

CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 5'-6.5

DIEDRICH D.120 (027)

OP: MEH

Test date: 6-Jun-2013

AR: 1.21 in²

SP: 0.492 k/ft³

LE: 11.00 ft

EM: 30,000 ksi

WS: 16,807.9 f/s

JC: 0.00

CSI: Max F1 or F2 Compr. Stress

DFN: Final Displacement

CSX: Max Measured Compr. Stress

DMX: Maximum Displacement

TSX: Tension Stress Maximum

EMX: Max Transferred Energy

VMX: Maximum Velocity

ETR: Energy Transfer Ratio

FMX: Maximum Force

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
10	0.00	27.2	26.3	12.0	22.1	32	1.02	1.02	0.320	91.5
11	0.00	27.9	26.6	12.1	22.1	32	0.98	0.98	0.319	91.3
12	0.00	27.3	26.0	12.5	22.2	31	0.77	0.77	0.310	88.6
13	0.00	27.2	25.8	10.8	22.0	31	1.01	1.01	0.323	92.3
14	0.00	27.0	25.6	9.7	21.7	31	0.74	0.74	0.312	89.3
15	0.00	26.5	25.2	9.4	21.6	30	0.97	0.97	0.323	92.3
16	0.00	27.1	25.7	8.3	21.9	31	1.02	1.02	0.324	92.6
17	0.00	26.4	25.6	7.6	21.5	31	1.14	1.14	0.331	94.6
18	0.00	27.1	25.4	8.6	21.7	31	0.94	0.94	0.323	92.3
19	0.00	26.4	25.3	9.8	21.4	31	0.96	0.96	0.327	93.5
20	0.00	27.1	25.9	9.9	21.8	31	0.91	0.91	0.325	92.9
21	0.00	25.6	25.0	10.6	21.4	30	0.65	0.65	0.306	87.4
22	0.00	26.7	25.6	10.1	21.5	31	0.80	0.80	0.319	91.2
23	0.00	27.9	26.0	9.4	21.4	31	0.70	0.70	0.314	89.8
24	0.00	27.6	26.4	10.5	21.3	32	1.14	1.14	0.336	95.9
25	0.00	26.7	25.6	9.7	21.1	31	0.84	0.85	0.319	91.0
26	0.00	26.7	25.0	11.6	21.5	30	0.75	0.75	0.316	90.4
27	0.00	27.7	25.9	11.0	21.4	31	0.80	0.80	0.322	91.9
28	0.00	27.7	26.0	12.6	22.1	31	0.95	0.95	0.337	96.2
29	0.00	28.6	26.7	12.8	22.0	32	0.86	0.86	0.334	95.5
30	0.00	27.4	26.2	12.6	21.9	32	0.97	0.97	0.330	94.4
Average		27.1	25.8	10.6	21.7	31	0.90	0.90	0.322	92.1

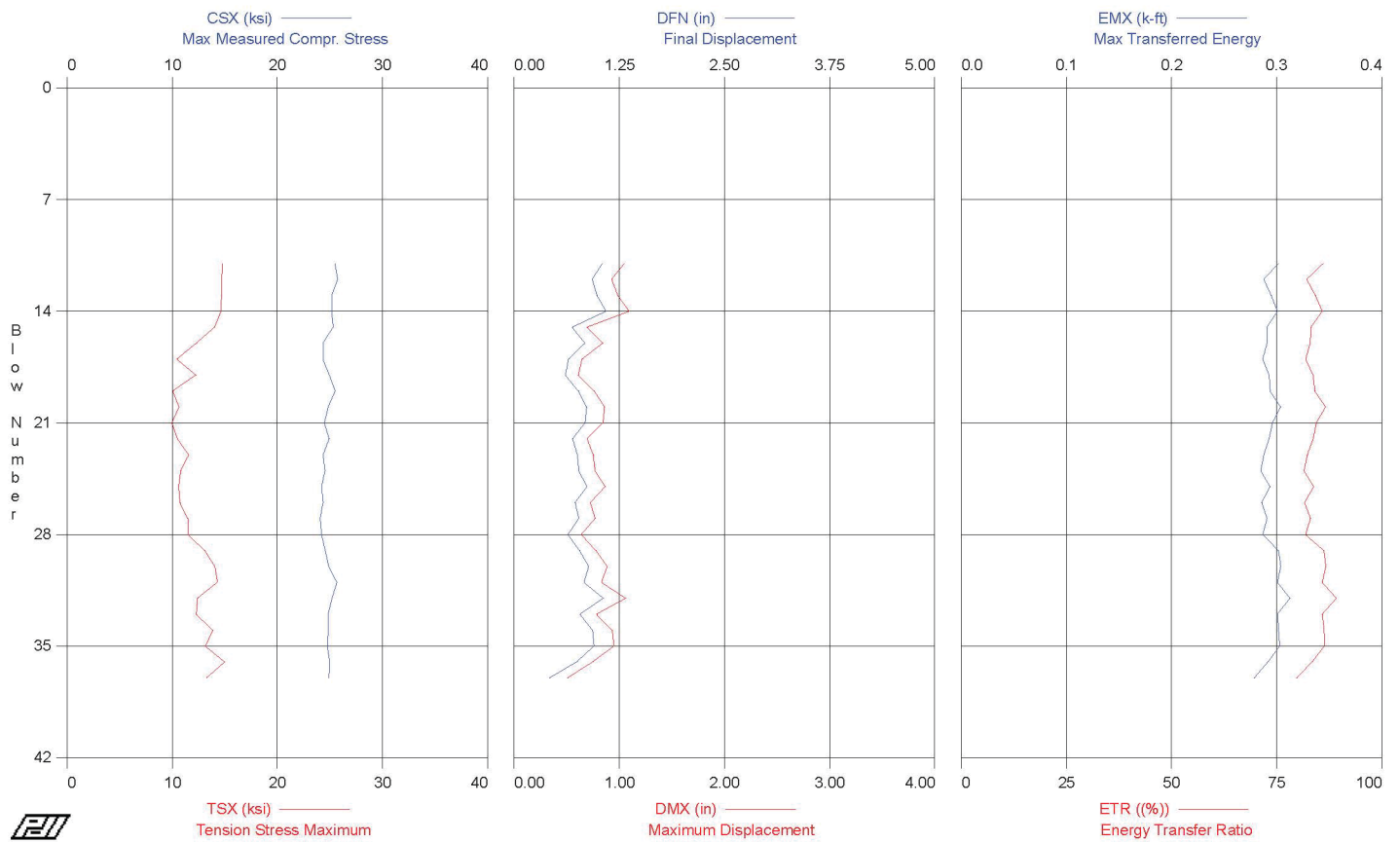
Total number of blows analyzed: 21

Time Summary

Drive 48 seconds

11:13:20 AM - 11:14:08 AM (6/6/2013) BN 1 - 31

CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 6.5'-8'



CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 6.5'-8'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in²
LE: 12.00 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.00

CSI: Max F1 or F2 Compr. Stress
CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force

DFN: Final Displacement
DMX: Maximum Displacement
EMX: Max Transferred Energy
ETR: Energy Transfer Ratio

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
11	0.00	27.6	25.5	14.7	21.4	31	1.05	1.05	0.302	86.2
12	0.00	28.1	25.7	14.7	21.5	31	0.93	0.93	0.288	82.2
13	0.00	27.5	25.2	14.7	21.3	30	0.99	0.99	0.295	84.3
14	0.00	27.8	25.2	14.6	21.4	30	1.10	1.10	0.301	85.9
15	0.00	28.1	25.3	14.0	21.3	31	0.69	0.69	0.291	83.2
16	0.00	26.3	24.3	12.3	21.0	29	0.84	0.84	0.291	83.0
17	0.00	25.9	24.3	10.4	20.8	29	0.65	0.65	0.287	81.9
18	0.00	27.4	25.0	12.3	21.6	30	0.61	0.61	0.293	83.7
19	0.00	26.5	25.5	10.1	20.8	31	0.76	0.76	0.294	84.1
20	0.00	27.3	24.9	10.7	21.4	30	0.86	0.86	0.304	86.7
21	0.00	25.7	24.5	10.0	20.4	30	0.85	0.85	0.296	84.5
22	0.00	26.7	24.9	10.5	21.1	30	0.70	0.70	0.293	83.8
23	0.00	26.0	24.4	11.6	21.2	29	0.75	0.75	0.288	82.3
24	0.00	25.8	24.5	10.8	20.2	30	0.77	0.77	0.285	81.5
25	0.00	25.4	24.2	10.6	20.6	29	0.87	0.87	0.294	83.9
26	0.00	25.6	24.4	10.7	20.8	29	0.73	0.73	0.286	81.7
27	0.00	26.5	24.1	11.5	21.1	29	0.77	0.77	0.291	83.1
28	0.00	25.5	24.2	11.5	20.3	29	0.64	0.64	0.287	81.9
29	0.00	26.3	24.6	13.1	21.3	30	0.78	0.78	0.302	86.3
30	0.00	27.4	24.9	14.1	21.2	30	0.89	0.89	0.304	86.7
31	0.00	27.9	25.7	14.3	21.5	31	0.83	0.83	0.301	85.9
32	0.00	27.3	25.2	12.4	20.9	31	1.06	1.06	0.313	89.3
33	0.00	27.4	24.8	12.3	21.2	30	0.78	0.78	0.301	85.9
34	0.00	26.7	24.9	13.9	21.2	30	0.93	0.93	0.302	86.3
35	0.00	27.6	24.8	13.2	21.3	30	0.95	0.95	0.303	86.4
36	0.00	27.1	25.0	15.0	21.4	30	0.75	0.75	0.292	83.5
37	0.00	27.6	24.9	13.3	21.0	30	0.42	0.51	0.279	79.8
Average		26.9	24.8	12.5	21.1	30	0.81	0.82	0.295	84.2

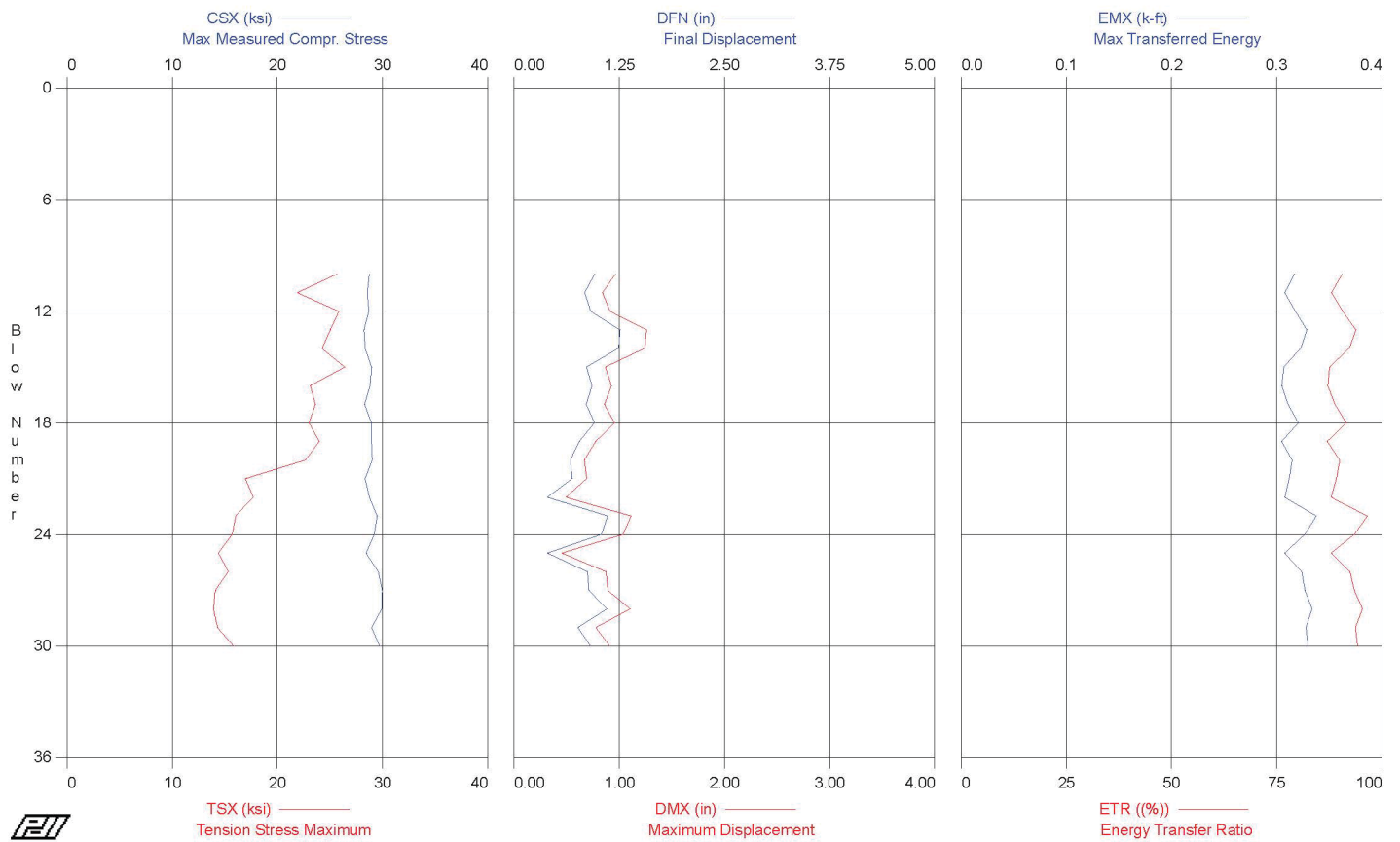
Total number of blows analyzed: 27

Time Summary

Drive 47 seconds

11:18:52 AM - 11:19:39 AM (6/6/2013) BN 1 - 38

CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 8'-9.5'



CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 8'-9.5'

DIEDRICH D.120 (027)

OP: MEH

Test date: 6-Jun-2013

AR: 1.21 in²

SP: 0.492 k/ft³

LE: 14.00 ft

EM: 30,000 ksi

WS: 16,807.9 f/s

JC: 0.00

CSI: Max F1 or F2 Compr. Stress

DFN: Final Displacement

CSX: Max Measured Compr. Stress

DMX: Maximum Displacement

TSX: Tension Stress Maximum

EMX: Max Transferred Energy

VMX: Maximum Velocity

ETR: Energy Transfer Ratio

FMX: Maximum Force

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
10	0.00	31.5	28.8	25.7	24.8	35	0.96	0.97	0.317	90.6
11	0.00	29.6	28.6	21.9	24.1	35	0.84	0.84	0.308	88.1
12	0.00	31.2	28.7	25.9	24.5	35	0.91	0.91	0.318	90.8
13	0.00	30.6	28.2	25.0	24.8	34	1.26	1.26	0.329	93.9
14	0.00	29.4	28.4	24.3	24.4	34	1.24	1.24	0.323	92.3
15	0.00	31.7	29.0	26.4	24.6	35	0.86	0.87	0.307	87.6
16	0.00	31.5	28.8	23.1	23.5	35	0.93	0.93	0.305	87.2
17	0.00	30.3	28.3	23.6	24.1	34	0.86	0.86	0.311	88.9
18	0.00	31.2	29.0	23.0	24.0	35	0.96	0.96	0.321	91.6
19	0.00	32.1	29.0	24.0	24.3	35	0.78	0.78	0.305	87.1
20	0.00	32.0	29.0	22.7	23.4	35	0.67	0.67	0.315	90.1
21	0.00	30.1	28.4	17.0	21.4	34	0.69	0.69	0.312	89.2
22	0.00	31.6	28.8	17.7	21.4	35	0.40	0.49	0.308	88.0
23	0.00	32.3	29.5	16.0	21.0	36	1.11	1.11	0.338	96.7
24	0.00	32.0	29.2	15.7	20.9	35	1.04	1.04	0.327	93.5
25	0.00	31.9	28.5	14.4	20.7	34	0.40	0.46	0.308	88.0
26	0.00	33.0	29.6	15.4	21.1	36	0.87	0.87	0.324	92.5
27	0.00	32.9	30.0	14.1	21.0	36	0.89	0.89	0.327	93.5
28	0.00	33.5	29.9	13.9	20.9	36	1.11	1.11	0.334	95.5
29	0.00	32.6	29.0	14.3	21.0	35	0.76	0.78	0.328	93.8
30	0.00	32.3	29.7	15.9	21.2	36	0.91	0.91	0.330	94.3
Average		31.6	29.0	20.0	22.7	35	0.88	0.89	0.319	91.1

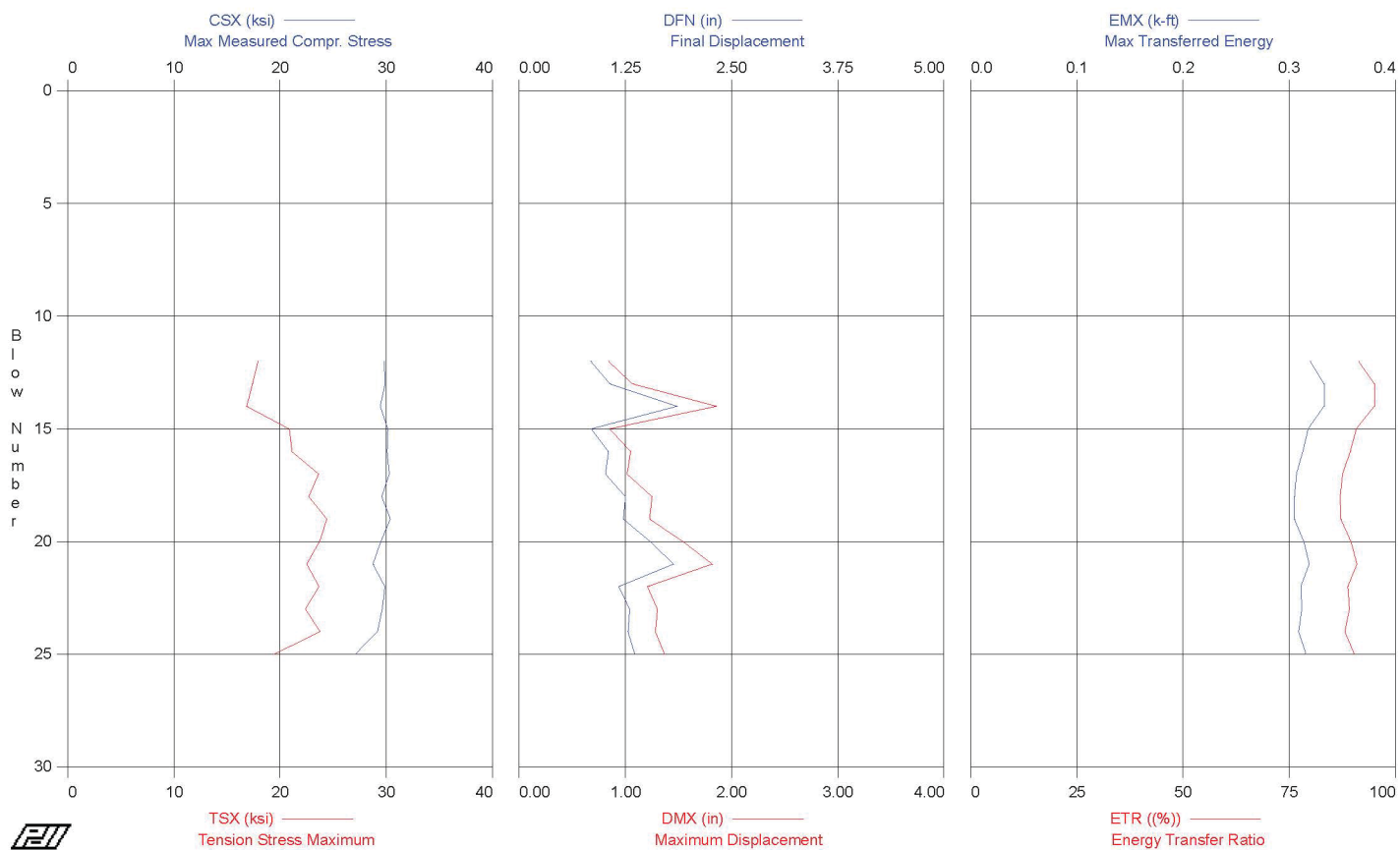
Total number of blows analyzed: 21

Time Summary

Drive 43 seconds

11:23:14 AM - 11:23:57 AM (6/6/2013) BN 1 - 35

CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 9.5'-11'



CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 9.5'-11'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in²
LE: 16.00 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.00

CSI: Max F1 or F2 Compr. Stress
CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force

DFN: Final Displacement
DMX: Maximum Displacement
EMX: Max Transferred Energy
ETR: Energy Transfer Ratio

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
12	0.00	31.5	29.8	17.9	20.9	36	0.84	0.84	0.320	91.4
13	0.00	31.8	29.9	17.4	20.7	36	1.07	1.07	0.333	95.1
14	0.00	30.6	29.4	16.9	19.7	36	1.86	1.86	0.333	95.1
15	0.00	31.4	30.2	20.9	22.5	36	0.85	0.85	0.318	90.8
16	0.00	31.2	30.1	21.1	22.8	36	1.05	1.05	0.313	89.4
17	0.00	31.5	30.3	23.6	23.3	37	1.02	1.02	0.307	87.6
18	0.00	30.7	29.6	22.7	23.5	36	1.25	1.25	0.305	87.0
19	0.00	31.9	30.4	24.4	24.5	37	1.23	1.23	0.305	87.2
20	0.00	31.5	29.5	23.7	23.7	36	1.55	1.55	0.314	89.6
21	0.00	30.2	28.8	22.5	23.6	35	1.82	1.82	0.319	91.0
22	0.00	31.1	29.9	23.7	23.1	36	1.17	1.21	0.311	88.8
23	0.00	30.7	29.6	22.4	22.4	36	1.30	1.30	0.312	89.2
24	0.00	30.2	29.2	23.8	22.9	35	1.28	1.28	0.309	88.1
25	0.00	27.9	27.1	19.5	21.8	33	1.36	1.37	0.316	90.4
Average		30.9	29.6	21.5	22.5	36	1.26	1.26	0.315	90.1

Total number of blows analyzed: 14

Time Summary

Drive 46 seconds

11:27:45 AM - 11:28:31 AM (6/6/2013) BN 1 - 25

TABLE 2
SUMMARY OF SPT ENERGY MEASUREMENTS (ASTM D4633-10)
M&W Drilling SPT Energy Measurements (1500 RPM)

Oak Ridge, Tennessee

AMEC Project No. 6468-13-1072



Rig 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)
R308 Diedrich D-120	M&W Drilling	George Akins	Test hole #8 (near MET Tower)	6/6/2013	AW-J	11.0-12.5	7-6-5	11	258	73.7%
						12.5-14.0	6-6-7	13	277	79.1%
						14.0-15.5	8-8-11	19	298	85.1%
						Average for Rig:				

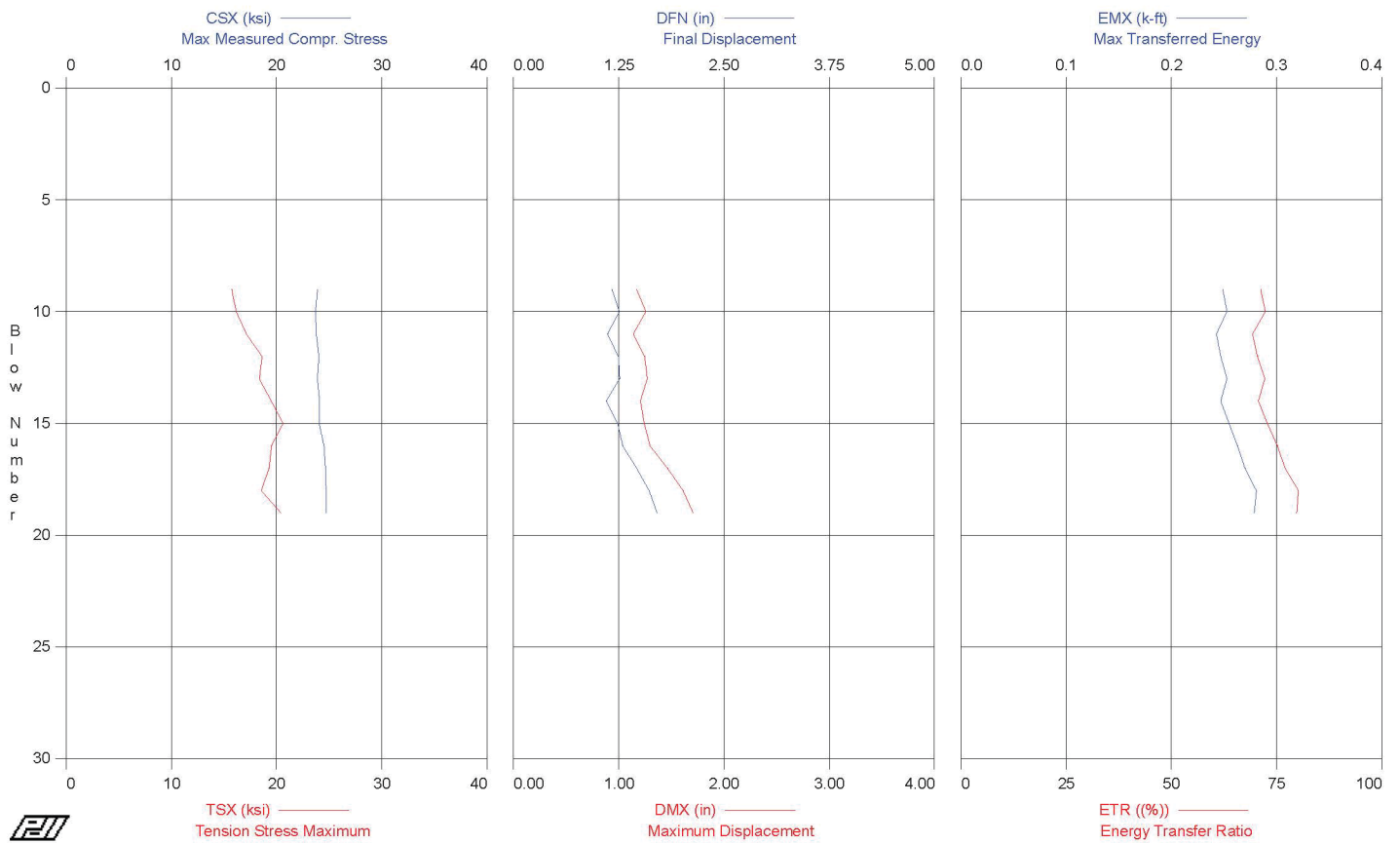
^aMeasured Energy is energy based on the EFV method, as outlined in ASTM D4633-10, for each blow recorded by the PDA. Only blows used to calculate N-values were considered per ASTM D4633-10. In some cases, the initial and/or final one to two blows produced poor quality data, and were not used to calculate the Average Measured Energy.

EFV = $EMX * 1000 \text{ lbs/kip}$, where EMX equals the 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: MA	Date: 1-10-14	Checked By: SA	Date: 1-10-14
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CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 11'-12.5'



CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 11'-12.5'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in²
LE: 16.00 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.00

CSI: Max F1 or F2 Compr. Stress
CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force

DFN: Final Displacement
DMX: Maximum Displacement
EMX: Max Transferred Energy
ETR: Energy Transfer Ratio

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
9	0.00	25.5	23.9	15.7	21.4	29	1.17	1.17	0.249	71.2
10	0.00	24.9	23.7	16.2	21.3	29	1.26	1.26	0.253	72.4
11	0.00	25.2	23.8	17.2	21.7	29	1.12	1.14	0.243	69.3
12	0.00	25.2	24.0	18.6	22.0	29	1.25	1.25	0.247	70.5
13	0.00	25.7	23.9	18.4	22.3	29	1.26	1.27	0.253	72.2
14	0.00	26.1	24.1	19.5	22.5	29	1.10	1.21	0.247	70.7
15	0.00	25.9	24.1	20.6	22.7	29	1.24	1.24	0.255	72.9
16	0.00	26.7	24.5	19.5	21.8	30	1.30	1.30	0.263	75.2
17	0.00	27.1	24.7	19.3	21.9	30	1.46	1.46	0.270	77.1
18	0.00	26.5	24.7	18.6	22.0	30	1.61	1.61	0.281	80.3
19	0.00	26.5	24.7	20.4	22.6	30	1.71	1.71	0.279	79.8
Average		25.9	24.2	18.5	22.0	29	1.32	1.33	0.258	73.8

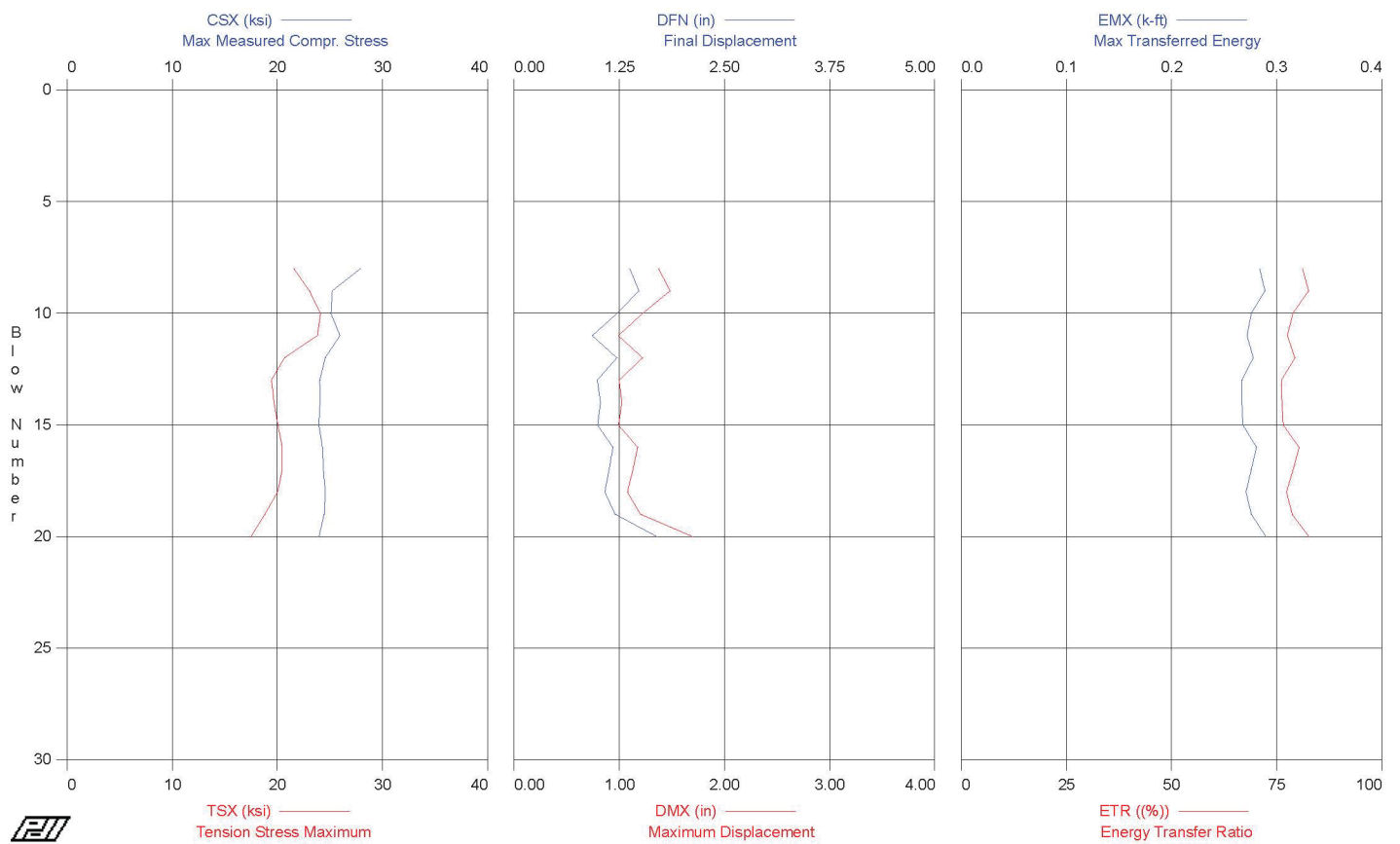
Total number of blows analyzed: 11

Time Summary

Drive 39 seconds

11:32:49 AM - 11:33:28 AM (6/6/2013) BN 1 - 19

CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 12.5'-14'



CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 12.5'-14'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in²
LE: 17.00 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.00

CSI: Max F1 or F2 Compr. Stress
CSX: Max Measured Compr. Stress
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VMX: Maximum Velocity
FMX: Maximum Force

DFN: Final Displacement
DMX: Maximum Displacement
EMX: Max Transferred Energy
ETR: Energy Transfer Ratio

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
8	0.00	31.2	27.9	21.6	24.3	34	1.38	1.38	0.284	81.2
9	0.00	26.8	25.2	23.1	22.4	31	1.49	1.49	0.289	82.6
10	0.00	27.5	25.1	24.1	22.9	30	1.23	1.23	0.276	78.9
11	0.00	28.1	26.0	23.8	23.4	31	0.93	0.99	0.272	77.6
12	0.00	25.6	24.6	20.7	21.7	30	1.22	1.22	0.278	79.4
13	0.00	25.5	24.0	19.4	20.8	29	0.99	1.00	0.267	76.2
14	0.00	25.6	24.1	19.7	20.8	29	1.03	1.03	0.267	76.3
15	0.00	25.8	23.9	20.1	21.2	29	0.99	0.99	0.268	76.6
16	0.00	26.0	24.3	20.5	21.4	29	1.18	1.18	0.281	80.4
17	0.00	25.7	24.4	20.5	20.9	30	1.13	1.13	0.276	79.0
18	0.00	27.0	24.6	20.0	20.9	30	1.08	1.08	0.271	77.4
19	0.00	26.5	24.5	18.8	20.4	30	1.20	1.20	0.276	78.7
20	0.00	26.2	24.0	17.5	19.5	29	1.70	1.70	0.290	82.7
Average		26.7	24.8	20.8	21.6	30	1.19	1.20	0.277	79.0

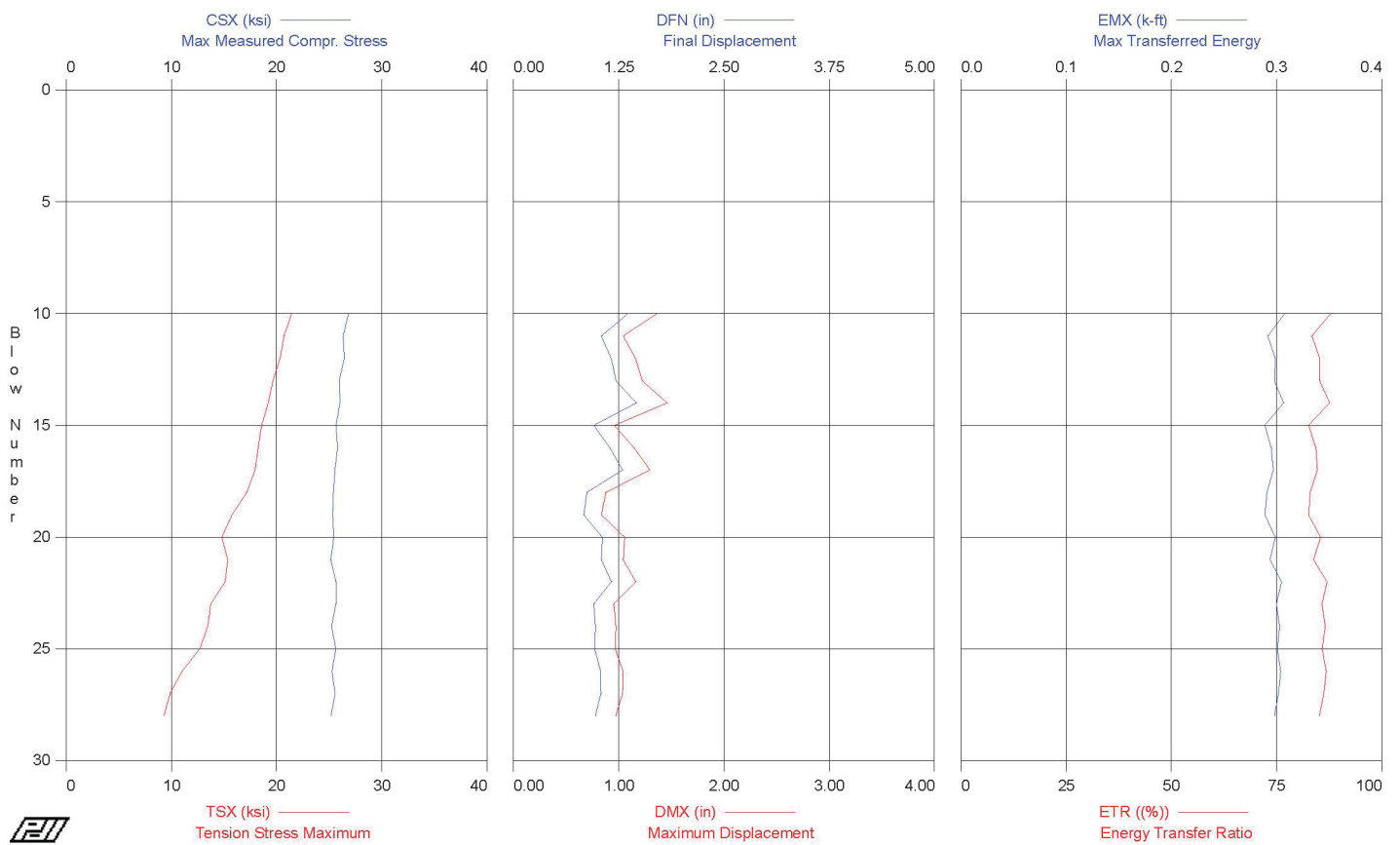
Total number of blows analyzed: 13

Time Summary

Drive 44 seconds

11:37:33 AM - 11:38:17 AM (6/6/2013) BN 1 - 20

CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 14'-15.5'



CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 14'-15.5'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in²
LE: 19.00 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft³
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BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
10	0.00	28.9	26.9	21.4	21.3	32	1.36	1.36	0.308	87.9
11	0.00	27.9	26.3	20.7	20.9	32	1.04	1.04	0.292	83.5
12	0.00	28.3	26.4	20.3	20.8	32	1.16	1.16	0.299	85.3
13	0.00	27.6	26.0	19.7	20.5	31	1.22	1.22	0.298	85.3
14	0.00	27.7	26.0	19.2	20.5	32	1.46	1.46	0.307	87.7
15	0.00	27.5	25.7	18.6	20.0	31	0.96	0.96	0.289	82.7
16	0.00	27.3	25.8	18.3	19.7	31	1.15	1.15	0.295	84.4
17	0.00	27.1	25.6	18.0	19.4	31	1.30	1.30	0.297	84.7
18	0.00	26.6	25.4	17.2	19.7	31	0.87	0.88	0.291	83.1
19	0.00	26.7	25.3	15.8	19.5	31	0.84	0.84	0.289	82.7
20	0.00	27.1	25.5	14.8	19.8	31	1.06	1.06	0.299	85.5
21	0.00	26.6	25.2	15.4	19.4	30	1.04	1.04	0.294	83.9
22	0.00	26.9	25.7	15.1	19.8	31	1.16	1.16	0.305	87.0
23	0.00	27.0	25.7	13.8	19.7	31	0.95	0.95	0.300	85.8
24	0.00	26.8	25.2	13.5	19.5	31	0.97	0.97	0.303	86.6
25	0.00	27.3	25.6	12.7	19.5	31	0.97	0.97	0.301	85.9
26	0.00	26.8	25.3	11.0	19.4	31	1.04	1.04	0.304	86.9
27	0.00	27.2	25.6	9.9	19.3	31	1.04	1.04	0.302	86.3
28	0.00	26.7	25.2	9.3	19.5	30	0.97	0.97	0.298	85.2
Average		27.3	25.7	16.0	19.9	31	1.08	1.08	0.298	85.3

Total number of blows analyzed: 19

Time Summary

Drive 55 seconds

11:42:51 AM - 11:43:46 AM (6/6/2013) BN 1 - 28

TABLE 3

SUMMARY OF SPT ENERGY MEASUREMENTS (ASTM D4633-10)

M&W Drilling SPT Energy Measurements (2500 RPM)

Oak Ridge, Tennessee

AMEC Project No. 6468-13-1072



Rig Serial Number and 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)
R308 Diedrich D-120	M&W Drilling	George Akins	Test hole #8 (near MET Tower)	6/6/2013	AW-J	15.5-17.0	11-10-10	20	325	92.9%
						17.0-18.5	11-10-10	20	308	88.0%
						18.5-20.0	7-8-10	18	309	88.3%
Average for Rig:									314.2	89.8%

^aMeasured Energy is energy based on the EFV method, as outlined in ASTM D4633-10, for each blow recorded by the PDA. Only blows used to calculate N-values were considered per ASTM D4633-10. In some cases, the initial and/or final one to two blows produced poor quality data, and were not used to calculate the Average Measured Energy.

EFV = $EMX \times 1000 \text{ lbs/kip}$, where EMX equals the 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.

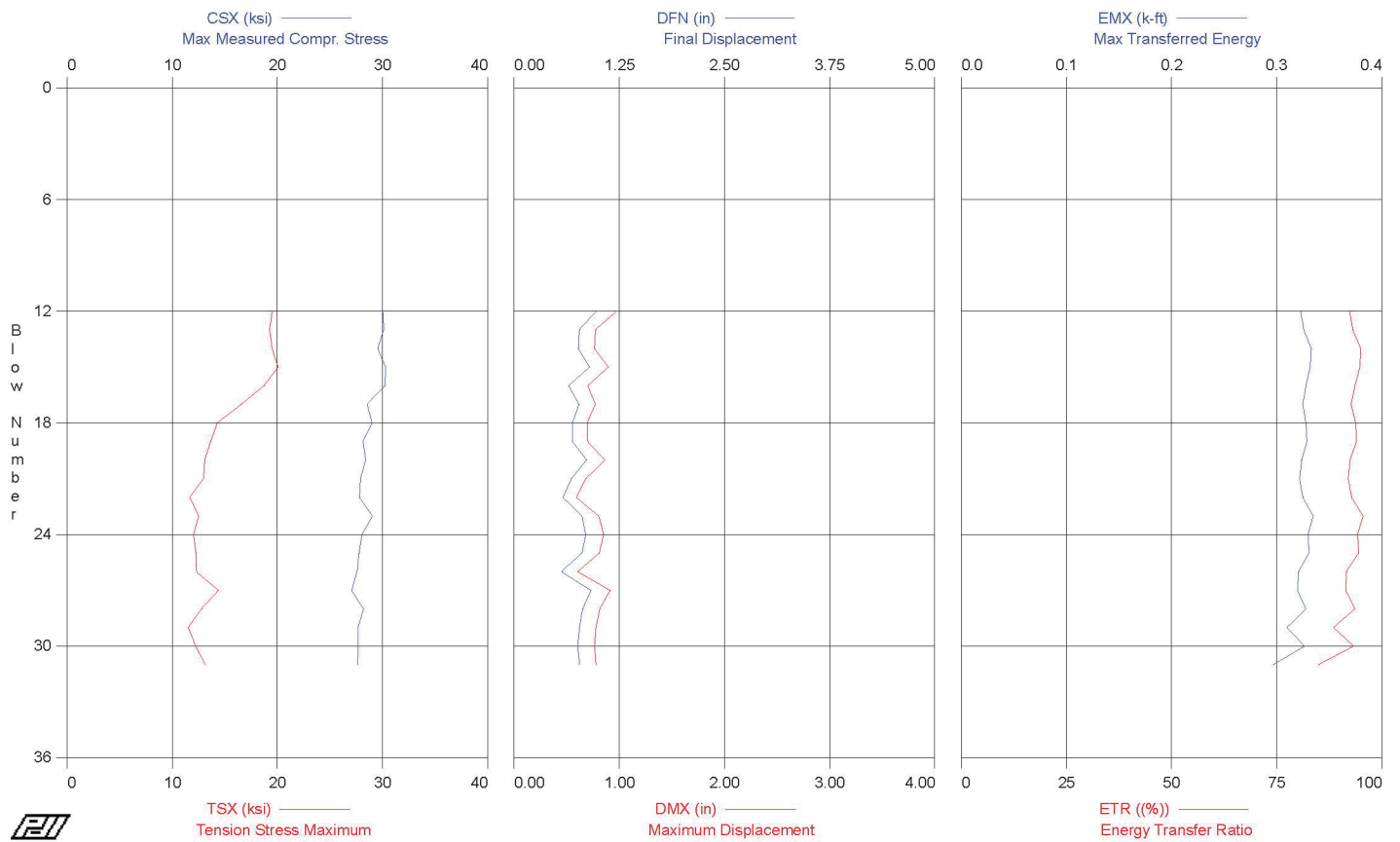
Prepared By: *MLH*

Date: 1-10-14

Checked By: *AL*

Date: 1-10-14

CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 15.5'-17'



CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 15.5'-17'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in²

SP: 0.492 k/ft³

LE: 21.00 ft

EM: 30,000 ksi

WS: 16,807.9 f/s

JC: 0.00

CSI: Max F1 or F2 Compr. Stress

DFN: Final Displacement

CSX: Max Measured Compr. Stress

DMX: Maximum Displacement

TSX: Tension Stress Maximum

EMX: Max Transferred Energy

VMX: Maximum Velocity

ETR: Energy Transfer Ratio

FMX: Maximum Force

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
12	0.00	31.9	30.0	19.5	21.9	36	0.98	0.98	0.323	92.4
13	0.00	32.8	30.1	19.3	22.2	36	0.77	0.77	0.326	93.2
14	0.00	31.9	29.6	19.5	22.0	36	0.76	0.76	0.333	95.1
15	0.00	32.8	30.3	20.1	22.8	37	0.90	0.90	0.332	94.8
16	0.00	32.4	30.2	18.7	22.2	37	0.65	0.70	0.328	93.7
17	0.00	30.5	28.6	16.6	21.5	35	0.77	0.77	0.325	92.7
18	0.00	31.0	29.0	14.3	22.0	35	0.69	0.70	0.328	93.9
19	0.00	30.1	28.2	13.7	20.7	34	0.70	0.70	0.329	94.0
20	0.00	29.7	28.4	13.1	21.0	34	0.86	0.87	0.324	92.5
21	0.00	29.1	27.9	13.0	21.2	34	0.68	0.68	0.322	92.1
22	0.00	29.5	27.8	11.7	20.6	34	0.58	0.59	0.325	92.9
23	0.00	30.8	29.1	12.5	21.3	35	0.81	0.81	0.335	95.6
24	0.00	29.7	28.1	12.0	20.0	34	0.85	0.85	0.330	94.3
25	0.00	29.1	27.8	12.3	21.1	34	0.81	0.81	0.331	94.6
26	0.00	29.5	27.6	12.3	20.8	33	0.56	0.61	0.321	91.6
27	0.00	28.1	27.1	14.4	19.6	33	0.92	0.92	0.320	91.5
28	0.00	29.8	28.2	12.8	20.6	34	0.81	0.82	0.328	93.7
29	0.00	29.0	27.7	11.5	19.8	34	0.78	0.78	0.310	88.6
30	0.00	29.5	27.7	12.3	21.1	34	0.76	0.77	0.327	93.4
31	0.00	28.8	27.6	13.1	18.6	33	0.78	0.78	0.297	85.0
Average		30.3	28.6	14.6	21.1	35	0.77	0.78	0.325	92.8

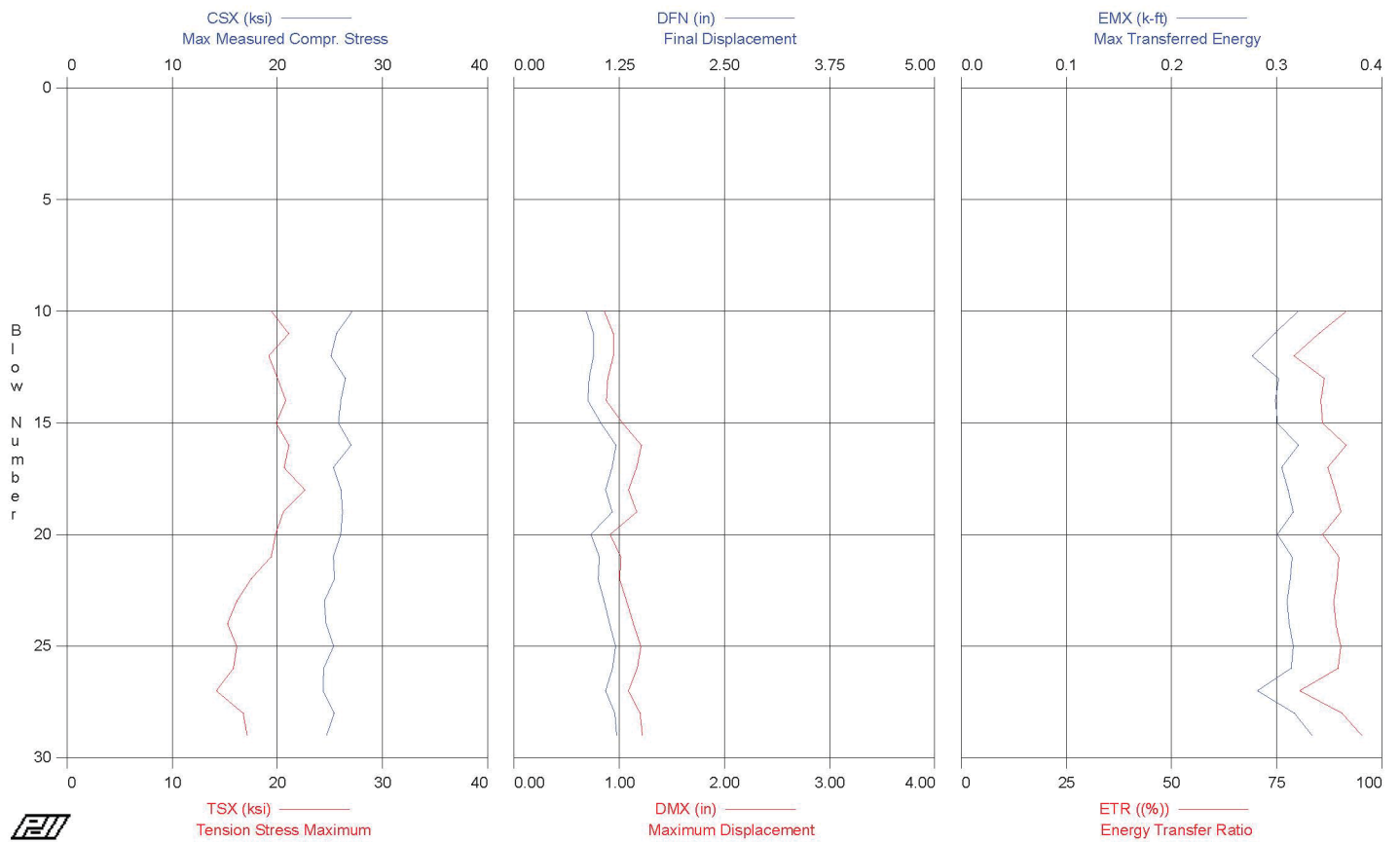
Total number of blows analyzed: 20

Time Summary

Drive 36 seconds

11:48:10 AM - 11:48:46 AM (6/6/2013) BN 1 - 32

CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 17'-18.5'



CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 17'-18.5'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in²
LE: 22.00 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.00

CSI: Max F1 or F2 Compr. Stress
CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force

DFN: Final Displacement
DMX: Maximum Displacement
EMX: Max Transferred Energy
ETR: Energy Transfer Ratio

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
10	0.00	30.9	27.1	19.5	21.8	33	0.86	0.86	0.321	91.7
11	0.00	28.5	25.6	21.1	20.3	31	0.95	0.95	0.298	85.1
12	0.00	28.1	25.1	19.2	19.4	30	0.94	0.94	0.277	79.2
13	0.00	30.2	26.5	20.0	20.5	32	0.89	0.89	0.302	86.4
14	0.00	27.5	26.0	20.8	19.8	32	0.88	0.88	0.299	85.5
15	0.00	29.0	25.8	19.9	19.8	31	1.03	1.03	0.301	85.9
16	0.00	30.2	27.0	21.1	19.9	33	1.21	1.21	0.321	91.6
17	0.00	27.9	25.3	20.7	19.8	31	1.17	1.17	0.305	87.2
18	0.00	29.1	26.1	22.7	19.7	32	1.09	1.09	0.311	88.9
19	0.00	28.4	26.2	20.6	20.8	32	1.17	1.17	0.316	90.4
20	0.00	28.7	26.0	19.8	19.1	32	0.91	0.92	0.301	86.0
21	0.00	28.7	25.3	19.4	20.2	31	1.01	1.01	0.315	89.9
22	0.00	27.1	25.4	17.5	20.3	31	1.00	1.00	0.313	89.4
23	0.00	26.0	24.5	16.1	19.7	30	1.07	1.07	0.310	88.6
24	0.00	25.8	24.6	15.3	19.5	30	1.14	1.14	0.312	89.1
25	0.00	27.2	25.4	16.1	19.6	31	1.21	1.21	0.316	90.3
26	0.00	26.1	24.4	15.8	19.6	30	1.17	1.17	0.314	89.7
27	0.00	25.5	24.4	14.2	17.9	29	1.09	1.09	0.282	80.6
28	0.00	26.6	25.4	16.8	19.8	31	1.20	1.20	0.317	90.6
29	0.00	26.9	24.7	17.1	19.6	30	1.22	1.22	0.334	95.3
Average		27.9	25.6	18.7	19.8	31	1.06	1.06	0.308	88.1

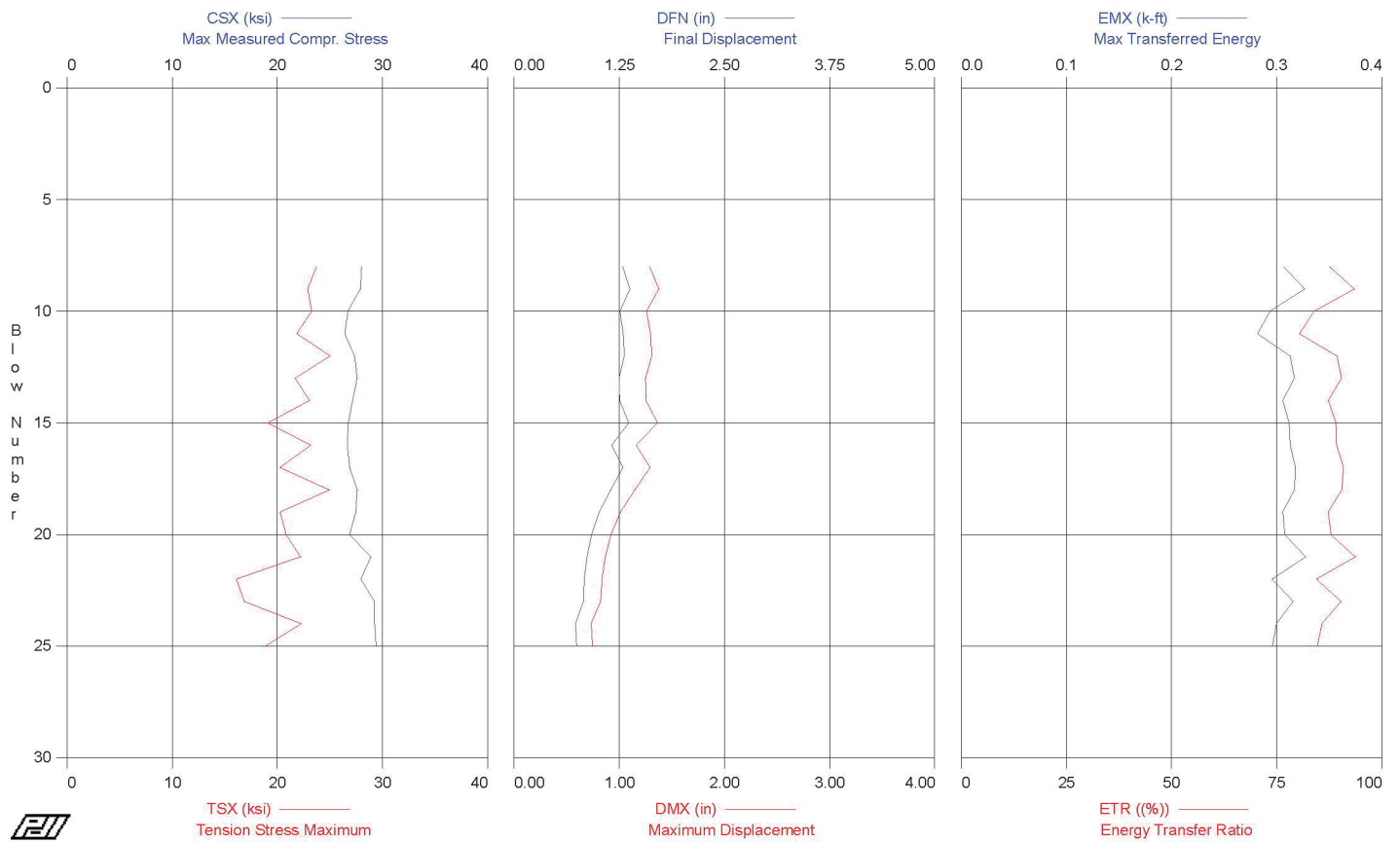
Total number of blows analyzed: 20

Time Summary

Drive 34 seconds

11:52:44 AM - 11:53:18 AM (6/6/2013) BN 1 - 29

CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 18.5'-20'



CLINCH RIVER SMR - CLINCH RIVER MWD (GEORGE A) 18.5'-20'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in²
LE: 24.00 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.00

CSI: Max F1 or F2 Compr. Stress
CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force

DFN: Final Displacement
DMX: Maximum Displacement
EMX: Max Transferred Energy
ETR: Energy Transfer Ratio

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
8	0.00	29.7	28.0	23.7	19.0	34	1.29	1.29	0.307	87.7
9	0.00	28.8	27.9	22.9	19.0	34	1.38	1.38	0.327	93.6
10	0.00	28.7	26.7	23.3	17.1	32	1.26	1.26	0.294	84.0
11	0.00	28.0	26.4	21.9	16.5	32	1.30	1.30	0.282	80.5
12	0.00	29.4	27.4	25.0	17.0	33	1.31	1.31	0.313	89.4
13	0.00	29.2	27.6	21.7	15.5	33	1.25	1.25	0.317	90.5
14	0.00	28.4	27.2	23.1	14.9	33	1.25	1.25	0.306	87.4
15	0.00	28.8	26.8	19.1	14.8	32	1.37	1.37	0.312	89.1
16	0.00	28.8	26.7	23.2	19.4	32	1.16	1.16	0.313	89.3
17	0.00	28.9	26.9	20.3	16.3	33	1.29	1.29	0.318	90.9
18	0.00	30.5	27.6	25.0	21.0	33	1.15	1.15	0.317	90.5
19	0.00	30.3	27.5	20.3	16.5	33	1.01	1.01	0.306	87.3
20	0.00	29.4	26.9	20.9	17.5	33	0.92	0.92	0.308	87.9
21	0.00	31.4	28.9	22.2	21.7	35	0.87	0.87	0.328	93.8
22	0.00	31.2	28.0	16.1	14.2	34	0.83	0.84	0.296	84.6
23	0.00	32.2	29.2	16.9	15.0	35	0.82	0.82	0.316	90.4
24	0.00	32.3	29.3	22.3	20.8	35	0.73	0.73	0.300	85.8
25	0.00	32.4	29.4	18.9	16.7	36	0.74	0.75	0.296	84.7
Average		29.9	27.7	21.5	17.4	33	1.11	1.11	0.309	88.2

Total number of blows analyzed: 18

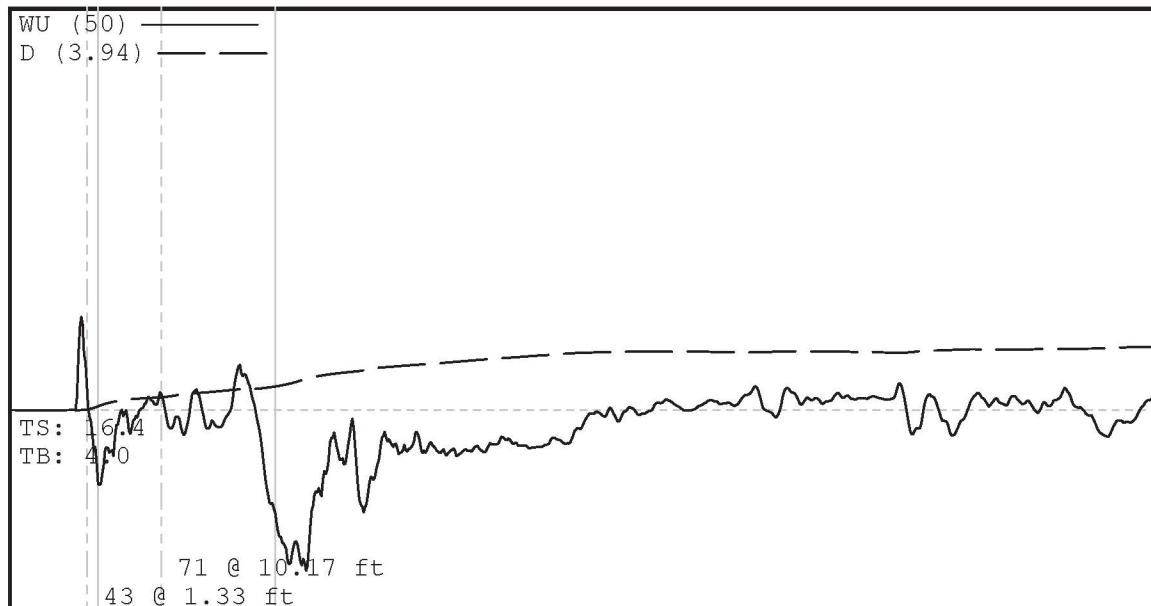
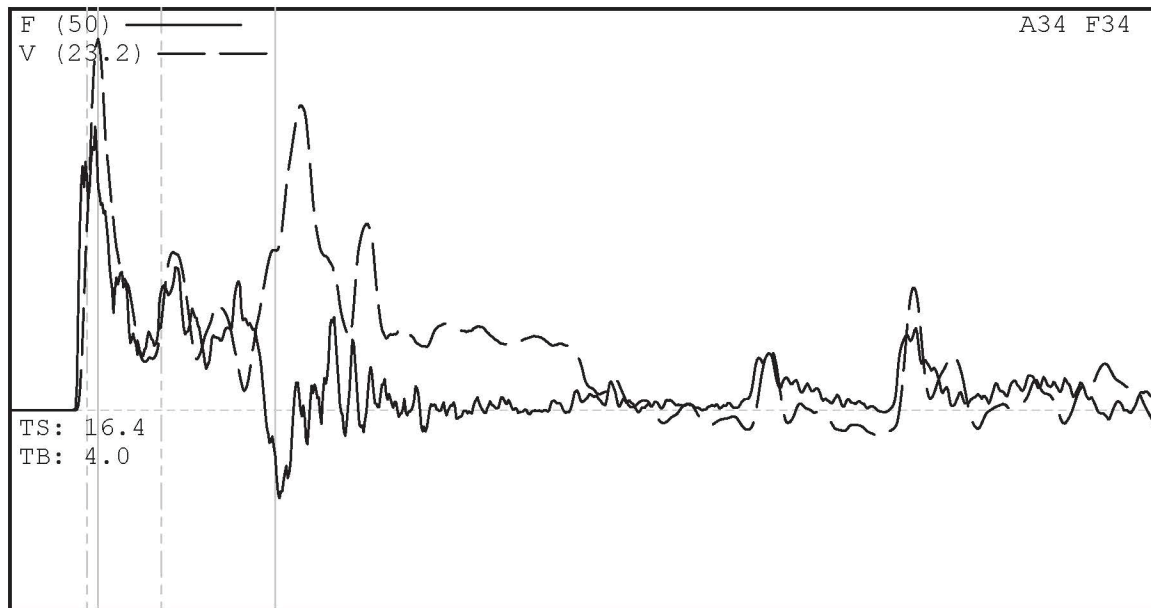
Time Summary

Drive 30 seconds

11:57:20 AM - 11:57:50 AM (6/6/2013) BN 1 - 25

CLINCH RIVER SMR

CLINCH RIVER MWD (GEORGE A) 15.5'-17'

Project Information

PROJECT: CLINCH RIVER SMR
 PILE NAME: CLINCH RIVER MWD (GEORGE A)
 DESCR: DIEDRICH D.120 (027)
 OPERATOR: MEH
 FILE: CLINCH RIVER MWD (GEORGE A) 15.5'-17'
 6/6/2013 11:48:36 AM
 Blow Number 22/23

Quantity Results

CSI 30.8 ksi
 CSX-29.1 ksi
 TSX 12.5 ksi
 VMX 21.3 f/s
 FMX01 35 kips
 DFN 0.81 in
 DMX 0.81 in
 EMX 0.3 k-ft
 ETR 95.6 (%)

Pile Properties

LE 21.00 ft
 AR 1.21 in²
 EM 30000 ksi
 SP 0.492 k/ft³
 WS 16807.9 f/s
 EA/C 2.2 ksec/ft
 2L/C 2.52 ms
 JC []

Sensors

F3: [75AW1] 208.84 (1)
 F4: [75AW2] 209.17 (1)
 A3: [K3370] 325 mv/5000g's (1)
 A4: [K0686] 315 mv/5000g's (1)
 CLIP: OK
 F3/F4: OK 1.14
 V3/V4: OK 1.02



10 January 2014

Mr. Steve Criscenzo
AMEC Environment & Infrastructure, Inc.
4021 Stirrup Creek Drive
Suite 100
Durham, North Carolina 27703

Subject: **Report of SPT Hammer Energy Measurements**
M&W Drilling Diedrich D-120 Drill Rig
Rig Serial No. 027 Automatic Hammer
Clinch River SMR Site
AMEC Project No. 6468-13-1072

AMEC Environment & Infrastructure, Inc. (AMEC) is pleased to present the results of Standard Penetration Test (SPT) hammer energy measurements for the subject drill rig at the Clinch River SMR site in Oak Ridge, Tennessee. This report summarizes the field testing activities and presents the results of the hammer energy measurements.

SPT Hammer Energy Field Measurements

SPT energy measurements were made at the referenced site on June 6, 2013. A separate boring from the planned exploratory borings was used (test hole #7 near MET Tower). Per an approved deviation request, testing was performed at depths shallower than those recommended in ASTM D4633-10 due to the presence of relatively shallow rock at the site. The testing was performed by Michael Hamilton, an AMEC representative, from approximately 9:30AM to 11:00 AM under cloudy skies and an air temperature of about 64 degrees Fahrenheit. The boring was drilled with personnel and equipment from M&W Drilling. The drilling equipment consisted of a Diedrich D-120 drill rig with an automatic SPT hammer. The drilling tools consisted of AW-J sized drilling rods and a 2-foot long split tube sampler. The drill rig operator during sampling was Gary Akins. Energy measurements were recorded during sampling at the depth intervals shown in Table 1.

The energy measurements were performed with a SPT Analyzer (Serial No.3622L) with SPT Analyzer software, accelerometers (Serial Nos. K3370 and K1050) and strain gages (Serial Nos. 75 AW-1 and 75 AW-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 anvil. 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 1.21 square inches and an outside diameter of approximately 1.75 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 outside

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RCN: CRP-1215.0
Page 1 of 165

and inside diameters of approximately 1.75 and 1.375 inches, respectively. Due to the closed hammer system, the hammer lubrication condition could not be observed.

Testing was performed with the rig running at multiple engine speeds at the request of the field site manager in order to determine the effects (if any) of engine speed on the energy transfer ratio. The normal operating speed used for this drill rig by the driller is approximately 2,000 RPMs. Engine speeds of approximately 1,500 and 2,500 RPMs were also tested for information purposes only and are presented herein.

Calibration Records

The calibration records for the equipment associated with this testing are filed in the project record control center. The calibration services were procured and approved in accordance with the commercial grade dedication process as outlined in AMEC's nuclear quality assurance program.

Calculations for EFV

The work was performed in accordance with ASTM D 4633-10. The strain and acceleration signals were converted to force and velocity by the PDA. The maximum energy transmitted to the drill rod string (EFV), as measured at the location of the strain gages and accelerometers, was calculated by the SPT Analyzer using the equation 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

As recommended by ASTM D 4633-10, the force-velocity method of energy calculation was used. The equation shown above for calculating EFV, integrated over the complete wave event, measures the total energy 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 a percentage of the theoretical value) are shown in Table 1.

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 was 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 within the range of typical values for automatic hammers as reported in the literature.

Evaluation and Conclusions

Based on the field testing results, our evaluation and conclusions from the SPT energy measurements are summarized below:

- The average energy transferred from the hammer to the drill rods for each individual depth interval ranged from 309 foot-pounds to 340 foot-pounds. These average energy transfers correspond to energy transfer ratios (ETR) of 88% to 97% of the theoretical energy (350 foot-pounds) of the SPT hammer.
- The average at each depth interval was calculated as the transferred energy for each analyzed blow at the depth interval divided by the total number of hammer blows analyzed. The overall average energy transfer of the SPT system (for all the depth intervals tested) was 331.3 foot-pounds, with an average ETR of 94.7%.
- The above measurements are for the hammer running at 2,000 RPMs which is the engine speed under normal operating conditions.

Closing

Please contact us when we can be of further service or if you have any questions concerning this report.

Sincerely,

AMEC Environment & Infrastructure, Inc.



Mike Hamilton, E.I.T.
Technical Professional



Steven E. Kiser
Principal Geotechnical Professional

Attachments: Page 4 – Record of SPT Energy Measurement – 1 Page
Page 5 – Table 1 - Summary of SPT Energy Measurements (2,500 RPMs) – 1 Page
Pages 6-13 – PDILOT Output (2,500 RPMs) – 8 Pages
Page 14 – Table 2 – Summary of SPT Energy Measurements (1,500 RPMs) – 1 Page
Page 15-18 – PDILOT Output (1,500 RPMs) – 4 Pages
Page 19 – Table 3 – Summary of SPT Energy Measurements (2,500 RPMs) – 1 Page
Page 20-25 – PDILOT Output (2,500 RPMs) – 6 Pages
Page 26 – Example Force Velocity Plot

For 
With Permission



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Telephone: (704) 357-8600 / Facsimile: (704) 357-8638

RECORD OF SPT ENERGY MEASUREMENT - ASTM D4633 - 10

GENERAL INFORMATION			
PROJECT NAME:	Clinch River SMR	DATE:	6-6-13
PROJECT NO.:	6468-13-1072	INSPECTOR:	MEH
LOCATION:	NET. Tower	WEATHER:	Cloudy / 64°

BORING AND DRILL RIG DATA			
BORING NUMBER:	Test Hole #17	DRILLING COMPANY:	M & G Drilling
RIG OPERATOR:	Gary Akins	DRILL RIG MAKE:	Diedrich D-120
HAMMER OPERATOR:	Timmy Criss	DRILL RIG MODEL:	D-120
PAK SERIAL NO.:	3622L	RIG SERIAL NO.:	0217
INSTR. ROD AREA:	1.21 in ²	HAMMER TYPE:	Automatic
ACCEL. SERIAL NOS.:	A3: K3370 A4: K1050	ROPE CONDITION:	N/A
STRAIN SERIAL NOS.:	F3: AW-75-1 F4: AW-75-2	NO. OF SHEAVES:	N/A

SPT OBSERVATION OR SPT DATA RECORD	ROD SIZE (AW-J, NW, etc)	ROD LENGTH (feet)	SAMPLE DEPTH (feet)	SPT N-VALUE (bpf)	COMMENTS
SPT Data Record	AW-J ^{#46613}	9'	3.6'-5'	3-5-8 N=11	Good A-4 Good
		10.5	6.5'-	8-10-13 N=23	Good A-4 Bad
		12	6.5'-8'		Not Marked
		12.0	7.2'-8.7'	13-13-9 N=22	Good Clipped
		13.5	8.2'-10.3'	15-15-13 N=28	Good Gravel/pebbles layer
		16	10.2'-11.7'	11-10-6 N=15	Good
		17	11.0'-13.2'	5-5-3 N=8	Clipped
		19	13.2'-14.7'	6-8-9 N=17	Good silty sand
		21	14.7'-16.2'	10-6-7 N=13	Good
		22	16.2'-17.7'	No values taken	Wrong RPM
		22	17.2'-18.7'	10-10-11 N=21	Good
		24	18.7'-20.2'	13-13-12 N=23	Good
		26	20.2'-21.7'	13-14-15 N=29	Good

REMARKS

SPT Version 2.2.5, 20120705

Form 4633 REV.2 (11-4-11)

PREPARED BY: M. Hamilton
DATE: 6-6-13CHECKED BY:
DATE:RCN: CRP-1215.0
Page 1 of 165



TABLE 1
SUMMARY OF SPT ENERGY MEASUREMENTS (ASTM D4633-10)
 M&W Drilling SPT Energy Measurements (2000 RPM)
 Oak Ridge, Tennessee
 AMEC Project No. 6468-13-1072

Rig 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)
027 Diedrich D-120	M&W Drilling	Gary Akins	Test hole #7 (near MET Tower)	6/6/2013	AW-J	5.0-6.5	8-10-13	23	340	97.1%
						7.2-8.7	13-13-9	22	309	88.3%
						8.7-10.2	15-15-13	28	337	96.3%
						10.2-11.7	11-10-5	15	340	97.1%
Average for Rig:									331.3	94.7%

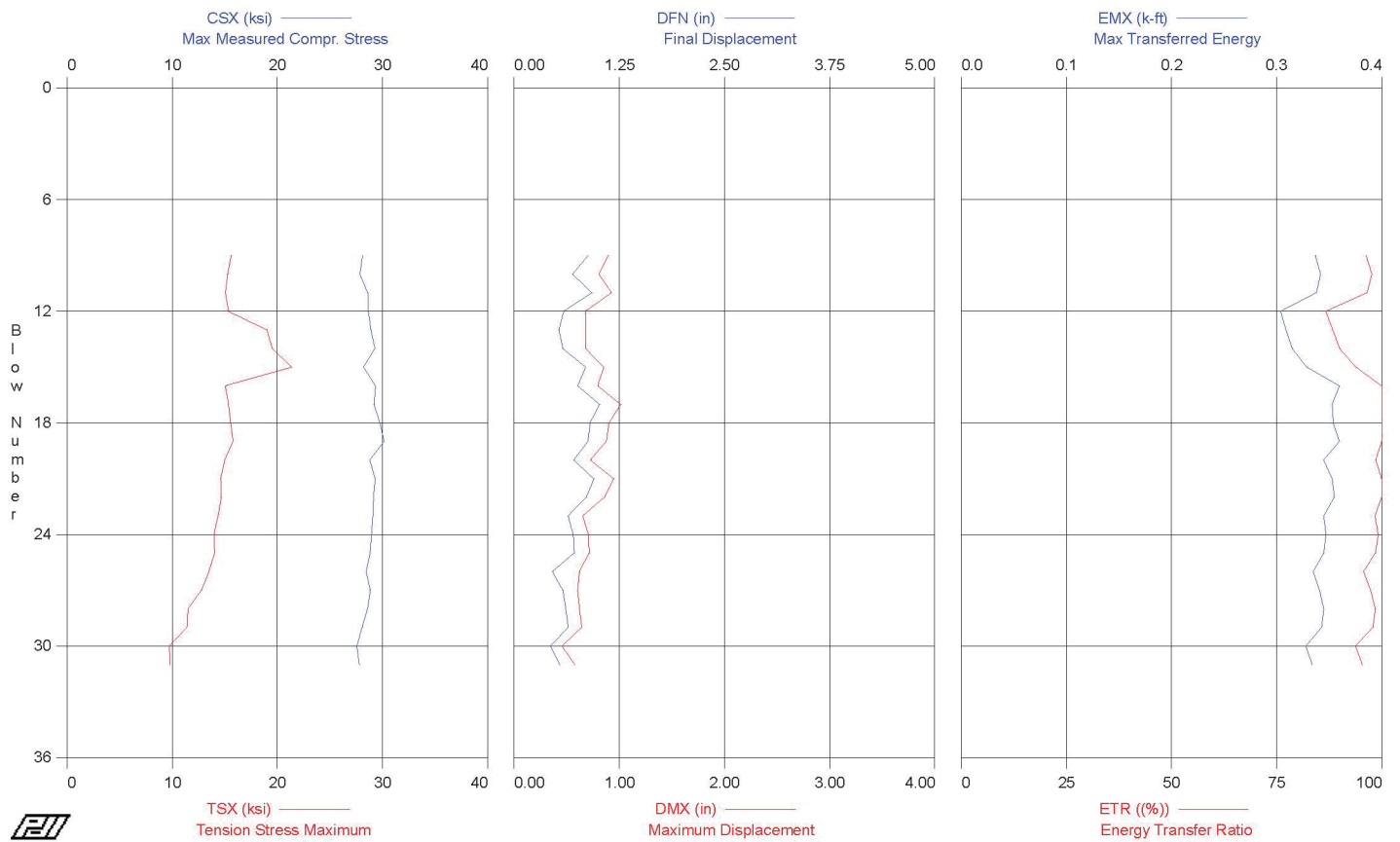
^aMeasured Energy is energy based on the EFV method, as outlined in ASTM D4633-10, for each blow recorded by the PDA. Only blows used to calculate N-values were considered per ASTM D4633-10. In some cases, the initial and/or final one to two blows produced poor quality data, and were not used to calculate the Average Measured Energy.

EFV = EMX * 1000 lbs/kip, where EMX equals the 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: MA	Date: 1-10-14	Checked By: SL	Date: 1-10-14
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CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 5'-6.5'



CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 5'-6.5'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in²
LE: 10.50 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.00

CSI: Max F1 or F2 Compr. Stress
CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force

DFN: Final Displacement
DMX: Maximum Displacement
EMX: Max Transferred Energy
ETR: Energy Transfer Ratio

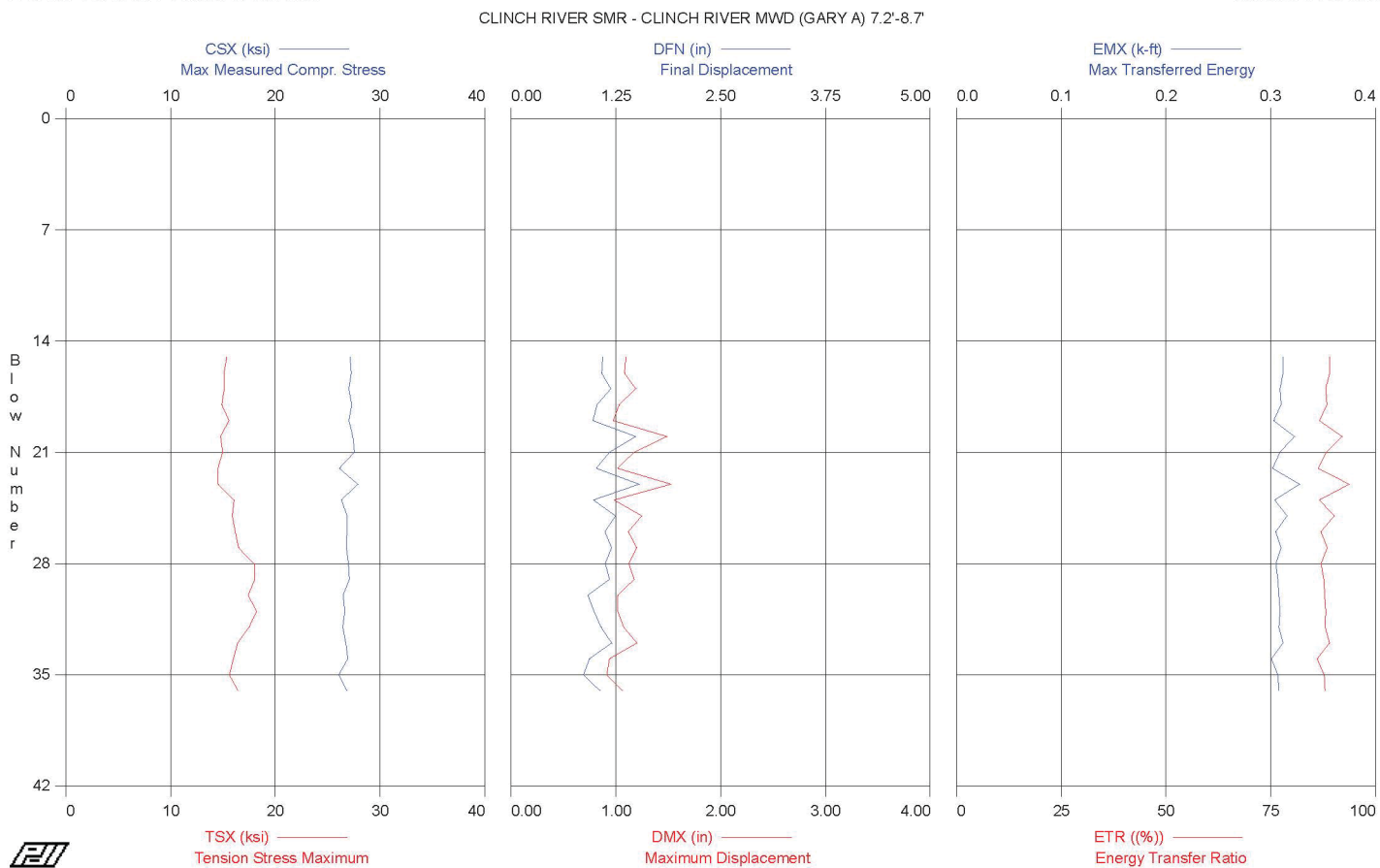
BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
9	0.00	28.8	28.1	15.6	26.5	34	0.88	0.90	0.337	96.3
10	0.00	28.2	27.9	15.3	26.7	34	0.70	0.81	0.342	97.7
11	0.00	29.2	28.6	15.1	25.9	35	0.93	0.93	0.338	96.6
12	0.00	28.8	28.7	15.4	24.5	35	0.59	0.68	0.304	86.7
13	0.00	29.1	28.9	19.0	24.8	35	0.53	0.68	0.309	88.4
14	0.00	29.8	29.3	19.5	25.0	35	0.58	0.68	0.315	90.0
15	0.00	28.4	28.2	21.4	26.3	34	0.85	0.85	0.329	93.9
16	0.00	30.3	29.3	15.1	26.6	36	0.76	0.80	0.360	102.9
17	0.00	31.2	29.2	15.4	24.5	35	1.02	1.02	0.353	101.0
18	0.00	31.6	29.8	15.6	25.2	36	0.90	0.90	0.354	101.2
19	0.00	31.2	30.2	15.8	25.6	37	0.88	0.88	0.360	102.8
20	0.00	30.3	28.8	15.0	25.0	35	0.71	0.73	0.345	98.6
21	0.00	30.7	29.3	14.6	25.1	35	0.95	0.95	0.353	100.9
22	0.00	30.3	29.2	14.7	25.5	35	0.86	0.86	0.355	101.4
23	0.00	30.3	29.1	14.4	25.2	35	0.64	0.65	0.345	98.4
24	0.00	30.3	29.0	14.0	25.3	35	0.70	0.71	0.347	99.2
25	0.00	30.0	28.8	14.0	25.4	35	0.71	0.71	0.345	98.5
26	0.00	29.4	28.5	13.5	25.2	34	0.46	0.62	0.335	95.7
27	0.00	29.8	28.9	12.8	25.6	35	0.58	0.60	0.341	97.4
28	0.00	29.2	28.6	11.5	25.7	35	0.61	0.62	0.345	98.5
29	0.00	28.6	28.1	11.4	25.8	34	0.64	0.64	0.343	97.9
30	0.00	28.5	27.6	9.7	25.4	33	0.43	0.46	0.328	93.8
31	0.00	28.5	27.8	9.8	25.2	34	0.54	0.58	0.334	95.5
Average		29.7	28.8	14.7	25.5	35	0.72	0.75	0.340	97.1

Total number of blows analyzed: 23

Time Summary

Drive 1 minute 4 seconds

9:39:04 AM - 9:40:08 AM (6/6/2013) BN 1 - 34



CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 7.2'-8.7'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in²
LE: 12.00 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.00

CSI: Max F1 or F2 Compr. Stress
CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force

DFN: Final Displacement
DMX: Maximum Displacement
EMX: Max Transferred Energy
ETR: Energy Transfer Ratio

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
15	0.00	31.1	27.1	15.4	23.2	33	1.09	1.10	0.312	89.1
16	0.00	31.4	27.3	15.1	23.6	33	1.08	1.08	0.312	89.1
17	0.00	31.0	27.0	15.1	23.1	33	1.19	1.19	0.309	88.2
18	0.00	31.0	27.3	14.9	23.2	33	1.03	1.03	0.310	88.5
19	0.00	30.9	27.1	15.6	23.1	33	0.98	0.98	0.303	86.7
20	0.00	31.5	27.4	14.8	23.1	33	1.49	1.49	0.323	92.2
21	0.00	31.7	27.6	15.0	23.2	33	1.18	1.18	0.309	88.3
22	0.00	28.9	26.1	14.5	22.5	32	1.02	1.02	0.302	86.4
23	0.00	31.9	27.9	14.5	23.4	34	1.53	1.53	0.328	93.8
24	0.00	29.7	26.3	16.1	23.0	32	0.98	0.99	0.304	86.7
25	0.00	30.8	26.9	15.9	23.2	32	1.25	1.25	0.316	90.3
26	0.00	30.8	26.8	16.2	23.1	32	1.12	1.12	0.305	87.0
27	0.00	30.8	26.8	16.5	23.3	32	1.20	1.20	0.310	88.6
28	0.00	31.0	27.0	18.0	23.4	33	1.12	1.12	0.305	87.1
29	0.00	31.0	27.1	18.1	23.6	33	1.18	1.18	0.307	87.7
30	0.00	29.6	26.5	17.4	23.3	32	0.92	1.02	0.308	87.9
31	0.00	29.8	26.6	18.2	23.6	32	0.99	1.02	0.309	88.2
32	0.00	30.0	26.5	17.5	23.4	32	1.07	1.08	0.308	88.0
33	0.00	30.2	26.7	16.4	23.3	32	1.20	1.20	0.312	89.1
34	0.00	30.8	26.9	16.0	23.5	33	0.93	0.94	0.301	86.1
35	0.00	29.6	26.1	15.6	23.0	32	0.87	0.91	0.307	87.8
36	0.00	30.4	26.8	16.4	23.6	32	1.06	1.06	0.308	88.0
Average		30.6	26.9	16.1	23.3	33	1.11	1.12	0.309	88.4

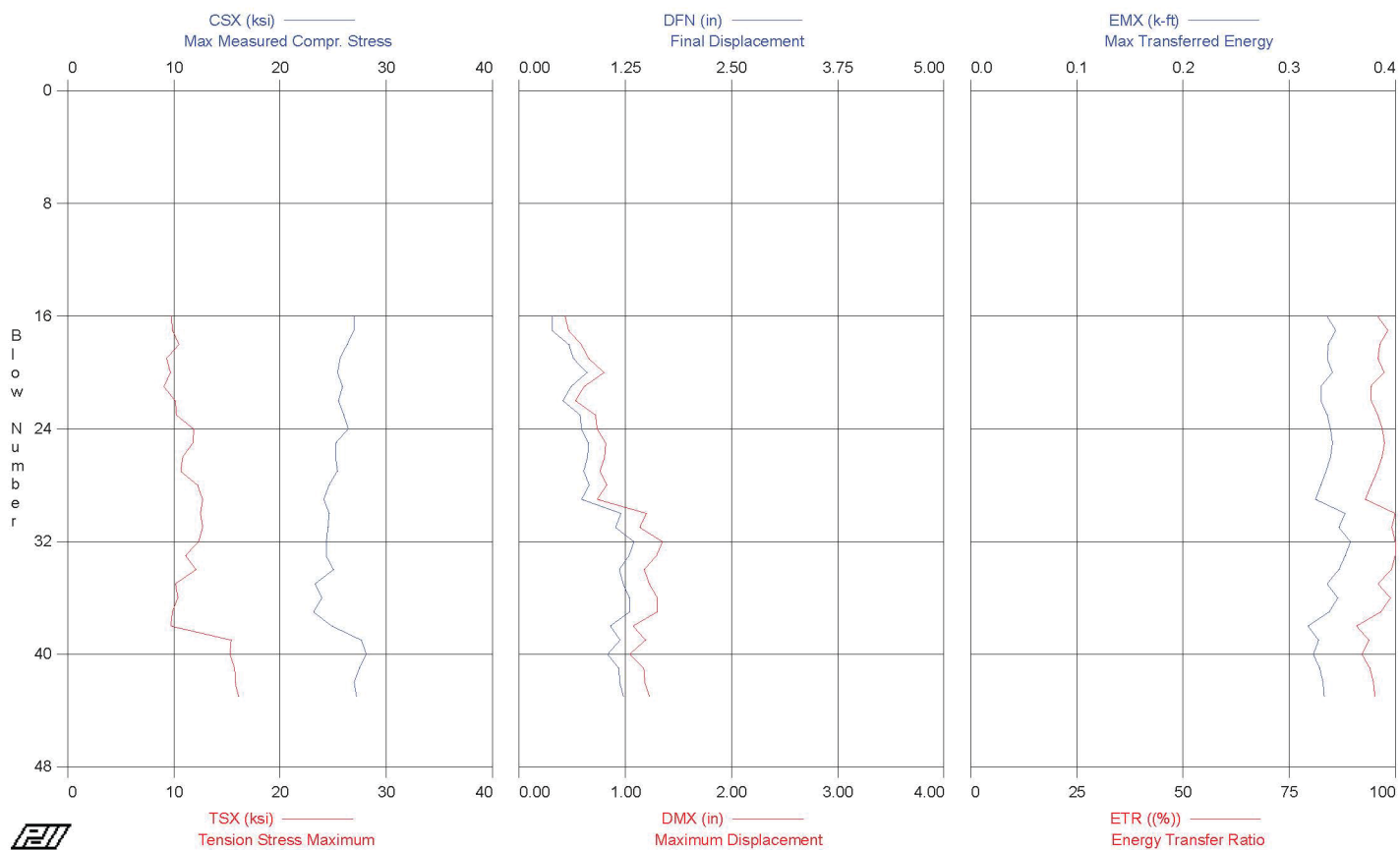
Total number of blows analyzed: 22

Time Summary

Drive 1 minute 29 seconds

9:52:47 AM - 9:54:16 AM (6/6/2013) BN 1 - 37

CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 8.7'-10.3'



CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 8.7'-10.3'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in²

SP: 0.492 k/ft³

LE: 13.50 ft

EM: 30,000 ksi

WS: 16,807.9 f/s

JC: 0.00

CSI: Max F1 or F2 Compr. Stress

DFN: Final Displacement

CSX: Max Measured Compr. Stress

DMX: Maximum Displacement

TSX: Tension Stress Maximum

EMX: Max Transferred Energy

VMX: Maximum Velocity

ETR: Energy Transfer Ratio

FMX: Maximum Force

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
16	0.00	30.9	27.0	9.8	25.0	33	0.39	0.43	0.336	95.9
17	0.00	31.0	27.0	9.9	25.1	33	0.39	0.47	0.344	98.3
18	0.00	30.4	26.3	10.5	25.1	32	0.59	0.59	0.337	96.4
19	0.00	29.6	25.7	9.3	25.3	31	0.64	0.66	0.336	95.9
20	0.00	29.1	25.4	9.7	25.5	31	0.80	0.80	0.341	97.5
21	0.00	29.1	25.9	9.1	25.1	31	0.61	0.61	0.330	94.2
22	0.00	28.9	25.5	10.1	25.1	31	0.52	0.53	0.330	94.4
23	0.00	29.8	26.0	10.2	25.2	31	0.72	0.72	0.336	95.9
24	0.00	30.4	26.4	11.9	25.4	32	0.73	0.73	0.339	97.0
25	0.00	28.9	25.3	11.8	25.4	31	0.82	0.82	0.341	97.5
26	0.00	28.1	25.2	10.8	25.2	31	0.81	0.81	0.339	96.9
27	0.00	29.2	25.4	10.6	25.3	31	0.76	0.76	0.335	95.8
28	0.00	27.0	24.6	12.2	24.7	30	0.83	0.83	0.330	94.4
29	0.00	27.2	24.1	12.7	24.6	29	0.74	0.74	0.325	93.0
30	0.00	27.4	24.6	12.5	24.9	30	1.20	1.20	0.353	101.0
31	0.00	27.3	24.5	12.7	24.9	30	1.14	1.14	0.347	99.2
32	0.00	28.0	24.4	12.4	25.1	29	1.35	1.35	0.358	102.2
33	0.00	28.0	24.3	11.1	25.1	29	1.30	1.30	0.353	100.7
34	0.00	28.8	25.0	12.1	25.2	30	1.18	1.18	0.347	99.1
35	0.00	26.8	23.3	10.2	24.6	28	1.23	1.23	0.336	96.0
36	0.00	27.8	24.0	10.4	25.1	29	1.30	1.30	0.346	99.0
37	0.00	25.9	23.2	9.8	24.7	28	1.30	1.30	0.338	96.7
38	0.00	29.0	24.9	9.7	24.7	30	1.08	1.08	0.318	90.9
39	0.00	29.4	27.7	15.4	22.9	33	1.19	1.19	0.328	93.8
40	0.00	30.9	28.1	15.3	22.8	34	1.04	1.04	0.323	92.2
41	0.00	29.1	27.5	15.7	22.7	33	1.17	1.17	0.329	94.1
42	0.00	28.3	27.0	15.8	23.3	33	1.18	1.18	0.332	94.9
43	0.00	29.4	27.2	16.1	23.5	33	1.23	1.23	0.333	95.2
Average		28.8	25.6	11.7	24.7	31	0.94	0.94	0.337	96.4

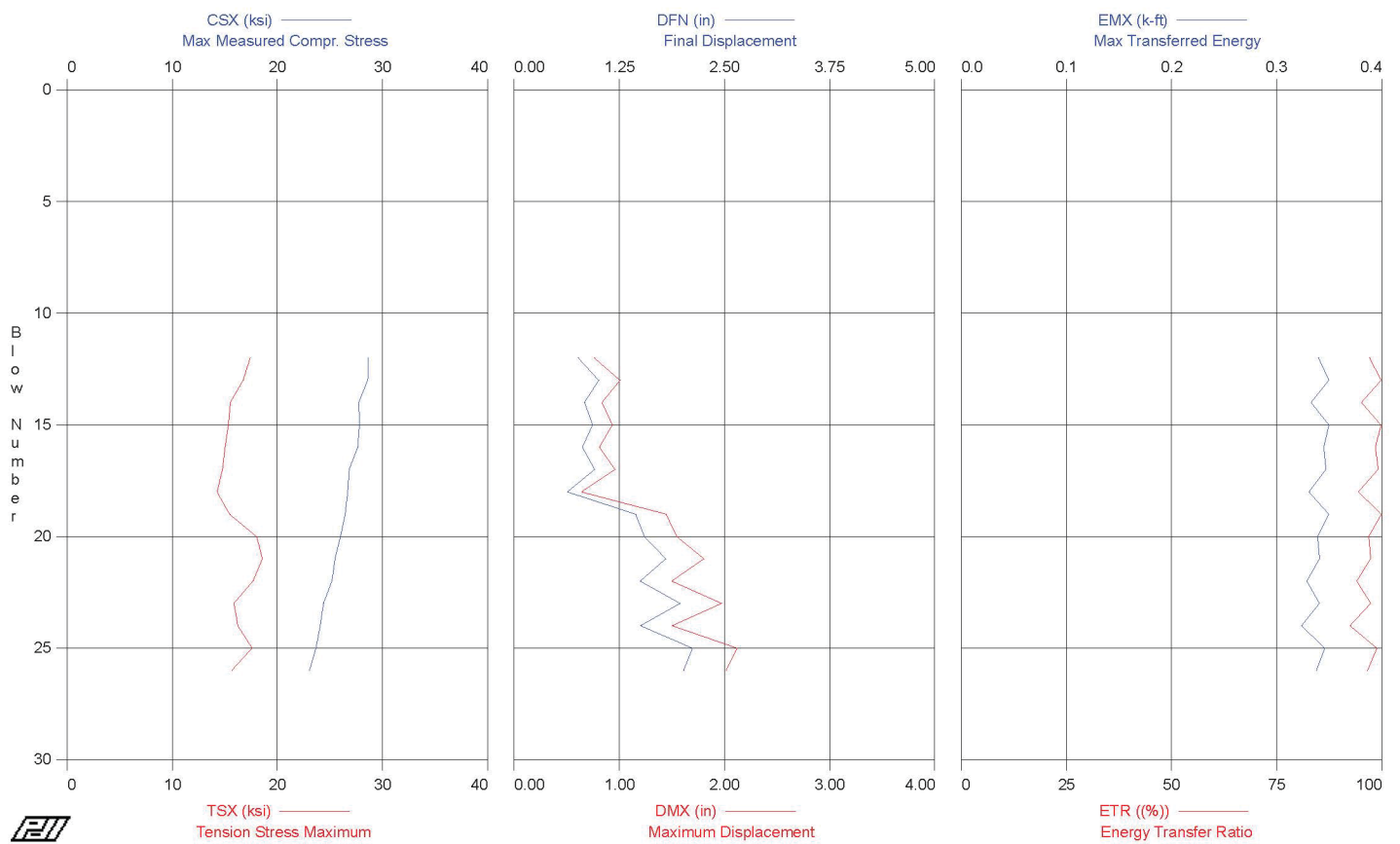
Total number of blows analyzed: 28

Time Summary

Drive 1 minute 5 seconds

9:58:23 AM - 9:59:28 AM (6/6/2013) BN 1 - 45

CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 10.2'-11.7'



CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 10.2'-11.7'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in² SP: 0.492 k/ft³
LE: 16.00 ft EM: 30,000 ksi
WS: 16,807.9 f/s JC: 0.00

CSI: Max F1 or F2 Compr. Stress DFN: Final Displacement
CSX: Max Measured Compr. Stress DMX: Maximum Displacement
TSX: Tension Stress Maximum EMX: Max Transferred Energy
VMX: Maximum Velocity ETR: Energy Transfer Ratio
FMX: Maximum Force

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
12	0.00	30.3	28.6	17.4	24.5	35	0.76	0.76	0.340	97.1
13	0.00	30.6	28.6	16.8	24.5	35	1.01	1.01	0.350	99.9
14	0.00	29.0	27.8	15.5	24.2	34	0.84	0.84	0.333	95.2
15	0.00	29.1	27.8	15.3	24.7	34	0.93	0.94	0.350	99.9
16	0.00	28.8	27.7	15.0	24.8	33	0.81	0.81	0.345	98.5
17	0.00	29.6	26.8	14.8	24.8	32	0.96	0.96	0.347	99.2
18	0.00	27.5	26.7	14.3	24.7	32	0.64	0.64	0.331	94.5
19	0.00	28.1	26.5	15.5	24.8	32	1.45	1.45	0.350	100.1
20	0.00	27.8	26.0	18.0	24.7	31	1.55	1.55	0.339	97.0
21	0.00	28.3	25.5	18.6	24.6	31	1.81	1.81	0.341	97.4
22	0.00	27.1	25.2	17.7	24.7	30	1.50	1.50	0.329	94.1
23	0.00	25.9	24.4	15.9	24.3	30	1.98	1.98	0.341	97.4
24	0.00	25.2	24.1	16.2	24.3	29	1.50	1.50	0.324	92.5
25	0.00	24.9	23.7	17.6	24.7	29	2.12	2.12	0.346	98.9
26	0.00	24.1	23.1	15.7	24.2	28	2.02	2.02	0.338	96.7
Average		27.8	26.2	16.3	24.6	32	1.32	1.33	0.340	97.2
Total number of blows analyzed: 15										

Time Summary

Drive 43 seconds

10:04:31 AM - 10:05:14 AM (6/6/2013) BN 1 - 27



TABLE 2
SUMMARY OF SPT ENERGY MEASUREMENTS (ASTM D4633-10)
 M&W Drilling SPT Energy Measurements (1500 RPM)
 Oak Ridge, Tennessee
 AMEC Project No. 6468-13-1072

Rig 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)	
027 Diedrich D-120	M&W Drilling	Gary Akins	Test hole #7 (near MET Tower)	6/6/2013	AW-J	13.2-14.7	6-8-9	17	318	90.9%	
						14.7-16.2	6-6-7	13	344	98.3%	
						Average for Rig:					

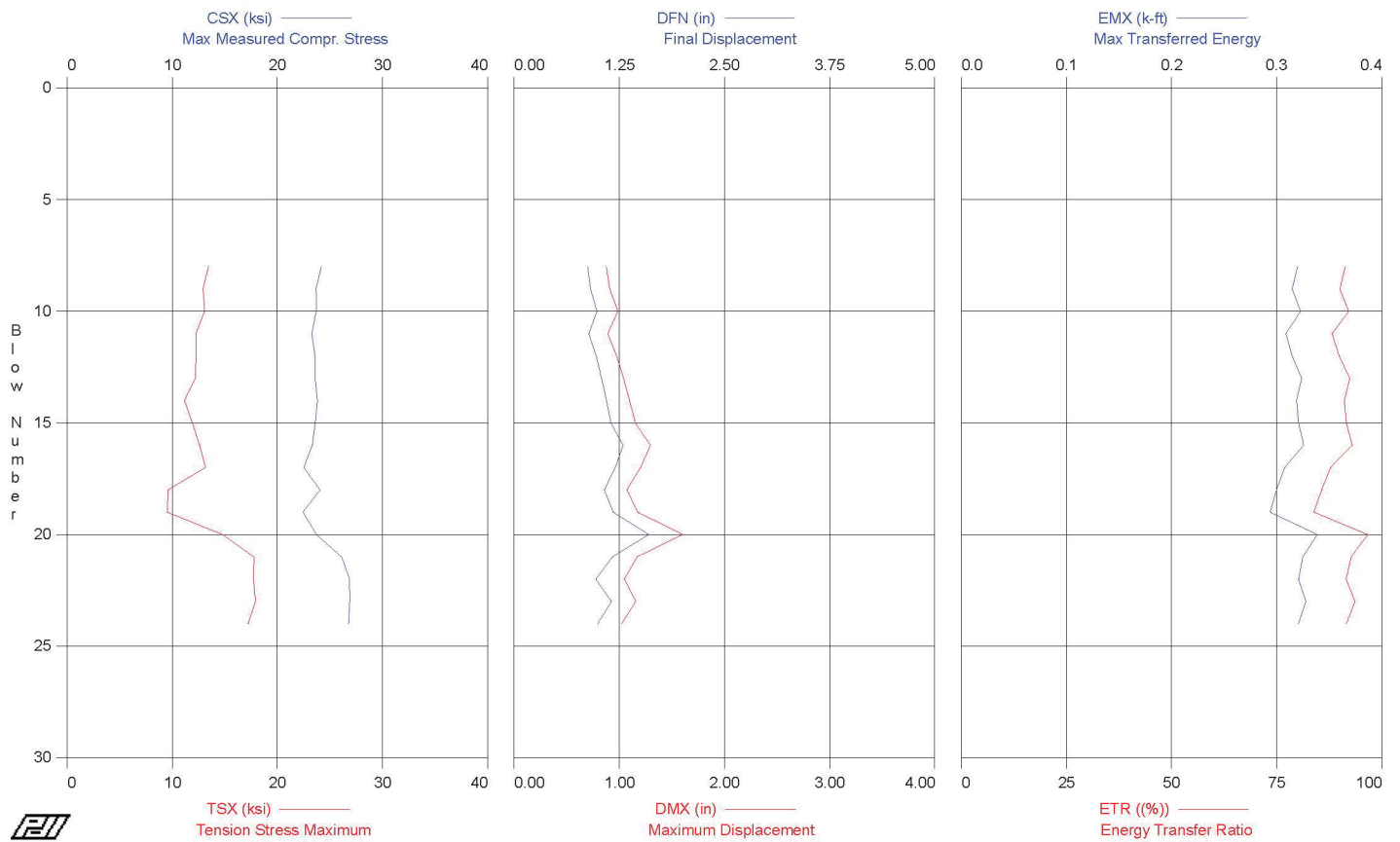
^aMeasured Energy is energy based on the EFV method, as outlined in ASTM D4633-10, for each blow recorded by the PDA. Only blows used to calculate N-values were considered per ASTM D4633-10. In some cases, the initial and/or final one to two blows produced poor quality data, and were not used to calculate the Average Measured Energy.

EFV = EMX * 1000 lbs/kip, where EMX equals the 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: <i>MLL</i>	Date: 1-10-14	Checked By: <i>SK</i>	Date: 1-10-14
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CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 13.2'-14.7'



CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 13.2'-14.7'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in²

SP: 0.492 k/ft³

LE: 19.00 ft

EM: 30,000 ksi

WS: 16,807.9 f/s

JC: 0.00

CSI: Max F1 or F2 Compr. Stress

DFN: Final Displacement

CSX: Max Measured Compr. Stress

DMX: Maximum Displacement

TSX: Tension Stress Maximum

EMX: Max Transferred Energy

VMX: Maximum Velocity

ETR: Energy Transfer Ratio

FMX: Maximum Force

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
8	0.00	26.6	24.2	13.5	24.9	29	0.87	0.88	0.320	91.3
9	0.00	26.3	23.7	12.9	24.9	29	0.91	0.91	0.315	90.1
10	0.00	26.3	23.7	13.1	25.0	29	0.99	0.99	0.323	92.2
11	0.00	26.2	23.3	12.3	24.7	28	0.89	0.89	0.309	88.2
12	0.00	26.4	23.6	12.3	24.8	29	0.98	0.98	0.315	89.9
13	0.00	26.7	23.6	12.2	25.1	29	1.04	1.04	0.324	92.5
14	0.00	26.9	23.8	11.2	25.0	29	1.10	1.10	0.319	91.2
15	0.00	26.3	23.6	11.9	25.0	29	1.15	1.15	0.321	91.6
16	0.00	26.1	23.3	12.6	25.0	28	1.30	1.30	0.326	93.0
17	0.00	24.4	22.5	13.2	24.5	27	1.20	1.20	0.308	87.9
18	0.00	24.9	24.1	9.6	23.7	29	1.07	1.07	0.300	85.7
19	0.00	23.7	22.5	9.5	22.9	27	1.18	1.18	0.294	83.9
20	0.00	25.5	23.7	14.8	24.6	29	1.61	1.61	0.339	96.7
21	0.00	27.1	26.1	17.8	23.1	32	1.17	1.17	0.325	92.8
22	0.00	28.1	26.9	17.7	23.4	33	0.97	1.05	0.321	91.6
23	0.00	28.0	26.9	17.9	23.3	33	1.16	1.16	0.328	93.7
24	0.00	27.8	26.8	17.2	23.4	32	1.00	1.02	0.321	91.6
Average		26.3	24.3	13.5	24.3	29	1.09	1.10	0.318	90.8

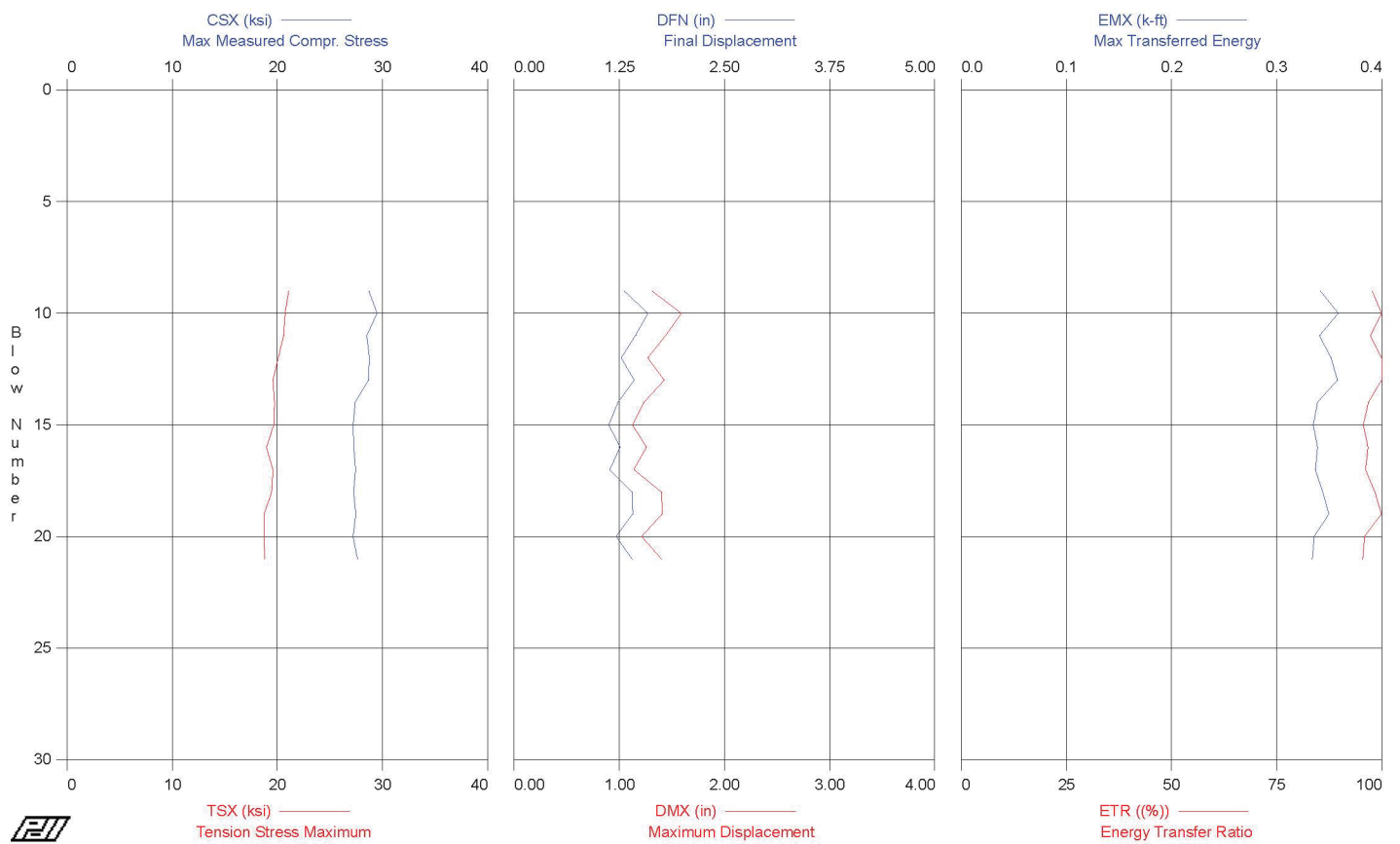
Total number of blows analyzed: 17

Time Summary

Drive 50 seconds

10:18:09 AM - 10:18:59 AM (6/6/2013) BN 1 - 25

CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 14.7'-16.2'



CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 14.7'-16.2'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in²
LE: 21.00 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.00

CSI: Max F1 or F2 Compr. Stress
CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force

DFN: Final Displacement
DMX: Maximum Displacement
EMX: Max Transferred Energy
ETR: Energy Transfer Ratio

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
9	0.00	30.8	28.7	21.1	23.1	35	1.31	1.31	0.342	97.8
10	0.00	32.1	29.5	20.7	23.3	36	1.59	1.59	0.359	102.6
11	0.00	30.6	28.5	20.6	23.5	35	1.44	1.44	0.341	97.4
12	0.00	31.7	28.8	20.1	23.9	35	1.27	1.27	0.352	100.7
13	0.00	31.1	28.7	19.6	23.8	35	1.43	1.43	0.358	102.3
14	0.00	29.3	27.4	19.7	23.8	33	1.24	1.24	0.339	96.9
15	0.00	31.1	27.2	19.7	23.8	33	1.13	1.13	0.335	95.6
16	0.00	30.6	27.3	19.0	23.9	33	1.26	1.26	0.339	96.8
17	0.00	31.2	27.5	19.6	23.9	33	1.14	1.14	0.337	96.2
18	0.00	30.9	27.3	19.5	24.2	33	1.40	1.40	0.344	98.4
19	0.00	31.4	27.5	18.7	23.9	33	1.41	1.41	0.350	100.0
20	0.00	30.9	27.2	18.7	23.8	33	1.22	1.22	0.336	96.0
21	0.00	31.7	27.6	18.8	23.8	33	1.40	1.40	0.334	95.5
Average		31.0	27.9	19.7	23.8	34	1.33	1.33	0.344	98.2

Total number of blows analyzed: 13

Time Summary

Drive 34 seconds

10:24:37 AM - 10:25:11 AM (6/6/2013) BN 1 - 21

TABLE 3
SUMMARY OF SPT ENERGY MEASUREMENTS (ASTM D4633-10)
M&W Drilling SPT Energy Measurements (2500 RPM)
Oak Ridge, Tennessee
AMEC Project No. 6468-13-1072



Rig Serial Number and 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)
027 Diedrich D-120	M&W Drilling	Gary Akins	Test hole #7 (near MET Tower)	6/6/2013	AW-J	17.2-18.7 18.7-20.2 20.2-21.7	10-10-11 13-13-12 13-14-15	21 25 29	341 333 353	97.4% 95.1% 100.9%
Average for Rig:									343.0	98.0%

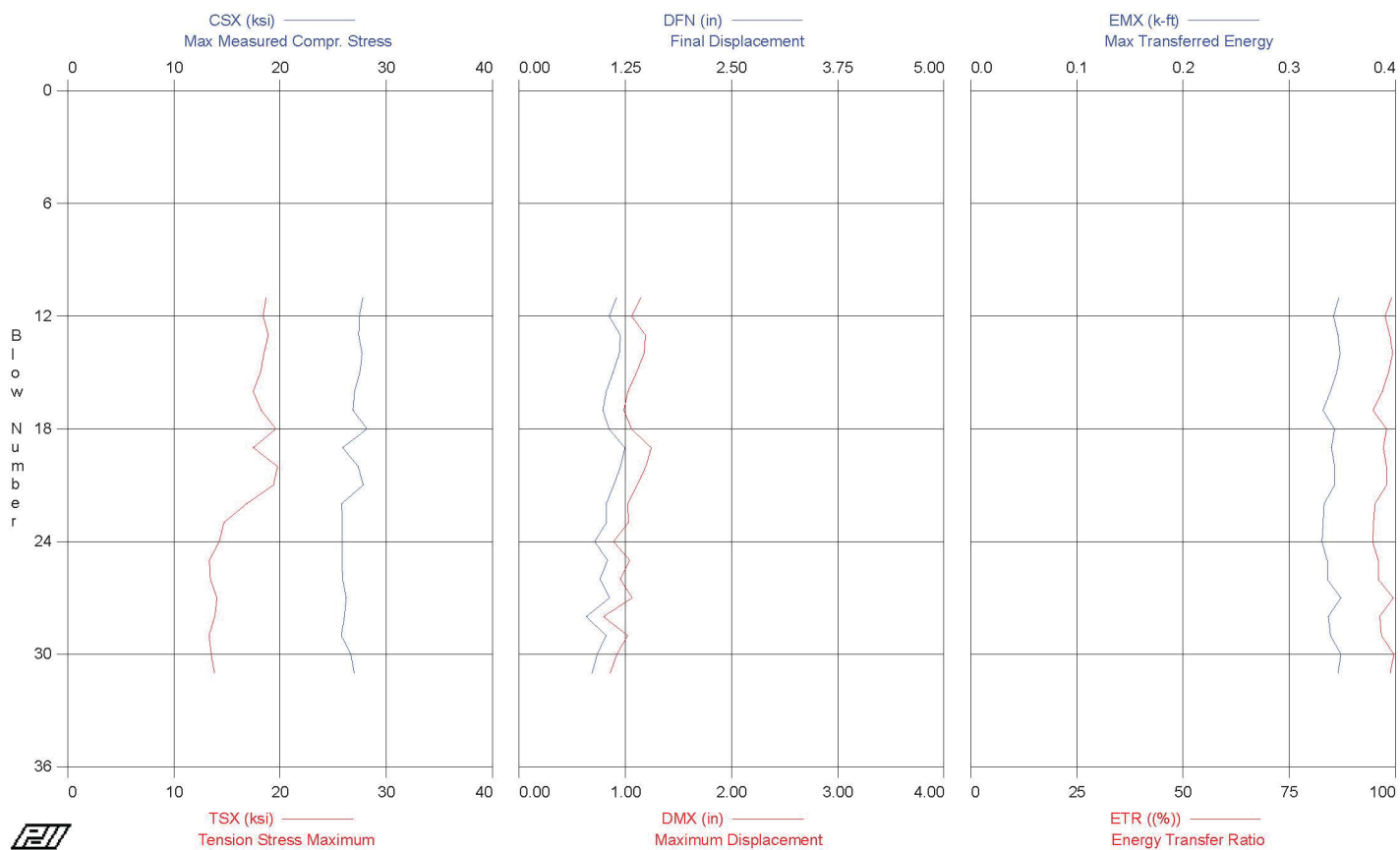
^aMeasured Energy is energy based on the EFV method, as outlined in ASTM D4633-10, for each blow recorded by the PDA. Only blows used to calculate N-values were considered per ASTM D4633-10. In some cases, the initial and/or final one to two blows produced poor quality data, and were not used to calculate the Average Measured Energy.

EFV = EMX * 1000 lbs/kip, where EMX equals the 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 PDIPLOT tables due to roundoff.

Prepared By: MA	Date: 1-10-14	Checked By: SL	Date: 1-10-14
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CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 17.2'-18.7'



CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 17.2'-18.7'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in²
LE: 22.00 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.00

CSI: Max F1 or F2 Compr. Stress
CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force

DFN: Final Displacement
DMX: Maximum Displacement
EMX: Max Transferred Energy
ETR: Energy Transfer Ratio

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
11	0.00	31.7	27.8	18.7	22.7	34	1.15	1.15	0.347	99.2
12	0.00	31.3	27.5	18.4	22.5	33	1.06	1.06	0.342	97.6
13	0.00	31.3	27.4	18.9	22.5	33	1.19	1.19	0.346	98.7
14	0.00	31.5	27.7	18.5	22.6	34	1.18	1.18	0.348	99.4
15	0.00	31.4	27.5	18.2	22.6	33	1.11	1.11	0.345	98.4
16	0.00	31.0	27.0	17.5	22.6	33	1.03	1.03	0.339	97.0
17	0.00	30.6	26.9	18.2	22.6	33	0.99	0.99	0.332	94.8
18	0.00	32.5	28.2	19.6	22.6	34	1.06	1.06	0.343	98.0
19	0.00	29.9	25.9	17.5	22.4	31	1.25	1.25	0.340	97.2
20	0.00	31.0	27.4	19.8	22.7	33	1.20	1.20	0.343	98.0
21	0.00	31.9	27.8	19.4	22.6	34	1.11	1.11	0.343	98.0
22	0.00	29.6	25.8	16.8	22.4	31	1.02	1.02	0.333	95.2
23	0.00	28.8	25.9	14.7	22.5	31	1.03	1.03	0.332	94.9
24	0.00	28.3	25.8	14.3	22.6	31	0.89	0.89	0.331	94.7
25	0.00	28.8	25.9	13.3	22.6	31	1.04	1.04	0.336	96.0
26	0.00	28.2	25.9	13.4	22.7	31	0.95	0.95	0.336	96.0
27	0.00	30.0	26.2	14.1	23.1	32	1.07	1.07	0.349	99.6
28	0.00	29.5	26.1	13.9	22.7	32	0.79	0.80	0.337	96.3
29	0.00	28.7	25.8	13.3	22.7	31	1.02	1.02	0.339	96.8
30	0.00	30.7	26.7	13.5	23.1	32	0.92	0.92	0.349	99.7
31	0.00	30.9	27.0	13.8	23.1	33	0.86	0.86	0.346	98.8
Average		30.4	26.8	16.5	22.7	32	1.04	1.04	0.341	97.4

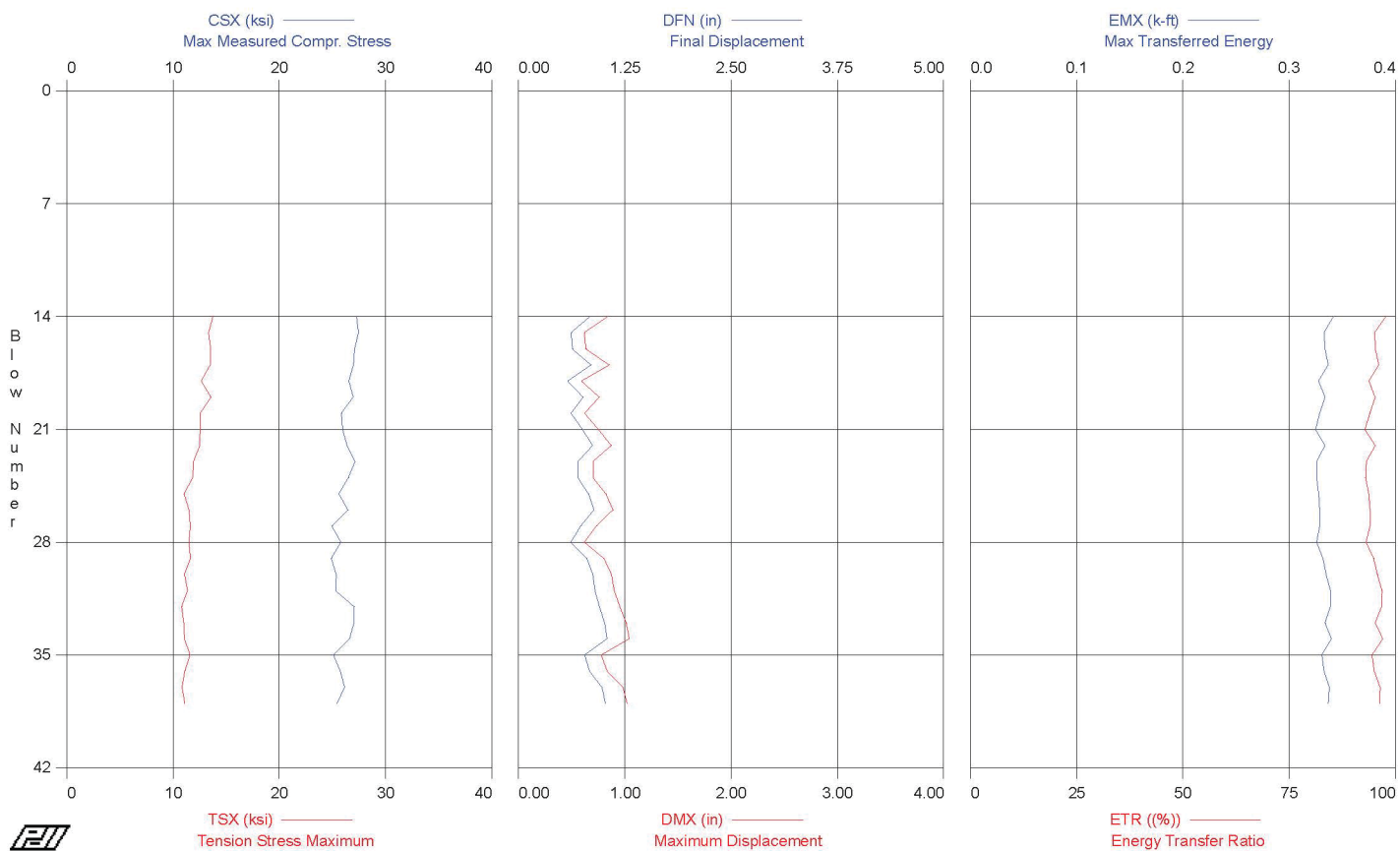
Total number of blows analyzed: 21

Time Summary

Drive 46 seconds

10:39:05 AM - 10:39:51 AM (6/6/2013) BN 1 - 32

CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 18.7'-20.2'



CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 18.7'-20.2'
OP: MEH

DIEDRICH D.120 (027)
Test date: 6-Jun-2013

AR: 1.21 in²
LE: 24.00 ft
WS: 16,807.9 f/s

SP: 0.492 k/ft³
EM: 30,000 ksi
JC: 0.00

CSI: Max F1 or F2 Compr. Stress
CSX: Max Measured Compr. Stress
TSX: Tension Stress Maximum
VMX: Maximum Velocity
FMX: Maximum Force

DFN: Final Displacement
DMX: Maximum Displacement
EMX: Max Transferred Energy
ETR: Energy Transfer Ratio

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
14	0.00	31.0	27.3	13.8	24.7	33	0.84	0.84	0.342	97.8
15	0.00	30.8	27.5	13.4	24.8	33	0.62	0.62	0.333	95.2
16	0.00	30.8	27.1	13.5	24.7	33	0.63	0.63	0.334	95.3
17	0.00	29.9	27.0	13.5	24.8	33	0.86	0.86	0.337	96.2
18	0.00	30.0	26.6	12.7	24.4	32	0.58	0.59	0.328	93.8
19	0.00	30.8	27.0	13.6	24.2	33	0.76	0.76	0.334	95.3
20	0.00	29.7	25.9	12.6	24.4	31	0.62	0.62	0.329	94.0
21	0.00	29.9	26.0	12.5	24.2	31	0.75	0.75	0.325	92.9
22	0.00	30.1	26.4	12.5	24.4	32	0.87	0.87	0.334	95.3
23	0.00	30.6	27.1	11.9	24.5	33	0.70	0.70	0.326	93.2
24	0.00	30.0	26.5	11.9	24.3	32	0.70	0.70	0.326	93.0
25	0.00	28.5	25.6	11.0	24.4	31	0.82	0.82	0.328	93.8
26	0.00	30.2	26.5	11.5	24.4	32	0.89	0.89	0.329	94.1
27	0.00	28.6	25.0	11.6	24.1	30	0.73	0.73	0.329	94.1
28	0.00	29.0	25.8	11.5	24.6	31	0.62	0.62	0.326	93.1
29	0.00	28.1	24.9	11.6	24.3	30	0.80	0.80	0.332	95.0
30	0.00	28.3	25.4	11.1	24.5	31	0.87	0.87	0.335	95.8
31	0.00	28.0	25.3	11.4	24.7	31	0.90	0.90	0.339	96.9
32	0.00	30.3	27.1	10.8	24.9	33	0.95	0.95	0.339	96.8
33	0.00	30.7	27.1	11.0	24.5	33	1.01	1.01	0.334	95.3
34	0.00	29.5	26.6	11.1	24.6	32	1.04	1.04	0.340	97.1
35	0.00	28.9	25.1	11.6	24.5	30	0.78	0.78	0.331	94.5
36	0.00	29.4	25.8	11.1	24.5	31	0.84	0.84	0.333	95.1
37	0.00	29.1	26.2	10.9	24.8	32	0.98	0.98	0.338	96.5
38	0.00	29.3	25.5	11.1	24.6	31	1.02	1.02	0.337	96.3
Average		29.7	26.2	12.0	24.5	32	0.81	0.81	0.333	95.1

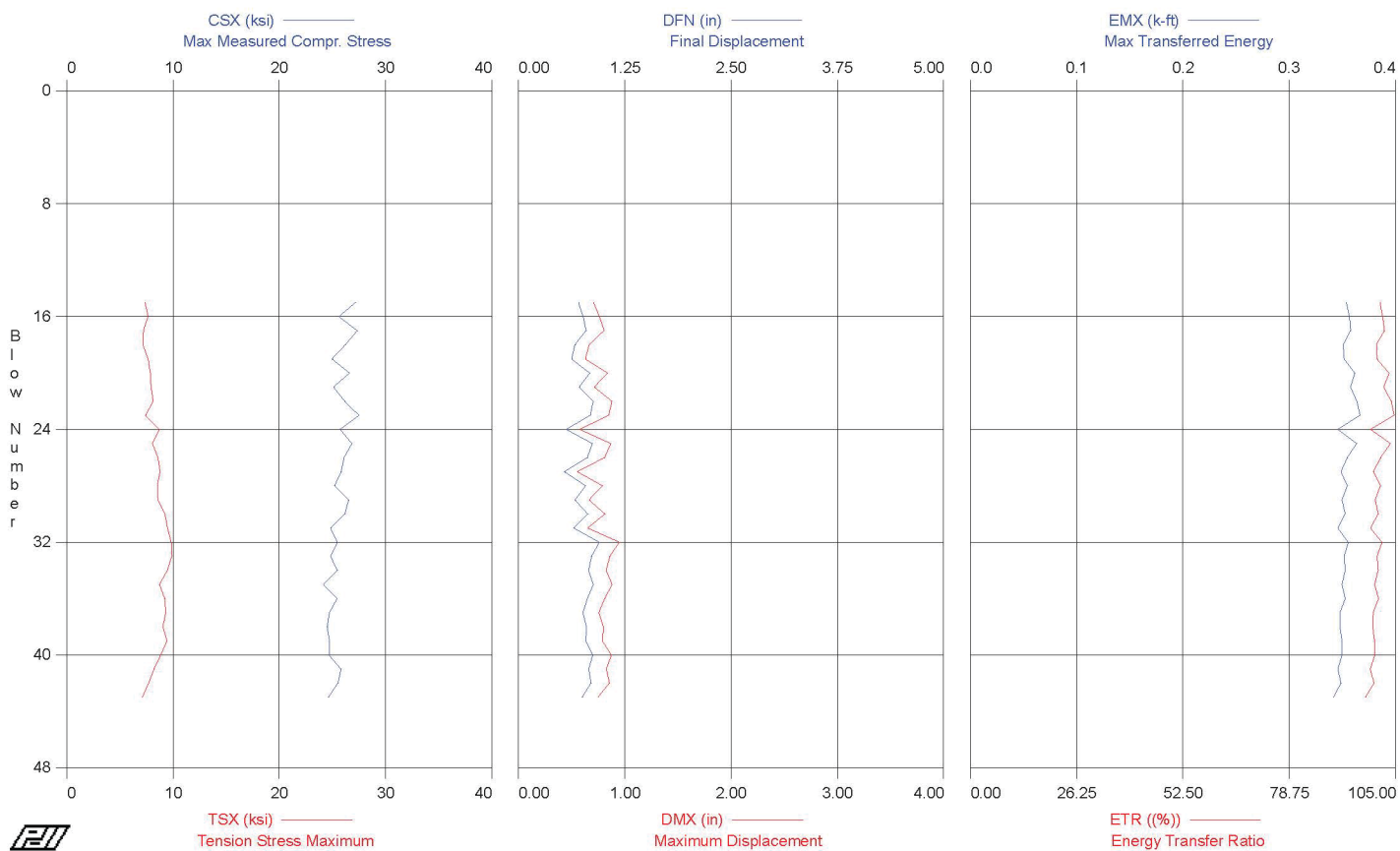
Total number of blows analyzed: 25

Time Summary

Drive 56 seconds

10:46:01 AM - 10:46:57 AM (6/6/2013) BN 1 - 39

CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 20.2-21.7



CLINCH RIVER SMR - CLINCH RIVER MWD (GARY A) 20.2-21.7

DIEDRICH D.120 (027)

OP: MEH

Test date: 6-Jun-2013

AR: 1.21 in²

SP: 0.492 k/ft³

LE: 26.00 ft

EM: 30,000 ksi

WS: 16,807.9 f/s

JC: 0.00

CSI: Max F1 or F2 Compr. Stress

DFN: Final Displacement

CSX: Max Measured Compr. Stress

DMX: Maximum Displacement

TSX: Tension Stress Maximum

EMX: Max Transferred Energy

VMX: Maximum Velocity

ETR: Energy Transfer Ratio

FMX: Maximum Force

BL#	depth ft	CSI ksi	CSX ksi	TSX ksi	VMX f/s	FMX kips	DFN in	DMX in	EMX k-ft	ETR (%)
15	0.00	30.3	27.2	7.4	25.4	33	0.71	0.71	0.354	101.2
16	0.00	29.0	25.6	7.7	24.9	31	0.76	0.76	0.357	101.9
17	0.00	30.6	27.4	7.2	25.4	33	0.80	0.81	0.358	102.4
18	0.00	29.9	26.2	7.2	24.7	32	0.66	0.66	0.351	100.4
19	0.00	28.1	25.0	7.7	24.6	30	0.63	0.63	0.352	100.5
20	0.00	29.7	26.7	7.9	24.9	32	0.84	0.84	0.362	103.5
21	0.00	27.9	25.1	7.9	24.6	30	0.71	0.71	0.358	102.2
22	0.00	29.8	26.2	8.1	25.1	32	0.88	0.88	0.364	104.0
23	0.00	31.2	27.5	7.4	25.4	33	0.85	0.85	0.367	104.7
24	0.00	29.3	25.8	8.7	24.4	31	0.56	0.58	0.346	99.0
25	0.00	29.9	26.9	8.1	24.8	33	0.87	0.87	0.364	103.9
26	0.00	29.8	26.1	8.6	24.7	32	0.81	0.81	0.355	101.4
27	0.00	29.5	25.8	8.8	24.4	31	0.54	0.55	0.349	99.6
28	0.00	28.9	25.2	8.5	24.3	31	0.79	0.79	0.355	101.4
29	0.00	30.0	26.5	8.6	24.3	32	0.67	0.67	0.350	100.1
30	0.00	29.9	26.2	9.2	24.2	32	0.82	0.82	0.353	100.8
31	0.00	27.9	24.8	9.5	23.7	30	0.65	0.65	0.346	98.9
32	0.00	29.5	25.5	9.8	24.4	31	0.95	0.95	0.356	101.8
33	0.00	28.8	24.8	9.9	23.8	30	0.86	0.86	0.352	100.5
34	0.00	29.3	25.5	9.5	24.0	31	0.83	0.83	0.353	100.8
35	0.00	27.2	24.2	8.7	23.7	29	0.88	0.88	0.350	99.9
36	0.00	28.6	25.5	9.2	24.5	31	0.81	0.81	0.353	100.9
37	0.00	28.8	24.7	9.3	23.8	30	0.76	0.76	0.348	99.6
38	0.00	28.6	24.5	9.0	23.8	30	0.80	0.80	0.348	99.4
39	0.00	28.5	24.7	9.4	23.9	30	0.79	0.79	0.350	99.9
40	0.00	28.5	24.7	8.9	23.8	30	0.87	0.87	0.350	100.0
41	0.00	29.6	25.8	8.2	23.4	31	0.83	0.83	0.346	98.8
42	0.00	29.3	25.5	7.7	23.7	31	0.85	0.86	0.349	99.8
43	0.00	27.8	24.6	7.1	23.3	30	0.75	0.75	0.342	97.6
Average		29.2	25.7	8.5	24.3	31	0.78	0.78	0.353	100.9

Total number of blows analyzed: 29

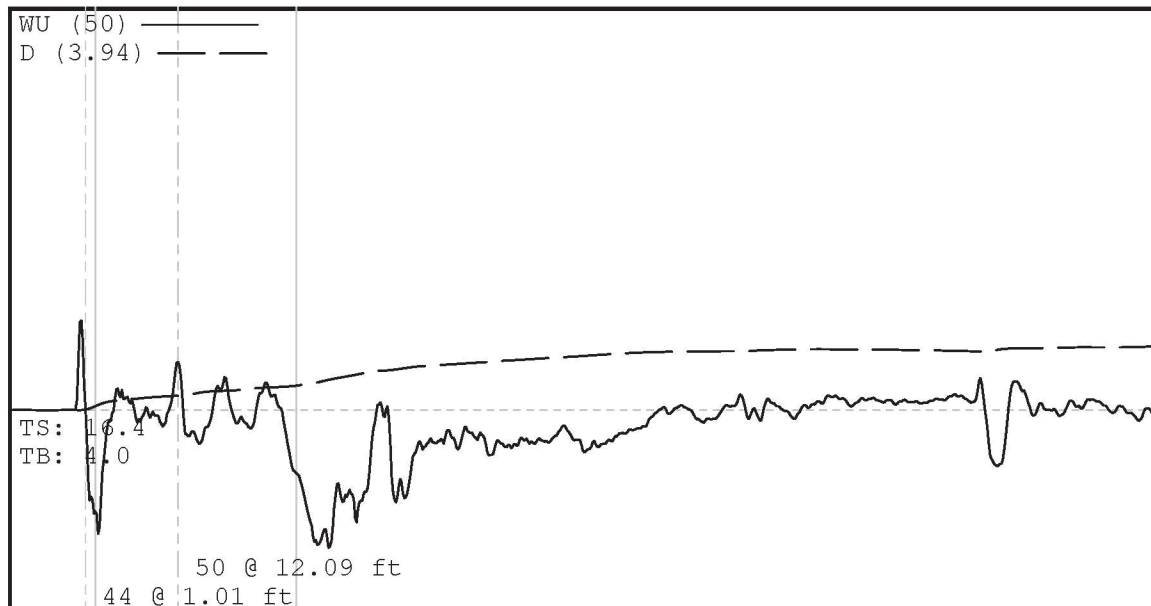
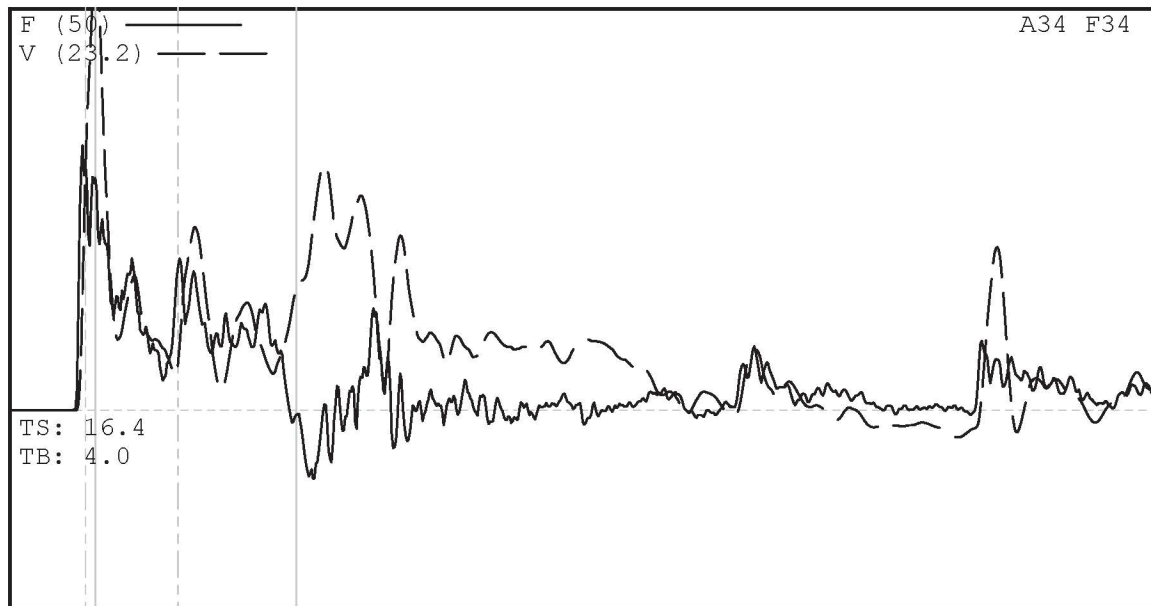
Time Summary

Drive 1 minute 5 seconds

10:51:39 AM - 10:52:44 AM (6/6/2013) BN 1 - 44

CLINCH RIVER SMR

CLINCH RIVER MWD (GARY A) 18.7'-20.2'

Project Information

PROJECT: CLINCH RIVER SMR
 PILE NAME: CLINCH RIVER MWD (GARY A) 18.7'-20.2'
 DESCR: DIEDRICH D.120 (027)
 OPERATOR: MEH
 FILE: CLINCH RIVER MWD (GARY A) 18.7'-20.2'
 6/6/2013 10:46:57 AM
 Blow Number 38/39

Quantity Results

CSI 30.6 ksi
 CSX 27.2 ksi
 TSX 10.1 ksi
 VMX 25.0 f/s
 FMX 33 kips
 DFN 1.05 in
 DMX 1.05 in
 EMX 0.3 k-ft
 ETR 97.6 (%)

Pile Properties

LE 24.00 ft
 AR 1.21 in²
 EM 30000 ksi
 SP 0.492 k/ft³
 WS 16807.9 f/s
 EA/C 2.2 ksec/ft
 2L/C 2.86 ms
 JC []

Sensors

F3: [75AW1] 208.84 (1)
 F4: [75AW2] 209.17 (1)
 A3: [K3370] 325 mv/5000g's (1)
 A4: [K0686] 315 mv/5000g's (1)
 CLIP: OK
 F3/F4: OK 1.10
 V3/V4: OK 1.13