Nine Mile Point 3 Nuclear Power Plant

Combined License Application

Part 11F: Boring Logs B434 to B441 and Test Pit logs

Revision 0
September, 2008

Graphic Legend:

Surficial Deposits	Oswego Transition Zone
Fill	Pulaski Formation
Glacial Till	Whetstone Gulf Formation
Oswego Sandstone	Marker Bed

Rock Field Hardness:

A measure of resistance to scratching or abrasion.

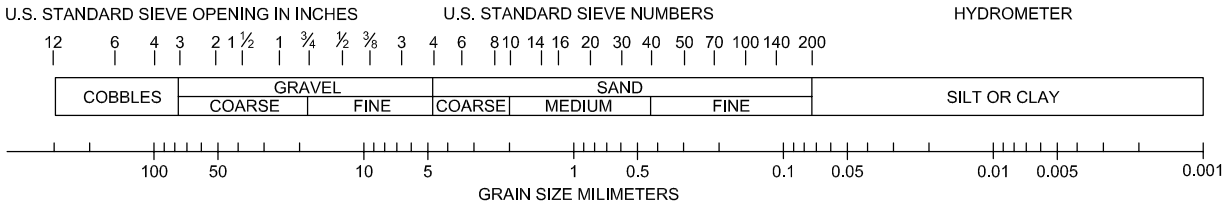
Hard	Scratches with point of steel blade with difficulty.
Medium	Scratches readily with point of steel blade.
Soft	Grooves readily with point of steel blade.

Rock Weathering:

The action of the elements in altering the color, texture, and composition of the rock.

Fresh	Crystals bright, some slight staining of joints.
Slight	Rock generally fresh, joints stained.
Moderate	Joints stained, discoloration extends 1-inch into rock.
Severe	Rock discolored, rock strength reduced to strong soil.

Soil Grain Size Scale:



Nine Mile Point Unit 3 Site Characterization Oswego, New York	GEI Consultants	FINAL BORING LOG LEGEND
AREVA NP Marlborough, Massachusetts	Project 07223	Rev. 1, July 2008

Final Boring Log

Boring No. **B434**

Boring Information

Northing : 1282742 **Easting :** 542988.3
Horizontal Datum : NAD 27
Ground Surface Elev. (ft): 238.3
Vertical Datum : NGVD 29
Rig Type/I.D: Mobile B57 / Barge 2

Date Start - End: 5/18/2008 - 5/27/2008
Driller Name: G. Jones, J. Weeks
Logged By : A. Cummings, A. Hare
Drilling Company : Boart Longyear
Total Depth (ft) : 196.1

Drilling Information

Hammer Ident: NA
Auger I.D: NM
Auger Head Length: NM

Casing I.D: 4 inch
Drill Rod O.D: 2 5/8 inch NW

Core Barrel Type: NQ2
Core Barrel I.D/O.D: 2 inch / 3 inch
Core Barrel Length: 13 ft

Drilling Method: Casing set 1.1 ft below mudline, rollerbit to clean out casing, wireline coring 0 to 196.1 ft.

ABBREVIATIONS:

Blows per 6 in.: 140 lb hammer falling 30 inches to drive a 2 inch O.D. split spoon sampler.

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Length of Sound Cores>4 in / Pen.,%
HSA = Hollow-Stem Auger

WOR = Weight of Rods
WOH = Weight of Hammer
S = Split Spoon Sample
C = Core Sample

NA, NM = Not Applicable, Not Measured
LL = Liquid Limit
PI = Plasticity Index
NV, NP = No value, Non-plastic

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Soil-Sample Description Rock-Lithological Description
			S1	0/0	NM	NA		S1: NO RECOVERY. Approximate top of Oswego Sandstone at depth 0.0 ft (El. 238.3 ft).
			C1	10/12	33	2.5		C1: SANDSTONE, greenish gray, hard, bedding massive, well sorted, fine grained, fractures planar, moderately weathered along fractures with some discoloration, fractures spaced 0.5 in. to 3 in.
			C2	63/60	20	2.0	Weathering in top 2 ft.	C2: SANDSTONE, greenish gray, hard, bedding typically massive, though some laminations are present, well sorted, fine grained, some weathering at top of core, otherwise unweathered, fractures generally planar, spaced <0.5 in. to 4 in., 20° fracture at 27 in., 45° fractures at 45 in. and 56 in.
						2.0		
						2.5		
						2.5		
						2.5	20° fracture.	
							45° fracture.	
			C3	123/120	76	2.0	45° fracture.	C3: SANDSTONE WITH INTERBEDDED SILTSTONE, sandstone greenish gray, hard, well sorted, fine grained, siltstone dark gray, soft, unweathered, bedding laminated with some disturbed bedding at 110 in. to 114 in., fractures generally planar and unweathered, spaced <0.5 in. to 14 in., 40° fractures at 25 in. and 27 in., clay seam at 0 in. to 2 in.
						2.0	40° fracture.	
230						2.0	1-inch-thick clay seam with shale fragments.	
						2.5	40° fracture.	
	10					2.0		
						2.0		
						2.0		
						2.0		
						2.0		Approximate top of Oswego Transition Zone at depth 13.4 ft (El. 224.9 ft).
						2.0		
							Shaly partings.	
			C4	69/72	89	2.0		C4: SANDSTONE WITH INTERBEDDED SILTSTONE, similar to C3, cross bedding present, 20° fractures at 62 in. and 69 in., fractures spaced <0.5 in. to 29 in.
						2.0		
220						2.5		
						2.0		
	20					3.0		
						5.5/8 in.		
							20° fracture.	
							20° fracture.	
			C5	49/49	94	3.0		C5: SANDSTONE WITH INTERBEDDED SILTSTONE, similar to C3, shale clasts more common, especially in last 4 in. of core, bedding both massive and laminated, fractures planar and unweathered, spaced 1 in. to 14 in.
						3.5		
						2.5		
						3.0		
			C6	118/120	70	3.5		C6: SANDSTONE WITH INTERBEDDED SILTSTONE AND SHALE, sandstone greenish gray, hard, well sorted, fine grained, siltstone dark gray and soft, shale black and soft, bedding laminated, though disturbed bedding does occur, unweathered, fractures planar and unweathered, spaced 1 in. to 12 in., 8 in. incipient vertical fracture at 33.4 ft., dolomite clasts at 30.2 in.
						3.5		
210						3.5		
						3.0		
	30					3.0	Dolomite clasts.	
						3.0		
						3.5		Approximate top of Pulaski Formation - Unit A at depth 30.0 ft (El. 208.3 ft).

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 238
Vertical Datum : NGVD 29
Date Start / End: 5/18/2008 - 5/27/2008
Total Depth (ft) : 196.1

Boring No.
B434

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Soil-Sample Description Rock-Lithological Description
						3.0		
						3.0		
						3.0		
							8-inch-long incipient fracture with calcite infill.	
			C7	119/120	92	2.0	Highly fractured zone.	C7: SANDSTONE AND SILTSTONE, sandstone gray to greenish gray, some argillaceous, fine grained, well sorted, hard, dominant in upper half of core run, followed by dark gray, soft siltstone in lower half, minor black soft shale throughout, bedding both laminated and disturbed, unweathered, fractures planar and unweathered, spaced 2 in. to 40 in., first fossils at 44 ft.
						2.5		
200						2.0		
						2.0		
	40					2.5		
						2.0		
						2.0		
						2.0		
						2.0		
						2.5	Fossils.	
			C8	123/120	78	3.0		C8: SILTSTONE WITH INTERBEDDED SANDSTONE AND SHALE, siltstone dark gray and soft, sandstone similar to C7, shale black and soft, bedding irregular, some lamination and cross bedding present, unweathered, fractures generally planar and unweathered, spaced 2 in. to 12 in., fossils at 51.8 ft. and 53.3 ft.
						2.5		
190						2.0		
						2.5	Highly fractured silty shale.	
	50					2.5	Highly fractured zone.	
						1.5		
						2.0		
						2.0		
						2.0		
						2.0		
							Thin clay film in fracture.	
			C9	119/120	95	2.0		C9: Similar to C8, highly fractured zones at 61.1 ft. and 65.8 ft., green mineral veins at 65.6 ft., 2 in. incipient vertical fractures at 64.2 ft. and 65.9 ft.
						2.0		
180						2.0		
						2.0		
	60					2.0		
						2.5		
						2.5	Highly fractured zone.	
						2.5		
						2.0		
						2.0	2-inch-long vertical fractures.	
								Approximate top of Pulaski Formation - Unit B at depth 66.1 ft (El. 172.2 ft).
							Green mineral veins.	
			C10	122/120	95	2.0	Highly fractured zone.	C10: Similar to C8, 1 in. incipient vertical fracture at 74.7 ft., 3 in. incipient fracture at 69.7 ft., fractures spaced 0.5 in. to 19 in.
						2.0		
170						3.0		
						2.5		
	70					2.0	3-inch-long incipient fracture with calcite infill.	
						5.5		
						3.0		
						1.5		
						1.5		

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

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Vertical Datum : NGVD 29
Date Start / End: 5/18/2008 - 5/27/2008
Total Depth (ft) : 196.1

Boring No. **B434**

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
						1.5				
							1-inch-long incipient vertical fracture.			
			C11	120/120	92	1.5				C11: SILTSTONE WITH INTERBEDDED SANDSTONE AND SHALE, siltstone dark gray and soft, sandstone gray and hard, fine grained, well sorted, shale black and soft, bedding irregular, some massive bedding in sandstone, unweathered, fractures planar and unweathered, spaced 1 in. to 19 in., fossils at 82.2 ft., 84.3 ft., and 85.6 ft.
						2.0				
160						2.0				
						2.0				
	80					2.0				
						1.5				
						1.5				
						2.0				
						1.5	Fossils.			
						1.5				Approximate top of Pulaski Formation - Unit C at depth 84.5 ft (El. 153.8 ft).
							Fossils.			
							Fossils.			
			C12	119/120	83	1.5				C12: SANDSTONE WITH SILTSTONE AND SHALE, gray, medium hardness, bedded sandstone, dark gray, soft siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal and smooth, spaced 0.25 in. to 25 in., irregular and nonplanar fractures at 98 in. and 112 in., 60° fracture at 116 in. to 119 in., soft sediment deformation at 11 in., 18-29 in., and 95-105 in.
						1.5				
150						2.0				
						1.5				
	90					1.5				
						1.5				
						1.5				
						2.0				
						2.0				
						2.0				
							Highly fractured siltstone.			
							Highly fratcured zone.			
			C13	122/120	64	1.0	60° fracture.			C13: SILTSTONE WITH SANDSTONE AND SHALE, gray, medium hardness, massive bedded sandstone, dark gray to black, soft, laminated siltstone, unweathered, fractures generally planar, horizontal, and smooth, spaced from 0.5 in. to 13.5 in., 60° fracture 0-3 in., 15° fracture at 18 in., highly fractured zone at 37 in., 8 in. vertical fracture at 65 in., 10° rough fractures at 117 in. and 119 in., soft sediment deformation 108 in. to 119.5 in.
						1.5	60° fracture.			
140						1.5				
						2.0	Highly fractured zone.			
	100					2.0				
						2.0	0.5-inch-thick clay seam with shale fragments.			
						2.0				
						2.0	8-inch-long vertical fracture.			
						2.5				
						2.0				
			C14	116/120	87	2.0				C14: SANDSTONE AND SILTSTONE WITH SHALE, gray, medium hardness, bedded sandstone, dark gray to black, soft, laminated siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal and smooth, spaced 0.25 in. to 14 in., alternating fine bedding, 13-15 in. and 32-34 in., fossil layer 43-44.5 in.
						2.5				
130						2.0				
						2.0				
	110					2.0				
						1.5	Fossils.			
						1.5				
						1.5				
						1.5				
						1.5				

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 238
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Total Depth (ft) : 196.1

Boring No. **B434**

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
			C15	117/120	86	1.5				Approximate top of Whetstone Gulf Formation - Unit A at depth 117.9 ft (El. 120.4 ft).
						1.5				
120						2.0				C15: SILTSTONE AND SHALE WITH SANDSTONE, dark gray to black, soft siltstone, gray, hard, bedded sandstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 0.5 in. to 12 in., highly fractures zone at 40-41 in., nonplanar fractures at 94 in. and 105 in., fossil layers at 29- 31.5 in., 38-40 in., 72 in., and 116-117 in., calcite and dolomite with pyrite crystal at 86 in., soft sediment deformation at 88-90 in.
						2.0				
	120					2.0	Shaly partings.			
						2.0	Highly fractured zone.			
						2.5				
						3.0				
						3.5				
						3.0	Calcite and dolomite with pyrite.			
			C16	122/108	100	3.5				C16: Similar to C15, fractures spaced from 2-22 in., irregular vertical fracture with slickenside at 80 in., 15° fracture at 48 in., calcite crystal at 13 in., soft sediment deformation at 114 in.
						2.5				
110						1.5	15° fracture.			
						2.0	Fossils.			
	130					2.0				
						1.5	Fractures in siltstone with slickensides, dip-slip motion.			
						2.0	Shaly partings.			
						2.5				
						2.0				
						2.0	Fossils.			
			C17	9/12	75	2				C17: SANDSTONE, gray, medium hardness, bedded, no fractures, unweathered.
			C18	120/120	79	2.0				C18: SANDSTONE WITH SILTSTONE AND SHALE, gray, medium hardness, bedded sandstone, soft laminated siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced from 1 in. to 35 in., slickenside at 97 in., 20° fractures at 114 in. and 118 in.
						2.0				
100						1.5				
						1.5				
	140					1.5				
						1.5				
						1.5				
						1.5				
						2.0				
						3.0				Approximate top of Whetstone Gulf Formation - Unit B at depth 144.7 ft (El. 93.6 ft).
							Shaly partings.			
							Slickensides.			
			C19	115/120	89	3.0	20° fracture.			C19: SILTSTONE AND SHALE WITH SOME SANDSTONE, dark gray to black, soft, laminated siltstone, gray, hard, bedded sandstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 0.5 in. to 26 in., highly fractured zone at 31 in., soft sediment deformation last 12 in. of core.
						3.0	20° fracture.			
90						3.0				
						3.0	Highly fractured siltstone.			
	150					3.0				
						2.5				
						2.0				
						2.5				
						2.0				
						2.0				
			C20	123/120	91	2.5				C20: Similar to C19, fractures spaced from 3 in. to 31 in., chipping at 0 in. and 4 in., fossil layers at 34 in., 54 in., and 79 in.
						2.5				

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

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Final Boring Log

Ground Surface Elev. (ft): 238
Vertical Datum : NGVD 29
Date Start / End: 5/18/2008 - 5/27/2008
Total Depth (ft) : 196.1

Boring No. **B434**

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures / Graphic Log	Soil-Sample Description Rock-Lithological Description
80						2.0			
						2.5			
						2.5			
	160					2.0			
						2.0			
						2.5			
						3.0			
						2.5			
			C21	121/120	99	4.0			C21: Similar to C19, fractures spaced 2 in. to 31 in., alternating thin beds 8 in. to 35 in.
						3.0			
70						2.5			
						2.0			
	170					2.5			
						3.0			
						2.0			
						1.5			
						1.5			
						1.5			
			C22	122/120	97	2.0			C22: Similar to C19, fractures spaced from 0.25 in. to 36 in., fossil layers at 42 in. to 44 in., 105.5 in. to 110 in., and 117 in. to 118 in.
						1.5			
60						1.5			
						1.5	Fossils.		
	180					2.5			
						1.5			
						2.5			
						2.0			
						2.0			
						2.0	Fossils. Highly fractured siltstone. Fossils.		
			C23	124/120	81	2.0	Fossils.		C23: SANDSTONE AND SILTSTONE WITH SHALE, gray, medium hardness, bedded sandstone, dark gray to black soft laminated siltstone, well sorted, fine grained, unweathered, fractures generally planar horizontal and smooth, spaced 1.5 in. to 45 in., chipping fractures at 61 in. and 115 in., 1 in. clay seam at 51 in., soft sediment deformation throughout siltstone.
						1.5			
50						2.0			
						2.0			
	190					2.5	1-inch-thick clay seam.		
						2.0			
						3.0	Clay film in fractures.		
						3.0			
						3.0			
						3.0			
40							General Comments about Core Samples:		Bottom of boring at depth 196.1 ft (El. 42.2 ft). Borehole grouted to top of lake bed upon completion.

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 238
Vertical Datum : NGVD 29
Date Start / End: 5/18/2008 - 5/27/2008
Total Depth (ft) : 196.1

Boring No.
B434

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
	200						Bedding-parallel fractures are most frequent in shale and siltstone and less common in sandstone. Vertical fractures occasionally present in sandstone beds. Hand pressure produces bedding-parallel fractures in siltstone of Pulaski Formation during handling and transport. Fracture surfaces are generally unweathered unless otherwise noted.			
30										
	210									
20										
	220									
10										
	230									
0										
	240									

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log Signature Page	Boring No. B434

Project: Nine Mile Point Site Characterization — GEI Project No. 07223

Location: Oswego, New York

Final Log Prepared by: _____ Date: 9/11/08

Per GEI Procedure 150 rev. 1 using computer IBM Thinkpad - Product 64576PU

Final Log Checked by:

Soil Descriptions Checked by: _____ Date: 9/11/08

Rock Descriptions Checked by: _____ Date: 9/11/08

Drilling and Sample Information Checked by: _____ Date: 9/11/08

Notes:

A. Cummings performed a sofware funtionality check: Input from software database equals output on Final Log.

Form 150.3 rev. 1

Final Boring Log

Boring No. **B435**

Boring Information

Northing : 1282797.2 **Easting :** 542892
Horizontal Datum : NAD 27
Ground Surface Elev. (ft): 236.4
Vertical Datum : NGVD 29
Rig Type/I.D: Mobile B57 / Barge 2

Date Start - End: 5/30/2008 - 6/3/2008
Driller Name: P. Dickensen
Logged By : T. Daigle, A. Cummings
Drilling Company : Boart Longyear
Total Depth (ft) : 189.9

Drilling Information

Hammer Ident: NA
Auger I.D: NM
Auger Head Length: NM

Casing I.D: 4 inch
Drill Rod O.D: 2 5/8 inch NW

Core Barrel Type: NQ2
Core Barrel I.D/O.D: 2 inch / 3 inch
Core Barrel Length: 13 ft

Drilling Method: Casing to 1.9 ft. below mudline, rollerbit to clean out casing, wireline coring 1.9 ft. to bottom

ABBREVIATIONS:

Blows per 6 in.: 140 lb hammer falling 30 inches to drive a 2 inch O.D. split spoon sampler.

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Length of Sound Cores>4 in / Pen.,%
HSA = Hollow-Stem Auger

WOR = Weight of Rods
WOH = Weight of Hammer
S = Split Spoon Sample
C = Core Sample

NA, NM = Not Applicable, Not Measured
LL = Liquid Limit
PI = Plasticity Index
NV, NP = No value, Non-plastic

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
			S1	4/4	50/4 in.	NA	Casing set to 1.9 ft. below mudline.			S1: WIDELY GRADED GRAVEL WITH SILT (GW-GM), ~90% gravel up to 1.5 in. with fragments of sandstone, ~5% fine sand, ~5% nonplastic fines, some aquatic grass. LAKE SEDIMENT. Approximate top of Oswego Sandstone at depth 1.9 ft (El. 234.5 ft).
			C1	36/36	83	2.5, 1.5, 1.5				C1: SANDSTONE, gray, medium hard to hard sandstone, medium to fine grained, unweathered, well sorted, fractures generally planar, horizontal, and smooth, spaced 3-8 in., 10° fracture at 36 in., fractures appear unweathered.
230			C2	118/120	83	1.5, 2.5, 2, 1.5, 1.5, 1.5, 1, 1.5, 1.5, 1.5	10° fracture. Highly fractured zone.			C2: Similar to C1, thin lenses of siltstone at 10-12 in. and 103-109 in., slightly darker sandstone at 32-34 in. and 87-92 in., fractures generally planar, horizontal, and smooth, spaced <1-17 in., highly fractured zone 9-13 in.
	10									Approximate top of Oswego Transition Zone at depth 14.8 ft (El. 221.6 ft).
220			C3	122/120	85	2, 1.5, 1.5, 1.5, 2, 1.5, 1.5, 2, 2.5, 1.5	2-inch-long vertical fracture.			C3: SANDSTONE AND ARGILLACEOUS SANDSTONE, few siltstone layers, gray, medium hard to hard sandstone, dark gray, medium hardness argillaceous sandstone, fine to medium grained sandstone, fine grained argillaceous sandstone and siltstone, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 1-28 in., 2 in. vertical fracture at 101 in. and 114 in., fracture at 114 in. has calcite infill.
	20									
210			C4	121/120	89	2, 2, 3, 2.5, 2, 2, 2, 2.5, 2	2-inch-long vertical fracture. 2-inch-long vertical fracture.			C4: SANDSTONE AND ARGILLACEOUS SANDSTONE WITH INTERBEDDED SILTSTONE, gray, medium hard sandstone, dark gray, medium hard argillaceous sandstone, dark gray medium hard to soft siltstone, siltstone increasing with depth, trace fossil fragments 94-95 in., fine grained, well sorted, unweathered , greenish-blue sandstone coloration 87-93 in., fractures generally planar, horizontal, and smooth, spaced 1-14 in., 2 in. vertical fracture at 47 in., 5 in. incipient vertical fracture at 98 in. with calcite infill.
	30									

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 236
Vertical Datum : NGVD 29
Date Start / End: 5/30/2008 - 6/3/2008
Total Depth (ft) : 189.9

Boring No.
B435

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Soil-Sample Description Rock-Lithological Description
						2		
							Incipient vertical fracture.	
							Slickensides in siltstone, dip slip orientation, no apparent offset in bedding, polishing.	
			C5	120/120	93	2.5	20° fracture.	C5: Similar to C4, increasing argillaceous sandstone down core, thick argillaceous sandstone bed 75-111 in. with fossil fragments at 92-98 in., dark gray to black siltstone layers at 7-9 in. and 32-36 in., fractures generally planar, horizontal, and smooth, spaced <1-43 in., 30° fracture at 57 in.
200						1.5		
						2.5		
						1.5		
						2		
						3		
	40					2.5	30° fracture.	
						2.5		
						2		
						2		
								Approximate top of Pulaski Formation-Unit A at depth 37.6 ft (El. 198.8 ft).
			C6	111/120	78	2		C6: ARGILLACEOUS SANDSTONE WITH INTERBEDDED SANDSTONE AND SILTSTONE, dark gray, medium hardness argillaceous sandstone, dark gray, soft siltstone, gray, medium hard to hard sandstone interbeds, unweathered, mottling at 31-35 in., fossil fragments at 92-93 in. and 100-103 in., thinly bedded siltstone, fractures generally planar, horizontal, and smooth, spaced <1-30 in., highly fractured zone 12-24 in.
						2.5		
190						2	Highly fractured zone. Shaly partings.	
						1.5		
						1.5		
						2		
	50					2		
						1.5		
						2		
						2		
							Fossils.	
			C7	129/120	100	2		C7: SANDSTONE AND ARGILLACEOUS SANDSTONE WITH INTERBEDDED SILTSTONE, gray, hard sandstone, dark gray medium hardness argillaceous sandstone, dark gray, soft siltstone interbeds, unweathered, fossil fragments 20-24 in., fractures generally planar, horizontal, and smooth, spaced 2-29 in., 4 in. vertical fracture at 0 in., 3 in. vertical fracture at 118 in., vertical fractures have irregular, non-planar surfaces, may be from drilling.
						2		
180						2		
						2		
						2		
						2.5	Fossil fragments.	
	60					2		
						2.5		
						2		
						1.5		
			C8	120/120	94	2	Trace green mineral.	C8: SANDSTONE WITH INTERBEDDED ARGILLACEOUS SANDSTONE AND SILTSTONE, gray, hard sandstone, dark gray, medium hard argillaceous sandstone, dark gray, soft siltstone, trace green mineral lenses 0-5 in., mottling 52-60 in., fossil fragments 92-94 in., fine grained, well sorted, unweathered , fractures generally planar, horizontal, and smooth, spaced 1-25 in.
170						2		
						2.5		
						2.5		
						3.5		
	70					3		
						2.5		
						2		
						2		

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 236
Vertical Datum : NGVD 29
Date Start / End: 5/30/2008 - 6/3/2008
Total Depth (ft) : 189.9

Boring No. **B435**

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
							Fossil fragments.			Approximate top of Pulaski Formation-Unit B at depth 74.9 ft (El. 161.5 ft).
			C9	122/120	92	2				C9: Similar to C8, fossil fragments 3-6 in. thick, gray sandstone bed 83-96 in., mottling at 64-68 in., 96-99 in., and 114-116 in., fractures generally planar and horizontal, spaced <1-32 in.
160						1.5	Fossil fragments.			
						2.5				
						2				
						2.5				
						2.5				
	80					2				
						1.5				
						1.5				
						2				
			C10	114/120	71	1.5				C10: SANDSTONE AND SILTSTONE WITH INTERBEDDED SHALE, gray, medium hard to hard sandstone, dark gray, soft to medium hard siltstone and shale, unweathered, fossil fragments 15-16 in., lenses of gray sandstone 53-64 in., fractures generally planar, horizontal, and smooth, spaced <1-24 in., incipient vertical fracture 105-108 in. with calcite infill, 45° fractures at 95-97 in. with slickensides on fracture surface. Approximate top of Pulaski Formation-Unit C at depth 86.1 ft (El. 150.3 ft).
150						2	Fossil fragments. Shaly partings.			
						2				
						2				
						1.5				
						2				
	90					1.5				
						3				
						3.5				
						2.5				
							Two 45° fractures in siltstone with slickensides, dip slip orientation, no apparent offset in bedding. Incipient vertical fracture.			
			C11	123/120	93	3.5				C11: SILTSTONE WITH INTERBEDDED SANDSTONE AND SHALE, dark gray, medium hard to soft siltstone and shale, gray, medium hard to hard sandstone, thick siltstone beds, thin sandstone interbeds, core is mostly siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced <1-31 in.
140						3.5				
						2.5				
						2.5				
						2.5				
						3				
	100					3				
						3				
						3.5				
						2				
			C12	116/120	88	4				C12: Similar to C11, slightly thicker sandstone beds, mottling 15-17 in., fossil fragments 51-54 in., well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced <1-26 in., 10° fracture at 68 in. and 72 in., 45° fractures at 76-77 in., highly fractured zone 81-83 in., vertical chips at 0-2 in., may be from drilling
130						3				
						3				
						2				
						2				
						2				
	110					2.5	Fossil fragments.			
						2.5	10° fractures.			
						2	45° fractures.			
						1.5	Shaly partings.			
			C13	120/120	93	2				C13: SANDSTONE AND SILTSTONE WITH INTERBEDDED

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 236
Vertical Datum : NGVD 29
Date Start / End: 5/30/2008 - 6/3/2008
Total Depth (ft) : 189.9

Boring No. **B435**

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures / Graphic Log	Soil-Sample Description Rock-Lithological Description
120						2.5 2.5 2.5 2 2 3 2 3 2.5	Shaly partings. 45° fractures with minor striations. Shaly partings, siltstone with slickensides, dip slip orientation, no apparent offset in bedding, minor clay coating. 45° fracture with minor striations.		SHALE, dark gray, soft to medium hard siltstone and shale, gray, medium hard to hard sandstone, well bedded sandstone intervals becoming thicker down core, fossil fragments 45-51 in., well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced <1-19 in., 45° inclined fracture at 72 in. and 89 in., with a few faintly visible striations, 45° fracture at 99 in. has no visible striations. Approximate top of Whetstone Gulf Formation-Unit A at depth 116.4 ft (El. 120.0 ft).
	120								
110			C14	118/120	83	3.5 4.5 4 3 4 3 2.5 4.5 2.5 1.5			C14: SILTSTONE WITH INTERBEDDED SANDSTONE AND SHALE, dark gray, soft to medium hard siltstone and shale, gray, medium hard to hard sandstone, sandstone beds thinning downcore, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced <1-26 in., fossil fragments 3-5 in. and 93-94 in., 8 in. incipient vertical fracture at 36 in., 3 in. incipient vertical fracture at 87 in., 4 in. incipient vertical fracture at 114 in., all incipient fractures have minor calcite infill.
	130								
100			C15	123/120	88	1.5 1.5 2.5 6 1.5 1.5 1.5 2.5 5 4	40-inch-thick sandstone bed. 45° fracture.		C15: SANDSTONE WITH INTERBEDDED SILTSTONE AND SHALE, thick beds of gray, medium hard to hard sandstone, thin interbeds of soft to medium hard siltstone and shale, few lenses of siltstone in sandstone, well sorted, fine grained, unweathered, fractures generally planar and smooth, spaced 2-45 in., 45° fracture at 48 in., faint striations present. Approximate top of Whetstone Gulf Formation-Unit B at depth 142.8 ft (El. 93.6 ft).
	140								
90			C16	120/120	95	4 5.5 4 2.5 3 2.5 3 3 2 6	Highly fractured zone. Shaly partings. Slickensides in siltstone fractures with polishing, dip slip orientation, no apparent offset in bedding, highly fractured silty shale. 30° fracture. 48-inch-thick sandstone bed.		C16: SILTSTONE WITH INTERBEDDED SANDSTONE AND SHALE, thick beds of dark gray, soft to medium hard siltstone and shale, thin interbeds of medium hard gray sandstone, well sorted, fine grained, unweathered, fractures generally planar horizontal, and smooth, spaced <1-29 in., highly fractured zone with shaly partings at 28-30 in., 30° fracture at 43 in.
	150								
80			C17	120/120	100	1.5 2.5 2.5			C17: Similar to C16, slightly thicker sandstone beds, fractures generally planar, horizontal, and smooth, spaced 4-60 in.

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

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GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 236
Vertical Datum : NGVD 29
Date Start / End: 5/30/2008 - 6/3/2008
Total Depth (ft) : 189.9

Boring No.
B435

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
						3				
						2				
	160					3				
						3				
						1.5				
						NM				
						NM				
			C18	121/120	94	7.5	Highly fractured siltstone with slickensides, dip slip orientation, no apparent offset in bedding, some polishing.			C18: SHALE WITH INTERBEDDED SANDSTONE AND SILTSTONE, shale soft and black, siltstone soft and dark gray, sandstone hard, gray, well sorted, fine grained, massively bedded, shale and siltstone generally laminated with some disturbed bedding, unweathered, fractures generally planar and unweathered, spaced 0.5 in. to 48 in., 9 in. incipient vertical fracture at 168.2 ft.
	70					4				
						3.5				
						2.5	9-inch-long incipient vertical fracture.			
						3				
						3				
	170					4				
						4				
						3.5				
						1				
			C19	123/120	96	4.5	Highly fractured siltstone. 50° fracture with striations.			C19: SANDSTONE AND SHALE WITH INTERBEDDED SILTSTONE, sandstone gray, hard, fossiliferous, massively bedded, fine grained, moderately sorted, shale black and soft, siltstone dark gray and soft, fractures generally planar and unweathered, 50° fracture with striations at 175.4 ft. and 183.8 ft., fractures spaced 0.5 to 28 in.
	60					2.5				
						2.5	Fossils.			
						1.5				
						2	Fossils.			
						3				
	180					3				
						3				
						2.5	Fossils.			
						1				
							Fossils. 50° fracture.			
			C20	66/60	100	2.5				C20: Similar to C19, thick sandstone bed from 185 ft. to 189.2 ft. featuring some cross bedding, fractures spaced 2 in. to 53 in.
	50					1.5				
						1.5				
						2				
						3				
	190									Bottom of boring at depth 189.9 ft (El. 46.5 ft). Borehole grouted to top of lake bed upon completion.
							General Comments about Core Samples:			
	40						Bedding-parallel fractures are most frequent in shale and siltstone and less common in sandstone.			

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
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GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 236
Vertical Datum : NGVD 29
Date Start / End: 5/30/2008 - 6/3/2008
Total Depth (ft) : 189.9

Boring No.
B435

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
	200						Vertical fractures occasionally present in sandstone beds. Hand pressure produces bedding-parallel fractures in siltstone of Pulaski Formation during handling and transport. Fracture surfaces are generally unweathered unless otherwise noted.			
30										
	210									
20										
	220									
10										
	230									
0										
	240									

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Form 150.2 rev. 1

Final Boring Log Signature Page	Boring No. B435

Project: Nine Mile Point Site Characterization — GEI Project No. 07223

Location: Oswego, New York

Final Log Prepared by: _____ Date: 9/11/08

Per GEI Procedure 150 rev. 1 using computer IBM Thinkpad - Product 64576PU

Final Log Checked by:

Soil Descriptions Checked by: _____ Date: 9/11/08

Rock Descriptions Checked by: _____ Date: 9/11/08

Drilling and Sample Information Checked by: _____ Date: 9/11/08

Notes:

A. Cummings performed a sofware funtionality check: Input from software database equals output on Final Log.

Form 150.3 rev. 1

Final Boring Log

Boring No. **B436**

Boring Information

Northing : 1282908.1 **Easting :** 542881.9
Horizontal Datum : NAD 27
Ground Surface Elev. (ft): 234.8
Vertical Datum : NGVD 29
Rig Type/I.D: CME 75 / Barge 1

Date Start - End: 6/7/2008 - 6/9/2008
Driller Name: N. Short
Logged By : A. Hare
Drilling Company : Nothnagle
Total Depth (ft) : 184.0

Drilling Information

Hammer Ident: NA
Auger I.D: NM
Auger Head Length: NM

Casing I.D: 4 inch
Drill Rod O.D: 2 5/8 inch NW

Core Barrel Type: NQ2
Core Barrel I.D/O.D: 2 inch / 3 inch
Core Barrel Length: 13 ft

Drilling Method: Casing set to 0.3 ft. below mudline, rollerbit to wash to 0.5 ft., wireline coring to bottom

ABBREVIATIONS:

Blows per 6 in.: 140 lb hammer falling 30 inches to drive a 2 inch O.D. split spoon sampler.

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Length of Sound Cores>4 in / Pen.,%
HSA = Hollow-Stem Auger

WOR = Weight of Rods
WOH = Weight of Hammer
S = Split Spoon Sample
C = Core Sample

NA, NM = Not Applicable, Not Measured
LL = Liquid Limit
PI = Plasticity Index
NV, NP = No value, Non-plastic

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
			S1	2/4	125/4 in.	NA	Rollerbit to 0.5 ft.			S1: WIDELY GRADED GRAVEL (GW), 100% sandstone gravel up to 2 in. LAKE SEDIMENT. Approximate top of Oswego Sandstone at depth 0.5 ft (El. 234.3 ft).
			C1	27/30	53	1.5 1.5 1	Highly fractured zone.			
230			C2	58/60	64	1.5 1.5 1 1 1	Highly fractured argillaceous sandstone. 30° fracture.			C1: SANDSTONE, greenish gray, hard, bedded, well sorted, medium grained, slightly to moderately weathered rock, fractures spaced from 0.25 in. to 7 in., siltstone clasts at 5 in. C2: Similar to C1, fractures generally planar, horizontal, and smooth, spaced from 0.5 in. to 9.5 in., highly fractured zone from 3 in. to 4.5 in., vertical fracture 2.5 in. to 3 in., 30° fracture at 27 in.
10			C3	118/120	87	1.5 1.5 1.5 1.5 1.5 2.5 1.5 1.5 1.5 2	Fracture with oxidation. 0.5-inch-long vertical fracture. 30° fracture.			C3: Similar to C2, 2 in. dark gray, soft siltstone present, fractures generally planar, horizontal, and smooth, spaced 0.5 in. to 25.5 in., 0.5 in. vertical fracture at 19 in., 30° fracture at 28 in., 15° fracture at 101 in. Approximate top of Oswego Transition Zone at depth 9.6 ft (El. 225.2 ft).
220			C4	121/120	90	1.5 2 1.5 2 1.5 2 2 2.5 3 3.5	Vertical fractures. 3-inch-long incipient vertical fracture. 4-inch-long incipient vertical fracture. 5-inch-long vertical fracture.			C4: SANDSTONE AND SILTSTONE, gray, hard, bedded sandstone, dark gray, soft siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 0.5 in. to 25 in., 3 in. vertical fracture at 28 in., chip at 48 in., 3 in. incipient fracture at 56 in., 4 in. incipient vertical fracture at 81 in., shaly partings at 92 in., 5 in. vertical fracture at 101 in., siltstone clasts at 5 in. to 10 in.
210			C5	120/120	90	2 1.5 1.5 2 1.5	0.5-inch-long vertical fracture.			C5: Similar to C4, fractures generally planar, horizontal, and smooth, spaced 0.5 in. to 19 in., two parallel incipient vertical fractures 21-28 in., 0.5 in. vertical fracture at 32 in., chip at 43 in., soft sediment deformation and discoloration 3.5 in. to 16 in.

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 235
Vertical Datum : NGVD 29
Date Start / End: 6/7/2008 - 6/9/2008
Total Depth (ft) : 184.0

Boring No. **B436**

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
						1.5 1.5 1.5 3 3.5	Fossils.			Approximate top of Pulaski Formation-Unit A at depth 36.8 ft (El. 198.0 ft).
200										
	40		C6	118/120	85	1.5 1.5 1.5 2 2 2 2.5 2 2 1				C6: SILTSTONE AND SANDSTONE, dark gray, soft, laminated siltstone, gray, medium hardness, bedded sandstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 0.25 in. to 37.5 in.
190										
	50		C7	123/114	95	1.5 2 2 2 1.5 2 1.5 2 2.5 1	Verical fracture. Fossils.			C7: Similar to C6, fractures generally planar, horizontal, and smooth, spaced 1 in. to 46 in., fossils at 2 in., 17 in. incipient vertical fracture 119 in. to 123 in.
180										
	60		C8	60/66	86	1.5 1.5 2 1.5 2				C8: Similar to C6, fractures spaced 1 in. to 20 in., mottling throughout, green mineral veins at 50 in. Approximate top of Pulaski Formation-Unit B at depth 62.6 ft (El. 172.6 ft).
			C9	60/60	82	1.5 1.5 1.5 2 2	Green mineral layer.			C9: Similar to C6, fractures generally planar, horizontal, and smooth, spaced from 1.5 in. to 23 in., soft sediment deformation and mottling prevalent.
170										
	70		C10	120/114	100	1.5 1.5 1.5 1.5 2.5 2 1.5	Slickenside. Fossils.			C10: INTERBEDDED SILTSTONE AND SHALE WITH SOME SANDSTONE, dark gray to black, soft laminated siltstone, gray, hard, bedded sandstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 2 in. to 29 in., slickenside at 20 in., soft sediment deformation throughout, fossils at 51 in.

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

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Final Boring Log

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Boring No. **B436**

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
						2				
160						2				
						1.5				
			C11	113/120	83	1				C11: Similar to C10, fractures generally planar, horizontal, and smooth, spaced 2 in. to 24 in., 20° fracture at 29 in., 1 in. vertical fracture and highly fractured zone 51 in. to 53.5 in., multiple vertical fractures 109 in. to 113 in., fossils at 64 in., soft sediment deformation 29 in. to 51 in., 86 in. to 89 in., and 91 in. to 92 in. Approximate top of Pulaski Formation-Unit C at depth 79.5 ft (El. 155.3 ft).
						1.5				
						3.5				
	80					2.5	20° fracture.			
						3.5				
						2	Highly fractured zone.			
						3.5				
						1.5				
						2				
150						2.5				
							Multiple vertical fractures, highly fractured siltstone.			
			C12	44/44	90	2				C12: SANDSTONE WITH SILTSTONE AND SHALE, gray, hard, bedded sandstone, dark gray, soft siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 0.125 in. to 16.5 in., soft sediment deformation 25-27 in.
						2				
						3				
	90					2				
			C13	87/81	96	3	Highly fractured zone (core blockage), highly fractured siltstone.			C13: Similar to C12, fractures generally planar, horizontal, and smooth, spaced 1.5 in. to 22 in., highly fractured zone due to core blockage 0-2 in., soft sediment deformation 35 in. to 38 in.
						3				
						2.5				
						2.5				
140						3				
						2				
			C14	120/120	85	2.5				C14: INTERBEDDED SILTSTONE AND SHALE WITH SOME SANDSTONE, dark gray, soft, laminated siltstone, gray, hard sandstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal and smooth, spaced 0.125 in. to 19 in., 30° fracture at 85 in.
						2.5				
	100					2.5				
						3				
						2.5				
						1.5				
						2.5				
						3				
130						2	Shaly partings.			
						2.5				
							Fossils.			
							Highly fractured zone.			
			C15	120/120	93	3				C15: SANDSTONE AND SILTSTONE AND SHALE, gray, hard sandstone, dark gray to black soft siltstone, well sorted fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced <0.5 to 24 in., chipping at 3 in., soft sediment deformation at 110 to 111 in., fossil layer 118-120 in.
						2				
	110					2				
						2				
						3				
						2				
						2.5				
						2.5				
120						2				

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

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Vertical Datum : NGVD 29
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Boring No.
B436

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
						2				Approximate top of Whetstone Gulf Formation-Unit A at depth 117.7 ft (El. 117.1 ft).
	120		C16	120/120	88	2.5 1.5 1.5 2 2.5 2 2 2.5 2.5 2	Shaly partings. Fossils. Shaly partings. 15° fracture.			C16: Similar to C15, fractures generally planar, horizontal, and smooth, spaced 0.125 in. to 19 in., 15° fracture at 68 in., fossils at 2.3 in. and 17 in., soft sediment deformation 60 in. to 69 in., siltstone clasts at 59 in.
110										
	130		C17	122/120	100	3 3 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	Fossils. Slickensides. 15° fracture. Fossils.			C17: SANDSTONE WITH SOME SILTSTONE, gray, hard, bedded sandstone, dark gray, soft, laminated siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 2 in. to 53 in., chipping at 12-13 in., slickenside at 14 in., 15° fracture at 21.5 in., fossils at 15 in. to 21 in. and 41 in. to 42 in., siltstone clasts at 34 in. and 94 in. to 95 in.
100										
	140		C18	114/120	74	2.5 2.5 2 2.5 2.5 2.5 2 2 2.5 2.5	Shaly partings. Highly fractured siltstone. Highly fractured zone. 0.5-inch-long vertical fracture.			C18: Similar to C17, except more siltstone and shale, fractures generally planar, horizontal, and smooth, spaced 0.125 in. to 16 in., chipping at 56 in. and 75-77 in., 0.5 in. vertical fracture and highly fractured zone at 65.5 in., shaly partings at 27.5 in. to 28.5 in. Approximate top of Whetstone Gulf Formation-Unit B at depth 140.3 ft (El. 94.5 ft).
90										
	150		C19	114/114	92	1.5 1.5 2 1.5 3.5 2.5 2.5 2.5 3 1.5	30° fracture.			C19: SILTSTONE AND SHALE WITH SOME SANDSTONE, dark gray to black siltstone, gray, hard, bedded sandstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal and smooth, spaced 0.25 in. to 36 in., 30° fracture 12-13 in.
80										

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 235
Vertical Datum : NGVD 29
Date Start / End: 6/7/2008 - 6/9/2008
Total Depth (ft) : 184.0

Boring No. **B436**

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
			C20	119/112	100	2.5 2.5 2.5 2.5 3 2.5 2.5 2 2 2	Vertical fractures.			C20: Similar to C19, fractures generally planar, horizontal, and smooth, spaced 1 in. to 14.5 in., vertical fractures 0-4 in. and 4-8 in., soft sediment deformation 114-119 in.
160										
70										
			C21	17/14	100	3				C21: Similar to C19, no fractures.
			C22	119/120	99	3 3 2 2 2 2 2.5 2.5 2.5 2.5				C22: INTERBEDDED SILTSTONE AND SHALE WITH SANDSTONE, dark gray, soft siltstone, gray, hard sandstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 5 in. to 81 in., siltstone clasts at 28 in. and 42 in.
170										
60										
			C23	72/72	100	2 3 2.5 2 2 2				C23: Similar to C22, fractures spaced 8 in. to 47 in., pyrite at 8.5 in.
180										
50										Bottom of boring at depth 184 ft (El. 50.8 ft). Borehole grouted to top of lake bed upon completion.
							General Comments about Core Samples:			
190							Bedding-parallel fractures are most frequent in shale and siltstone and less common in sandstone.			
							Vertical fractures occasionally present in sandstone beds.			
40							Hand pressure produces bedding-parallel fractures in siltstone of Pulaski Formation during handling and transport.			

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 235
Vertical Datum : NGVD 29
Date Start / End: 6/7/2008 - 6/9/2008
Total Depth (ft) : 184.0

Boring No.
B436

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
	200						Fracture surfaces are generally unweathered unless otherwise noted.			
30										
	210									
20										
	220									
10										
	230									
0										
	240									

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Form 150.2 rev. 1

Final Boring Log Signature Page	Boring No. B436

Project: Nine Mile Point Site Characterization — GEI Project No. 07223

Location: Oswego, New York

Final Log Prepared by: _____ Date: 9/11/08

Per GEI Procedure 150 rev. 1 using computer IBM Thinkpad - Product 64576PU

Final Log Checked by:

Soil Descriptions Checked by: _____ Date: 9/11/08

Rock Descriptions Checked by: _____ Date: 9/11/08

Drilling and Sample Information Checked by: _____ Date: 9/11/08

Notes:

A. Cummings performed a sofware funtionality check: Input from software database equals output on Final Log.

Form 150.3 rev. 1

Final Boring Log

Boring No. **B437**

Boring Information

Northing : 1282964.3 **Easting :** 542790.8
Horizontal Datum : NAD 27
Ground Surface Elev. (ft): 233.2
Vertical Datum : NGVD 29
Rig Type/I.D: CME 75 / Barge 1

Date Start - End: 4/28/2008 - 5/1/2008
Driller Name: J. Stockholm
Logged By : J. Scully
Drilling Company : Nothnagle
Total Depth (ft) : 175.9

Drilling Information

Hammer Ident: NA
Auger I.D: NM
Auger Head Length: NM

Casing I.D: 4 inch
Drill Rod O.D: 3 inch NW

Core Barrel Type: NQ2
Core Barrel I.D/O.D: 2 inch / 3 inch
Core Barrel Length: 13.1 ft

Drilling Method: Casing to 2.0 ft below mudline, rollerbit to clean out casing, wireline coring 2.2 ft to bottom.

ABBREVIATIONS:

Blows per 6 in.: 140 lb hammer falling 30 inches to drive a 2 inch O.D. split spoon sampler.

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Length of Sound Cores>4 in / Pen.,%
HSA = Hollow-Stem Auger

WOR = Weight of Rods
WOH = Weight of Hammer
S = Split Spoon Sample
C = Core Sample

NA, NM = Not Applicable, Not Measured
LL = Liquid Limit
PI = Plasticity Index
NV, NP = No value, Non-plastic

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Soil-Sample Description Rock-Lithological Description
			S1	6/8	35-100/2 in	NA		S1: NARROWLY GRADED GRAVEL (GP); ~95% gravel to 1 in, ~5% fine to coarse sand, gray. Approximate top of Oswego Sandstone at depth 0.0 ft (El. 233.2 ft).
230			C1	43/44	64	1 1 1 1	20° fracture. 15° fracture.	C1: SANDSTONE, gray, hard, fine-grained, well-sorted, unweathered, fractures generally horizontal, planar and smooth, spaced 0.5 in. to 7 in.
	10		C2	119/120	82	NM NM 1.5 1.5 1.5 NM NM NM 1.5 NM	Shaly partings.	C2: SANDSTONE TO ARGILLACEOUS SANDSTONE, gray, hard, fine grained, well sorted, unweathered, fractures generally horizontal, planar and smooth, spaced 0.5 in. to 19.5 in., siltstone at 109-110 in, soft sediment deformation at 92-93 in. Approximate top of Oswego Transition Zone at depth 9.8 ft (El. 223.4 ft).
220							20° fracture. 30° fracture. 30° fracture.	
	20		C3	116/120	63	NM NM 2 2 2 2 2 2 2 3	Highly fractured argillaceous sandstone. 30° fracture. Vertical fracture. 7-inch-long vertical fracture with calcite on surface.	C3: ARGILLACEOUS SANDSTONE, gray, medium to hard, fine grained, well sorted, unweathered, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 16 in., incipient vertical fractures at 55-57 in. and 100-102 in., 7 in. vertical fracture at 104 in., highly fractured zone at 40-41 in.
210								
	30		C4	118/120	82	NM NM NM 2 2 2 1.5	Shaly partings. 4-inch-long incipient fracture with calcite infill.	C4: SANDSTONE WITH INTERBEDDED SILTSTONE, gray to dark gray, medium hardness sandstone, soft siltstone, fine grained, well sorted, unweathered, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 17 in., incipient vertical fracture at 32 in., soft sediment deformation at 50-52 in., 94-99 in., and 109-112 in.

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

NINE MILE POINT SITE CHARACTERIZATION 1 NMP OFFSHORE LOGS.GPJ GEI DATA TEMPLATE.GDT 9/11/08

Final Boring Log

Ground Surface Elev. (ft): 233
Vertical Datum : NGVD 29
Date Start / End: 4/28/2008 - 5/1/2008
Total Depth (ft) : 175.9

Boring No.
B437

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
						1.5				
200						2	Siltstone clasts.			
						3				
										Approximate top of Pulaski Formation - Unit A at depth 35.5 ft (El. 197.7 ft).
							6-inch-thick shale layer.			
			C5	119/120	76	NM				C5: ARGILLACEOUS SANDSTONE AND SILTSTONE, gray to dark gray, medium hard sandstone, soft siltstone, fine grained, well sorted, unweathered, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 52 in., highly fractured zone at 69-71 in. and 118-119 in., fossil layer at 24-33 in., soft-sediment deformation at 93-95 in.
						NM				
						NM				
						NM				
						2.5				
	40					1.5				
						1.5	Shaly partings.			
						2				
						1.5	Highly fractured.			
190						1.5	Shaly partings.			
			C6	122/120	94	NM				C6: Similar to C5, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 31 in., , incipient vertical fracture at 114 in., highly fractured zone at 32-34 in., fossil layer at 6-7 in. and 27-28 in., soft sediment deformation at 111 in.
						NM				
						NM				
						1.5	Highly fractured siltstone.			
						1.5	Trace fossils.			
	50					1.5				
						1.5				
						1.5	Highly fractured.			
						1.5	Bioturbation.			
180						1.5				
							Black siltstone clast.			
			C7	121/120	97	NM	3-inch-long incipient fracture.			C7: Similar to C5, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 30 in.
						NM				
						NM				
						2				
						1.5				
	60					NM	Thin green veins.			
						1.5				
						1.5				
						1.5				
170						1.5				
							40° fracture.			Approximate top of Pulaski Formation - Unit B at depth 65.9 ft (El. 167.3 ft).
			C8	120/120	98	NM	Fractured siltstone with trace fossils.			C8: Similar to C5, fractures generally horizontal, planar, and smooth, spaced 3-32 in.
						NM				
						NM				
						1.5				
						1.5				
	70					1.5				
						1.5				
						1.5				
						1.5				
160						1.5				

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 233
Vertical Datum : NGVD 29
Date Start / End: 4/28/2008 - 5/1/2008
Total Depth (ft) : 175.9

Boring No.
B437

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
			C9	123/120	93	NM NM NM 1.5 2.5 3 2 2 2 1.5	Highly fractured. 40° fracture. 7-inch-long vertical fracture with calcite infill.			C9: Similar to C5, fractures generally horizontal, planar, and smooth, spaced 1 in. to 19.5 in., vertical fracture at 103 in., highly fractured zone at 94-95 in., fossil layers at 78-79 in. and 84-85 in. Approximate top of Pulaski Formation - Unit C at depth 84.3 ft (El. 148.9 ft).
150	80									
			C10	120/120	73	NM 1.5 NM NM 2 2.5 2.5 NM 2.5 NM	Highly fractured. Shaly partings.			C10: SANDSTONE AND SILTSTONE, gray to dark gray, hard sandstone, soft siltstone, fine grained, well sorted, unweathered, fractures generally horizontal, planar and smooth, spaced 0.5 in. to 23.5 in., highly fractured zone at 44-45 in.
140	90									
			C11	121/120	81	NM NM NM NM NM 2.5 2.5 2.5 2.5 2	Shaly partings. Highly fractured siltstone with some shale. 2-inch-long incipient fracture. 20° fracture. 20° fracture.			C11: SILTSTONE WITH INTERBEDDED SANDSTONE, dark gray, medium hard sandstone, soft siltstone, fine grained, well sorted, unweathered, fractures generally horizontal, planar and smooth, spaced 0.5 in. to 11 in., highly fractured zones at 0-4 in. and 11.5-13 in., fossils at 110 in. and 120 in.
130	100									
			C12	121/120	88	NM NM NM NM NM 2 2 1.5 2 1.5	Shaly partings. Fossils.			C12: SILTSTONE WITH INTERBEDDED SANDSTONE, dark gray to gray, medium hardness sandstone, soft siltstone, fine grained, well sorted, unweathered, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 18 in.
120	110									

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 233
Vertical Datum : NGVD 29
Date Start / End: 4/28/2008 - 5/1/2008
Total Depth (ft) : 175.9

Boring No. **B437**

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
			C13	101/120	73	NM NM 4.5 NM NM 1.5 2 2 2 2.5	Shaly partings. 1-inch-long vertical fracture in shale. Highly fractured. 3-inch-long incipient fracture.			C13: Similar to C12, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 20 in., highly fractured zone at 23.5-24.5 in., fossils at 69-75 in. Approximate top of Whetstone Gulf Formation - Unit A at depth 125.0 ft (El. 108.2 ft).
			C14	121/101	100	NM NM 2 1.5 2 1.5 1.5 NM	Vertical fracture. 3-inch-long incipient fracture. Highly fractured.			C14: SANDSTONE WITH INTERBEDDED SILTSTONE, gray to dark gray, medium hardness sandstone, soft siltstone, fine grained, well sorted, unweathered, fractures generally horizontal, planar, and smooth, spaced 3.5 in. to 42.5 in., vertical fracture at 0 in., highly fractured zone at 36-38 in., fossils at 23-28 in. and 92 in.
			C15	21/19	100	NM NM				C15: Similar to C14, fractures generally horizontal, planar, and smooth, spaced 6 in. to 15 in.
			C16	117/120	85	NM NM NM NM 3 3.5 3.5 2 2.5 2	Shaly partings. Shaly partings.			C16: SILTSTONE WITH INTERBEDDED SANDSTONE, dark gray, medium hardness sandstone, soft siltstone, fine grained, well sorted, unweathered, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 28 in., highly fractured zone at 28-32 in.
			C17	117/120	93	NM NM NM 2 2 2 1.5 2 1.5 1.5				C17: Similar to C16, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 29 in.
			C18	121/120	97	NM NM				C18: Similar to C16, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 27 in., highly fractured zones are 54-56

Depth (ft): 120, 130, 140, 150
Elev. (ft): 110, 100, 90, 80

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 233
Vertical Datum : NGVD 29
Date Start / End: 4/28/2008 - 5/1/2008
Total Depth (ft) : 175.9

Boring No.
B437

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
						2				in. and 65-67 in.
						2				
						2				
	160					2.5	Highly fractured.			Approximate top of Whetstone Gulf Formation - Unit B at depth 161.2 ft (El. 72.0 ft).
						2.5				
						2.5	20° fracture.			
						NM	20° fracture.			
70						NM				
			C10	119/120	93	2				C19: Similar to C16, fractures generally horizontal, planar, and smooth, spaced 1 in. to 19 in., soft sediment deformation at 99-103 in.
						2.5				
						2				
						2.5				
	170					2				
						2.5				
						2				
						2				
60						2				
						1.5				
							40° fracture.			
										Bottom of boring at depth 175.9 ft (El. 57.3 ft). Borehole grouted to top of lake bed upon completion.
	180						General Comments about Core Samples:			
50							Bedding-parallel fractures are most frequent in shale and siltstone and less common in sandstone.			
							Vertical fractures occasionally present in sandstone beds.			
	190						Hand pressure produces bedding-parallel fractures in siltstone of Pulaski Formation during handling and transport.			
40							Fracture surfaces are generally unweathered unless otherwise noted.			

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log Signature Page	Boring No. B437

Project: Nine Mile Point Site Characterization — GEI Project No. 07223

Location: Oswego, New York

Final Log Prepared by: _____ Date: 9/11/08

Per GEI Procedure 150 rev. 1 using computer IBM Thinkpad - Product 64576PU

Final Log Checked by:

Soil Descriptions Checked by: _____ Date: 9/11/08

Rock Descriptions Checked by: _____ Date: 9/11/08

Drilling and Sample Information Checked by: _____ Date: 9/11/08

Notes:

A. Cummings performed a sofware funtionality check: Input from software database equals output on Final Log.

Form 150.3 rev. 1

Final Boring Log

Boring No. **B438**

Boring Information

Northing : 1283074 **Easting :** 542775.5
Horizontal Datum : NAD 27
Ground Surface Elev. (ft): 230.1
Vertical Datum : NGVD 29
Rig Type/I.D: CME 75 / Barge 1

Date Start - End: 6/5/2008 - 6/7/2008
Driller Name: N. Short
Logged By : A. Hare
Drilling Company : Nothnagle
Total Depth (ft) : 178.3

Drilling Information

Hammer Ident: NA
Auger I.D: NM
Auger Head Length: NM

Casing I.D: 4 inch
Drill Rod O.D: 2 5/8 inch NW

Core Barrel Type: NQ2
Core Barrel I.D/O.D: 2 inch / 3 inch
Core Barrel Length: 13 ft

Drilling Method: Casings set to 1.6 ft. below mudline, rollerbit to 1.8 ft., wireline coring to bottom

ABBREVIATIONS:

Blows per 6 in.: 140 lb hammer falling 30 inches to drive a 2 inch O.D. split spoon sampler.

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Length of Sound Cores>4 in / Pen.,%
HSA = Hollow-Stem Auger

WOR = Weight of Rods
WOH = Weight of Hammer
S = Split Spoon Sample
C = Core Sample

NA, NM = Not Applicable, Not Measured
LL = Liquid Limit
PI = Plasticity Index
NV, NP = No value, Non-plastic

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Soil-Sample Description Rock-Lithological Description
			S1	3/10	46-100/4 in.		Casing set to 1.6 ft. below mudline.	S1: WIDELY GRADED GRAVEL WITH SILT (GW-GM), ~90% gravel up to 2 in. containing sandstone pieces, ~10% nonplastic fines, gray. LAKE SEDIMENT. Approximate top of Oswego Sandstone at depth 2.3 ft (El. 227.8 ft).
			C1	44/60	36	1 1 2.5 4 1.5	Rollerbit to 2.3 ft. below mudline. Highly fractured siltstone. Highly fractured siltstone.	C1: SANDSTONE, green gray, hard, massive sandstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced from 0.125 in. to 7 in., highly fractured zones 7.5-12 in. and 29-30.5 in., slightly weathered at some joints.
220	10		C2	61/60	91	2.5 2 1.5 1.5 1.5		C2: Similar to C1, 9.5 in. to 14 in., dark gray soft siltstone with moderately weathered fractures, fractures generally planar, horizontal, and smooth, spaced 0.25 in. to 36 in., cross bedding at 24.5 in.
			C3	120/120	95	1.5 1.5 2 2 2.5 2 2 1.5 3.5 3	1-inch-long vertical fracture. Vertical fracture. Two 6-inch-long vertical fractures.	C3: SANDSTONE AND SILTSTONE, gray, hard, bedded sandstone, dark gray, soft, laminated siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced from 1 in. to 15.5 in., 1 in. vertical fracture at 48 in., two 6 in. vertical fractures at 67 in. and 73 in., 2 in. vertical fracture at 51 in., 5 in. vertical fracture at 32 in., siltstone clasts and mottling 23-30 in. Approximate top of Oswego Transition Zone at depth 14.3 ft (El. 215.8 ft).
210	20							
			C4	104/120	62	2 2.5 1.5 1.5 1.5 1.5 1.5 2 3 2	Incipient vertical fracture. Shaly partings. Incipient vertical fractures.	C4: Similar to C3, fractures generally planar, horizontal, and smooth, spaced 0.125 in. to 18 in., rounded chipped fractures at 31 in., curved incipient fractures at 37 in., siltstone clasts at 42 in. and 61 in., 2 in. incipient vertical parallel fractures 44-48 in., incipient horizontal fracture at 81 in.
200	30							Approximate top of Pulaski Formation-Unit A at depth 31.7 ft (El. 198.4 ft).

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 230
Vertical Datum : NGVD 29
Date Start / End: 6/5/2008 - 6/7/2008
Total Depth (ft) : 178.3

Boring No.
B438

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Soil-Sample Description Rock-Lithological Description
			C5	121/104	96	1.5 1.5 2 2 2 1.5 1.5 1.5 1.5	Fossils. Vertical fracture. 3-inch-long vertical fracture.	C5: SANDSTONE WITH INTERBEDDED SILTSTONE AND SHALE, gray, hard, bedded sandstone, dark gray to black, soft, laminated siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced from 1 in. to 33 in., incipient horizontal fracture at 51 in., 1 in. vertical fracture at 56.5 in., 3 in. vertical fracture at 66 in., fossils at 25-33 in., 97-98 in., and 116-17 in., soft sediment deformation at 70-75 in.
190	40							
			C6	17/16	88	2 2	Fossils.	C6: Similar to C5, mostly sandstone, fractures generally planar, horizontal, and smooth, spaced 3 in. to 14 in., fossils at 1 in. and 4.5 in., pyrite and dolomite at 10.5 in., chipping fracture at 16 in.
			C7	120/120	93	1.5 2.5 2 2 1.5 1.5 1.5 2 1.5 2.5	Dolomite vug with pyrite. Fossils.	C7: Similar to C5, medium hardness sandstone, fractures generally planar, horizontal, and smooth, spaced from 0.125 in. to 42.5 in., fossils at 6 in. and 11.5 in., siltstone clasts at 84 in., 87 in., 101.5 in., and 108.5 in.
180	50							
			C8	120/120	94	2 2 2 2 2 2 1.5 2 1.5 1.5	Green mineral layer.	C8: Similar to C5, fractures generally planar, horizontal, and smooth, spaced 0.5 in. to 19 in., soft sediment deformation 44 in. to 46 in. and 87 in. to 99 in., mottling 49 in. to 52 in., and 102 in. to 105 in., green mineral layer at 35 in. to 38 in.
170	60							
			C9	119/120	99	1.5 1.5 1.5 1.5 1.5 2 2 1.5 2 1.5	Fossils. 10° fracture.	C9: Similar to C5, fractures generally planar, horizontal, and smooth, spaced 0.5 in. to 39 in., 10° fracture at 16 in., fossils at 7 in. to 11 in. and 40 in. to 41.5 in., mottling at 55 in. and 60 in., soft sediment deformation at 95 in. to 105 in.
160	70							Approximate top of Pulaski Formation-Unit B at depth 68.2 ft (El. 161.9 ft).
			C10	116/120	89	1.5 2.5		C10: INTERBEDDED SILTSTONE AND SHALE WITH SANDSTONE, dark gray to black, soft, laminated siltstone, gray,

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 230
Vertical Datum : NGVD 29
Date Start / End: 6/5/2008 - 6/7/2008
Total Depth (ft) : 178.3

Boring No.
B438

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
						2 2.5 3 2.5 1.5 1.5 1.5 1.5				hard, bedded sandstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 0.75 in. to 25 in., curved fractures at 107.5 in. and 113 in., fossils at 63.5 in., soft sediment deformation 15 in. to 18 in., 28 in to 29 in., 41 in. to 50 in., and 91 to 93 in., shaly partings at 93 in., siltstone clasts at 91 in.
150	80						6-inch-long incipient vertical fracture with calcite infilling.			Approximate top of Pulaski Formation-Unit C at depth 82.3 ft (El. 147.8 ft).
			C11	124/120	78	1 2.5 3 2.5 3 2 1.5 2 2 3	Slickensides in siltstone with minor polishing, dip slip orientation, no visable offset in bedding. 30° fracture. Minor poloshing, few slickensides. Shaly partings.			C11: Similar to C10, fractures generally planar, horizontal, and smooth, spaced 0.25 in. to 18 in., 30° fracture at 23 in., 20° slightly weathered fracture at 38 in., 1 in. vertical fractures at 24 in. and 109 in., shaly partings at 24 in., 31.5 in., and 108.5 in., 4 in. incipient vertical fracture at 55 in.
140	90									
			C12	106/120	86	3.5 3 3 3 3.5 1.5 1.5 1.5 1.5 1.5				C12: Similar to C10, fractures generally planar, horizontal, and smooth, spaced 0.5 in. to 15 in., mottling at 34 in., siltstone clasts at 77 in.
130	100									
			C13	72/60	100	1.5 2 1.5 1.5 3	Slickensides in siltstone fracture, dip slip orientation, no apparent offset in bedding. Fossils.			C13: SANDSTONE AND INTERBEDDED SILTSTONE AND SHALE, gray, hard, bedded sandstone, dark gray, soft siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 3 in. to 55 in., curved chip fracture at 55.5 in., 60° fracture at 62.5 in., 30° fracture at 64 in., fossils at 65.5 in.
			C14	56/60	60	3.5 2 2.5 3 3	Slickensides in siltstone fracture, dip slip orientation, no apparent offset in bedding.			C14: INTERBEDDED SILTSTONE AND SHALE WITH SOME SANDSTONE, dark gray, soft siltstone, gray, hard sandstone, well sorted, fine grained unweathered, fractures generally planar, horizontal, and smooth, spaced 1 in. to 16 in., slightly weathered fracture at 12 in., fossils at 18 in., siltstone clasts and calcite deposit at 32 in.
120	110									
			C15	121/114	93	2 2.5 1.5 4	Highly fractured siltstone.			C15: Similar to C14, more sandstone, fractures generally planar, horizontal, and smooth, spaced 0.125 in. to 17 in., highly fractured zone 24 in. to 26 in., chipping 50 in. to 51 in., 15° fracture at 121 in., fossils 53 in. to 54 in., siltstone clasts at 68 in.

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 230
Vertical Datum : NGVD 29
Date Start / End: 6/5/2008 - 6/7/2008
Total Depth (ft) : 178.3

Boring No.
B438

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Soil-Sample Description Rock-Lithological Description
						3.5		Approximate top of Whetstone Gulf Formation-Unit A at depth 116.1 ft (El. 114.0 ft).
						2		
						2.5		
						2		
						2		
110	120					1		
			C16	119/120	80	1.5	Slickensides in siltstone fracture, dip slip orientation, no apparent offset in bedding, minor polishing.	C16: SANDSTONE WITH SOME INTERBEDDED SILTSTONE AND SHALE, gray, hard, bedded sandstone, dark gray, soft siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 0.5 in. to 82 in., fossils at 6 in., cross bedding at 10 in. to 16 in., highly fractured zone 28 in. to 30 in.
						2.5	15° fracture.	
						2.5		
						1.5	Highly fractured zone.	
						1.5	Fossils.	
						1.5	Shaly partings.	
						1.5		
						3		
						2		
						1.5		
100	130							
			C17	114/120	73	1.5		C17: Similar to C16, fractures generally planar, horizontal, and smooth, spaced 0.125 in. to 40 in., 11 in. vertical fracture at 67 in., shaly partings at 42.5 in.
						1.5		
						2.5		
						3.5		
						5		
						3.5		
						4	Vertical fracture.	
						4		
						4.5		
						4.5		
90	140							
			C18	117/116	100	4		C18: INTERBEDDED SILTSTONE AND SHALE with occasional beds of gray, hard sandstone, dark gray to black, soft, laminated siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced from 4 in. to 48 in., chipping at 0 in. and 117 in.
						2.5		Approximate top of Whetstone Gulf Formation-Unit B at depth 146.0 ft (El. 84.1 ft).
						3		
						2		
						3.5		
						2.5		
						3		
						3.5		
						3		
						3		
80	150						Fossils.	
			C19	17/12	100	3		C19: Similar to C18, fractures spaced 0 in. to 17 in., fossils and dolomite at 15.5 in.
			C20	120/120	95	3.5		C20: Similar to C18, fractures generally planar, horizontal, and smooth, spaced 1 in. to 40 in., siltstone clasts at 84.5, 15° fracture at 92.5 in.
						3.5		
						3.5		
						3		
						3		
						2.5		

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 230
Vertical Datum : NGVD 29
Date Start / End: 6/5/2008 - 6/7/2008
Total Depth (ft) : 178.3

Boring No.
B438

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
						3				
						2.5				
						2				
70	160					3.5				
							15° fracture.			
			C21	121/120	93	2.5				C21: Similar to C18, fractures generally planar, horizontal, and smooth, spaced 3 in. to 25 in., slickenside and 60° fracture at 37 in., 10° fracture at 76 in., siltstone clasts at 36 in., fossil layer 90.5 in. to 93 in.
						3				
						1.5				
						1.5				
						1.5				
						2.5	60° fracture in siltstone with slickensides, dip slip orientation, no apparent offset in bedding, minor polishing.			
						3				
						2.5				
						3				
60	170					3.5	10° fracture. Fossils.			
							Fossils.			
			C22	69/72	96	3				C22: similar to C18, fractures spaced 0 in. to 69 in., fine bedding 65 in. to 69 in.
						3				
						2.5				
						2.5				
						1.5				
						2				
										Bottom of boring at depth 178.3 ft (El. 51.8 ft). Borehole grouted to top of lake bed upon completion.
50	180						General Comments about Core Samples:			
							Bedding-parallel fractures are most frequent in shale and siltstone and less common in sandstone.			
							Vertical fractures occasionally present in sandstone beds.			
40	190						Hand pressure produces bedding-parallel fractures in siltstone of Pulaski Formation during handling and transport. Fracture surfaces are generally unweathered unless otherwise noted.			

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Form 150.2 rev. 1

NINE MILE POINT SITE CHARACTERIZATION 1 NMP OFFSHORE LOGS.GPJ GEI DATA TEMPLATE.GDT 9/11/08

Final Boring Log Signature Page	Boring No. B438

Project: Nine Mile Point Site Characterization — GEI Project No. 07223

Location: Oswego, New York

Final Log Prepared by: _____ Date: 9/11/08

Per GEI Procedure 150 rev. 1 using computer IBM Thinkpad - Product 64576PU

Final Log Checked by:

Soil Descriptions Checked by: _____ Date: 9/11/08

Rock Descriptions Checked by: _____ Date: 9/11/08

Drilling and Sample Information Checked by: _____ Date: 9/11/08

Notes:

A. Cummings performed a sofware funtionality check: Input from software database equals output on Final Log.

Final Boring Log

Boring No. **B439**

Boring Information

Northing : 1283141.1 **Easting :** 542680.9
Horizontal Datum : NAD 27
Ground Surface Elev. (ft): 227.5
Vertical Datum : NGVD 29
Rig Type/I.D: CME 75 / Barge 1

Date Start - End: 6/4/2008 - 6/5/2008
Driller Name: N. Short
Logged By : T. Daigle
Drilling Company : Nothnagle
Total Depth (ft) : 175.0

Drilling Information

Hammer Ident: NA
Auger I.D: NM
Auger Head Length: NM
Drilling Method: Casing to 0.2 ft. below mudline, rollerbit to wash out, wireline coring to bottom

Casing I.D: 4 inch
Drill Rod O.D: 2 5/8 inch NW

Core Barrel Type: NQ2
Core Barrel I.D/O.D: 2 inch / 3 inch
Core Barrel Length: 13 ft

ABBREVIATIONS:

Blows per 6 in.: 140 lb hammer falling 30 inches to drive a 2 inch O.D. split spoon sampler.

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Length of Sound Cores>4 in / Pen.,%
HSA = Hollow-Stem Auger

WOR = Weight of Rods
WOH = Weight of Hammer
S = Split Spoon Sample
C = Core Sample

NA, NM = Not Applicable, Not Measured
LL = Liquid Limit
PI = Plasticity Index
NV, NP = No value, Non-plastic

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
			S1	0/1	150/1 in.		Casing set to 0.2 ft. below mudline, rollerbit to 0.5 ft.			S1: NO RECOVERY. Approximate top of Oswego Sandstone at depth 0.0 ft (El. 227.5 ft).
			C1	36/43	66	3				C1: SANDSTONE, gray, hard, fine to medium grained sandstone, well sorted, unweathered, slight reddish oxidation hue from 17-22 in., fractures generally planar and horizontal, spaced <1-22 in., fractures at 17-22 in., show some oxidation on the surface.
						3				
						3.5				
						1				
			C2	129/120	80	2				C2: Similar to C1, lenses of siltstone in sandstone, mottling at 60-62 in., 73-75 in., and 104-108 in., medium to fine grained sandstone 104-129 in., slightly darker gray, fractures generally planar, horizontal, and smooth, spaced <1-18 in., 15° fracture at 25 in., 45° fracture at 104 in. and 106 in., 2 in. vertical fracture at 114 in., vertical chips at 116 in. and 127 in., may be due to coring.
						2.5				
						2	15° fracture.			
220						2				
						2				
						2				
						2.5				
	10					2.5				Approximate top of Oswego Transition Zone at depth 10.5 ft (El. 217.0 ft).
						3				
						2.5	Highly fractured argillaceous sandstone and siltstone. 45° fracture. 45° fracture.			
			C3	121/120	73	2	Highly fractured argillaceous sandstone and siltstone.			C3: SANDSTONE AND ARGILLACEOUS SANDSTONE WITH INTERBEDDED SILTSTONE, gray, hard sandstone, dark gray, medium hard to hard argillaceous sandstone, dark gray, soft to medium hard siltstone, fine grained, well sorted, unweathered, well bedded, fractures generally planar, horizontal, and smooth, spaced <1-14 in., 80° incipient fracture at 23 in. and 45 in., 5 in. incipient fracture at 58 in., 3 in. incipient vertical fracture at 100 in.
						2.5				
						2.5	Highly fractured argillaceous sandstone and siltstone.			
						4.5				
210						3				
						3				
						3	5-inch-long incipient vertical fracture.			
	20					2				
						2.5				
						2.5				
			C4	118/120	85	1.5				C4: ARGILLACEOUS SANDSTONE WITH INTERBEDDED SANDSTONE AND SILTSTONE, dark gray, medium hard to hard argillaceous sandstone, gray, medium hard to hard sandstone, dark gray, soft to medium hard siltstone and some shale, fossil fragments 58-64 in., fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced <1-46 in., 3 in. vertical fracture at 0 in., 80° fracture at 114 in., 3 in. incipient vertical fracture at 108 in.
						1.5				
						3	Minor fossil debris.			
200						2				
						2				
						2				
	30					2	Fossil fragments.			Approximate top of Pulaski Formation-Unit A at depth 27.1 ft (El. 200.4 ft).
						2.5				
						2				

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 228
Vertical Datum : NGVD 29
Date Start / End: 6/4/2008 - 6/5/2008
Total Depth (ft) : 175.0

Boring No.
B439

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Soil-Sample Description Rock-Lithological Description
						2		
							3-inch-long incipient vertical fracture.	
			C5	121/120	97	2.5	80° fracture.	C5: Similar to C4, fossil fragments 42-44 in., fractures generally planar, horizontal, and smooth, spaced <1-30 in., 8 in. incipient vertical fracture at 29 in.
						2		
						2.5		
190						3	8-inch-long incipient fracture with calcite infill.	
						3.5	Fossil fragments.	
						3.5		
	40					2.5		
						2		
						3		
						3	Fossils.	
			C6	120/120	100	2.5	4-inch-long incipient fracture with calcite infill.	C6: Similar to C4, light gray sandstone beds near top of core run, trace green mineral layer 87-90 in., core is mostly argillaceous sandstone, fractures generally planar, horizontal, and smooth, spaced 4-21 in.
						2		
						2		
180						2		
						2		
						2		
	50					2		
						2		
						3		
						2	Trace green mineral layer.	
			C7	120/120	97	2.5		C7: SANDSTONE WITH INTERBEDDED SILTSTONE, gray, hard, bedded sandstone, dark gray, soft siltstone, some shale, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 0.25 in. to 32 in., two incipient parallel vertical fractures 100 in. to 105.5 in., mottling 55-64.5 in, fossil layer 87.5 in. to 88.5 in. Approximate top of Pulaski Formation-Unit B at depth 55.5 ft (El. 172.0 ft).
						2	Shaly partings.	
						2		
170						2		
						2.5		
						2		
	60					2		
						2		
						2.5	Fossils.	
						2.5	Fossil layer.	
			C8	118/120	95	2	Two 1-inch-long incipient vertical fractures.	C8: Similar to C7, fractures generally planar, horizontal, and smooth, spaced 1.5 in. to 28.5 in., fossil layers at 68 in., 112 in., and 114 in., 15° fracture at 111 in.
						2		
						2		
160						2		
						2		
						2.5		
	70					2.5		
						2.5		
						2.5		
						2		
							15° fracture.	

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Form 150.2 rev. 1

NINE MILE POINT SITE CHARACTERIZATION 1 NMP OFFSHORE LOGS.GPJ GEI DATA TEMPLATE.GDT 9/11/08

Final Boring Log

Ground Surface Elev. (ft): 228
Vertical Datum : NGVD 29
Date Start / End: 6/4/2008 - 6/5/2008
Total Depth (ft) : 175.0

Boring No.
B439

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
										Approximate top of Pulaski Formation-Unit C at depth 74.5 ft (El. 153.0 ft).
			C9	118/120	78	2	Fossils.			C9: SANDSTONE AND SILTSTONE, gray, hard, bedded sandstone, dark gray to black, soft siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced from highly fractured to 20.5 in., 20° fracture at 28 in., highly fractured zone 84-85.5 in., siltstone clasts at 67.5 in
						2.5				
						3	20° fracture.			
						3				
150						2.5				
						2.5				
						2				
	80					2				
						2				
						2				
						2	Highly fractured zone, slickensides in siltstone, dip slip orientation, no apparent offset of bedding.			
							Shaly partings.			
			C10	119/120	97	2				C10: SILTSTONE AND SHALE WITH SOME SANDSTONE, dark gray to black, soft siltstone, gray, hard, bedded sandstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced from 0.125 in. to 28 in.
						2				
						2				
						2				
140						2.5				
						2				
						2				
	90					3				
						3				
						3				
							Fossils.			
			C11	121/120	96	2.5				C11: SANDSTONE AND SILTSTONE, gray, hard, finely bedded sandstone, dark gray to black soft siltstone, well sorted, fine grained, unweathered, fractures generally planar, smooth, and horizontal, spaced from highly fractured to 33 in., fossil layers at 21 in., 98 in., and 117-120 in.
						2.5	Fossils.			
						2.5	Highly fractured zones (due to rock core blockage).			
130						2				
						2				
						2				
	100					2				
						2.5				
						2	Fossils.			
						2				
			C12	123/120	86	2				C12: SILTSTONE AND SHALE WITH SOME SANDSTONE, soft, dark gray and black, laminated siltstone, gray, medium hard, bedded sandstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 1.4 in. to 13 in., 15° fracture at 32 in., 30° fracture at 66 in., fossils at 16-18 in., calcite crystal at 25 in.
						2.5	Fossils.			
						2.5				
						3	15° fracture.			
120						2.5				
						2.5				
						2.5	30° fracture.			
	110					2				
						2				
						2				
										Approximate top of Whetstone Gulf Formation-Unit A at depth 106.7 ft (El. 120.8 ft).
			C13	114/120	81	2				C13: SANDSTONE AND SILTSTONE WITH SHALE, gray, hard, bedded sandstone, dark gray to black, soft laminated siltstone,

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 228
Vertical Datum : NGVD 29
Date Start / End: 6/4/2008 - 6/5/2008
Total Depth (ft) : 175.0

Boring No.
B439

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures / Graphic Log	Soil-Sample Description Rock-Lithological Description
						2			well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 0.125 in. to 36 in., two 20° fractures at 47.5 in. and 49.5 in., fossil layer 78-79 in., last 24 in. fossiliferous sandstone.
						2			
110						2			
						2	20° fracture.		
						2	20° fracture.		
	120					2			
						2			
						2			
						2			
			C14	120/120	81	1.5	Fossils.		C14: Similar to C13, fractures generally planar, horizontal, and smooth, spaced 0.125 in. to 54 in., fossils 0-3 in., shaly partings at 61 in. and 84 in.
						1.5			
						1.5			
100						1.5			
						1.5			
						1.5			
						1.5			
	130					3			Approximate top of Whetstone Gulf Formation-Unit B at depth 131.1 ft (El. 96.4 ft).
						3			
						3.5	Shaly partings.		
						2	Shaly partings.		
			C15	123/114	99	2			C15: SILTSTONE AND SHALE WITH SOME SANDSTONE, dark gray to black, soft, laminated siltstone, gray, hard, bedded sandstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 0.25 in. to 52.5 in., irregular fractures at 25 in. and 70 in., 15° fracture at 51 in.
						2.5			
						3			
90						2.5			
						2.5			
						2.5	15° fracture.		
						3	Irregular chip.		
	140					2.5			
						3			
						1			
			C16	118/122	83	2			C16: Similar to C15, fractures generally planar, horizontal, and smooth, spaced from highly fractured to 27 in., highly fractured zone 27 in. to 28 in., irregular vertical fractures at 19 in. and 63 in.
						2.5			
						2.5			
						2	Irregular vertical fracture.		
80						2.5			
						2.5			
						3			
	150					3	Irregular vertical fracture.		
						3.5			
						2.5			
			C17	122/120	94	1.5	Irregular chip.		C17: SANDSTONE AND SILTSTONE WITH SHALE, gray, hard, bedded sandstone, dark gray to black, siltstone soft, well sorted, fine grained, unweathered, fractures spaced from highly fractured to 20 in., irregular vertical fractures 0-2 in. and 83.5-85.5 in., siltstone clasts at 33.5 in., soft sediment deformation 80-83 in., irregular curved horizontal fracture at 33 in., highly fractured
						2			
						2			
						1.5			

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 228
Vertical Datum : NGVD 29
Date Start / End: 6/4/2008 - 6/5/2008
Total Depth (ft) : 175.0

Boring No.
B439

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
						3.5	Irregular fracture, clasts.			zones at 58-60 in. and 85.5-86.5 in.
						1.5	Highly fractured zone.			
						2				
	160					1.5				
						1.5	Irregular chip.			
						1	Highly fractured siltstone.			
			C18	123/120	95	1.5				C18: Similar to C17, fractures generally planar, horizontal, and smooth, spaced 0.5 in. to 21 in., two 1 in. vertical fractures at 26.5 in. and 27.5 in., irregular curve of fracture at 107 in. to 108.5 in., siltstone clasts at 107 in.
						2				
						2.5	Vertical fractures, highly fractured siltstone.			
						1.5				
60						2				
						3				
						2				
	170					1.5				
						2				
						1				
			C19	11/12	71	1.5				C19: SANDSTONE AND SILTSTONE, sandstone gray, hard, bedded, siltstone dark gray, soft, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 0.25 in. to 8.5 in.
50										Bottom of boring at depth 175 ft (El. 52.5 ft). Borehole grouted to top of lake bed upon completion.
							General Comments about Core Samples:			
	180									
							Bedding-parallel fractures are most frequent in shale and siltstone and less common in sandstone.			
							Vertical fractures occasionally present in sandstone beds.			
40							Hand pressure produces bedding-parallel fractures in siltstone of Pulaski Formation during handling and transport.			
	190						Fracture surfaces are generally unweathered unless otherwise noted.			
30										

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log Signature Page	Boring No. B439

Project: Nine Mile Point Site Characterization — GEI Project No. 07223

Location: Oswego, New York

Final Log Prepared by: _____ Date: 9/11/08

Per GEI Procedure 150 rev. 1 using computer IBM Thinkpad - Product 64576PU

Final Log Checked by:

Soil Descriptions Checked by: _____ Date: 9/11/08

Rock Descriptions Checked by: _____ Date: 9/11/08

Drilling and Sample Information Checked by: _____ Date: 9/11/08

Notes:

A. Cummings performed a sofware funtionality check: Input from software database equals output on Final Log.

Form 150.3 rev. 1

Final Boring Log

Boring No. **B440**

Boring Information

Northing : 1283244.9 **Easting :** 542676.2
Horizontal Datum : NAD 27
Ground Surface Elev. (ft): 223.1
Vertical Datum : NGVD 29
Rig Type/I.D: CME 75 / Barge 1

Date Start - End: 5/30/2008 - 6/3/2008
Driller Name: N. Short
Logged By : J. Scully, A. Hare, M. MacLeod
Drilling Company : Nothnagle
Total Depth (ft) : 171.0

Drilling Information

Hammer Ident: NA
Auger I.D: NM
Auger Head Length: NM

Casing I.D: 4 inch
Drill Rod O.D: 2 5/8 inch NW

Core Barrel Type: NQ2
Core Barrel I.D/O.D: 2 inch / 3 inch
Core Barrel Length: 13 ft

Drilling Method: Casing set to 1.5 ft. below mudline, rollerbit to clean out casing, wireline coring 4.5 ft. to bottom

ABBREVIATIONS:

Blows per 6 in.: 140 lb hammer falling 30 inches to drive a 2 inch O.D. split spoon sampler.

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Length of Sound Cores>4 in / Pen.,%
HSA = Hollow-Stem Auger

WOR = Weight of Rods
WOH = Weight of Hammer
S = Split Spoon Sample
C = Core Sample

NA, NM = Not Applicable, Not Measured
LL = Liquid Limit
PI = Plasticity Index
NV, NP = No value, Non-plastic

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
			S1	14/18	103-17-33-50/0"		Casing set 1.5 ft. below mudline.			S1 (0-7 in.): WIDELY GRADED GRAVEL WITH SAND (GW), ~80% gravel to 0.5 in., ~15% fine to coarse sand, ~5% nonplastic fines, gray, zebra mussels. (7-9 in.): WIDELY GRADED GRAVEL WITH SAND (GW), ~70 % gravel to 0.25 in., ~25% fine to coarse sand, ~5% nonplastic fines, brown, shells. (9-14 in.): WIDELY GRADED GRAVEL WITH SILT AND SAND (GW-GM), ~75% gravel to 1.5 in., ~15% fine to coarse sand, ~10% nonplastic fines. LAKE SEDIMENT. Approximate top of Oswego Sandstone at depth 1.5 ft (El. 221.6 ft).
			C1	53/60	63	1	Highly fractured.			
220						1.5	45° fracture.			
						1.5				
						2	10° fracture.			
						2.5	Vertical fracture.			
							Vertical fracture.			
							45° fracture.			
			C2	113/120	52	3.5	Vertical fracture.			C1: SANDSTONE, greenish gray, hard, massive, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced from highly fractured to 12 in., 45° fracture at 4 in., 10° fracture at 33 in., 45° fracture at 50.5 in., 1 in. vertical fracture from 40.5 in. to 41.5 in., 1 in. vertical fracture from 48.5 in. to 49.5 in., highly fractured zone from 0-2 in., clay seam at 53 in., mottling from 38-39.5 in. and 50-50.5 in., siltstone clasts from 44-47 in. Approximate top of Oswego Transition Zone at depth 4.7 ft (El. 218.4 ft).
						3	Vertical fracture.			
						2	Highly fractured argillaceous sandstone and siltstone.			
						1.5	Highly fractured argillaceous sandstone and siltstone.			
	10					2.5	Highly fractured argillaceous sandstone and siltstone.			
						3.5				
						2.5				
210						2				
						2				
						2				
			C3	120/120	92	2				C2: SANDSTONE AND SILTSTONE WITH SHALE, gray sandstone, dark gray siltstone and shale, hard sandstone, medium hard siltstone and shale, bedded sandstone, laminated siltstone and shale, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced from highly fractured to 10 in., 1 in. vertical fracture from 14.5-15.5 in., 0.5 in. vertical fracture from 23.5-24 in., 1 in. vertical fracture from 41.5-42.5 in., 2 in. vertical fracture from 50-52 in., 45° fracture at 63.5 in., 2 in. incipient vertical fracture from 99-101 in., 10.5 in. incipient vertical fracture from 101.5-112 in., highly fractured zones from 0-2 in., 8-12 in., 40-44 in., and 48-50 in. C3: Similar to C2, fractures generally planar, horizontal, and smooth, spaced from 1 in. to 27.5 in., siltstone clasts at 3 in., 35 in., and 47 in. Approximate top of Pulaski Formation-Unit A at depth 21.5 ft (El. 201.6 ft).
						1.5				
						1.5				
						2				
	20					2				
						2.5				
						2				
						2				
200						1.5				
						3.5				
			C4	120/120	87	3				C4: SILTSTONE AND SHALE WITH SANDSTONE, dark gray to black, soft, laminated siltstone, gray, medium hardness, bedded sandstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 1.5 in. to 29.5 in., three-way vertical fracture at 8.5 in. to 10.5 in., 4.5 in. vertical fracture/chip at 18-23 in., 3 in. incipient vertical fracture at 67 in., alternating thin bedding at 32 in. to 38 in., fossil layers at 70-71.5 in. and 93.5-95 in.
						2	Three-way vertical fracture.			
						2.5	4.5-inch-long vertical fracture.			
						2				
	30					2				
						2				
						2				

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 223
Vertical Datum : NGVD 29
Date Start / End: 5/30/2008 - 6/3/2008
Total Depth (ft) : 171.0

Boring No. **B440**

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
						2	Incipient vertical fracture.			
190						2.5	Fossil layer.			
						2.5	Fossil layer.			
			C5	121/120	99	1.5				C5: Similar to C4, fractures generally planar, horizontal, and smooth, spaced 2 in. to 15 in., 2 in. vertical fracture at 61 in., soft sediment deformation at 20 in., 23 in., and 70 in.
						2				
						2				
	40					2				
						3				
						2				
						2	2-inch-long vertical fracture.			
						2				
180						2.5				
						2.5				
			C6	119/120	97	1.5				C6: Similar to C4, fractures generally planar, horizontal, and smooth, spaced 0.25 in. to 31 in., 2 in. incipient vertical fractures from 74-83 in., soft sediment deformation 107 in. and 88-100 in.
						2				
						2				
						2				
	50					2				
						2				
						2				
						2				
170						1.5	Two 9-inch-long incipient vertical fractures.			Approximate top of Pulaski Formation-Unit B at depth 53.9 ft (El. 169.2 ft).
						2				
			C7	119/120	100	1.5				C7: Similar to C4, fractures generally horizontal, planar, and smooth, spaced 5 in. to 31 in., soft sediment deformation throughout siltstone, alternating beds last 9 in. of core.
						2				
						1.5				
						2				
	60					2				
						2				
						2				
						2				
160						2				
						2.5				
			C8	117/120	82	1.5				C8: SANDSTONE AND SILTSTONE WITH SHALE, gray, hard, bedded sandstone, dark gray to black soft laminated siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced from highly fractured to 20.5 in., highly fractured zones at 111 in. and 103 in., zone at 103 in. shows weathering, irregular 60° fracture at 33.5 in. to 35 in., incipient vertical fracture at 88 in. to 90.5 in., incipient horizontal fractures that are scalloped at 91 in. and 92 in., fossil layers at 30-32.5 in. and 35-37 in., alternating thin beds 64 in. to 72 in.
						2.5				
						2.5				
						4.5	Fossil layer.			
	70					2.5	Slickensides, dip slip orientation, minor polishing, no apparent offset of bedding.			
						2	60° fracture.			
						1.5	Fossil layer.			Approximate top of Pulaski Formation-Unit C at depth 72.9 ft (El. 150.2 ft).
150						2				
						4				

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 223
Vertical Datum : NGVD 29
Date Start / End: 5/30/2008 - 6/3/2008
Total Depth (ft) : 171.0

Boring No.
B440

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Soil-Sample Description Rock-Lithological Description
						4		
							Fossils.	
			C9	116/120	85	2		C9: Similar to C8, fractures spaced 0.25 in. to 23 in., generally planar, smooth, and horizontal, soft sediment deformation at 98 in. to 109 in.
						4.5		
						2.5		
						3.5		
	80					3		
						2.5		
						3		
						4		
140						3		
						3		
			C10	112/120	84	3.5		C10: Similar to C8, less sandstone, fractures generally planar, horizontal, and smooth, spaced 0.5 in. to 16 in., vertical fracture 24.5-30 in. and 30.5-34 in., vertical fracture 94-97 in., chip at 31-33 in.
						1.5		
						2		
						1.5	Vertical fracture.	
	90					2.5		
						2		
						2		
						2		
130						2		
						2	Vertical fracture.	
			C11	58/60	78	2		C11: Similar to C8, fractures generally planar, horizontal, and smooth, spaced 1 in. to 18 in., 15° fracture at 12 in., siltstone clasts at 4.5 in., 11 in., 39 in., and 48 in.
						2.5	15° fracture.	
						2		
						2		
	100					NM		
							Fossils.	
			C12	64/60	93	2		C12: SILTSTONE AND SHALE WITH SOME SANDSTONE, dark gray to black, soft laminated siltstone, gray, hard, bedded sandstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, spaced 0.25 in. to 20 in., fossil layers at 2.5-4 in., and 14-15 in., mottling 28-31 in., siltstone clasts at 44-46 in.
						2.5		
120						3		
						3		
						3		
								Approximate top of Whetstone Gulf Formation-Unit A at depth 102.4 ft (El. 120.7 ft).
			C13	119/120	81	2.5		C13: Similar to C12, fractures generally planar, horizontal, and smooth, spaced 0.5 in. to 32 in., siltstone clasts at 94 in., fossil layers at 56 in. and 104 in.
						2.5		
						2		
						2		
	110					3	Shaly partings.	
						1.5	Fossil layer.	
						1.5		
						2		
110						2		
						NM		
							Fossil layer.	

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 223
Vertical Datum : NGVD 29
Date Start / End: 5/30/2008 - 6/3/2008
Total Depth (ft) : 171.0

Boring No.
B440

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
			C14	116/120	80	1.5 1.5 1.5 1.5 1.5 1.5 2 2 2 4				C14: Similar to C12, fractures generally planar, horizontal, and smooth, spaced 0.5 in. to 32 in., soft sediment deformation at 26 in., siltstone clasts and mottling at 40 in., large sandstone clast at 103 in. Approximate top of Whetstone Gulf Formation-Unit B at depth 126.5 ft (El. 96.6 ft).
120 100			C15	115/120	70	3 5 3 2 3.5 3 2.5 2 3 2	15° fracture. Highly fractured siltstone. Highly fractured siltstone. 70° fracture. Shaly partings. Vertical fractures. Vertical fracture. Shaly partings. 15° fracture. Vertical fracture.			C15: SILTSTONE AND SHALE WITH SOME SANDSTONE, dark gray siltstone and shale, gray sandstone, medium hard siltstone and shale, hard sandstone, laminated siltstone and shale, bedded sandstone, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced from highly fractured to 17 in., 15° fractures at 13.5 in. and 71 in., 70° fracture at 18.5 in., 0.5 in vertical fracture from 26 in. to 26.5 in., 1 in. vertical fracture from 32.5-33.5 in., 2 in. vertical fracture from 82-84 in., highly fractured zones from 13.5-15 in. and 16.5-19 in., shaly partings from 25.5-28 in. and 33.5-34 in., irregular nonplanar fracture at 16.5 in.
130 90			C16	113/106	100	2.5 2.5 2 2 2 3 2.5 3 6.5	10° fracture. Fossils.			C16: SANDSTONE WITH SOME SILTSTONE AND SHALE, gray sandstone , dark gray siltstone and shale, hard sandstone, medium hard siltstone and shale, bedded sandstone, laminated siltstone and shale, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 1-29.5 in., 10° fracture at 12 in., 10° fracture at 91 in., 4.5 in trace fossil layer from 44-48.5 in., calcite filled clast at 46 in., ripple marks from 10-10.5 in. and at 92 in., crossbedding from 0-3 in., siltstone clasts at 38 in., mottling from 9-11.5 in., 43.5-49.5 in., 91-92 in., 93.5-96.5 in., and 99.5-104 in.
140 80			C17	18/14	100	3				C17: SILTSTONE AND SOME SHALE WITH INTERBEDDED SANDSTONE, dark gray siltstone and shale, gray sandstone, medium hard siltstone and shale, hard sandstone, laminated siltstone and shale, bedded sandstone, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 4.5-8 in., alternating thin, nonplanar bands throughout, some mottling.
			C18	120/120	97	2 2.5 3 2.5 2 2 2.5 2.5 3 2.5	Highly fractured. Partial vertical fracture.			C18: SANDSTONE AND INTERBEDDED SILTSTONE WITH SOME SHALE, gray sandstone, dark gray siltstone, hard sandstone, medium hard siltstone and shale, bedded sandstone, laminated siltstone and shale, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced from highly fractured to 33.5 in., highly fractured zone from 20-21 in., with 1 in. partial vertical fracture, chipping from 19-20 in. and 118.5-120 in., interbedding from 35.5-62 in., surrounded by longer sandstone and siltstone interbeds, nonplanar bedding and some mottling throughout interbedded zone, mottling from 106.5-108.5 in., crossbedding from 41-42 in., siltstone clasts at 85 in. and 87 in.
150 70			C19	118/120	92	2.5				C19: Similar to C18, except increased interbedding and

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 223
Vertical Datum : NGVD 29
Date Start / End: 5/30/2008 - 6/3/2008
Total Depth (ft) : 171.0

Boring No.
B440

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
						2.5	45° fracture.			fossiliferous, fractures generally planar, horizontal, and smooth, spaced from highly fractured to 35.5 in., 45° fracture at 14 in., 10° fracture at 77.5 in., 15° fracture at 118 in., 0.5 in. highly fractured zone from 55.5-56 in., 1 in. trace fossil layer from 46.5-47.5 in., 1 in. trace fossil layer from 87-88 in., 1 in. trace fossil layer from 113.5-114.5 in., mottling from 13-16 in., 18.5-19 in., 88-90 in., and 114.5-115 in., long sandstone interbed from 0-33 in., some mottling and nonplanar bands in interbedded region.
						3				
						3				
	160					3				
						3	Highly fractured zone.			
						2.5				
						2.5				
	60					2.5	10° fracture.			
						2				
							Fossils.			
			C20	57/54	100	2	15° fracture.			C20: Similar to C18, fractures generally planar, horizontal, and smooth, spaced 0.5-30 in., 15° fracture at 35 in., 2.5 in. trace fossil layer with mottling and large, irregularly shaped calcite infilling from 0-2.5 in., mottling from 24.5-29 in., 32-33 in., and 37.5-39.5 in., silty shale at 42.5 in.
						2.5				
						2.5				
						1	15° fracture.			
	170									
							General Comments about Core Samples:			Bottom of boring at depth 171 ft (El. 52.1 ft). Borehole grouted to top of lake bed upon completion.
	50									
							Bedding-parallel fractures are most frequent in shale and siltstone and less common in sandstone.			
							Vertical fractures occasionally present in sandstone beds.			
	180						Hand pressure produces bedding-parallel fractures in siltstone of Pulaski Formation during handling and transport.			
	40						Fracture surfaces are generally unweathered unless otherwise noted.			
	190									
	30									

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

NINE MILE POINT SITE CHARACTERIZATION 1 NMP OFFSHORE LOGS.GPJ GEI DATA TEMPLATE.GDT 9/11/08

Final Boring Log Signature Page	Boring No. B440

Project: Nine Mile Point Site Characterization — GEI Project No. 07223

Location: Oswego, New York

Final Log Prepared by: _____ Date: 9/11/08

Per GEI Procedure 150 rev. 1 using computer IBM Thinkpad - Product 64576PU

Final Log Checked by:

Soil Descriptions Checked by: _____ Date: 9/11/08

Rock Descriptions Checked by: _____ Date: 9/11/08

Drilling and Sample Information Checked by: _____ Date: 9/11/08

Notes:

A. Cummings performed a sofware funtionality check: Input from software database equals output on Final Log.

Form 150.3 rev. 1

Final Boring Log

Boring No. **B441**

Boring Information

Northing : 1283307.4 **Easting :** 542583.3
Horizontal Datum : NAD 27
Ground Surface Elev. (ft): 218.7
Vertical Datum : NGVD 29
Rig Type/I.D: CME 75 / Barge 1

Date Start - End: 5/3/2008 - 5/9/2008
Driller Name: J. Stockholm
Logged By : H. Shields
Drilling Company : Nothnagle
Total Depth (ft) : 158.0

Drilling Information

Hammer Ident: NA
Auger I.D: NM
Auger Head Length: NM

Casing I.D: 4 inch
Drill Rod O.D: 3 inch NW

Core Barrel Type: NQ2
Core Barrel I.D/O.D: 2 inch / 3 inch
Core Barrel Length: 13.1 ft

Drilling Method: Sediment 0 - 1.25 ft, top of rock at 1.25 ft. Set casing at 2 ft, cored 2 - 158 ft.

ABBREVIATIONS:

Blows per 6 in.: 140 lb hammer falling 30 inches to drive a 2 inch O.D. split spoon sampler.

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Length of Sound Cores>4 in / Pen.,%
HSA = Hollow-Stem Auger

WOR = Weight of Rods
WOH = Weight of Hammer
S = Split Spoon Sample
C = Core Sample

NA, NM = Not Applicable, Not Measured
LL = Liquid Limit
PI = Plasticity Index
NV, NP = No value, Non-plastic

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
		X	S1	10/15	68-92-100/3 in.	NA				S1: WIDELY GRADED GRAVEL WITH SAND (GW), ~80% gravel, appears to be Oswego Sandstone fragments, ~15% widely graded sand, ~5% nonplastic fines, light brown sand and silt, gray rock fragments, zebra mussels in top 1 in. LAKE SEDIMENT. Approximate top of Oswego Transition Zone at depth 0.0 ft (El. 218.7 ft).
			C1	37/39	38	2 2 1.5 NM	Vertical fracture (with oxide staining).			C1: SANDSTONE, gray, medium hardness, bedded, medium grained, well sorted, slightly weathered, fractures generally horizontal, planar and smooth, spaced 0.125 in to 10 in., vertical fracture at 19.5-21.5 in. with oxidation on fracture surface, slightly weathered.
			C2	59/60	23	NM 1.5 2 2.5 1.5	Highly fractured zone. Highly fractured zone.			C2: SANDSTONE, similar to C1, except some thin (<1 in.) siltstone interbeds, siltstone is dark gray, soft, laminated, fine-grained, well-sorted, fractures spaced <0.5 in. to 9 in., unweathered.
210	10									
			C3	119/120	90	NM 2.5 2 2 NM 2 2 2 1.5 2.5	Highly fractured zone. 7-inch-thick siltstone bed.			Approximate top of Pulaski Formation - Unit A at depth 13.2 ft (El. 205.5 ft). C3: SANDSTONE WITH SILTSTONE, gray, medium hardness, bedded, medium grained, well sorted sandstone with occasional layers of dark gray, soft, fine grained, well sorted, laminated siltstone, unweathered, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 21 in., unweathered, siltstone lenses at 12 in., 29-30 in., 45 in., 49 in. Fossils at 107.5 in., 45° fracture at 112.5 in., near vertical fracture at 106-112 in.
200	20						7-inch-long vertical fracture with calcite.			
			C4	123/120	87	NM	45° fracture with calcite. Fossils. 70° fracture. Trace fossils.			C4: SANDSTONE WITH SILTSTONE, similar to C3, unweathered, mottling in several layers, fossils at 1-3 in. and 86-87 in., fractures generally horizontal, planar and smooth, spaced 0.5 in. to 25 in., incipient fractures at 29-32 in., 33-34 in., 91-94.5 in., 70° fracture at 40 in.
190	30									
			C5	123/120	98	2.5 1				C5: SANDSTONE WITH SILTSTONE, similar to C3, no fossils, unweathered, mottling in several layers, fractures generally

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 219
Vertical Datum : NGVD 29
Date Start / End: 5/3/2008 - 5/9/2008
Total Depth (ft) : 158.0

Boring No.
B441

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
						1				horizontal, planar, and smooth, spaced 0.5 in. to 34 in., irregular, near vertical fractures at 39-42 in., 42-47 in.
						1	Curved fracture (45° to vertical), 8 inches long.			
						1				
						1.5				
						2	4-inch-long incipient fracture with calcite infill.			
						2				
						1.5				
						2	Siltstone clasts.			
180										
	40									
			C6	117/120	93	1	Thin green veins.			C6: SANDSTONE WITH SILTSTONE, gray, medium hardness, bedded, fine grained, well sorted sandstone interbedded with dark gray, soft, laminated, fine grained, well sorted siltstone, unweathered, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 25 in., mottling in several layers, green mineral veins at 9 in.
						2				
						1				
						1				
						1				
						2				
						1				
						1.5				
						1				
						1.5				
170										
	50									Approximate top of Pulaski Formation - Unit B at depth 51.3 ft (El. 167.4 ft).
			C7	122/120	100	NM	After removing C7, natural gas was detected (6% LEL).			
						NM				
						NM				C7: SANDSTONE WITH SILTSTONE, similar to C6, mottling in several layers, fractures generally horizontal, planar and smooth, spaced 5 in. to 27 in., unweathered.
						1.5				
						1				
						2				
						1				
						1				
						2				
						1				
160										
	60									
			C8	123/120	99	2				C8: SANDSTONE WITH SILTSTONE, similar to C6, mottling in several layers, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 25 in., unweathered, fossils at 37-39 in., incipient fracture at 116-123 in.
						2				
						2				
						2				
						2				
						1				
						1.5				Approximate top of Pulaski Formation - Unit C at depth 66.5 ft (El. 152.2 ft).
						1.5				
						1				
						2				
150										
	70									
			C9	116/120	58	2				C9: SILTSTONE AND SHALE WITH SOME SANDSTONE, dark gray, soft, laminated, fine grained, well sorted siltstone and shale with a few layers of gray, medium hardness, fine grained, well sorted, bedded sandstone, fractures generally horizontal, planar, and smooth, spaced 0.25 in. to 13.5 in., unweathered, mottling at
						2				
						2				
						1.5				

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 219
Vertical Datum : NGVD 29
Date Start / End: 5/3/2008 - 5/9/2008
Total Depth (ft) : 158.0

Boring No. **B441**

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures / Graphic Log	Soil-Sample Description Rock-Lithological Description
						1.5	Highly fractured zone.		0-2 in., 5-7 in., 13 in.
						2			
						2			
						2			
						2.5			
						3			
140									
	80						Shaly partings.		
			C10	120/120	73	2	Highly fractured zone.		C10: Similar to C9, fractures generally horizontal, planar, and smooth, spaced <0.25 in. to 33 in., unweathered.
						1.5			
						2			
						2			
						1.5			
						2			
						2	Shaly partings.		
						2			
						2			
						2			
130									
	90								
			C11	121/120	92	1			C11: Similar to C9, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 31 in., unweathered, possible fossils at 17 in. and 24 in., mottling at 99 in., 102 in. and 117 in.
						1.5			
						2.5			
						1			Approximate top of Whetstone Gulf Formation - Unit A at depth 94.8 ft (El. 123.9 ft).
						1.5			
						1.5			
						1.5			
						1			
						2			
						3			
120									
	100								
			C12	117/120	93	2.5			C12: Similar to C9, fractures generally horizontal, planar and smooth, spaced 1 in. to 23.5 in., unweathered, mottling in a few layers, fossil layers at 100-105 in., 108-116 in., 73-77 in. and 80-82 in.
						2			
						1.5			
						1.5	Shaly partings.		
						2			
						1.5			
						1.5			
						2			
						1.5			
						2			
110									
	110						Shaly partings.		
			C13	119/120	94	1.5	4-inch-long incipient fracture with calcite infill.		C13: SANDSTONE WITH SILTSTONE, light gray, hard, bedded, medium grained, well sorted sandstone with some interbedded dark gray, soft, laminated, fine grained, well sorted siltstone, unweathered, fractures generally horizontal, planar, and smooth, spaced 0.25 in. to 52 in., unweathered, Incipient vertical fracture at 9-13 in., siltstone clasts and lenses at 7 in., 23-24 in., 44-46 in., 52-55 in., 68-69 in., 60° fracture with striations at 59 in.
						1.5			
						1.5			
						1.5			
						2			
						2	45° fracture in siltstone bed		

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

NINE MILE POINT SITE CHARACTERIZATION 1 NMP OFFSHORE LOGS.GPJ GEI DATA TEMPLATE.GDT 9/11/08

Final Boring Log

Ground Surface Elev. (ft): 219
Vertical Datum : NGVD 29
Date Start / End: 5/3/2008 - 5/9/2008
Total Depth (ft) : 158.0

Boring No. **B441**

Elev. (ft)	Depth (ft)	Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
						2	with slickensides indicating minor dip-slip motion, polished fracture surface.			
						2				
						2				
100						2				
	120						Highly fractured sandstone.			
			C14	115/120	75	2				C14: SILTSTONE AND SHALE WITH SOME SANDSTONE, dark gray, soft, laminated, fine grained, well sorted siltstone and shale with a few 4-6 in. thick interbeds of gray, medium hardness, bedded sandstone, unweathered, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 12 in., unweathered, 20° fracture at 94 in.
						1.5	After removing C14, natural gas was detected (18% LEL).			
						3				
						1.5				
						1.5	Highly fractured silty shale.			
						1.5				
						2				
						2.5				
						2				
						1.5	20° fractures.			
90										
	130									
			C15	135/120	100	2				C15: Similar to C14, except sandstone layers are thinner and more frequent, unweathered, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 46.5 in., unweathered, some vertical fractures at 66.5-69 in. and 73.5-77.5 in., mottling in a few layers.
						2				Approximate top of Whetstone Gulf Formation - Unit B at depth 135 ft (El. 83.7 ft).
						1				
						1.5				
						2				
						2				
						2.5				
						1.5	5-inch-long vertical fracture.			
						2	4-inch-long vertical fracture.			
						1.5	10-inch-long incipient fracture with calcite infill.			
80										
	140									
			C16	121/120	91	2.5				C16: Similar to C14, except sandstone layers a thinner and more frequent, fractures generally horizontal, planar, and smooth, spaced 0.5 in. to 22 in., unweathered, 20° fracture at 97.5 in., irregular, nonplanar fracture at 121 in., crossbedding at 87 in., mottling in a few layers.
						2				
						3				
						3				
						2.5	20° fracture.			
						2				
						2.5				
						2.5				
						2				
						3				
70										
							10° fracture.			
	150									
			C17	93/93	98	2	45° irregular fracture with slickensides and polished surface, minor dip-slip motion.			C17: SANDSTONE WITH SILTSTONE, gray, medium hardness, bedded, medium grained, well sorted sandstone with interbedded dark gray, soft, laminated siltstone, unweathered, fractures generally horizontal, planar, and smooth, spaced 1.5 in. to 40 in., unweathered, mottling in a few layers, possible fossils at 64 in.
						2.5				
						3				
						2.5				
						2.5				
						2				
						2.5				

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Final Boring Log

Ground Surface Elev. (ft): 219
Vertical Datum : NGVD 29
Date Start / End: 5/3/2008 - 5/9/2008
Total Depth (ft) : 158.0

Boring No.
B441

Elev. (ft)	Depth (ft)	Sample Information: Type	Sample No.	Rec./ Pen. (in)	Blows per 6 in. or RQD	Coring Time (min/ft)	Drilling Remarks and Engineering Geology Description of Rock Cores and Fractures	Fractures	Graphic Log	Soil-Sample Description Rock-Lithological Description
60										Bottom of boring at depth 158 ft (El. 60.7 ft). Borehole grouted to top of lake bed upon completion.
	160						General Comments about Core Samples:			
							Bedding-parallel fractures are most frequent in shale and siltstone and less common in sandstone.			
							Vertical fractures occasionally present in sandstone beds.			
50										
	170						Hand pressure produces bedding-parallel fractures in siltstone of Pulaski Formation during handling and transport.			
							Fracture surfaces are generally unweathered unless otherwise noted.			
40										
	180									
30										
	190									
20										

Notes: Engineering geology description of rock cores and fractures by Chad Conti.

Project Name: Nine Mile Point Unit 3 Site Characterization
City/State: Oswego, New York
GEI Project Number: 07223

GEI Consultants

Form 150.2 rev. 1

NINE MILE POINT SITE CHARACTERIZATION 1 NMP OFFSHORE LOGS.GPJ GEI DATA TEMPLATE.GDT 9/11/08

Final Boring Log Signature Page	Boring No. B441

Project: Nine Mile Point Site Characterization — GEI Project No. 07223

Location: Oswego, New York

Final Log Prepared by: _____ Date: 9/11/08

Per GEI Procedure 150 rev. 1 using computer IBM Thinkpad - Product 64576PU

Final Log Checked by:

Soil Descriptions Checked by: _____ Date: 9/11/08

Rock Descriptions Checked by: _____ Date: 9/11/08

Drilling and Sample Information Checked by: _____ Date: 9/11/08

Notes:

A. Cummings performed a sofware funtionality check: Input from software database equals output on Final Log.

Form 150.3 rev. 1

Test Pit Logs

TEST PIT LOG

TP101

Project	Nine Mile Point Unit 3 Site Characterization	**PG.**	1 **OF** 1
City/Town	Oswego, NY	**Location**	N 1,282,274.0
Client	AREVA NP		E 543,334.3
Contractor	Lindsey Aggregate	**Ground El.**	262.0
Equipment/Reach	Case 9010, 25 feet	**Datum**	NAD 27 / NGVD 29
Operator	Stewart Garrison **GEI Rep** C. Conti	**GEI Proj. No.**	07223
Weather	Sunny, ~50's F	**Date**	11/13/2007

Depth (feet)	Sample No. and Type	Sample Depth (feet)	Soil Description
			0 - 0.7' SILTY SAND (SM); ~65% mostly fine sand, ~35% slightly plastic fines; roots and organics, dark brown, <Topsoil>
1			0.7 - 5.5' SILTY SAND (SM); ~60% mostly fine to medium sand, ~ 30% slightly plastic fines, ~10% gravel and cobbles to ~12 inches; pockets of clayey sand with moderate plasticity, gravel increasing with depth, tan/gray/brown mottling <Glacial Till>
2			
3			
4			Excavation becomes difficult at ~4 feet
5	S1 Bulk	4 - 5	
6			Bottom of Test Pit at 5.5 feet

Notes:

- No water observed in test pit.
- No indications of faulting
- Description of NW Face of Test Pit

Pit Dimensions (ft)	NE-SW
length	~15
width	~4
depth	~5.5

GEI Consultants

TEST PIT LOG

TP102

Project	Nine Mile Point Unit 3 Site Characterization	**PG.**	1 **OF** 1
City/Town	Oswego, NY	**Location**	N 1,280,872.3
Client	AREVA NP		E 544,050.8
Contractor	Lindsey Aggregate	**Ground El.**	274.8
Equipment/Reach	Case 9010, 25 feet	**Datum**	NAD 27 / NGVD 29
Operator	Stewart Garrison **GEI Rep** C. Conti	**GEI Proj. No.**	07223
Weather	Sunny, ~40s	**Date**	11/14/2007

Depth (feet)	Sample No. and Type	Sample Depth (feet)	Soil Description
1			0 - 1.5' SILTY SAND (SM); ~65% mostly fine sand, ~35% slightly plastic fines; roots and organics, dark brown. <TOPSOIL>
2			1.5' - 8' SILTY SAND (SM); ~60% mostly fine to medium sand, ~30% slightly plastic fines, 10% gravel and cobbles to ~12"; pockets of clayey sand with medium plasticity; tan/ gray/ brown mottling. <GLACIAL TILL>
3			
4			
5			
6			
7			
8	S1 Bulk	7 - 8	
			Bottom of Test Pit at ~8 feet

Notes:

- Minor seepage on SE wall at ~4'.
- No indications of faulting.
- Description of NW face of Test Pit.

Pit Dimensions (ft)	NE-SW
length	~14
width	~4
depth	~8

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TEST PIT LOG

TP103

Project	Nine Mile Point Unit 3 Site Characterization	**PG.**	1 **OF** 1
City/Town	Oswego, NY	**Location**	N 1,280,418.6
Client	AREVA NP		E 544,378.9
Contractor	Lindsey Aggregate	**Ground El.**	283.1
Equipment/Reach	Case 9010, 25 feet	**Datum**	NAD 27 / NGVD 29
Operator	Stewart Garrison **GEI Rep** C. Conti	**GEI Proj. No.**	07223
Weather	50's F, Sunny	**Date**	11/14/2007

Depth (feet)	Sample No. and Type	Sample Depth (feet)	Soil Description
1	S1 Bulk	1 - 2	0 - 1' SILTY SAND (SM); ~65% mostly fine sand, ~35% slightly plastic fines; roots and organics, dark brown. <TOPSOIL>
2			1 - 2' SILTY SAND (SM); ~60% mostly fine sand, ~30% non plastic fines; ~10% gravel and cobbles to 6"; light brown/ tan. <FILL?>
3			2 - 7.5' SILTY SAND (SM); ~60% mostly fine to medium sand, ~30% non plastic to slightly plastic fines; ~10% gravel and cobble to 10"; brown/ light brown. <GLACIAL TILL with possible FILL>
4			
5			
6			
7	S2 Bulk	6.5 - 7.5	
8			Bottom of Test Pit at ~7.5 feet

Notes:

- No water observed in test pit.
- No indications of faulting
- Description of NW Face of Test Pit

Pit Dimensions (ft)	NE-SW
length	~14
width	~4
depth	~7.5

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