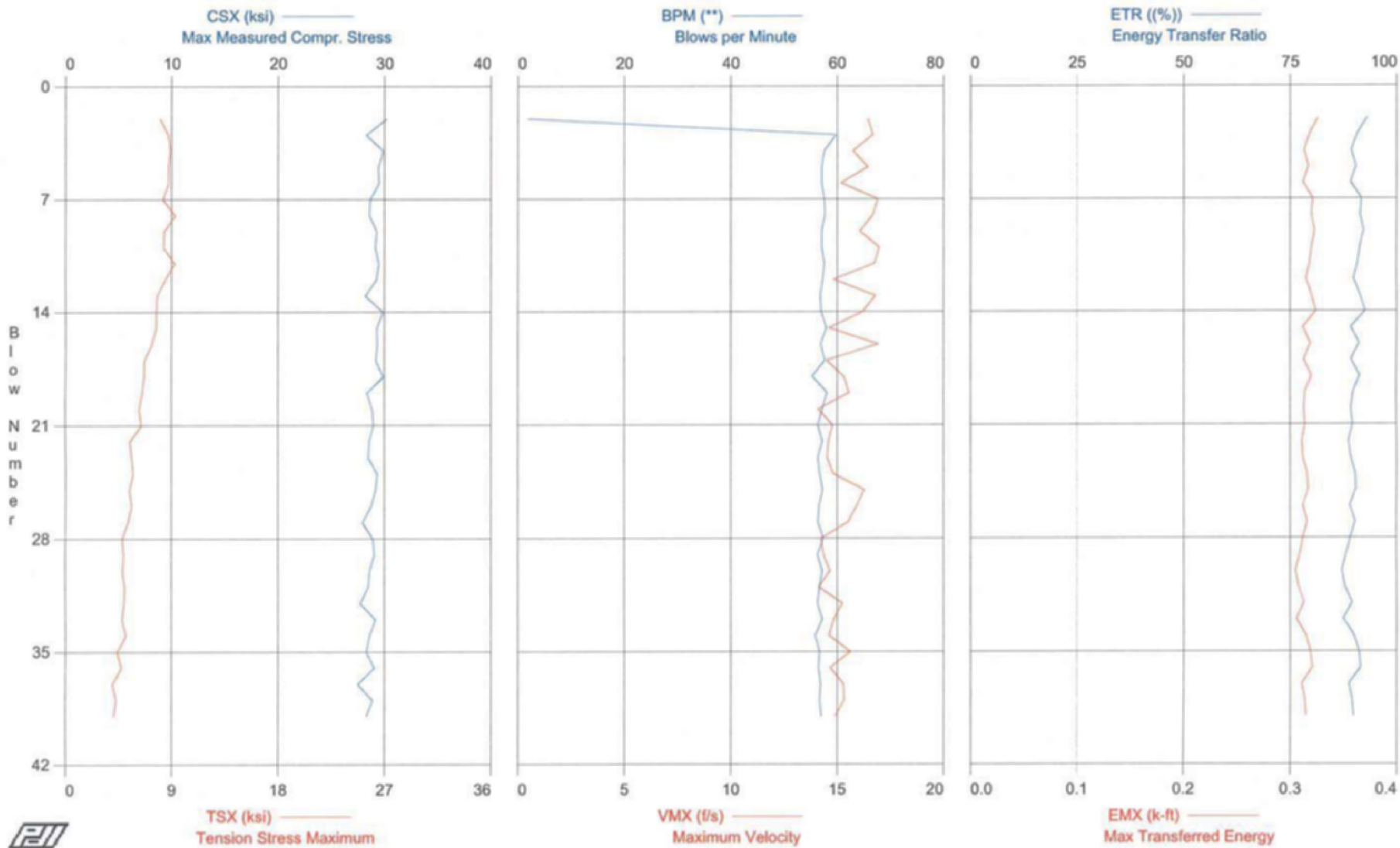


PDIPLOT Ver. 2008.2 - Printed: 10-Mar-2009

MACTEC Engineering and Consulting, Inc. - Case Method Results

Test date: 26-Jan-2009

EXELON VICTORIA - Boring B3234 (402.5'-404' sample)



EXELON VICTORIA - Boring B3234 (402.5'-404' sample)
OP: JNH

Hammer ID: 07; Driller: G.BILBREY CME750 (Miller)
Test date: 26-Jan-2009

AR: 1.43 in²
LE: 408.00 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.70

CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force
FVP: Force/Velocity proportionality

BPM: Blows per Minute
EF2: Energy of F²
ETR: Energy Transfer Ratio
EMX: Max Transferred Energy

BL#	CSX ksi	TSX ksi	VMX f/s	FMX kips	FVP []	BPM **	EF2 k-ft	ETR (%)	EMX k-ft
2	30.2	8.0	16.4	43	0.8	1.9	0.363	93.0	0.326
3	28.3	8.7	16.7	40	0.9	59.8	0.350	90.7	0.318
4	29.9	8.9	15.7	43	0.8	57.6	0.360	89.4	0.313
5	29.4	8.7	16.4	42	0.9	57.1	0.358	90.5	0.317
6	29.5	8.7	15.2	42	0.8	57.1	0.365	89.2	0.312
7	28.7	8.2	16.9	41	0.9	57.6	0.361	91.7	0.321
8	28.6	9.3	16.7	41	1.0	57.7	0.357	91.5	0.320
9	29.3	8.3	16.1	42	1.0	57.1	0.362	92.3	0.323
10	29.1	8.3	17.0	42	0.9	57.1	0.362	91.4	0.320
11	29.5	9.2	16.8	42	0.8	57.6	0.357	90.8	0.318
12	29.3	8.4	14.8	42	0.8	57.3	0.353	89.9	0.315
13	28.2	7.7	16.8	40	0.9	56.8	0.361	91.4	0.320
14	29.9	7.7	16.2	43	0.9	57.0	0.362	92.6	0.324
15	29.3	7.7	14.6	42	0.8	58.0	0.363	89.3	0.312
16	29.3	7.3	16.9	42	0.8	56.9	0.354	91.3	0.319
17	29.2	6.7	14.5	42	1.1	57.7	0.356	89.4	0.313
18	29.9	6.7	15.3	43	0.9	55.3	0.372	91.4	0.320
19	28.4	6.5	15.6	41	1.0	58.1	0.358	89.9	0.314
20	28.8	6.3	14.1	41	1.1	57.2	0.360	89.3	0.313
21	29.0	6.4	14.8	41	0.9	56.4	0.361	89.7	0.314
22	28.6	5.5	14.6	41	1.1	57.2	0.354	88.7	0.311
23	28.5	5.6	14.5	41	1.1	56.4	0.358	89.2	0.312
24	29.3	5.7	14.8	42	0.9	56.7	0.360	90.3	0.316
25	29.2	5.4	16.3	42	1.0	57.3	0.351	90.5	0.317
26	28.7	5.6	15.9	41	0.9	56.6	0.353	89.1	0.312
27	27.9	5.3	15.5	40	1.0	56.4	0.358	90.3	0.316
28	28.9	4.8	14.2	41	0.8	57.4	0.351	89.2	0.312
29	29.0	5.0	14.4	42	0.9	56.3	0.353	88.2	0.309
30	28.6	4.9	14.7	41	0.9	57.2	0.348	87.2	0.305
31	28.5	5.0	14.1	41	0.9	56.7	0.343	87.9	0.308
32	27.7	5.0	15.2	40	1.0	56.3	0.352	89.6	0.313
33	29.1	4.8	14.8	42	0.9	57.2	0.346	87.5	0.306
34	28.6	5.1	14.6	41	1.1	55.9	0.347	90.0	0.315
35	28.3	4.4	15.6	40	1.0	56.7	0.353	91.2	0.319
36	29.0	4.8	14.7	42	0.8	56.5	0.353	91.6	0.321
37	27.5	4.0	15.3	39	1.0	56.9	0.344	88.8	0.311
38	28.9	4.3	15.3	41	0.9	56.7	0.347	89.6	0.314
39	28.3	4.1	14.9	40	1.1	57.0	0.345	89.9	0.315
Average	28.9	6.5	15.4	41	0.9	55.6	0.356	90.1	0.315

Total number of blows analyzed: 38

Time Summary

Drive 3:45:37 PM - 3:45:37 PM (1/26/2009) BN 1 - 1
 Stop 21 minutes 23 seconds 3:45:37 PM - 4:07:00 PM
 Drive 39 seconds 4:07:00 PM - 4:07:39 PM BN 2 - 39
 Total time [0:22:02] = (Driving [0:00:39] + Stop [0:21:23])



Engineering and constructing a better tomorrow

May 4, 2009

Memorandum to File

From: Jon Honeycutt, Staff Professional JNH

Reviewed By: Steve Kiser, Principal Professional SK

Subject: **Report of SPT Energy – MACTEC Atlanta CME 550 ATV
Hammer Serial No. CME-08 Automatic Hammer
WORK INSTRUCTION No. 311 (DCN EXE917)
Exelon Texas COL Project – Supplemental Investigation, Including UHS
Victoria County, Texas
MACTEC Project No. 6468-07-1777**

Jonathan Honeycutt, of MACTEC Engineering and Consulting, Inc. (MACTEC), performed energy measurements on the above referenced drill rig at the subject site per the referenced Work Instructions. This memorandum summarizes the field testing activities and presents the results of the energy measurements.

SPT Energy Field Measurements

Energy measurements of this drill rig were made for two different rod sizes used for drilling operations. A summary of the testing for each rod size is below:

AW-J Sized Rods – SPT energy measurements were made on January 22, 2009, during drilling of Boring B3152 at the referenced site. The testing was performed by Jonathan Honeycutt from approximately 10:50 AM to 11:55 AM (ET) on January 22 under sunny skies with a temperature of about 70 degrees Fahrenheit. The boring was drilled with personnel and equipment from the MACTEC Atlanta office. The drilling equipment consisted of a CME 550 model ATV-mounted drill rig with an SPT automatic hammer. The drilling tools consisted of AW-J-sized drilling rods and a 2-foot long split tube sampler. Mud rotary drilling techniques were used to advance the boring. The drill rig operator during sampling was Mr. Larry Carter. Energy measurements were recorded during sampling at the depth intervals shown in Table 3.

The energy measurements were performed with a Pile Driving Analyzer (PDA) model PAX (Serial No. 3622L), and calibrated accelerometers (Serial Nos. K0686 and K983) and strain gages (Serial Nos. AW#75/1 and AW#75/2). A steel drill rod, 2-feet long and instrumented with dedicated strain gages, was inserted at the top of the drill rod string immediately below the SPT hammer. The inserted rod was also instrumented with two piezoresistive accelerometers that were bolted to the outside of the rod. The instrumented rod insert had a cross-sectional area of approximately 1.22 square inches and an outside diameter of approximately 1.75 inches at the

26 Pages Total

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gage location. The drill rods included in the drill rod string were hollow rods in 5 to 10 foot long sections, with an outside and inside diameter of approximately 1.75 and 1.375 inches, respectively. The recommended operation rate of the hammer is not known. Due to the closed hammer system, the hammer lubrication condition and anvil dimensions could not be observed.

NW-J Sized Rods – SPT energy measurements were made on February 21, 2009, during drilling of Boring B3290 at the referenced site. The testing was performed by Jonathan Honeycutt from approximately 2:25 PM to 3:40 PM (ET) on February 21 under cloudy and rainy skies with a temperature of about 65 degrees Fahrenheit. The boring was drilled with personnel and equipment from the MACTEC Atlanta office. The drilling equipment consisted of a CME 550 model ATV-mounted drill rig with an SPT automatic hammer. The drilling tools consisted of NW-J-sized drilling rods and a 2-foot long split tube sampler. Mud rotary drilling techniques were used to advance the boring. The drill rig operator during sampling was Mr. Larry Carter. Energy measurements were recorded during sampling at the depth intervals shown in Table 3.

The energy measurements were performed with a Pile Driving Analyzer (PDA) model PAX (Serial No. 3622L), and calibrated accelerometers (Serial Nos. K990 and K1050) and strain gages (Serial Nos. NW#221/1 and NW#221/2). A steel drill rod, 2-feet long and instrumented with dedicated strain gages, was inserted at the top of the drill rod string immediately below the SPT hammer. The inserted rod was also instrumented with two piezoresistive accelerometers that were bolted to the outside of the rod. The instrumented rod insert had a cross-sectional area of approximately 2.27 square inches and an outside diameter of approximately 2.625 inches at the gage location. The drill rods included in the drill rod string were hollow rods in 5 to 10 foot long sections, with an outside and inside diameter of approximately 2.625 and 2.25 inches, respectively. The recommended operation rate of the hammer is not known. Due to the closed hammer system, the hammer lubrication condition and anvil dimensions could not be observed.

Calibration Records

The calibration records for all the above are filed in DCN EXE 918.

Calculations for EFV

The work was done in general accordance with ASTM D 4633-05. The strain and acceleration signals were converted to force and velocity by the PDA, and the data was interpreted by the PDA according to the Case Method equation. The maximum energy transmitted to the drill rod string (as measured at the location of the strain gages and accelerometers) was calculated by the PDA using the EFV method equation, as shown below:

$$EFV = \int F(t) * V(t) * dt$$

Where: EFV = Transferred energy (EFV equation), or Energy of FV

F(t) = Calculated force at time t

V(t) = Calculated velocity at time t

The EFV method of energy calculation is recommended in ASTM Standard D4633-05. The EFV equation, integrated over the complete wave event, measures the total energy content of the event using both force and velocity measurements. The EFV values associated with each blow analyzed

are tabulated in the attached PDILOT tables and are also shown graphically in the PDILOT charts.

Calculations for ETR

The ratio of the measured transferred energy (EFV) to the theoretical potential energy of the SPT system (140 lb weight with the specified 30 inch fall) is the ETR. The ETR values (as percent of the theoretical value) are shown in Table 3.

Comparison of ETR to Typical Energy Transfer Ratio Range

Based on a research report published by the Florida Department of Transportation (FDOT) (Report WPI No. 0510859, 1999), the average ETR measured for automatic hammers is 79.6%. The standard deviation was 7.9%; therefore, the range of ETRs within one standard deviation of the average was reported to be 71.7% to 87.5%. This range of ETRs was also consistent with other research that was cited in the FDOT research paper; however, maximum and minimum ETR values of up to 98% and 56%, respectively, were reported in the literature. The ETR values shown in Table 1 are generally within the range of typical values for automatic hammers as reported in the literature.

Discussion

Based on the field testing results, observations from the SPT energy measurements are summarized below:

- The data obtained by the PDA are generally consistent between individual hammer blows and between the sample depths tested. In general, the first and last one (and sometimes two or more) hammer blow records recorded by the PDA produced poor quality data (which is relatively common) and, as such, the record(s) was(were) not used in the data reduction. This may result in more or less blows evaluated for ETR than what is shown on the boring logs.
- The range of average energy transferred from the hammer to the drill rods for each individual depth interval using the EFV method is shown in Table 1 below for each rod size tested. The corresponding energy transfer ratio of the SPT hammer system is also shown.

Table 1: Average Energy Transfer Range for the Depth Intervals Tested

Rod Size	Range of Average Energy Transferred, Per Individual Sample (foot-pounds)	Range of Average Energy Transfer Ratio (ETR)
AW-J	295 to 310	84% to 89%
NW-J	263 to 292	75% to 83%

- The average at each depth interval was calculated as the transferred energy for each analyzed blow of the depth intervals divided by the total number of hammer blows analyzed. The overall average energy transfer of the SPT system (for all the depth intervals tested) is shown in Table 2 below for each rod size tested.

Table 2: Overall Average Energy Testing Results for Each Rod Size

Rod Size	Overall Average Energy Transferred (foot-pounds)	Range of Overall Average Energy Transfer Ratio (ETR)
AW-J	301.7	86.2%
NW-J	273.6	78.2%
Average of All Rod Sizes	287.5	82.2%

Attachments: Page 5 Table 1 – Summary of SPT Energy Measurements – 1 Page
Page 6 Work Instruction No. 311 – DCN EXE917 – 1 Page
Pages 7 – 8 Record of SPT Energy Measurement – 2 Pages
Pages 9 – 26 PDILOT Output – 18 Pages

TABLE 3
SUMMARY OF SPT ENERGY MEASUREMENTS (ASTM D4633-05)
 Exelon Texas COL Project - Supplemental Investigation, Including UHS
 Victoria, Texas
 MACTEC Project No. 6468-07-1777

Automatic Hammer Serial Number and Rig Model	Rig Owner	Rig Operator	Boring No. Tested	Date Tested	Drill Rod Size	Sample Depth (feet)	SPT Blow Count (blows per six inches)	No. of Blows Analyzed	Average Measured Energy (Average EFV) (ft-lbs) ^a	Energy Transfer Ratio (%) ^b (Average ETR)
CME-08 (CME 550 ATV)	MACTEC (Raleigh)	Larry Carter	B3152	1/22/2009	AW-J	28.5 - 30	5 - 7 - 11	23	295	84.3%
						33.5 - 35	3 - 5 - 7	15	298	85.1%
						38.5 - 40	6 - 8 - 12	27	310	88.6%
						43.5 - 45	11 - 15 - 18	46	301	86.0%
						48.5 - 50	9 - 14 - 18	43	302	86.3%
						Average for AW-J Rods:			301.7	86.2%
			B3290	2/21/2009	NW-J	38.5 - 40	5 - 6 - 13	23	292	83.4%
						43.5 - 45	10 - 14 - 13	38	283	80.9%
						48.5 - 50	10 - 16 - 16	45	268	76.6%
						53.5 - 55	13 - 16 - 22	50	263	75.1%
						Average for NW-J Rods:			273.6	78.2%
			Total Average for Rig:			287.5	82.2%			

^aMeasured Energy is energy based on the EFV method, as outlined in ASTM D4633-05, for each blow recorded by the PDA. In some cases, the initial and final one to two blows produced poor quality data, and were not used to calculate the Average Measured Energy. This may result in more or less blows evaluated for ETR than what is shown on the boring logs.

EFV = EMX * 1000 lbs/kip, where EMX equals the maximum transferred energy measured by the PDA (see attached PDA data).

^bEnergy Transfer Ratio is the Measured Energy divided by the theoretical SPT energy of 350 foot-pounds (140 pound hammer falling 2.5 feet).

The average EFV and ETR values may differ slightly and insignificantly from those in the PDILOT tables due to roundoff.

Prepared By: 	Date: 5/4/09	Checked By: 	Date: 5-4-09
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Work Instruction No. 311
Exelon COL Victoria Site
MACTEC Engineering and Consulting, Inc.
MACTEC Project 6468-07-1777

DCN 11/2/09

Issued To: ~~Steve Kiser and Jonathan Honeycutt~~

Issued By: Daniel E. Atkinson

Rev. No. 0

Valid From: 11/12/09

Date: 11/12/09

To: 12/31/09

Task Description: Perform SPT Energy Measurements

Applicable Technical Procedures or Plans, or other reference:

1. Geotechnical Work Plan (current revision; available at Site Office), and
2. ASTM D 4633-05 (copy attached.).

Specific Instructions (note attachments where necessary): Perform energy measurements for each drill rig on site in accordance with ASTM D-4633-05. Consult with Site Manager as to schedule for performing the measurements. Hammer weights have been checked by site personnel, and records will be available on site. All rigs are using automatic hammer systems. Confirm that automatic hammer system is being operated within manufacturer's recommendations or in a typical operating fashion as observed from watching one or two SPT measurements prior to measuring energy. Check each drill rig using all hammer/rod combinations that it will be using. Depths for measurements should be coordinated with the Site Manager. See Site Manager for current boring logs of holes drilled and use these to plan most effective field measurement program. Submit copies of calibration records for equipment to Project Principal for review prior to beginning work on site.

Special Instructions (note attachments where necessary): Confirm with Site Manager that approval of equipment calibration records have been received prior to beginning field testing. If unexpected conditions are encountered that affect measurements, contact Site Manager or Project Principal immediately.

Report Format: Prepare standard report in accordance with ASTM D 4633 requirements.

Specific Quality Assurance Procedures Applicable: QAP 20-1; QAP 25-1; QAP for Reporting Nuclear-Related Defects, or Noncompliances, per Federal Regulation 10CFR21 and Section 306 of the Energy Reorganization Act of 1974. Current revisions apply.

Hold Points or Witness Points: None

Records: All records generated shall be considered QA Records.

Reviewed and Approved by: (Note: Only one signature is required for issuance)

Project Manager: _____

Project Principal Engineer: _____

Date: _____

Site Manager/Coordinator: 

Date: _____

Pages: 1 plus attachment

Date: 11/2/09

Attachments: ASTM D 4633-05

DCN: EXE917



GENERAL INFORMATION		DRILL RIG DATA	
PROJECT:	Exelon	MAKE:	CME
LOCATION:	Victoria, Texas	MODEL:	550
PROJECT NO.:	6468-07-1777	SERIAL NO.:	CME 08
DATE:	1/22/2009	HAMMER TYPE:	AUTO
WEATHER:	Sunny 70°F	ROPE CONDITION:	N/A
INSPECTOR:	JWH	ROD SIZE:	AW 3
DRILLING COMPANY:	mmtec	NO. OF SHEAVES:	N/A

BORING DATA	
BORING NUMBER:	B3/52
DEPTH DRILLED:	Various
TIME DRIVEN:	10:00 am - 11:00 am
RIG OPERATOR:	L. Carter
HAMMER OPERATOR:	N/A
PDA PAK SERIAL NO.:	3622L
INSTR. ROD AREA:	1.22 in ²
ACCEL. SERIAL NOS.:	43-60686 44-6983
STRAIN SERIAL NOS.:	75-19w 1/2
SAMPLE DEPTH (feet)	SPT N-VALUE (bpf)
38.5 - 30	5-7-11
33.5 - 35	3-5-7
38.5 - 40	6-8-12
43.5 - 45	11-15-18
48.5 - 50	9-14-18
REMARKS:	

SPT Energy Testing Form, Rev. 0 1/13/09

Volume 1. Revision 0

Page 580 of 751

DCN# EXE1436



GENERAL INFORMATION				DRILL RIG DATA	
PROJECT:	Exelon		MAKE:	CME 550	
LOCATION:	Victoria, Texas		MODEL:	550	
PROJECT NO.:	6468-07-1777		SERIAL NO.:	CMEOP	
DATE:	2/21/2009		HAMMER TYPE:	Auto	
WEATHER:	65°F Cloudy, Rain (scattered)		ROPE CONDITION:	N/A	
INSPECTOR:	JNH		ROD SIZE:		
DRILLING COMPANY:	Mactec A+L		NO. OF SHEAVES:	N/A	NWJ

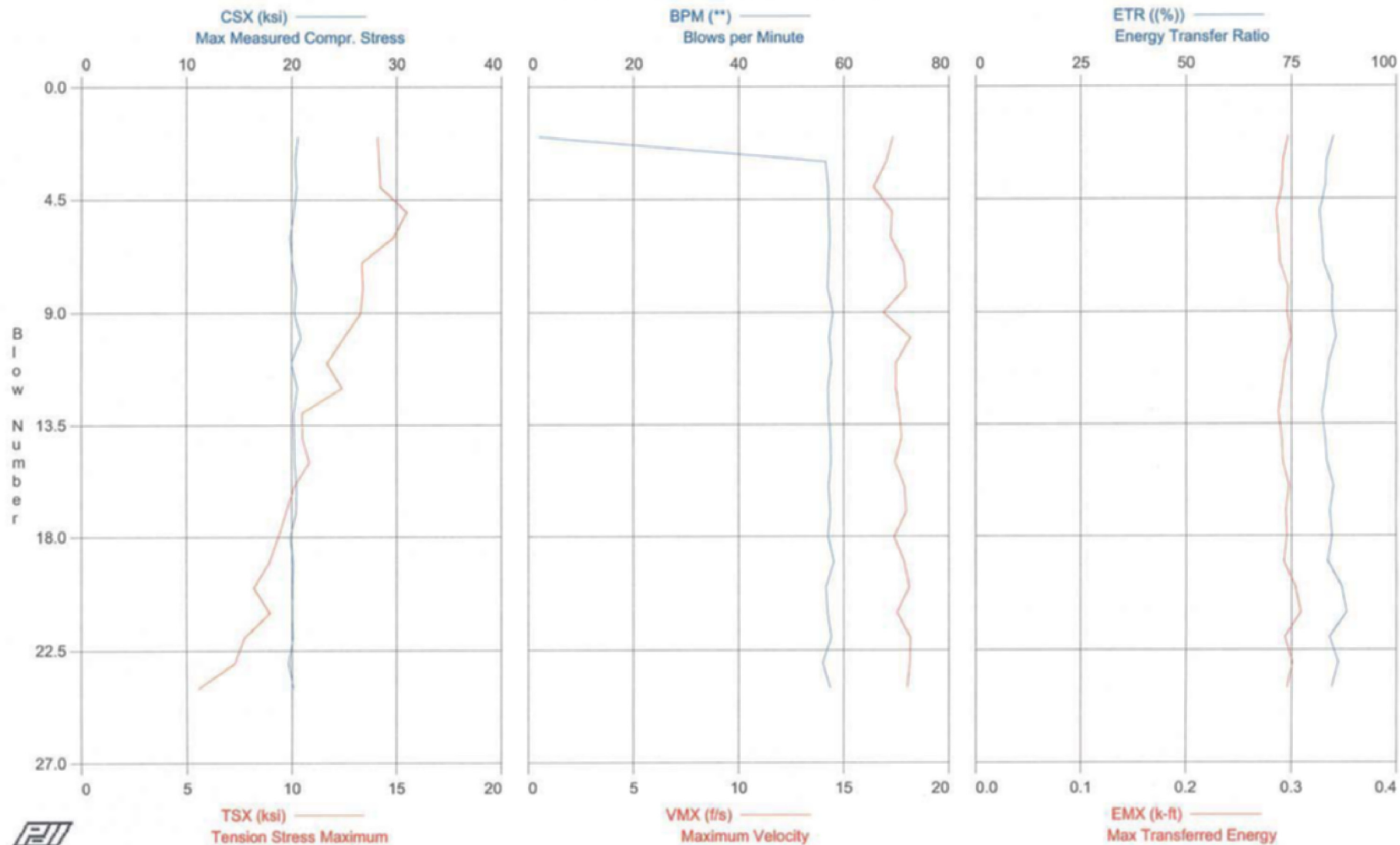
SPT Energy Testing Form, Rev. 0 1/13/09

PDILOT Ver. 2008.2 - Printed: 25-Feb-2009

MACTEC Engineering and Consulting, Inc. - Case Method Results

Test date: 22-Jan-2009

EXELON VICTORIA - Boring B-3152 (28.5 - 30' Sample)



EXELON VICTORIA - Boring B-3152 (28.5 - 30' Sample)
OP: JNH

Hammer ID: CME08, Driller: L. Carter CME 550 (MACTEC)
Test date: 22-Jan-2009

AR: 1.22 in²
LE: 34.00 ft
WS: 16,807.9 f/s

SP: 0.492 k/t³
EM: 30,000 ksi
JC: 0.70

CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force
FVP: Force/Velocity proportionality

BPM: Blows per Minute
EF2: Energy of F²
ETR: Energy Transfer Ratio
EMX: Max Transferred Energy

BL#	CSX ksi	TSX ksi	VMX f/s	FMX kips	FVP []	BPM **	EF2 k-ft	ETR (%)	EMX k-ft
2	20.6	14.1	17.3	25	0.7	1.9	0.280	85.0	0.297
3	20.3	14.2	17.0	25	0.7	56.5	0.268	83.3	0.292
4	20.5	14.2	16.4	25	0.7	57.0	0.270	83.1	0.291
5	20.2	15.5	17.3	25	0.7	57.1	0.267	81.7	0.286
6	19.9	14.8	17.2	24	0.6	57.3	0.265	82.3	0.288
7	20.0	13.3	17.9	24	0.6	57.1	0.264	82.6	0.289
8	20.4	13.4	18.0	25	0.6	56.9	0.270	84.7	0.297
9	20.3	13.3	16.9	25	0.7	57.9	0.270	84.7	0.296
10	20.9	12.5	18.2	25	0.6	57.2	0.273	85.7	0.300
11	20.0	11.7	17.5	24	0.6	57.6	0.266	83.9	0.294
12	20.6	12.4	17.5	25	0.7	57.0	0.262	83.2	0.291
13	20.2	10.5	17.7	25	0.6	57.1	0.261	82.3	0.288
14	20.2	10.5	17.8	25	0.6	57.4	0.263	83.0	0.291
15	20.3	10.8	17.4	25	0.7	57.5	0.266	83.4	0.292
16	20.5	10.1	17.9	25	0.6	57.1	0.267	85.0	0.298
17	20.4	9.7	18.0	25	0.6	57.4	0.260	84.2	0.295
18	19.8	9.4	17.4	24	0.6	57.0	0.255	84.7	0.296
19	20.1	8.9	17.9	25	0.6	58.1	0.253	83.6	0.293
20	20.1	8.2	18.1	24	0.6	56.6	0.257	87.0	0.304
21	20.0	9.0	17.5	24	0.6	56.9	0.260	88.2	0.309
22	20.1	7.7	18.2	25	0.6	57.6	0.256	84.0	0.294
23	19.7	7.3	18.1	24	0.6	56.0	0.259	86.1	0.301
24	20.1	5.6	18.0	25	0.6	57.4	0.253	84.5	0.296
Average	20.2	11.2	17.6	25	0.6	54.8	0.264	84.2	0.295

Total number of blows analyzed: 23

Time Summary

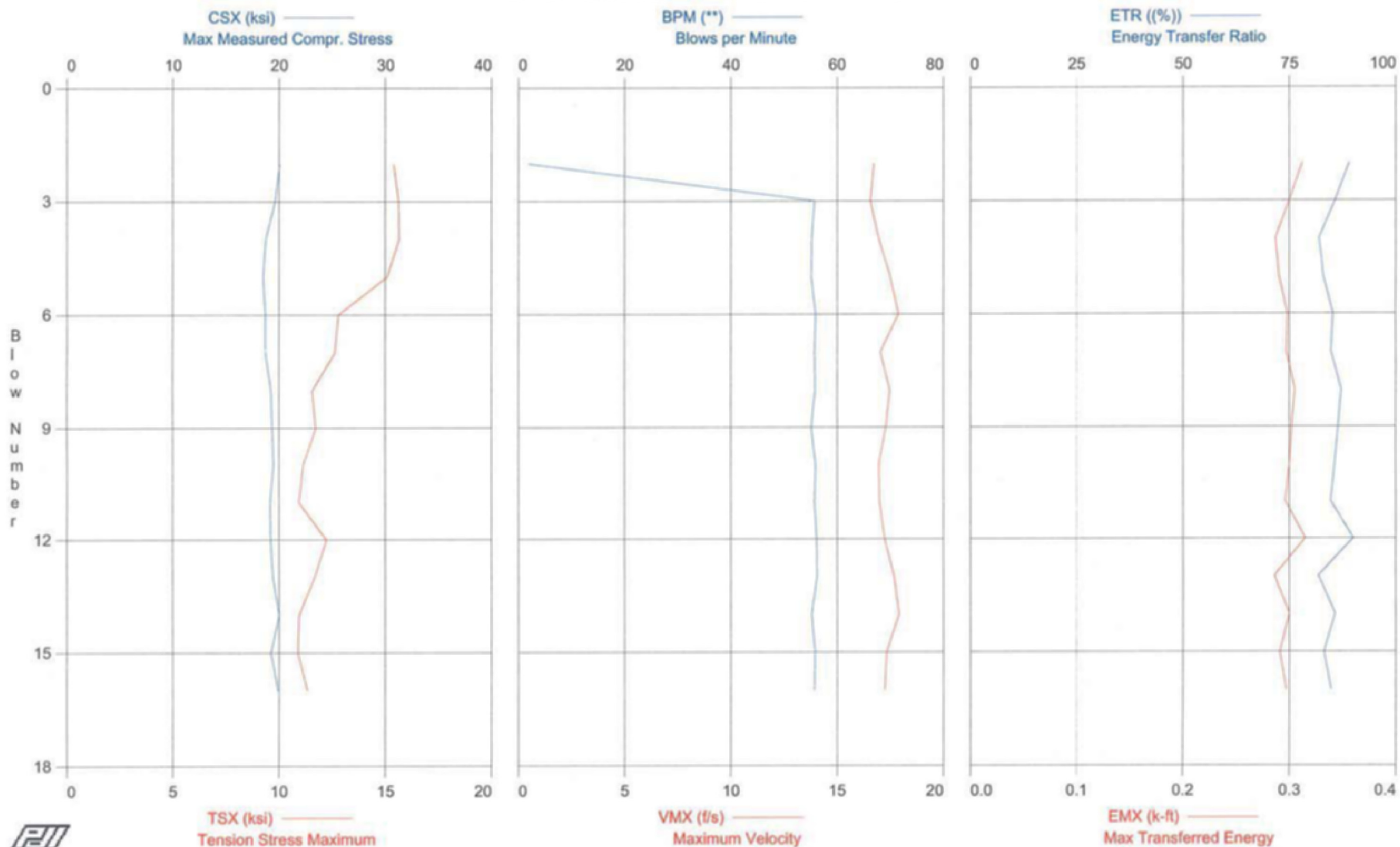
Drive 10:50:15 AM - 10:50:15 AM (1/22/2009) BN 1 - 1
 Stop 11 minutes 19 seconds 10:50:15 AM - 11:01:34 AM
 Drive 23 seconds 11:01:34 AM - 11:01:57 AM BN 2 - 24
 Total time [0:11:42] = (Driving [0:00:23] + Stop [0:11:19])

PDIPLOT Ver. 2008.2 - Printed: 25-Feb-2009

MACTEC Engineering and Consulting, Inc. - Case Method Results

Test date: 22-Jan-2009

EXELON COL VICTORIA - Boring B3152 (33.5'-35' sample)



EXELON COL VICTORIA - Boring B3152 (33.5'-35' sample)
OP: JNH

Hammer ID: CME08; Driller: L.CARTER CME 550 (MACTEC)
Test date: 22-Jan-2009

AR: 1.22 in² SP: 0.492 k/ft³
LE: 39.00 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.70

CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force
FVP: Force/Velocity proportionality
BPM: Blows per Minute
EF2: Energy of F²
ETR: Energy Transfer Ratio
EMX: Max Transferred Energy

BL#	CSX ksi	TSX ksi	VMX f/s	FMX kips	FVP []	BPM **	EF2 k-ft	ETR (%)	EMX k-ft
2	20.1	15.4	16.7	24	0.7	1.9	0.264	89.0	0.312
3	19.6	15.6	16.6	24	0.7	55.7	0.258	85.7	0.300
4	18.7	15.7	17.0	23	0.6	55.2	0.255	82.0	0.287
5	18.5	15.1	17.5	23	0.6	55.1	0.256	82.9	0.290
6	18.7	12.8	17.9	23	0.6	55.9	0.255	85.2	0.298
7	18.7	12.6	17.0	23	0.6	55.7	0.253	84.7	0.297
8	19.2	11.6	17.5	23	0.6	55.8	0.257	87.2	0.305
9	19.3	11.7	17.3	24	0.6	55.1	0.261	86.4	0.302
10	19.4	11.1	17.0	24	0.6	55.9	0.253	85.6	0.300
11	19.1	10.9	17.0	23	0.6	55.7	0.257	84.7	0.296
12	19.2	12.2	17.2	23	0.6	56.1	0.271	90.0	0.315
13	19.4	11.7	17.7	24	0.6	56.2	0.260	81.8	0.286
14	20.0	10.9	17.9	24	0.6	55.2	0.269	85.7	0.300
15	19.2	10.9	17.3	23	0.6	55.8	0.262	83.1	0.291
16	19.9	11.3	17.2	24	0.6	55.7	0.272	84.8	0.297
Average	19.3	12.6	17.3	24	0.6	52.1	0.260	85.2	0.298

Total number of blows analyzed: 15

Time Summary

Drive 9 minutes 30 seconds

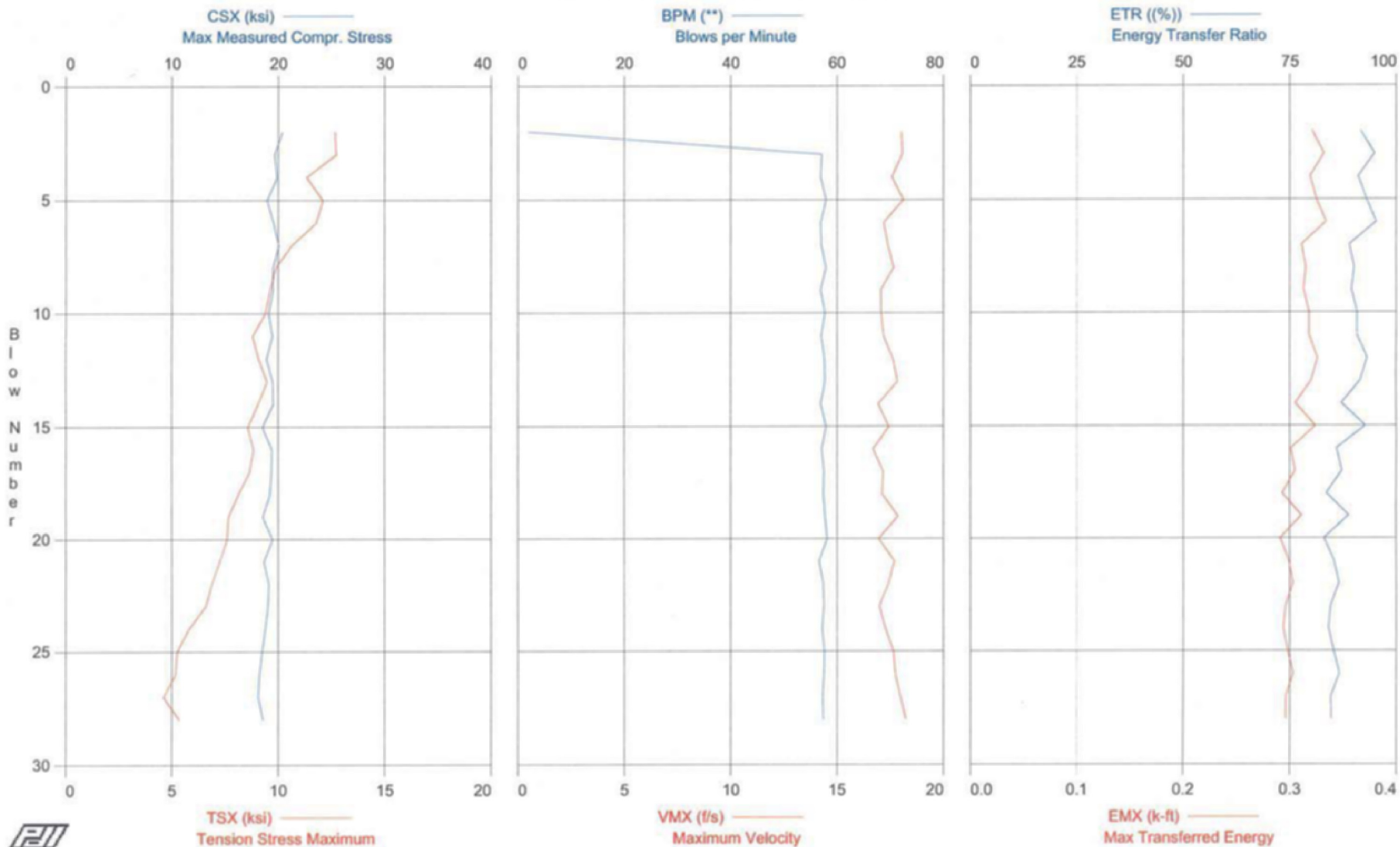
11:05:13 AM - 11:14:43 AM (1/22/2009) BN 1 - 16

PDILOT Ver. 2008.2 - Printed: 25-Feb-2009

MACTEC Engineering and Consulting, Inc. - Case Method Results

Test date: 22-Jan-2009

EXELON VICTORIA - Boring B3152 (38.5'-40' sample)



EXELON VICTORIA - Boring B3152 (38.5'-40' sample)
OP: JNH

Hammer ID: CME08; Driller: L.CARTER CME 550 (MACTEC)
Test date: 22-Jan-2009

AR: 1.22 in²
LE: 44.00 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.70

CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force
FVP: Force/Velocity proportionality

BPM: Blows per Minute
EF2: Energy of F²
ETR: Energy Transfer Ratio
EMX: Max Transferred Energy

BL#	CSX ksi	TSX ksi	VMX f/s	FMX kips	FVP []	BPM **	EF2 k-ft	ETR (%)	EMX k-ft
2	20.4	12.7	18.0	25	0.6	1.9	0.263	91.6	0.321
3	19.6	12.7	18.1	24	0.6	57.1	0.246	94.9	0.332
4	19.9	11.3	17.6	24	0.6	56.9	0.252	91.1	0.319
5	18.9	12.1	18.1	23	0.6	57.9	0.252	93.0	0.325
6	19.6	11.8	17.2	24	0.6	56.9	0.248	95.3	0.334
7	20.0	10.6	17.4	24	0.6	57.0	0.253	88.9	0.311
8	19.5	9.9	17.7	24	0.6	57.9	0.251	90.1	0.315
9	19.5	9.6	17.1	24	0.6	56.9	0.251	89.5	0.313
10	19.1	9.4	17.1	23	0.6	57.7	0.247	90.8	0.318
11	19.4	8.8	17.2	24	0.6	57.0	0.249	90.7	0.318
12	18.9	9.1	17.6	23	0.6	57.6	0.248	93.2	0.326
13	19.5	9.5	17.8	24	0.6	57.7	0.252	91.6	0.320
14	19.5	9.0	16.9	24	0.6	56.9	0.245	87.1	0.305
15	18.5	8.6	17.4	23	0.6	57.9	0.242	92.7	0.324
16	19.4	8.8	16.7	24	0.6	57.1	0.252	85.9	0.301
17	19.3	8.6	17.2	24	0.6	57.5	0.248	87.2	0.305
18	19.2	8.1	17.1	23	0.6	57.4	0.247	83.6	0.293
19	18.5	7.7	17.9	23	0.6	57.7	0.250	88.8	0.311
20	19.5	7.6	17.0	24	0.6	58.1	0.246	83.0	0.291
21	18.6	7.2	17.7	23	0.6	56.6	0.247	85.3	0.299
22	19.1	6.9	17.4	23	0.6	57.4	0.247	86.5	0.303
23	19.0	6.6	17.0	23	0.6	57.5	0.244	84.6	0.296
24	18.8	5.8	17.3	23	0.6	57.2	0.243	84.0	0.294
25	18.5	5.2	17.7	23	0.5	57.6	0.242	85.3	0.298
26	18.2	5.2	17.7	22	0.6	57.5	0.243	86.6	0.303
27	18.1	4.6	18.0	22	0.6	57.3	0.245	84.6	0.296
28	18.6	5.4	18.2	23	0.6	57.4	0.252	84.7	0.296
Average	19.2	8.6	17.5	23	0.6	55.3	0.248	88.5	0.310

Total number of blows analyzed: 27

Time Summary

Drive 4 minutes 55 seconds

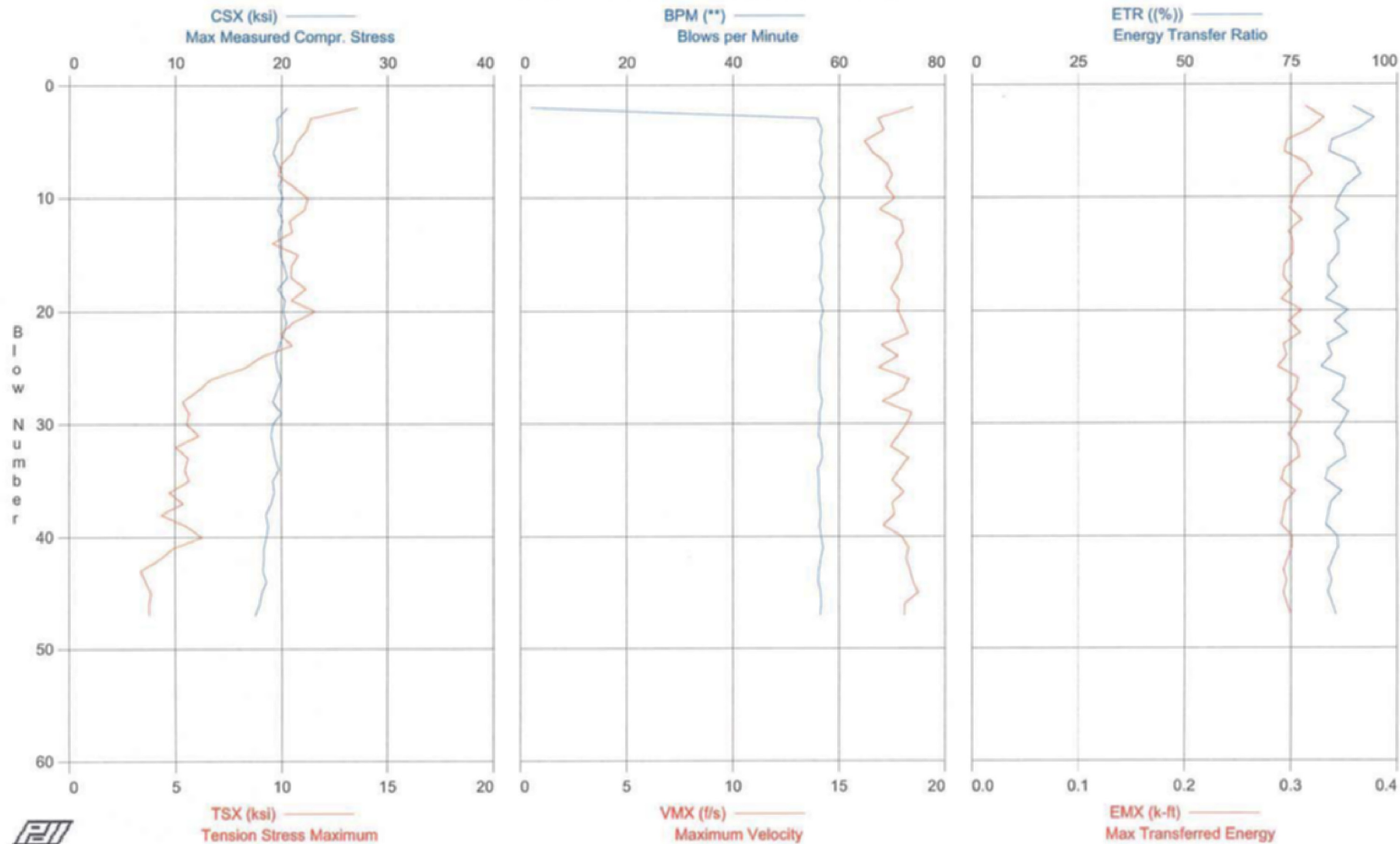
11:22:06 AM - 11:27:01 AM (1/22/2009) BN 1 - 28

PDIPLOT Ver. 2008.2 - Printed: 25-Feb-2009

MACTEC Engineering and Consulting, Inc. - Case Method Results

Test date: 22-Jan-2009

EXELON VICTORIA - Boring B3152 (43.5'-45' sample)



EXELON VICTORIA - Boring B3152 (43.5'-45' sample)
OP: JNH

Hammer ID: CME08; Driller: L.CARTER CME 550 (MACTEC)
Test date: 22-Jan-2009

AR: 1.22 in²
LE: 49.00 ft
WS: 16,807.9 l/s

SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.70

CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force
FVP: Force/Velocity proportionality

BPM: Blows per Minute
EF2: Energy of F²
ETR: Energy Transfer Ratio
EMX: Max Transferred Energy

BL#	CSX ksi	TSX ksi	VMX ft/s	FMX kips	FVP []	BPM **	EF2 k-ft	ETR (%)	EMX k-ft
2	20.5	13.6	18.5	25	0.6	1.9	0.272	89.6	0.314
3	19.6	11.3	16.8	24	0.6	55.9	0.268	94.6	0.331
4	19.7	11.2	17.1	24	0.6	56.7	0.255	90.8	0.318
5	19.6	10.7	16.2	24	0.6	56.3	0.260	84.5	0.296
6	19.2	10.5	16.6	23	0.6	56.7	0.257	84.0	0.294
7	19.7	10.0	17.2	24	0.6	56.3	0.258	89.8	0.314
8	20.1	9.9	17.5	24	0.6	56.9	0.262	91.4	0.320
9	19.7	10.6	17.2	24	0.6	56.3	0.265	88.1	0.308
10	20.1	11.2	17.6	25	0.6	57.3	0.262	86.3	0.302
11	19.7	11.1	16.9	24	0.6	56.2	0.263	85.4	0.299
12	20.1	10.4	17.9	25	0.6	56.7	0.265	88.6	0.310
13	19.7	10.5	18.0	24	0.6	57.1	0.266	85.3	0.298
14	19.8	9.6	17.7	24	0.6	56.4	0.257	86.2	0.302
15	19.9	10.8	17.9	24	0.6	56.7	0.265	86.2	0.302
16	20.2	10.5	18.0	25	0.6	56.7	0.261	83.9	0.294
17	20.6	10.5	17.8	25	0.6	56.3	0.260	83.8	0.293
18	19.7	11.2	17.5	24	0.6	56.9	0.265	86.0	0.301
19	20.3	10.5	17.8	25	0.6	56.4	0.254	83.2	0.291
20	20.2	11.6	17.8	25	0.6	57.0	0.269	88.5	0.310
21	20.5	10.5	18.0	25	0.6	56.4	0.261	85.2	0.298
22	20.2	10.0	18.2	25	0.6	56.7	0.264	88.3	0.309
23	19.8	10.5	17.0	24	0.6	56.5	0.260	83.6	0.293
24	19.4	9.1	17.8	24	0.6	56.3	0.256	84.7	0.296
25	19.6	8.3	16.9	24	0.7	56.3	0.250	82.2	0.288
26	20.0	6.7	18.3	24	0.6	56.3	0.255	87.8	0.307
27	19.6	6.1	18.0	24	0.6	56.3	0.262	87.2	0.305
28	19.2	5.3	17.1	23	0.6	56.8	0.257	84.8	0.297
29	20.0	5.7	18.4	24	0.6	56.3	0.263	88.5	0.310
30	19.2	5.6	18.2	23	0.6	56.3	0.256	87.0	0.305
31	19.0	6.1	17.8	23	0.6	56.2	0.250	85.3	0.298
32	19.2	5.0	17.4	23	0.6	56.7	0.256	87.4	0.306
33	19.4	5.6	18.3	24	0.6	56.8	0.255	87.9	0.308
34	19.8	5.4	17.9	24	0.6	56.0	0.254	83.9	0.294
35	19.2	5.7	17.5	23	0.6	56.2	0.248	83.1	0.291
36	19.3	4.7	18.1	24	0.6	56.2	0.249	86.9	0.304
37	19.0	5.4	17.5	23	0.6	56.3	0.248	84.4	0.295
38	18.5	4.3	17.6	23	0.6	56.5	0.246	83.8	0.293
39	18.7	5.5	17.1	23	0.6	56.3	0.241	83.3	0.291
40	18.6	6.3	18.0	23	0.6	56.6	0.246	85.9	0.301
41	18.3	4.9	18.3	22	0.6	57.0	0.248	86.1	0.301
42	18.3	4.3	18.2	22	0.5	56.5	0.247	84.9	0.297
43	18.2	3.4	18.3	22	0.5	56.2	0.246	83.8	0.293
44	18.6	3.6	18.5	23	0.6	56.1	0.245	84.6	0.296
45	18.1	3.9	18.7	22	0.5	56.5	0.242	83.7	0.293
46	17.9	3.8	18.1	22	0.5	56.6	0.248	84.7	0.296
47	17.5	3.8	18.1	21	0.5	56.4	0.245	85.6	0.300
Average	19.4	7.9	17.7	24	0.6	55.3	0.256	86.1	0.301

Total number of blows analyzed: 46

Time Summary

Drive 9 minutes 10 seconds

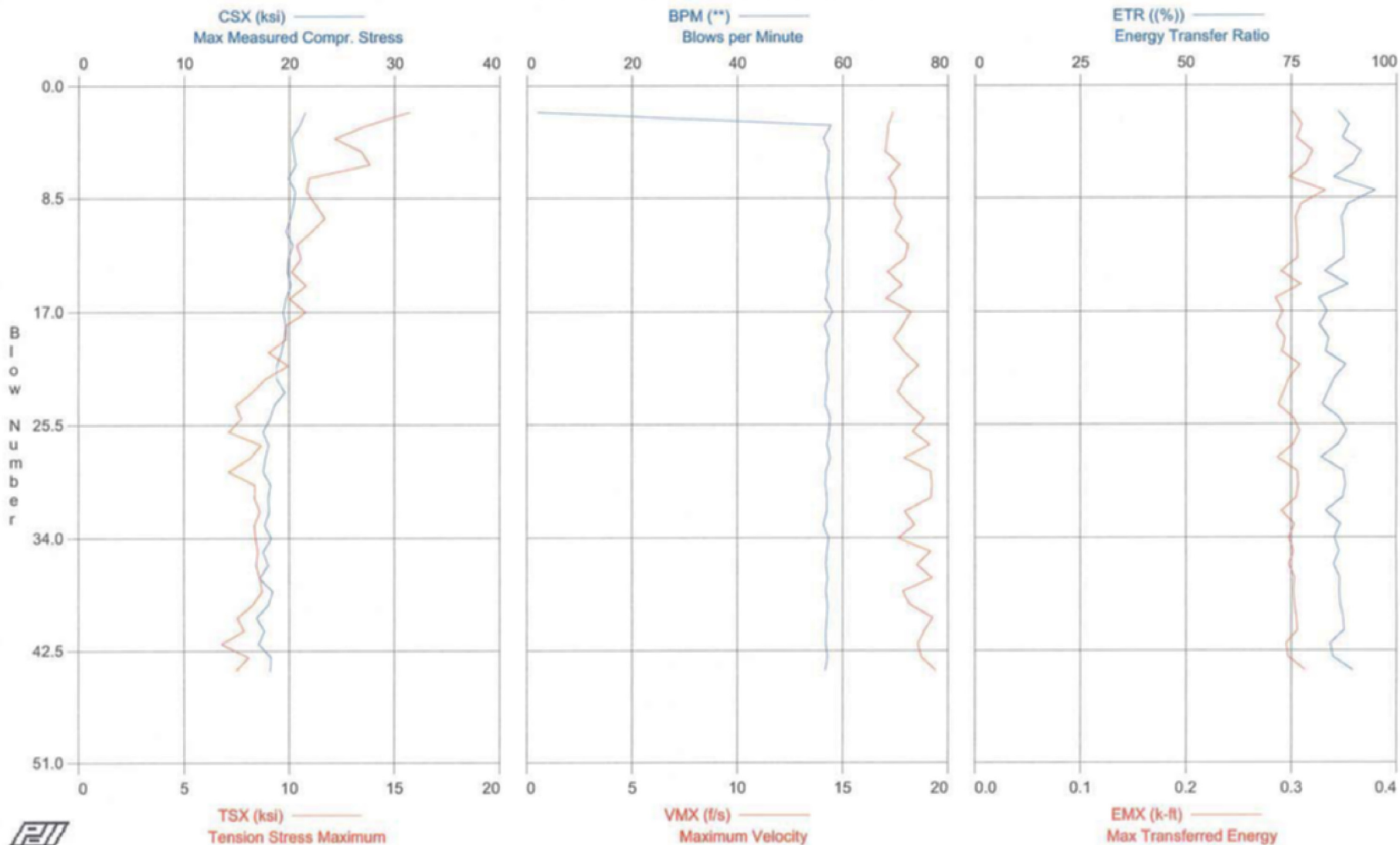
11:29:22 AM - 11:38:32 AM (1/22/2009) BN 1 - 47

PDILOT Ver. 2008.2 - Printed: 25-Feb-2009

MACTEC Engineering and Consulting, Inc. - Case Method Results

Test date: 22-Jan-2009

EXELON VICTORIA - Boring B3152 (48.5'-50' sample)



EXELON VICTORIA - Boring B3152 (48.5'-50' sample)
OP: JNH

Hammer ID: CME08; Driller: L.CARTER CME 550 (MACTEC)
Test date: 22-Jan-2009

AR: 1.22 in² SP: 0.492 k/ft³
LE: 54.00 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.70

CSX: Max Measured Compr. Stress BPM: Blows per Minute
TSX: Tension Stress Maximum EF2: Energy of F²
VMX: Maximum Velocity ETR: Energy Transfer Ratio
FMX: Maximum Force EMX: Max Transferred Energy
FVP: Force/Velocity proportionality

BL#	CSX ksi	TSX ksi	VMX f/s	FMX kips	FVP []	BPM **	EF2 k-ft	ETR (%)	EMX k-ft
2	21.5	15.7	17.4	26	0.7	1.9	0.277	86.1	0.301
3	21.0	13.7	17.2	26	0.7	57.7	0.281	88.7	0.310
4	20.2	12.2	17.1	25	0.7	56.3	0.273	87.0	0.305
5	20.4	13.4	17.0	25	0.7	57.3	0.280	91.5	0.320
6	20.6	13.8	17.7	25	0.7	57.2	0.276	89.6	0.314
7	19.9	10.9	17.2	24	0.6	56.8	0.273	85.1	0.298
8	20.6	10.8	17.5	25	0.7	57.0	0.272	94.9	0.332
9	20.4	11.3	17.4	25	0.7	57.4	0.272	88.3	0.309
10	20.1	11.7	17.8	24	0.6	57.3	0.268	86.9	0.304
11	19.7	11.0	17.5	24	0.6	56.7	0.270	87.3	0.305
12	20.3	10.4	18.1	25	0.6	57.5	0.267	87.4	0.306
13	19.9	10.5	18.0	24	0.6	57.3	0.268	87.4	0.306
14	19.8	10.1	17.1	24	0.6	56.9	0.262	82.9	0.290
15	20.1	10.8	17.8	25	0.6	57.2	0.266	88.4	0.309
16	19.7	10.0	17.1	24	0.6	56.7	0.262	81.5	0.285
17	19.4	10.8	18.2	24	0.6	58.0	0.265	83.5	0.292
18	19.7	9.9	17.9	24	0.6	56.6	0.262	81.6	0.286
19	19.5	9.9	17.4	24	0.6	57.4	0.265	83.9	0.294
20	19.3	9.0	17.9	23	0.6	56.9	0.265	83.2	0.291
21	18.8	10.0	18.6	23	0.6	56.9	0.270	87.9	0.308
22	18.8	8.9	17.9	23	0.6	57.2	0.268	85.3	0.298
23	19.6	8.3	17.6	24	0.6	56.8	0.268	83.8	0.293
24	18.6	7.5	18.2	23	0.6	56.7	0.257	82.4	0.288
25	18.2	7.7	18.9	22	0.5	57.6	0.260	86.4	0.302
26	17.5	7.1	18.3	21	0.5	57.4	0.254	88.1	0.308
27	18.1	8.7	19.1	22	0.5	57.0	0.257	86.2	0.302
28	17.7	8.1	17.9	22	0.5	57.6	0.248	82.1	0.287
29	17.5	7.1	19.2	21	0.5	56.8	0.260	87.3	0.306
30	18.2	8.4	19.2	22	0.5	56.7	0.264	87.8	0.307
31	18.0	8.4	19.2	22	0.5	57.0	0.259	87.2	0.305
32	18.1	8.6	18.0	22	0.6	57.0	0.253	83.2	0.291
33	17.7	8.3	18.4	22	0.5	56.3	0.254	86.7	0.303
34	18.3	8.4	17.6	22	0.6	57.3	0.258	85.3	0.298
35	17.5	8.5	19.2	21	0.5	57.0	0.259	86.4	0.302
36	18.0	8.4	18.5	22	0.5	56.8	0.258	85.1	0.298
37	17.2	8.6	19.3	21	0.5	57.1	0.259	86.5	0.303
38	18.4	8.7	17.9	22	0.6	56.8	0.261	86.4	0.302
39	18.0	8.3	18.2	22	0.5	57.1	0.260	86.6	0.303
40	16.9	7.5	19.3	21	0.5	57.0	0.259	87.3	0.305
41	17.6	7.8	18.9	21	0.5	56.8	0.262	87.5	0.306
42	17.1	6.8	18.6	21	0.5	56.8	0.247	84.2	0.295
43	18.2	8.1	18.7	22	0.5	57.1	0.259	84.8	0.297
44	18.2	7.5	19.4	22	0.5	56.7	0.263	89.5	0.313
Average	18.9	9.6	18.1	23	0.6	55.8	0.264	86.3	0.302

Total number of blows analyzed: 43

Time Summary

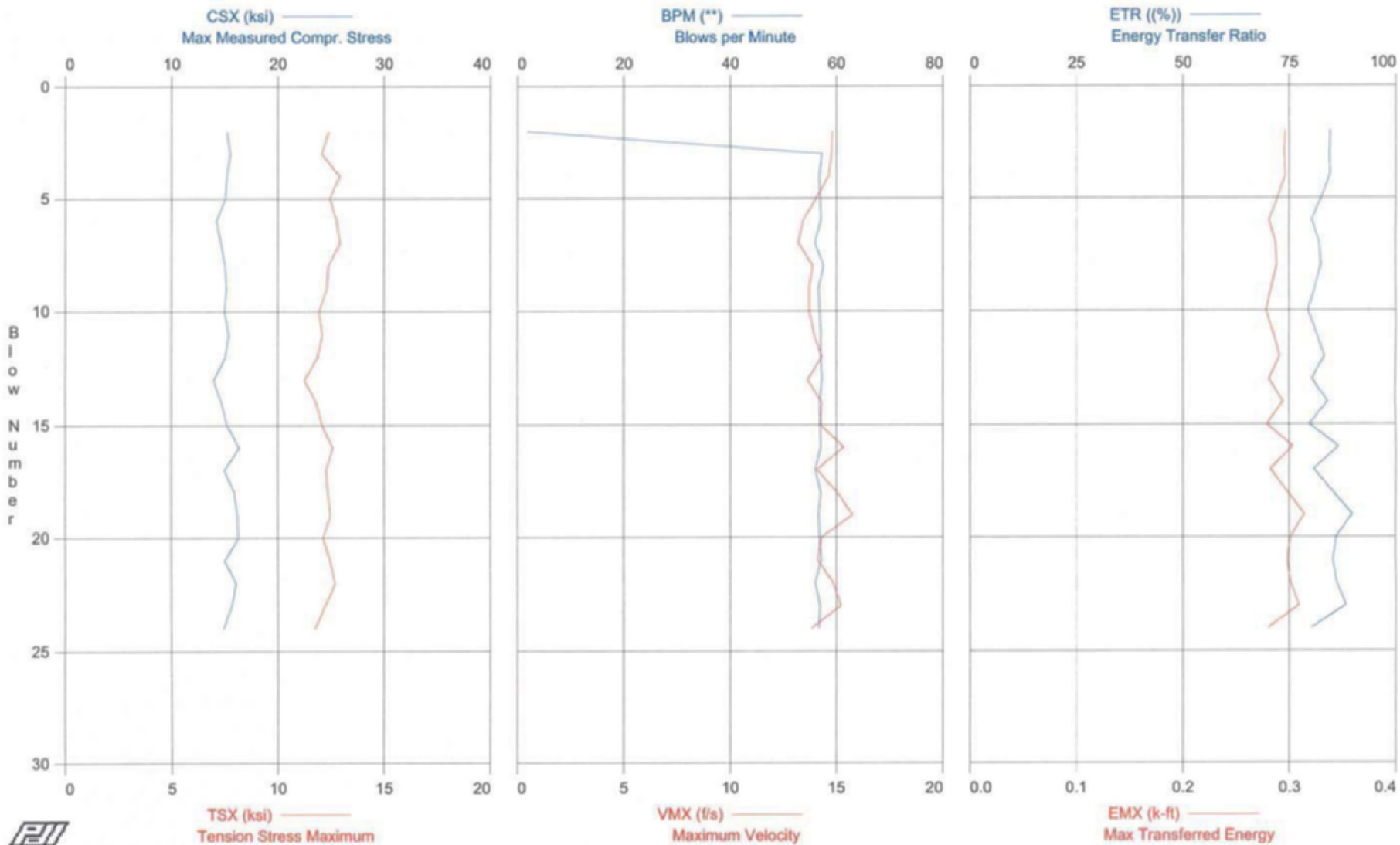
Drive 11:40:58 AM - 11:40:58 AM (1/22/2009) BN 1 - 1
 Stop 10 minutes 16 seconds 11:40:58 AM - 11:51:14 AM
 Drive 44 seconds 11:51:14 AM - 11:51:58 AM BN 2 - 44
 Total time [0:11:00] = (Driving [0:00:44] + Stop [0:10:16])

PDILOT Ver. 2008.2 - Printed: 25-Feb-2009

MACTEC Engineering and Consulting, Inc. - Case Method Results

Test date: 21-Feb-2009

EXELON VICTORIA - Boring B3290 (38.5'-40' sample)



EXELON VICTORIA - Boring B3290 (38.5'-40' sample)
OP: JNH

Hammer ID: CME08; Driller: L.CARTER CME550 (MACTEC)
Test date: 21-Feb-2009

AR: 2.27 in² SP: 0.492 k/ft³
LE: 44.00 ft EM: 30,000 ksi
WS: 16,807.9 l/s JC: 0.70

CSX: Max Measured Compr. Stress BPM: Blows per Minute
TSX: Tension Stress Maximum EF2: Energy of F²
VMX: Maximum Velocity ETR: Energy Transfer Ratio
FMX: Maximum Force EMX: Max Transferred Energy
FVP: Force/Velocity proportionality

BL#	CSX ksi	TSX ksi	VMX l/s	FMX kips	FVP []	BPM **	EF2 k-ft	ETR (%)	EMX k-ft
2	15.2	12.4	14.8	35	0.6	1.9	0.228	84.5	0.296
3	15.5	12.1	14.8	35	0.5	57.2	0.228	84.4	0.295
4	15.2	12.9	14.6	35	0.5	56.7	0.226	84.5	0.296
5	15.1	12.4	14.0	34	0.6	56.9	0.225	82.5	0.289
6	14.2	12.8	13.4	32	0.6	57.0	0.221	80.2	0.281
7	14.6	12.9	13.2	33	0.6	55.9	0.223	82.0	0.287
8	15.0	12.4	13.9	34	0.6	57.5	0.223	82.4	0.288
9	15.2	12.3	13.7	34	0.6	56.6	0.222	80.9	0.283
10	15.0	11.9	13.7	34	0.6	56.8	0.217	79.4	0.278
11	15.4	12.1	13.9	35	0.5	57.0	0.225	81.3	0.285
12	15.1	11.9	14.3	34	0.5	57.0	0.225	83.2	0.291
13	14.0	11.3	13.6	32	0.6	57.2	0.213	80.3	0.281
14	14.7	11.8	14.3	33	0.6	56.8	0.225	84.0	0.294
15	15.3	12.1	14.2	35	0.5	56.9	0.224	79.6	0.279
16	16.4	12.6	15.3	37	0.5	57.0	0.228	86.6	0.303
17	15.0	12.3	14.1	34	0.6	56.0	0.225	80.6	0.282
18	15.9	12.4	15.0	36	0.5	57.0	0.232	85.2	0.298
19	16.2	12.5	15.8	37	0.5	56.6	0.235	89.7	0.314
20	16.3	12.1	14.3	37	0.6	56.8	0.238	86.0	0.301
21	15.0	12.5	14.1	34	0.6	57.1	0.230	85.2	0.298
22	16.1	12.7	14.8	36	0.6	56.0	0.238	86.1	0.301
23	15.6	12.2	15.2	36	0.6	56.9	0.238	88.3	0.309
24	14.9	11.7	13.8	34	0.6	56.7	0.223	80.1	0.280
Average	15.3	12.3	14.3	35	0.6	54.4	0.227	83.3	0.292

Total number of blows analyzed: 23

Time Summary

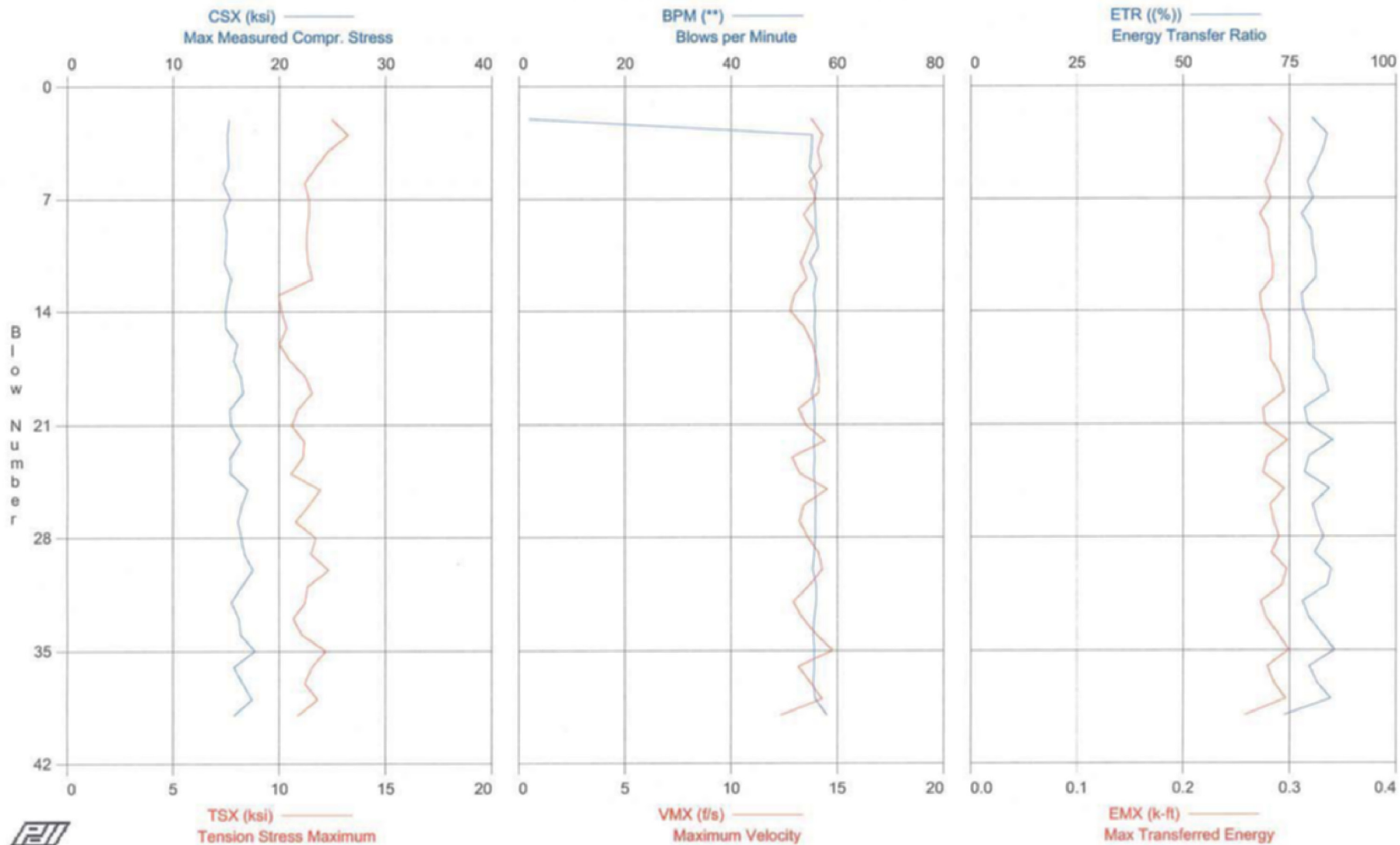
Drive 2:29:34 PM - 2:29:34 PM (2/21/2009) BN 1 - 1
Stop 16 minutes 6 seconds 2:29:34 PM - 2:45:40 PM
Drive 24 seconds 2:45:40 PM - 2:46:04 PM BN 2 - 24
Total time [0:16:30] = (Driving [0:00:24] + Stop [0:16:06])

PDILOT Ver. 2008.2 - Printed: 25-Feb-2009

MACTEC Engineering and Consulting, Inc. - Case Method Results

Test date: 21-Feb-2009

EXELON VICTORIA - Boring B3290 (43.5'-45' sample)



EXELON VICTORIA - Boring B3290 (43.5'-45' sample)
OP: JNH

Hammer ID: CME08; Driller: L.CARTER CME550 (MACTEC)
Test date: 21-Feb-2009

AR: 2.27 in² SP: 0.492 k/ft³
LE: 49.00 ft EM: 30.000 ksi
WS: 16,807.9 f/s JC: 0.70

CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force
FVP: Force/Velocity proportionality
BPM: Blows per Minute
EF2: Energy of F²
ETR: Energy Transfer Ratio
EMX: Max Transferred Energy

BL#	CSX ksi	TSX ksi	VMX f/s	FMX kips	FVP []	BPM **	EF2 k-ft	ETR (%)	EMX k-ft
2	15.3	12.4	13.8	35	0.6	1.9	0.218	80.1	0.280
3	15.1	13.2	14.3	34	0.6	55.2	0.230	83.8	0.293
4	15.1	12.3	14.1	34	0.6	55.1	0.229	82.8	0.290
5	15.2	11.7	14.2	35	0.6	54.7	0.222	81.1	0.284
6	14.7	11.2	13.7	33	0.6	56.1	0.217	79.1	0.277
7	15.4	11.4	14.0	35	0.6	55.6	0.221	80.5	0.282
8	14.8	11.4	13.4	33	0.6	55.8	0.218	77.7	0.272
9	15.0	11.3	13.9	34	0.6	55.9	0.219	80.0	0.280
10	15.0	11.3	13.6	34	0.6	56.4	0.221	80.3	0.281
11	14.8	11.4	13.3	34	0.6	54.8	0.225	81.1	0.284
12	15.5	11.5	13.5	35	0.6	56.0	0.231	81.1	0.284
13	15.1	10.0	13.0	34	0.6	55.5	0.223	77.8	0.272
14	14.9	10.1	12.8	34	0.6	55.8	0.226	78.2	0.274
15	15.0	10.3	13.4	34	0.6	55.6	0.228	79.9	0.280
16	16.0	10.0	13.8	36	0.6	55.9	0.233	80.7	0.282
17	15.7	10.5	14.0	36	0.6	55.8	0.229	80.7	0.282
18	16.4	11.2	14.1	37	0.6	55.9	0.241	83.2	0.291
19	16.6	11.5	14.1	38	0.6	55.2	0.245	84.2	0.295
20	15.4	10.9	13.2	35	0.6	55.7	0.230	78.5	0.275
21	15.5	10.6	13.5	35	0.6	55.7	0.229	79.3	0.277
22	16.3	11.2	14.4	37	0.6	55.5	0.245	85.1	0.298
23	15.4	11.1	12.9	35	0.6	55.7	0.236	79.6	0.279
24	15.4	10.5	13.2	35	0.6	55.5	0.225	78.4	0.275
25	17.0	11.9	14.5	39	0.6	55.8	0.243	84.3	0.295
26	16.5	11.4	13.4	37	0.6	55.9	0.240	80.4	0.282
27	16.1	10.8	13.2	37	0.6	55.8	0.238	81.4	0.285
28	16.4	11.7	13.6	37	0.7	55.8	0.241	83.0	0.290
29	16.7	11.5	14.1	38	0.6	55.6	0.234	80.9	0.283
30	17.5	12.3	14.3	40	0.6	55.3	0.250	84.8	0.297
31	16.5	11.3	13.7	37	0.7	56.0	0.249	83.8	0.293
32	15.5	11.2	12.9	35	0.7	56.0	0.235	78.0	0.273
33	16.2	10.7	13.4	37	0.6	55.6	0.236	79.6	0.278
34	16.4	11.1	14.0	37	0.6	55.4	0.238	82.5	0.289
35	17.7	12.2	14.8	40	0.6	55.6	0.251	85.5	0.299
36	15.7	11.5	13.2	36	0.6	55.6	0.233	79.6	0.279
37	16.5	11.2	13.7	38	0.6	55.4	0.240	81.3	0.285
38	17.4	11.8	14.3	40	0.6	55.8	0.251	84.6	0.296
39	15.7	10.9	12.3	36	0.6	58.0	0.221	73.7	0.258
Average	15.8	11.3	13.7	36	0.6	54.3	0.233	81.0	0.283

Total number of blows analyzed: 38

Time Summary

Drive 4 minutes 58 seconds

2:57:39 PM - 3:02:37 PM (2/21/2009) BN 1 - 39

PDILOT Ver. 2008.2 - Printed: 25-Feb-2009

MACTEC Engineering and Consulting, Inc. - Case Method Results

Test date: 21-Feb-2009

EXELON VICTORIA - Boring B3290 (48.5'-50' sample)

