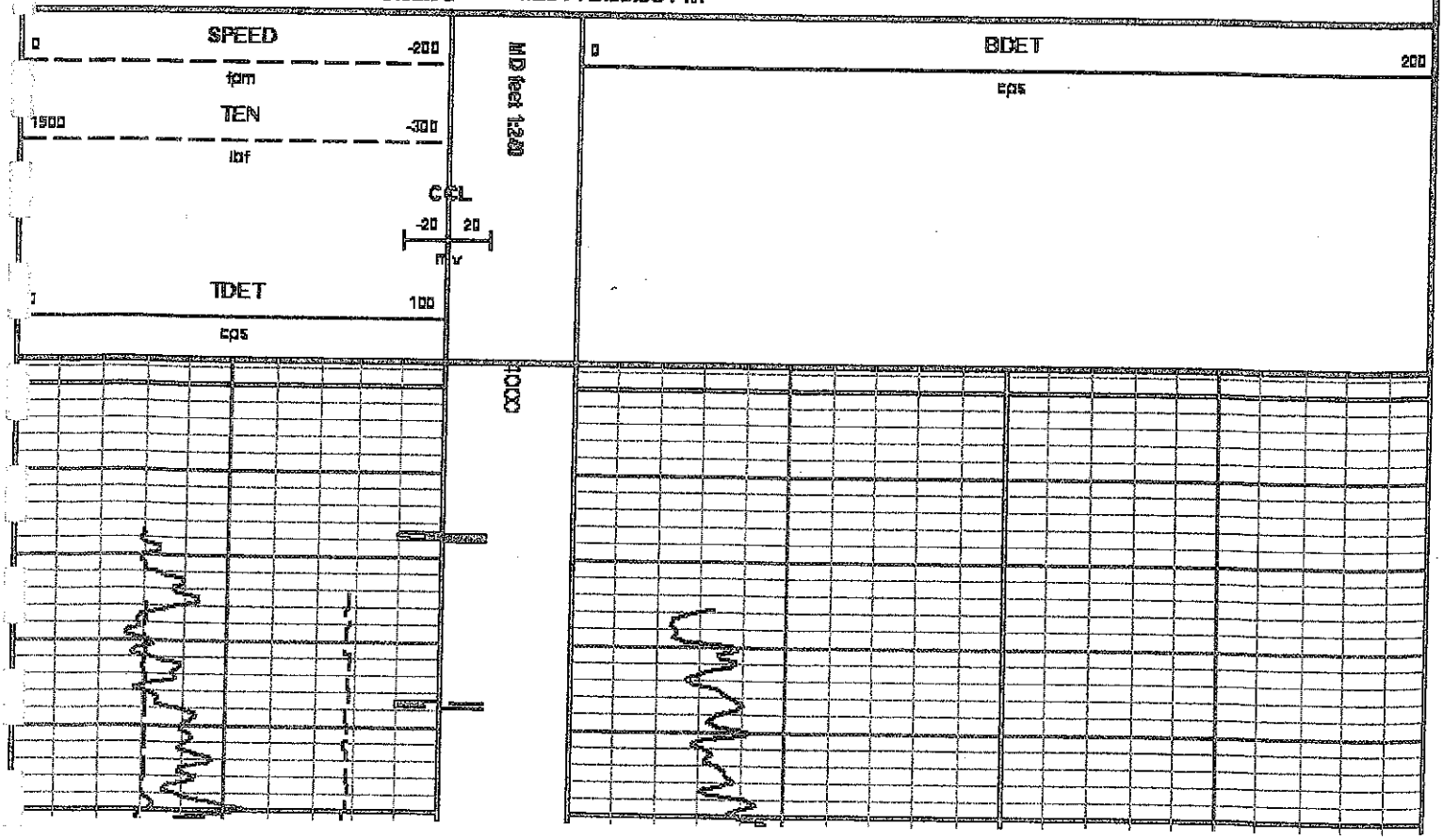
Well : 1-12

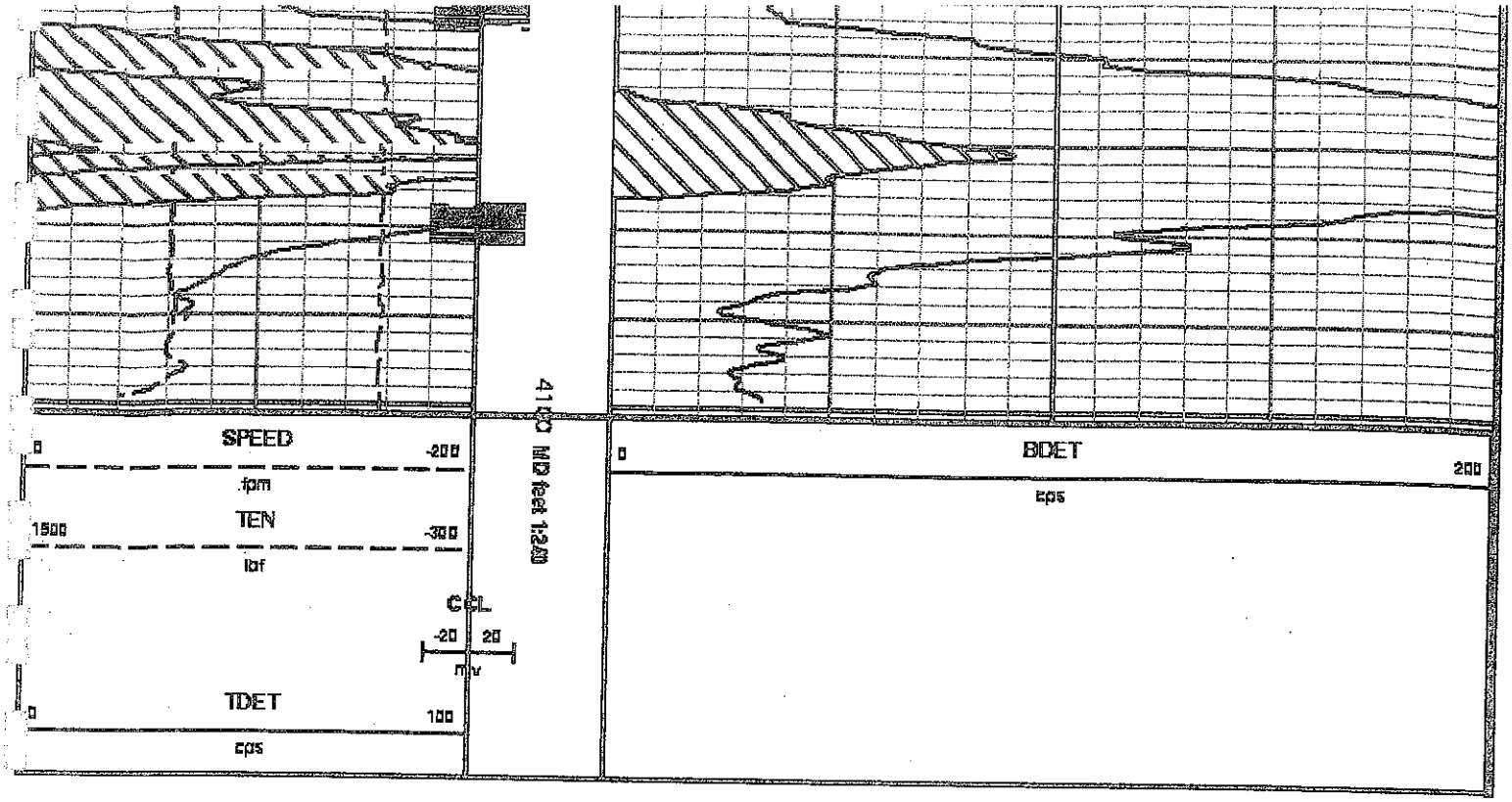
File Name : D:WELLDATA\91352\TRL11.XTF

Mode : PlotMgr 5.4.504

Interval : 3997.00 - 4101.00 feet UP

Created : 10/21/2014 2:55:06 PM

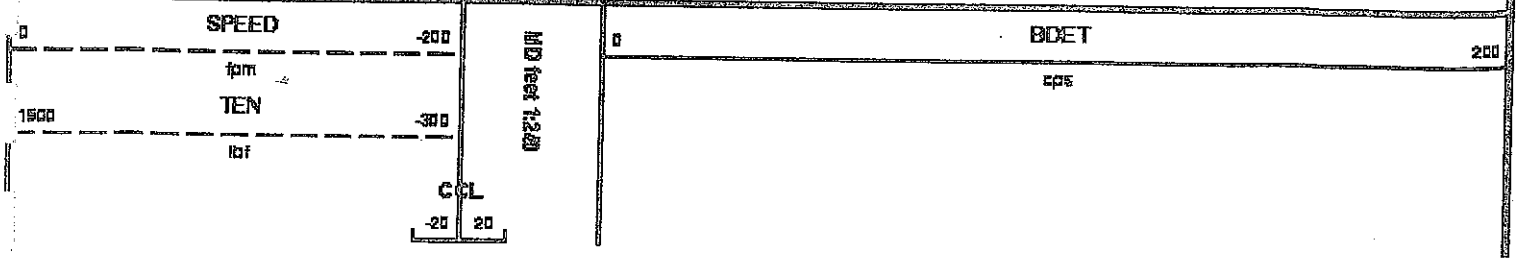


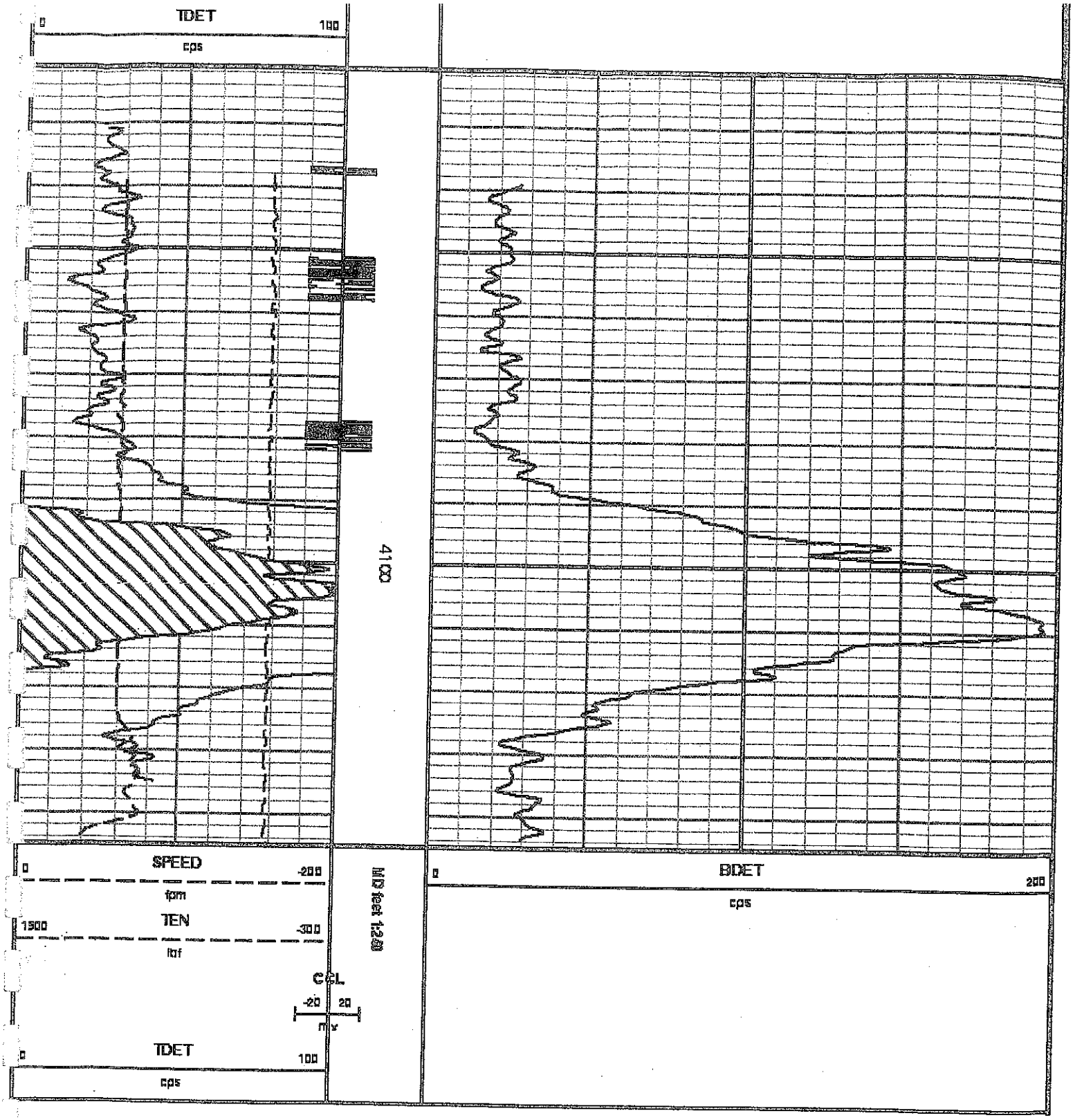


DEPTH OFFSETS
(for Acquired Curves)

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 : 1-12
File Name : D:\WELLDATA\91352\TRL12.XTF
Mode : PlotMgr5.4.504
Interval : 4021.00 - 4145.00 feet UP
Created : 10/21/2014 2:59:00 PM





DEPTH OFFSETS

(for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES

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

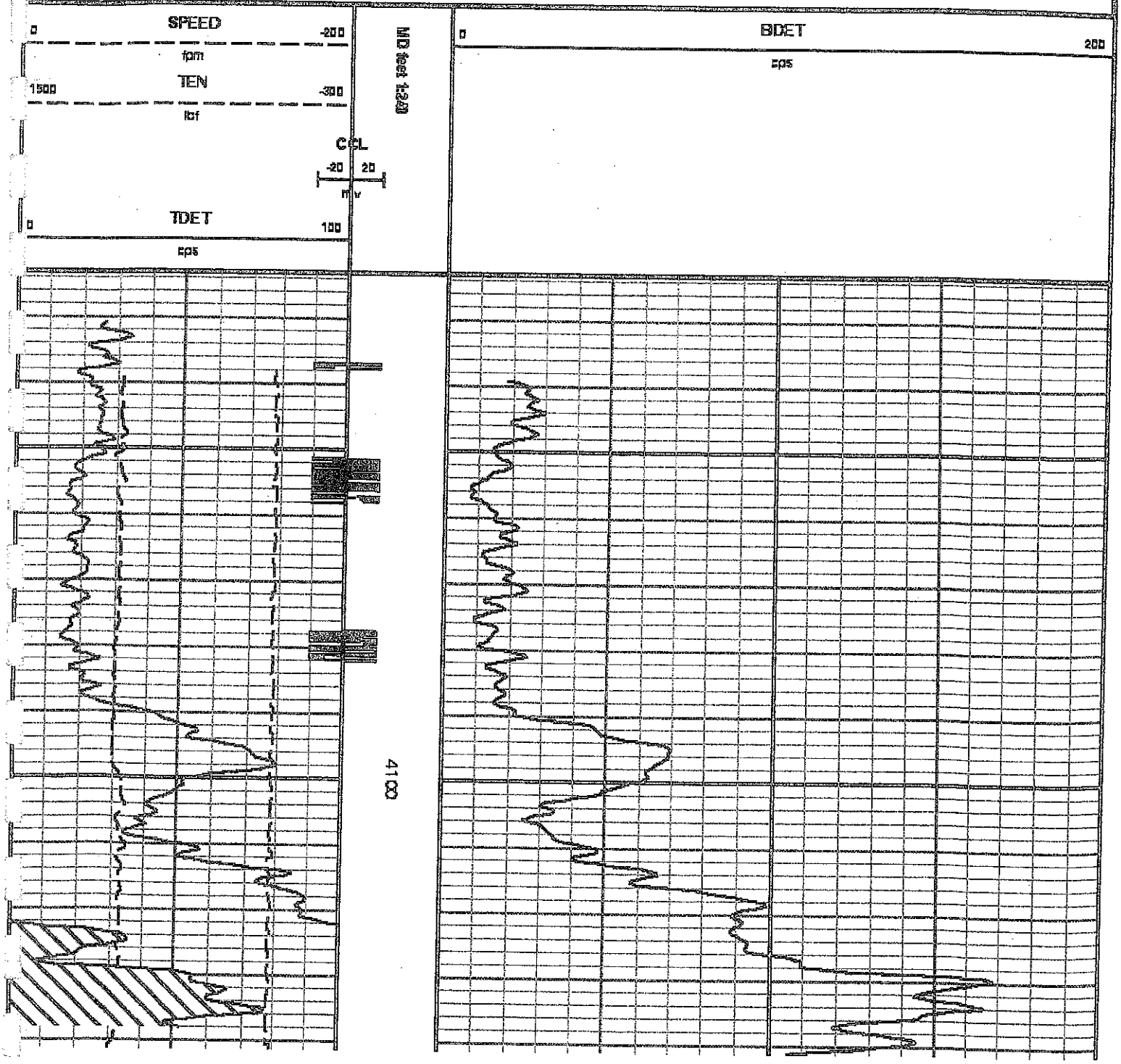
Well : 1-12

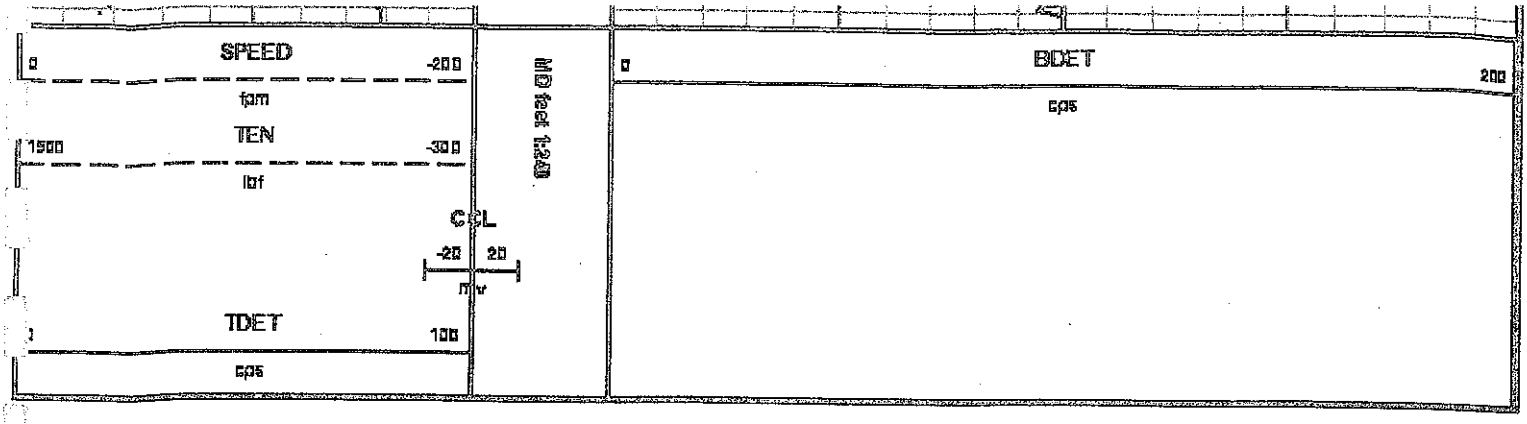
File Name : D:\WELLDATA\91352\TRL13.XTF

Mode : PlotMgr 5.4.504

Interval : 4023.00 - 4148.00 feet UP

Created : 10/21/2014 3:03:01 PM





CHASE #1 MERGED DATA

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

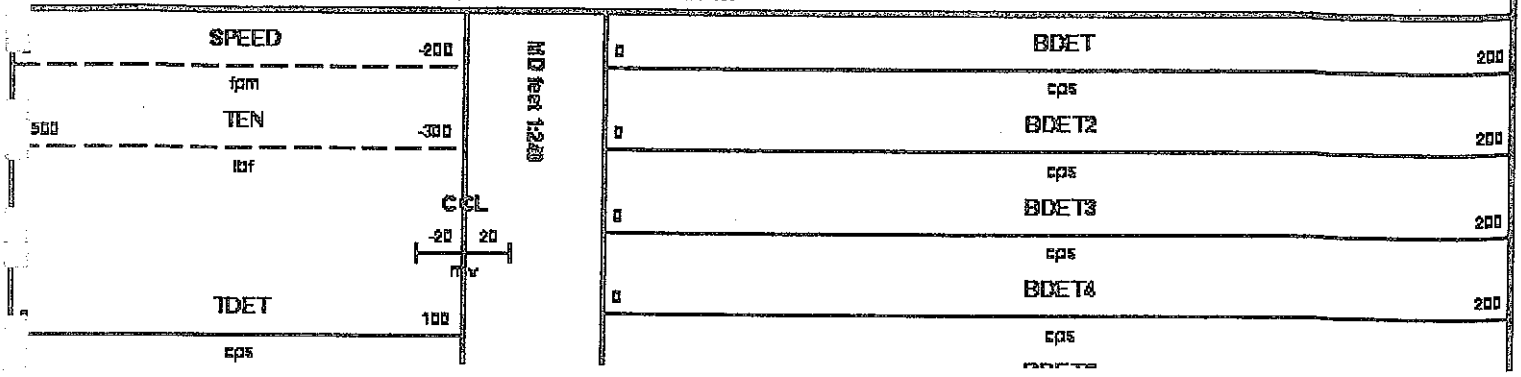
Well : 1-12

File Name : D:\WELLDATA\91352\CHASE 1 MERGE.rif

Mode : PlotMgr 5.4.504

Interval : 3127.00 - 4148.00 feet UP

Created : 10/21/2014 2:37:52 PM



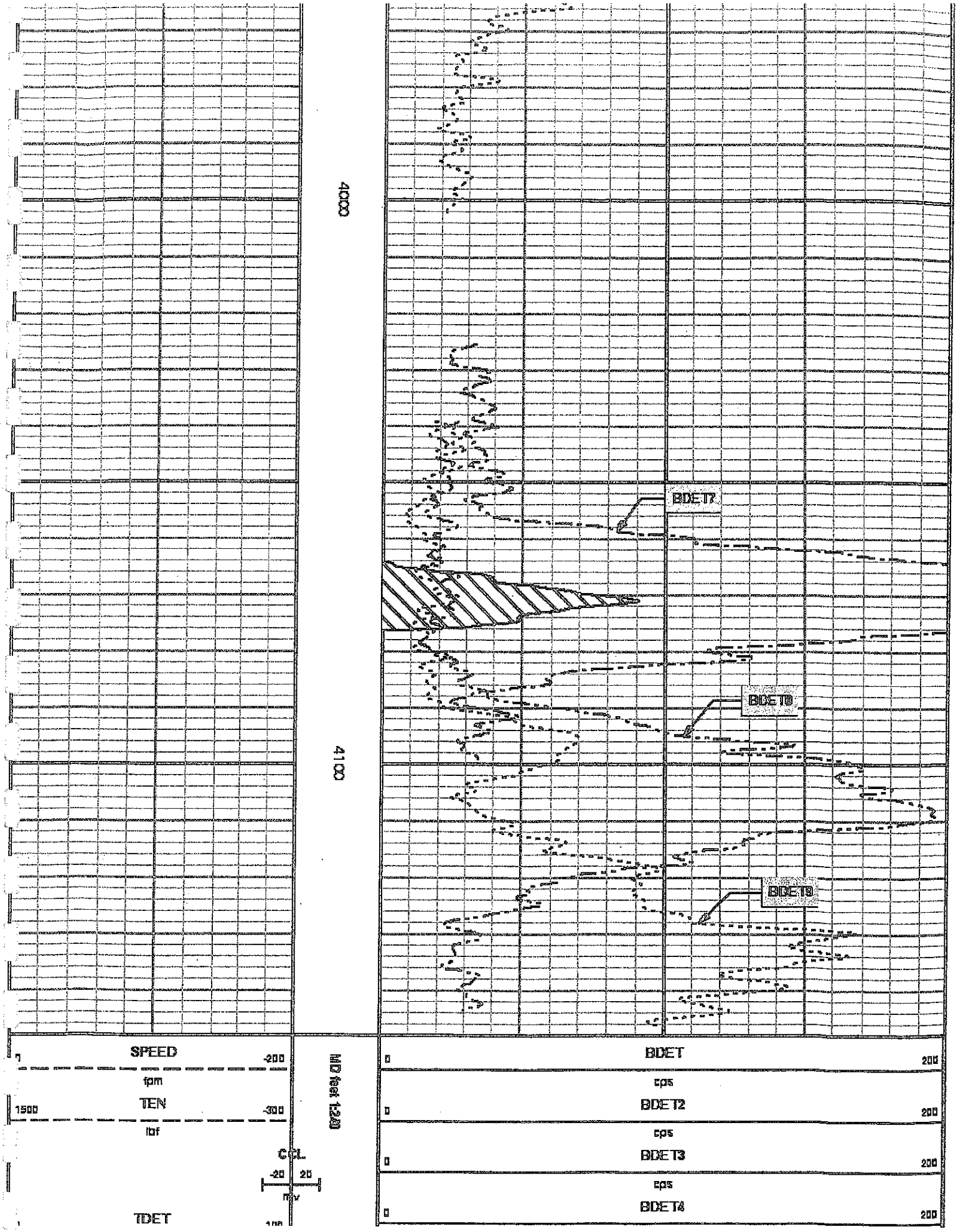
BDET6
cps
0
200
BDET7
cps
0
200
BDET8
cps
0
200
BDET9
cps
0
200
BDET
BDET2
3200
3300

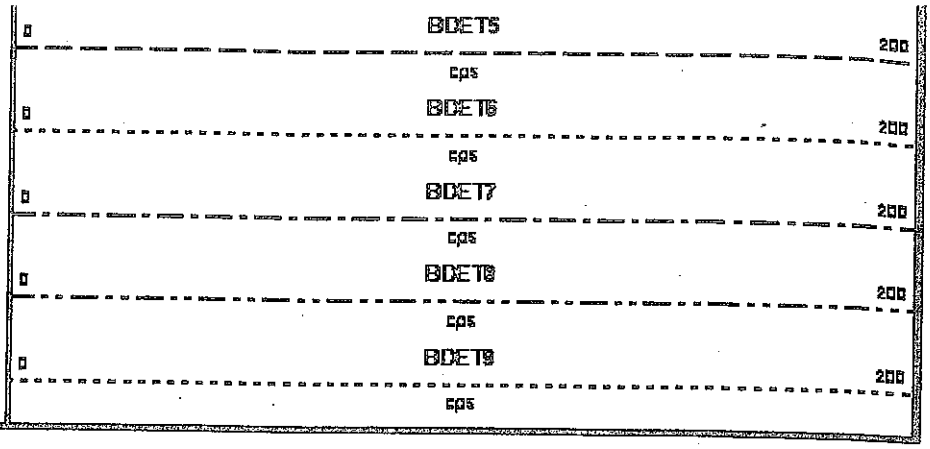
3400

3500

BDET4
BDET5
3600
3700

BDE 16
3800
3900


4000
4100
BDET7
BDET8
BDET9
SPEED
-200
fpm
1500
TEN
-300
lbf
COL.
-20
20
mv
TDET
BDET
0
200
cps
BDET2
BDET3
BDET4

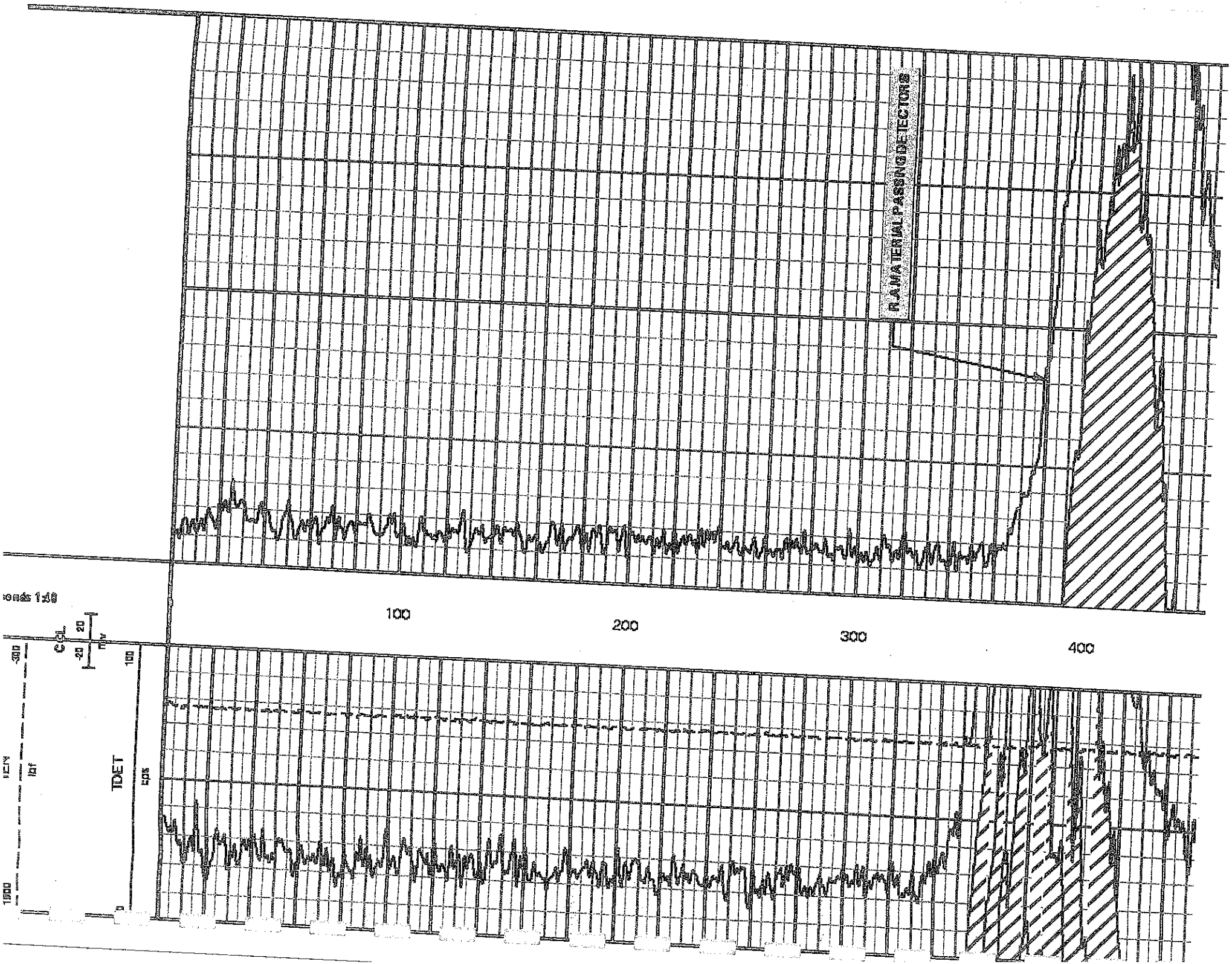


TIMEDRIVE
RELEASE SLUG @ 3730'
SET BDET @ 4080
30 MIN

DEPTH OFFSETS
(for Acquired Curves)

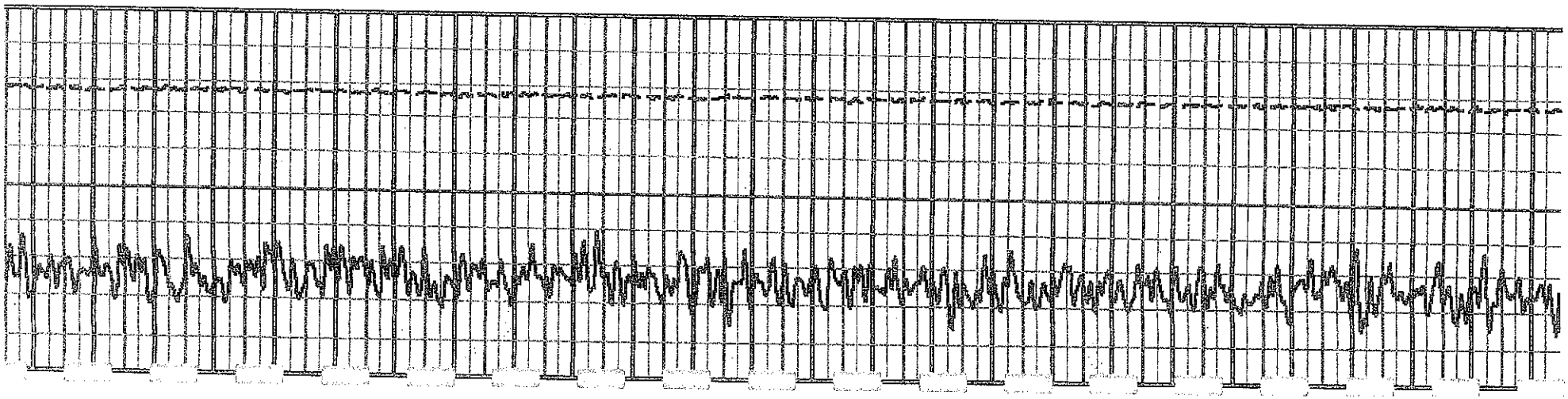
SERIES	DEPTH OFFSET	ACQUIRED CURVES	
2324NA	-10.500	CCL	ACCL
8219XA	-8.500	TDET	TDETBU
8219XA	0.000	BDET	BDETBU
SYSTEM	0.000	TEN	TTEN

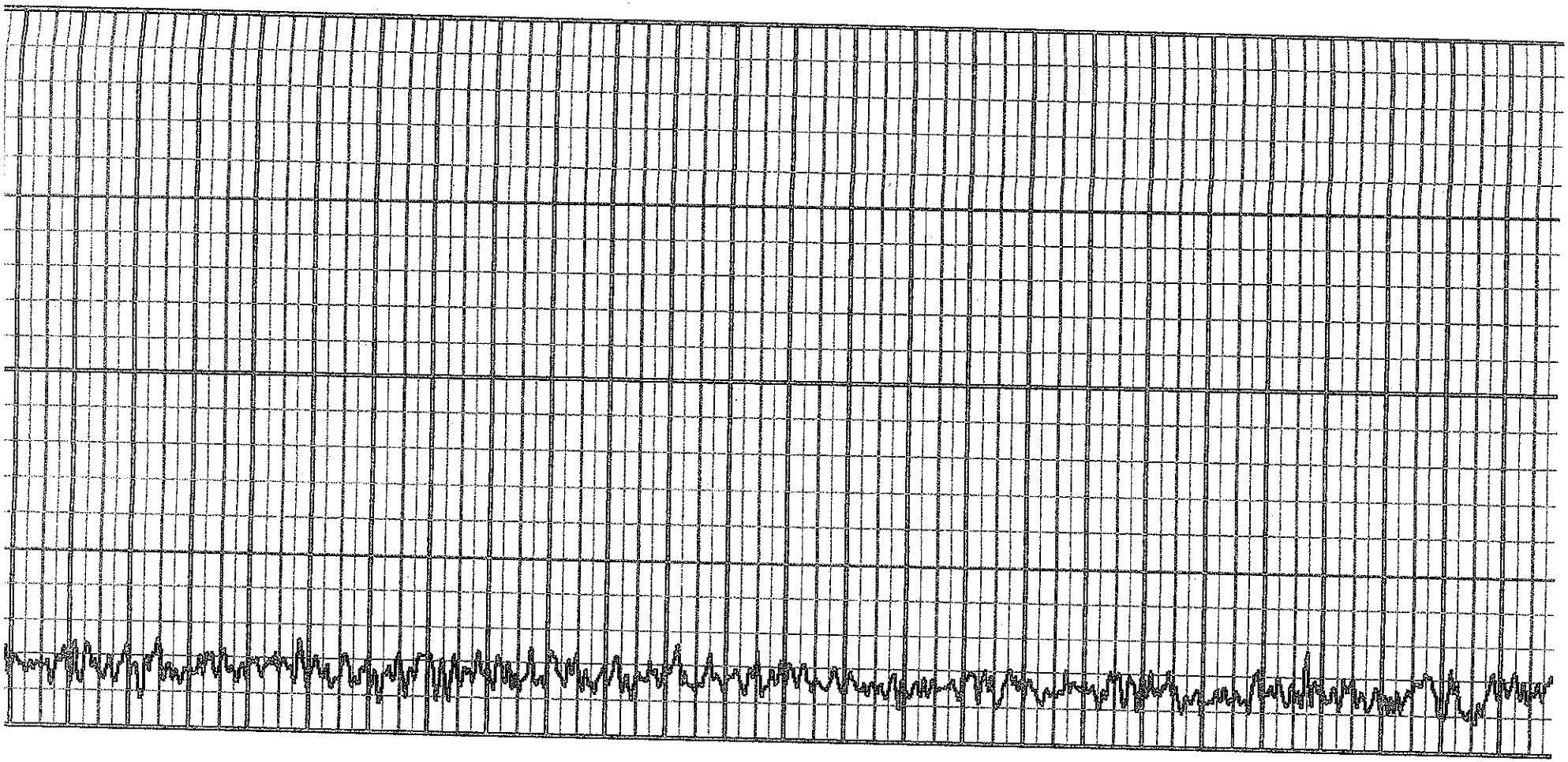
Created by : CNT. v4.07.00
Plotted by : PlotMgr. v5.4.504
Company : EGT
Well : 1-12
File Name : D:\WELLDATA\91352\TRL14.XTF
Mode : PlotMgr 5.4.504
Interval : 0 to 2410
Created : 10/21/2014 3:09:55 PM


R.A.MATERIAL PASSING DETECTORS
100
200
300
400
TDET
lbf
kps
mV
20
-20
100
-300
1500
0

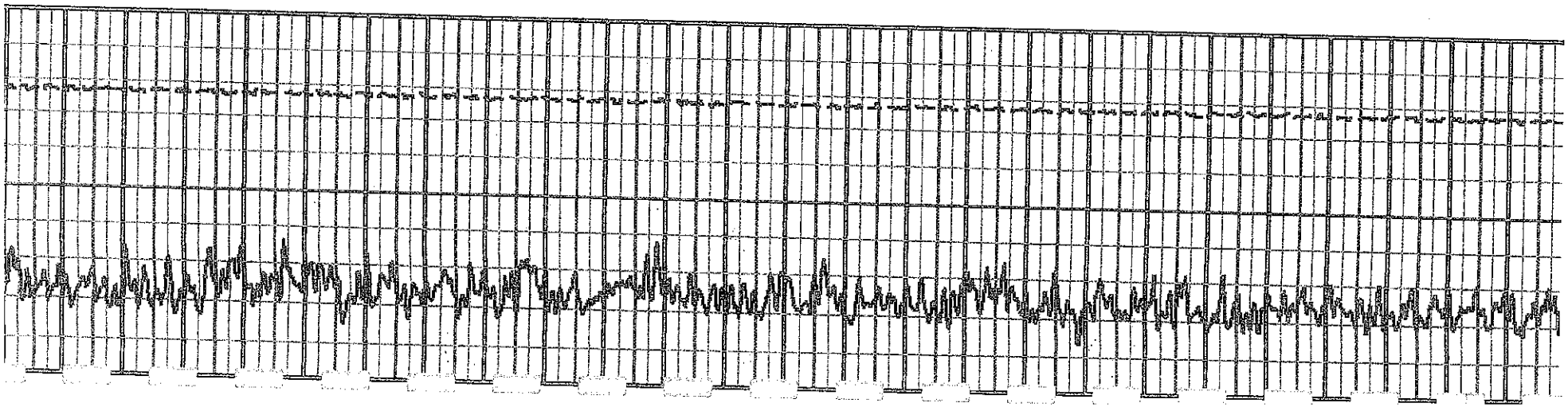
500
600
700
800
800

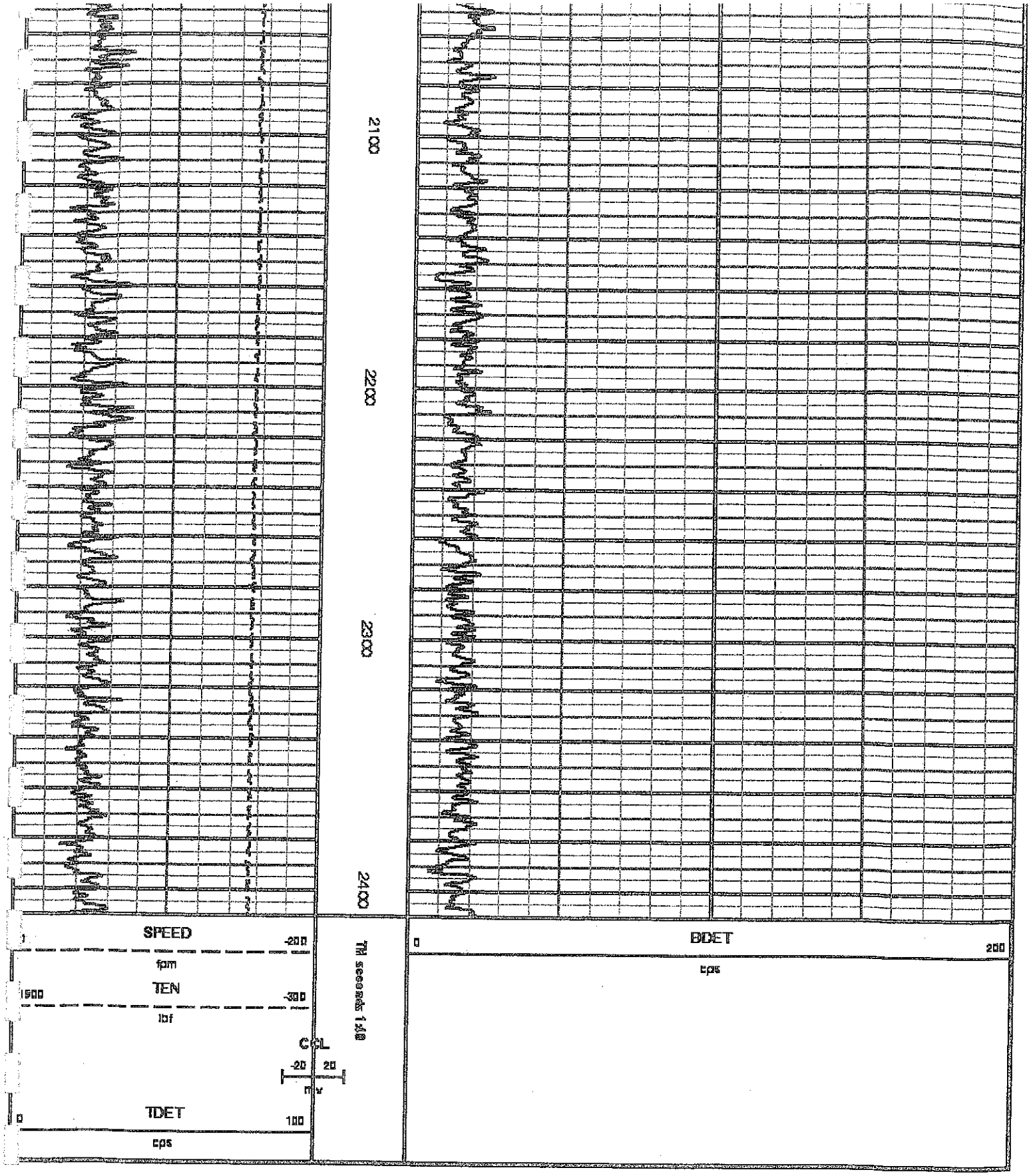
1000 1100 1200 1300 1400 1500





1600 1700 1800 1900 2000





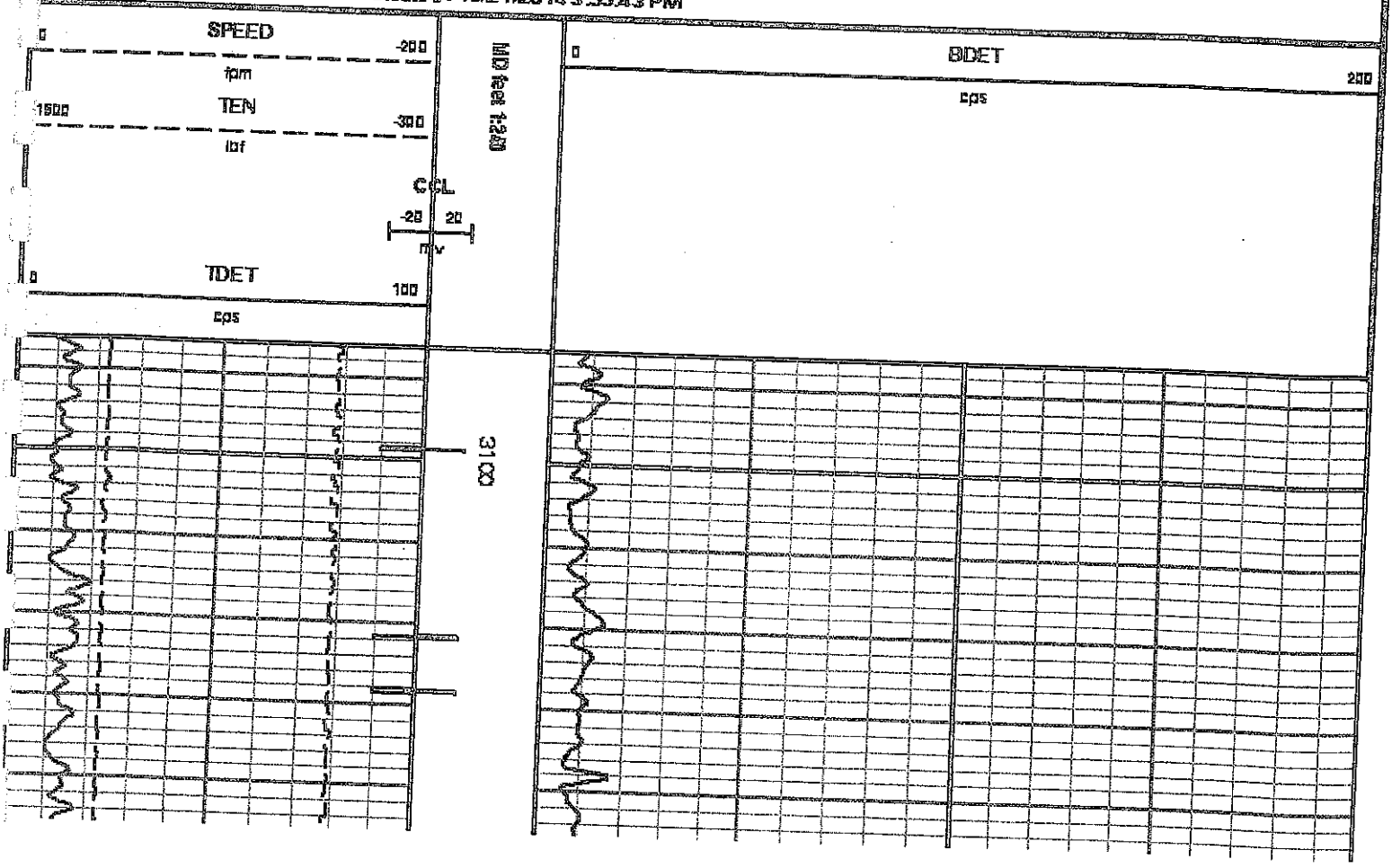
AFTER BASE GR

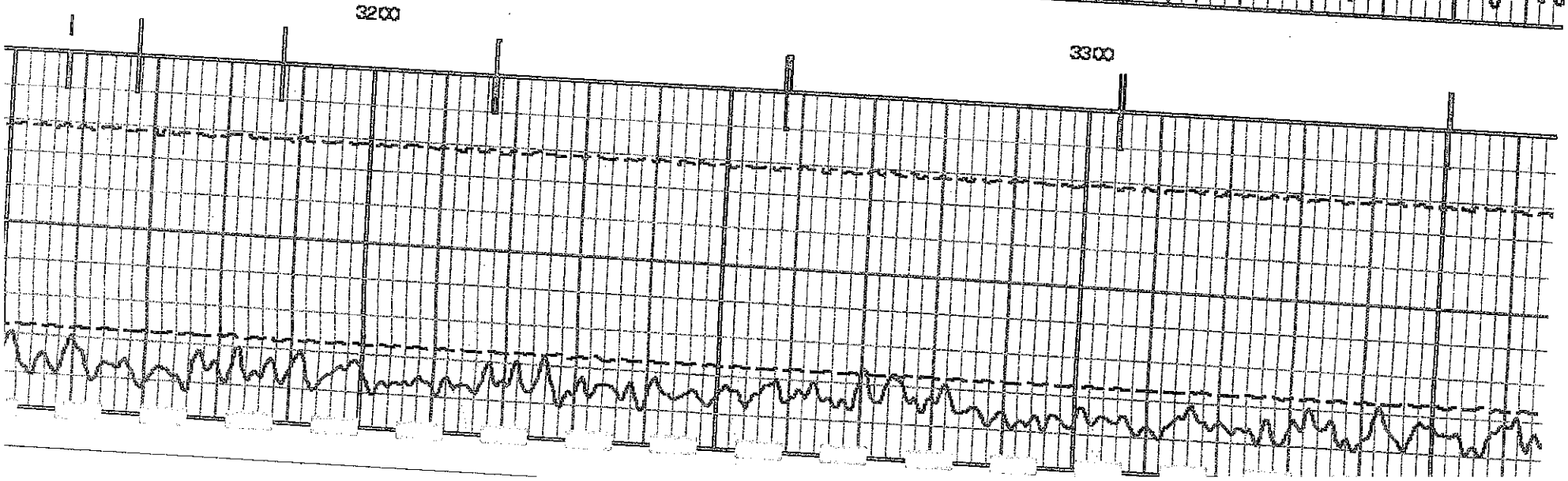
FLOWING 35 GPM

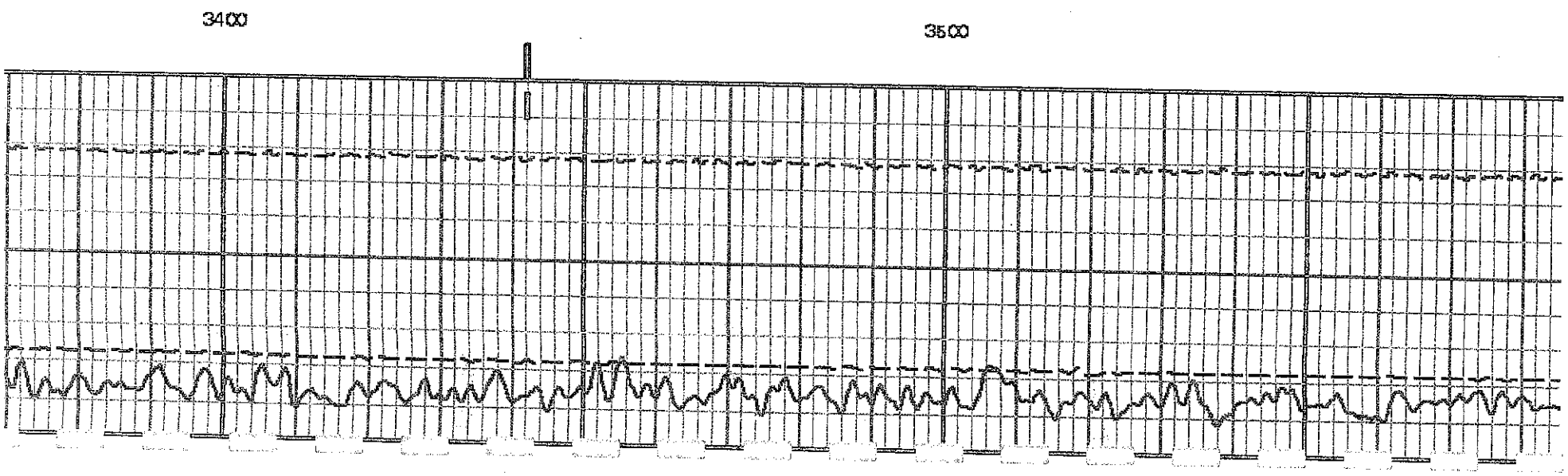
DEPTH OFFSETS
(for Acquired Curves)

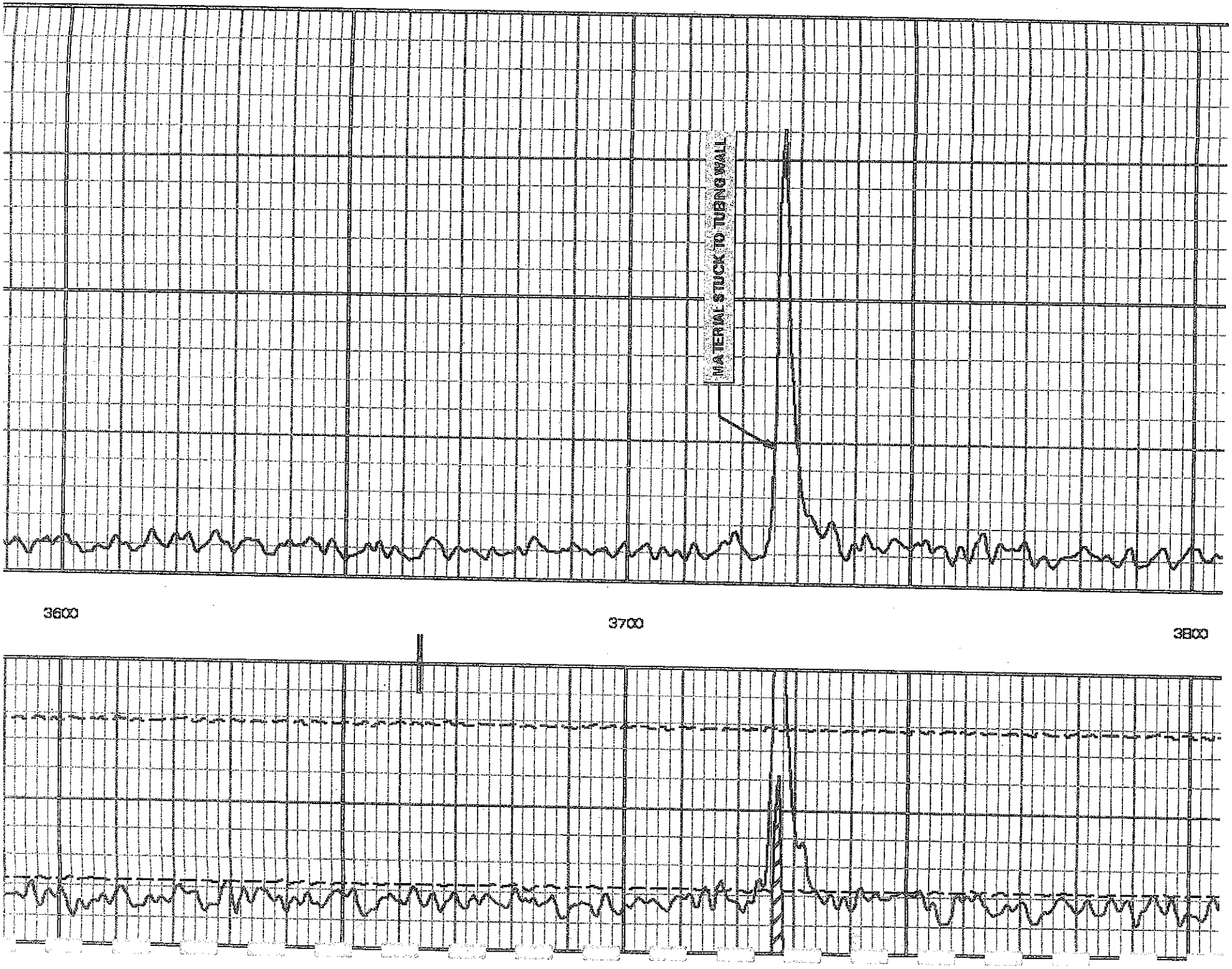
SERIES	DEPTH OFFSET	ACQUIRED CURVES	
2324NA	-10.500	CCL	ACCL
8219XA	-8.500	TDET	TDETBU
8219XA	0.000	BDET	BDETBU
SYSTEM	0.000	TEN	TTEN

Created by : CNT. v4.07.00
Plotted by : PlotMgr. v5.4.504
Company : EGT
Well : 1-12
File Name : D:\WELLDATA\91352\TRL15.XTF
Mode : PlotMgr 5.4.504
Interval : 3086.00 - 4147.00 feet UP
Created : 10/21/2014 3:35:43 PM

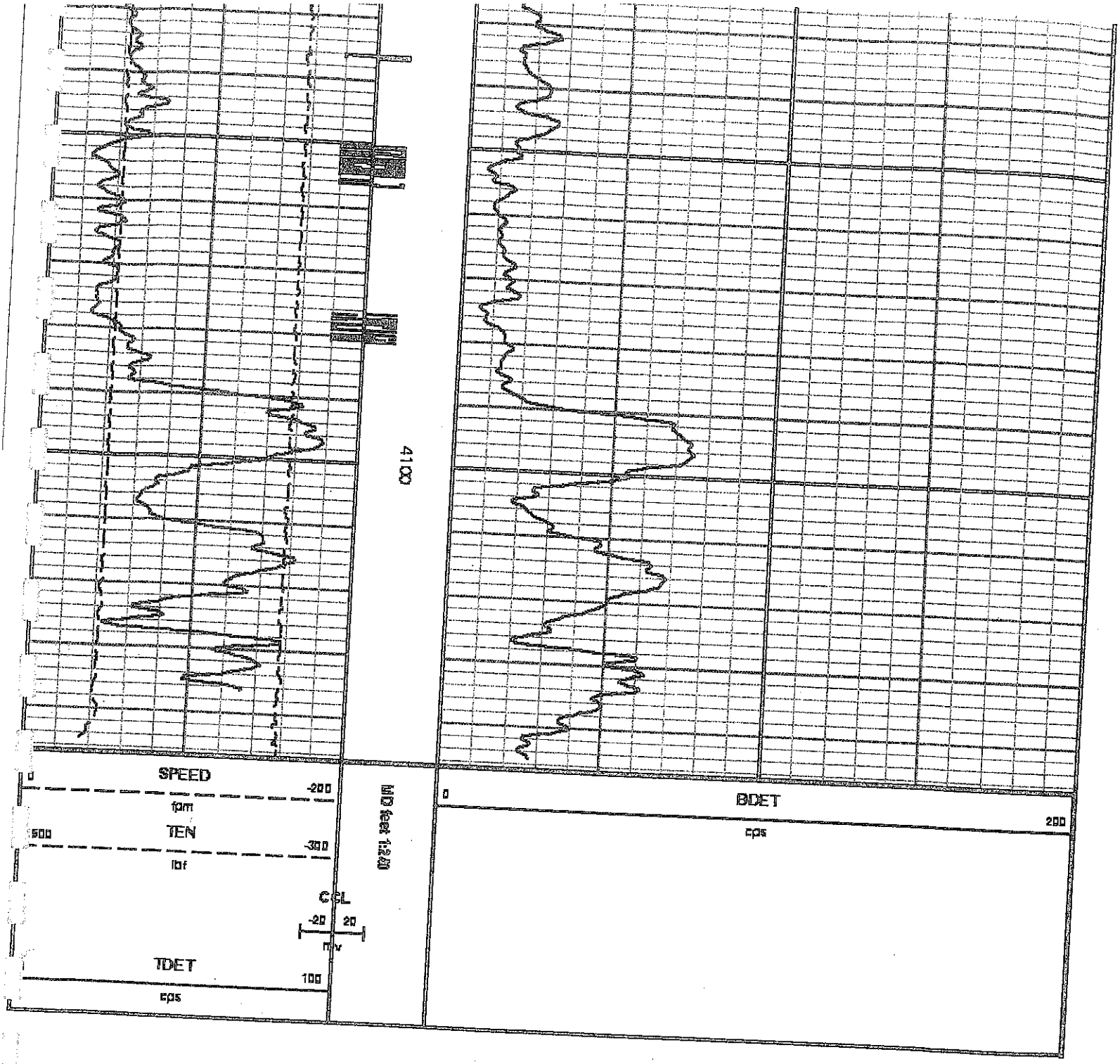



3200
3300


3400
3500


MATERIAL STUCK TO TUBING WALL
3600
3700
3800

3900
4000



REPEAT R.A. RESPONSE @ 3730'
MATERIAL STILL PRESENT

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

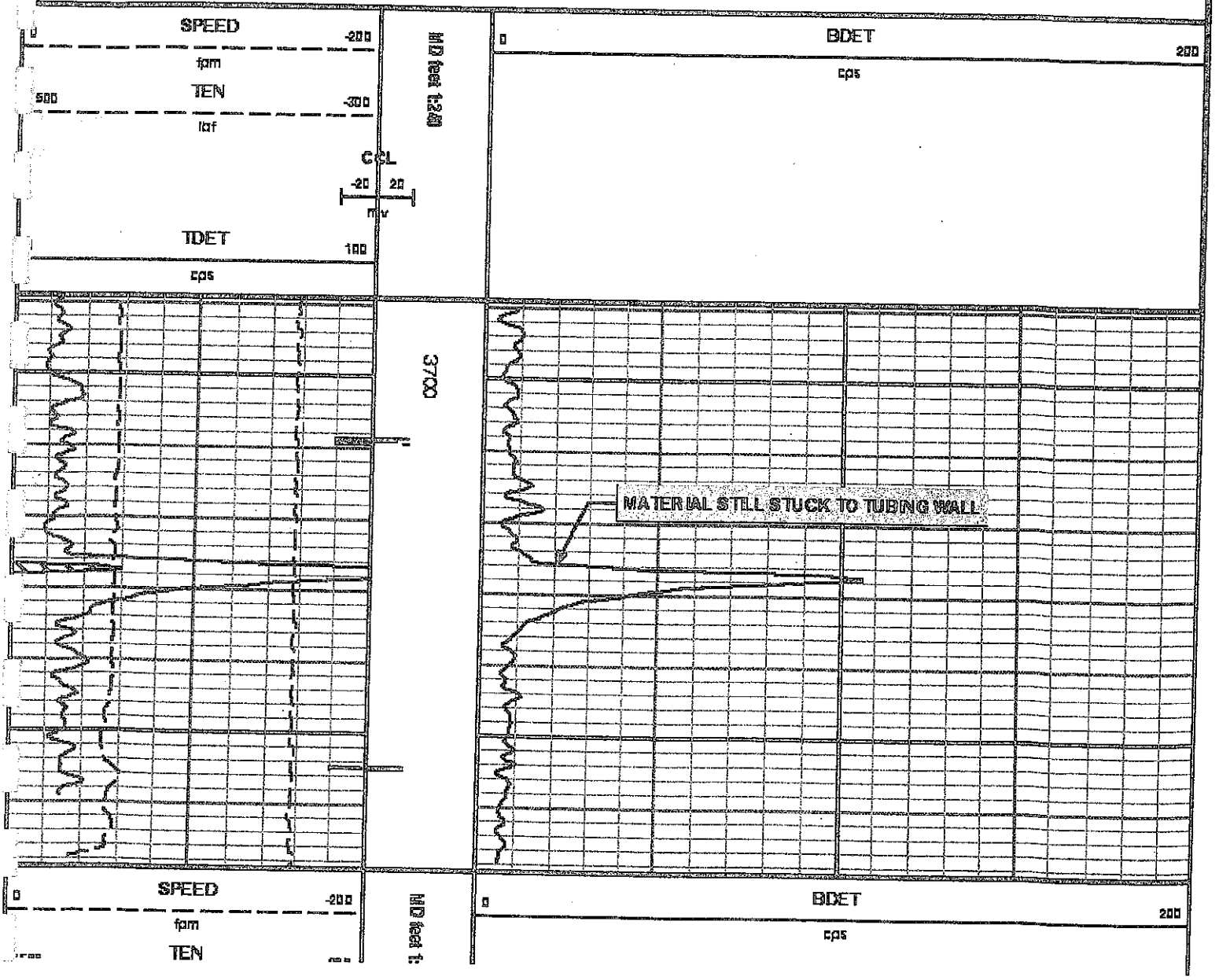
Well : 1-12

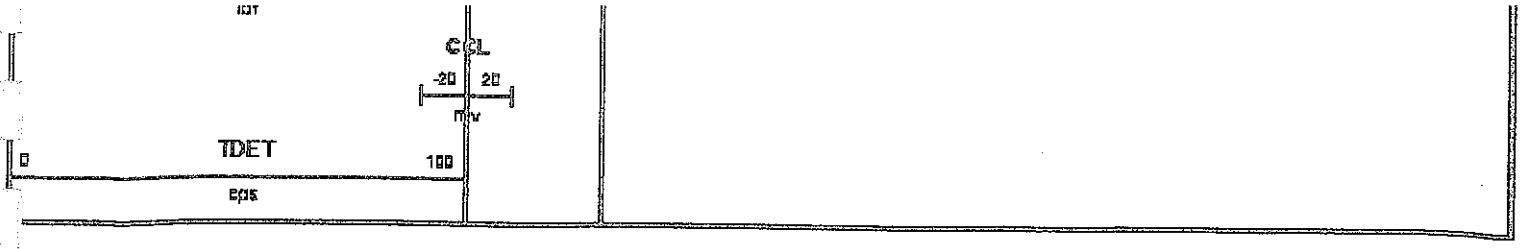
File Name : D:\WELLDATA\91352\TRL16.XTF

Mode : PlotMgr5.4.504

Interval : 3689.00 - 3769.00 feet UP

Created : 10/21/2014 4:23:49 PM





BEFORE & AFTER GR MERGE

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

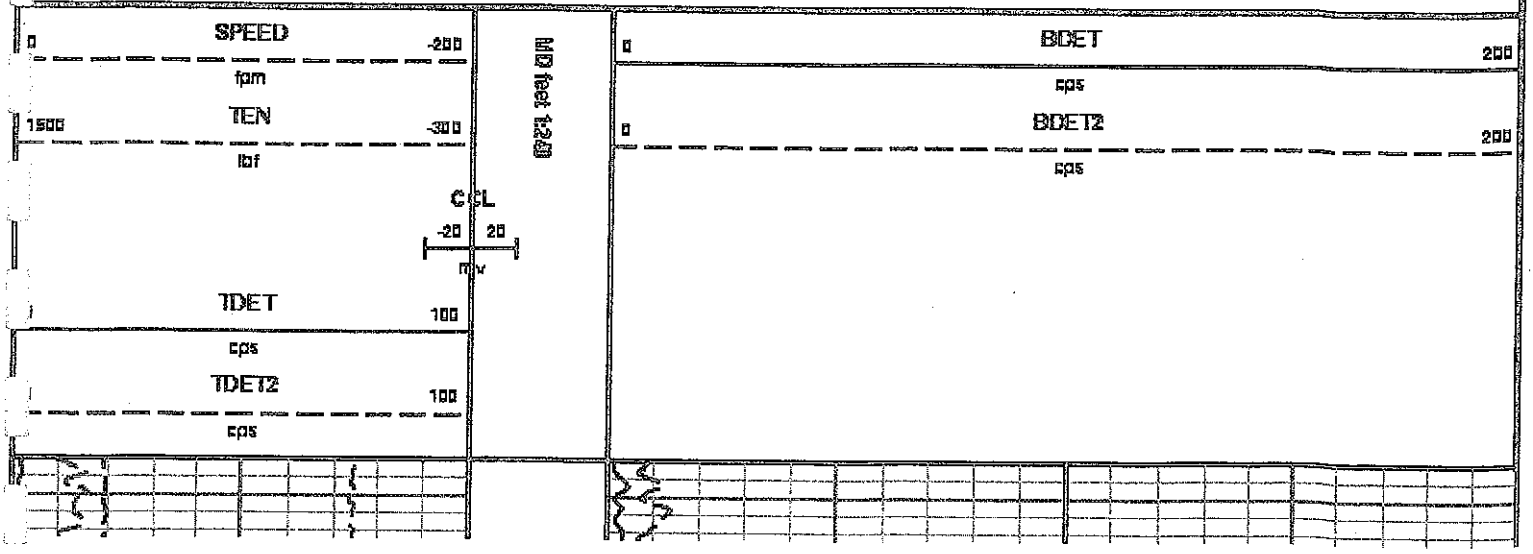
Well : 1-12

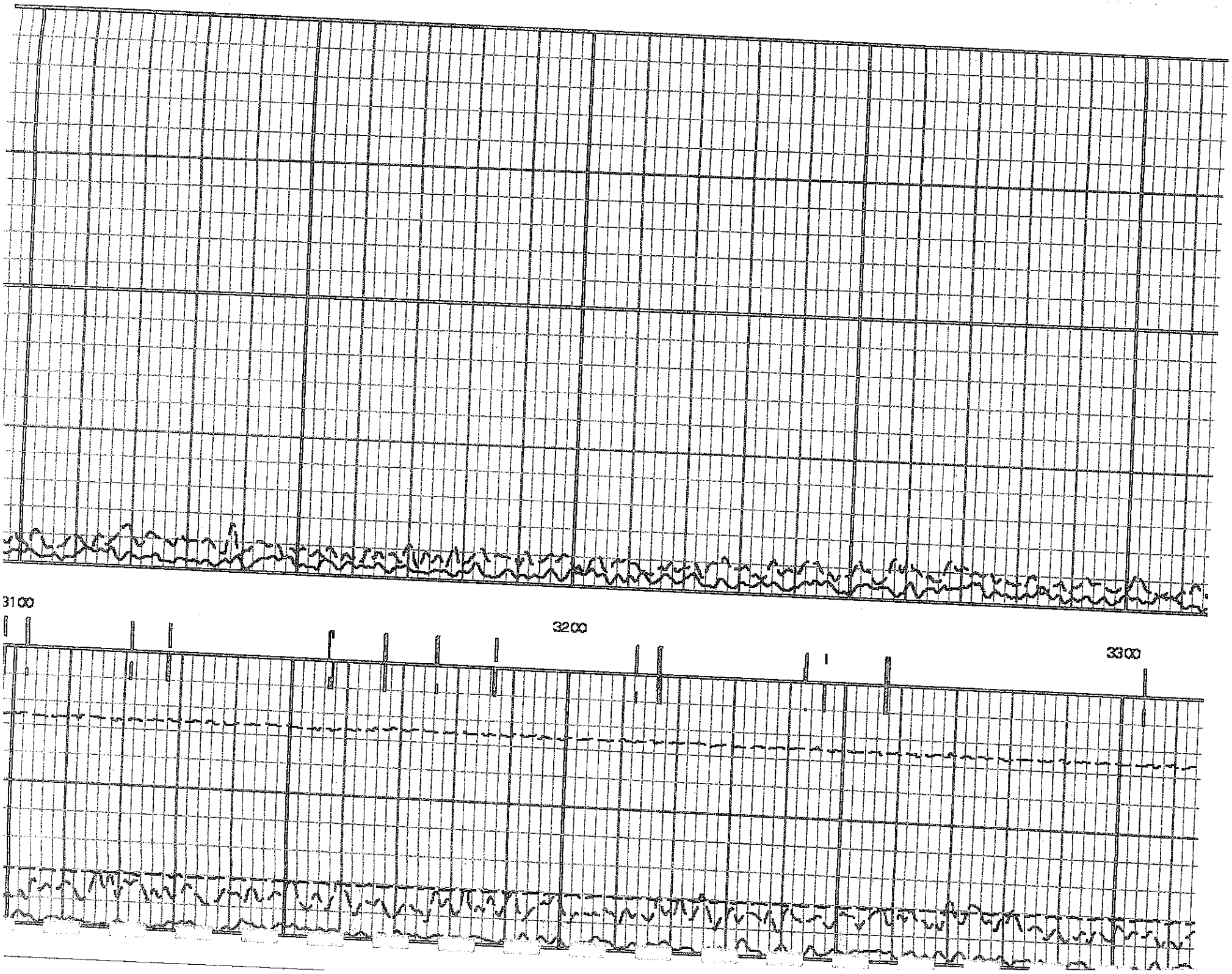
File Name : D:\WELLDATA\91352\GR MERGE.xlr

Mode : PlotMgr 5.4.504

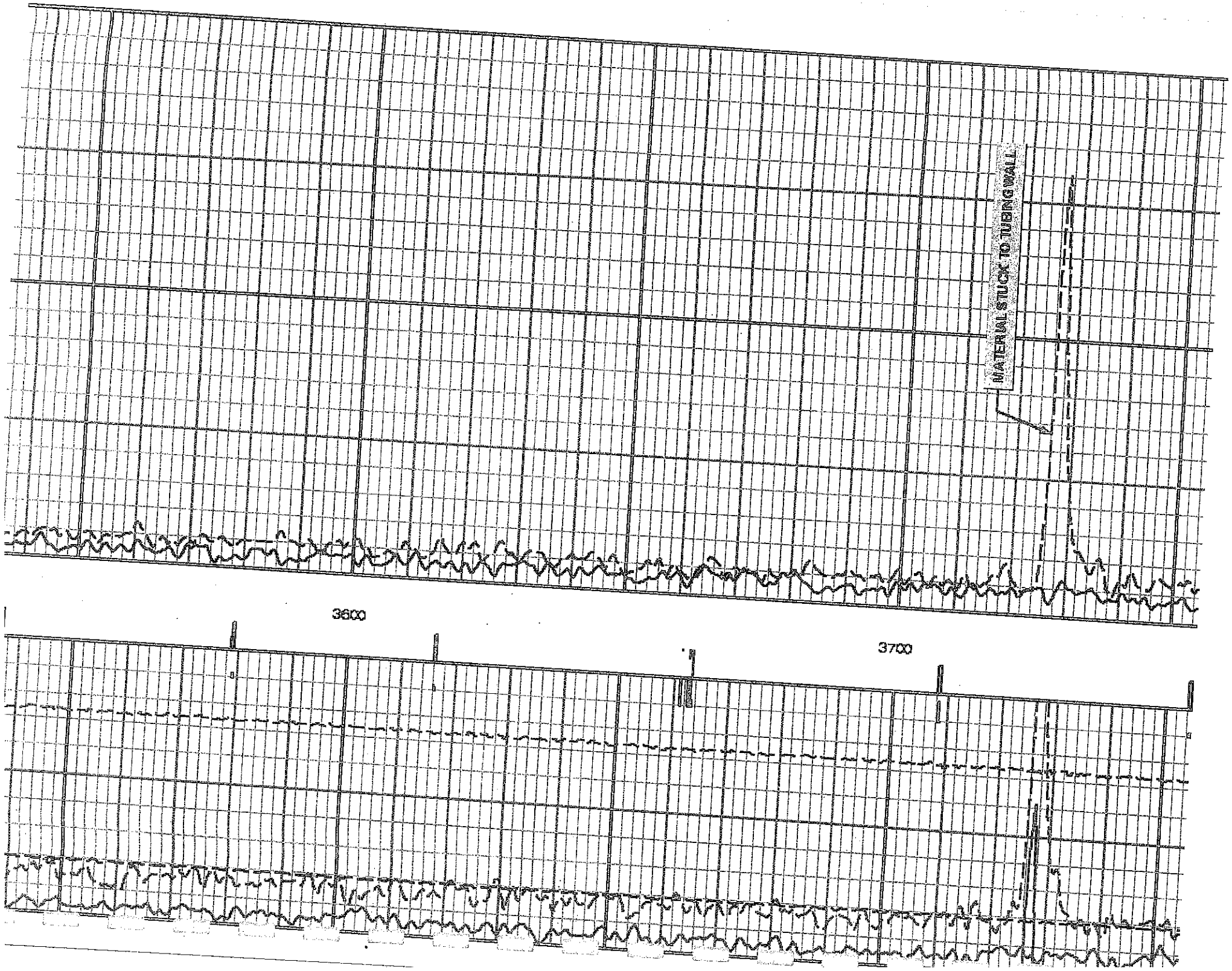
Interval : 3086.00 - 4147.00 feet UP

Created : 10/21/2014 11:33:20 AM

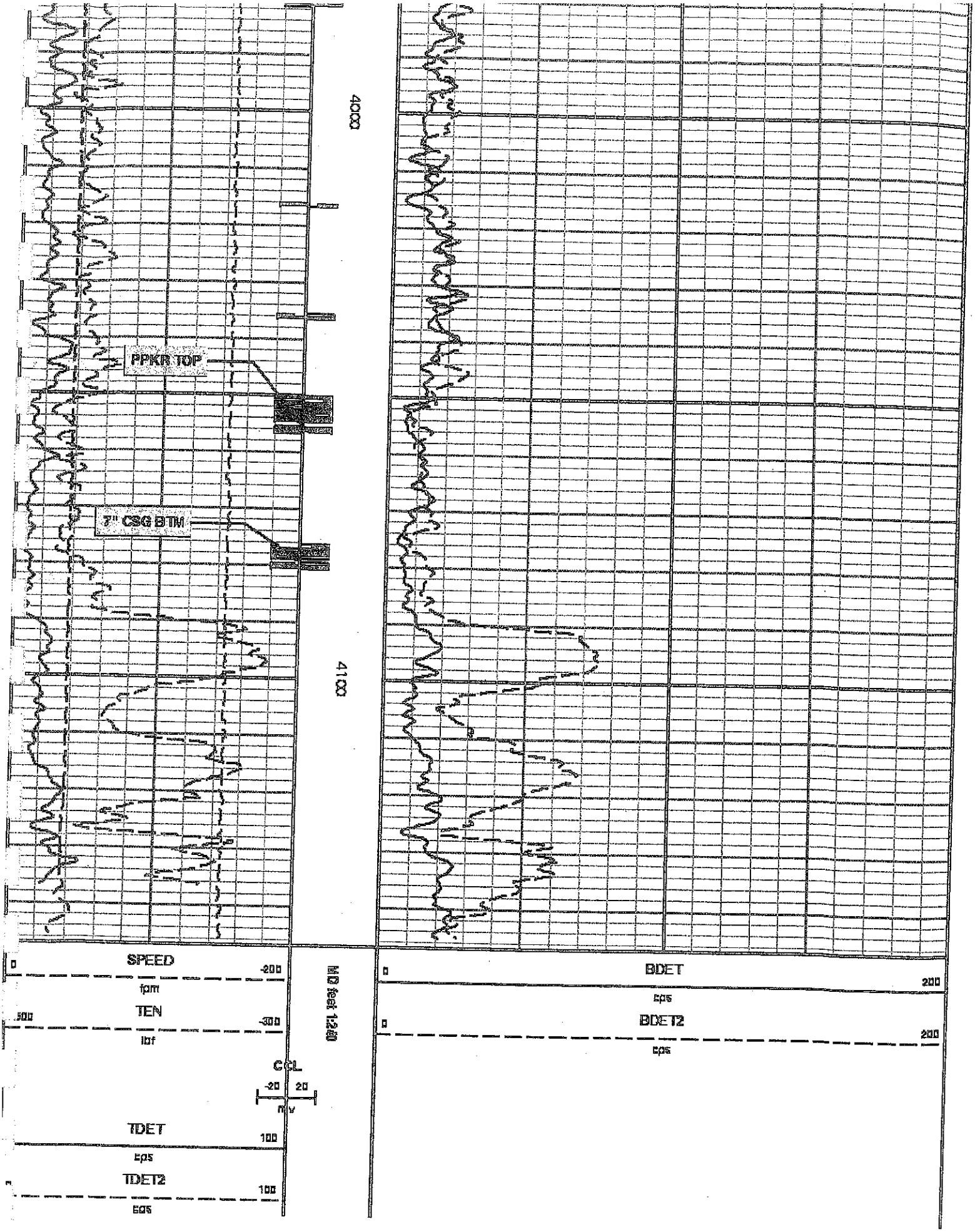



3100
3200
3300

3400
3500


MATERIAL STUCK TO TUBING WALL
3600
3700

3800
3900


4000
4100
PPKR TOP
7" CSG BTM
SPEED
0
-200
fpm
TEN
500
-300
lbf
CCL
-20
20
mv
TDET
100
cps
TDET2
100
cps
BDET
0
200
cps
BDET2
0
200
cps

BAKER HUGHES

Baker Atlas

CASE

Company	ENVIROMENTAL GEOTECH TECHNOLOGIES		File No:
Well	EGT #1-12		
Field	ROMULUS STORAGE		API No:
County	WAYNE	State MICHIGAN	

Location

1670'FSL & 2372'FEL

SEC 12 TWP 3S RGE 9E

Elevations

KB 639 ft

DF 638 ft

GL 626 ft

THANK YOU!

SUBSURFACE

A Parsons Brinckerhoff Company

HOUSTON, TX • BATON ROUGE, LA • SOUTH BEND, IN