Nine Mile Point 3 Nuclear Power Plant

Combined License Application

Part 11F: Boring Logs B401 to B408

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.

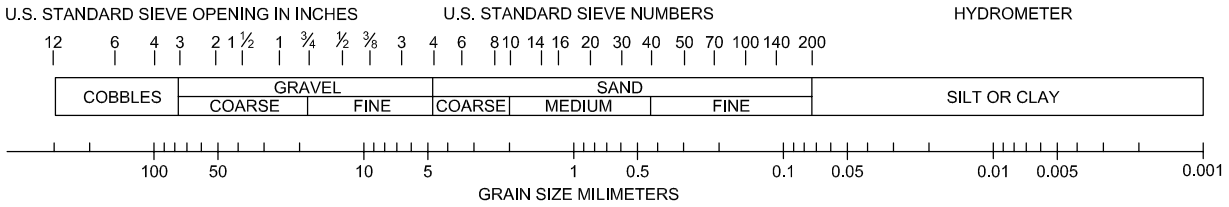
Hard	Scratches with point of steel blade with difficulty.
Medium	Scratches readily with point of steel blade.
Soft	Grooves readily with point of steel blade.

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. **B401**

Boring Information

Northing : 1282352.3 **Easting :** 543373.9
Horizontal Datum : NAD 27
Ground Surface Elev. (ft): 262.7
Vertical Datum : NGVD 29
Rig Type/I.D: CME 850-1 / Onshore

Date Start - End: 6/1/2008 - 6/6/2008
Driller Name: J. Stockholm
Logged By : T. Daigle, M. MacLeod
Drilling Company : Nothnagle
Total Depth (ft) : 249.0

Drilling Information

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

Casing I.D: 6 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: 4.25 HSA with continuous split spoon sampling 0-19.2 ft., top of rock, 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	8/24	2-6-16-8					S1: SANDY SILT (ML), ~70% slightly plastic fines, ~20% mostly fine sand, ~10% gravel to 0.5 in., roots present, brown, SURFICIAL DEPOSIT.
260			S2	17/24	4-8-15-34					S2: (0-5 in.) SANDY SILT WITH GRAVEL (ML), ~60% slightly plastic fines, ~25% mostly fine sand, ~15% gravel up to 0.75 in., brown. (5-17 in.) SANDY SILT (ML), ~60% slightly plastic fines, ~30% widely graded sand, ~10% gravel up to 0.5 in., brown, SURFICIAL DEPOSIT.
			S3	21/24	12-29-44-38					S3: Similar to S2 (5-17 in.), SURFICIAL DEPOSIT.
			S4	6/6	100/6 in.					S4: SANDY SILT (ML), ~55% low plasticity fines, ~35% widely graded sand, ~10% gravel up to 1 in., brown, SURFICIAL DEPOSIT.
			S5	12/12	17-100/6 in.					S5: Similar to S4, only gravel up to 0.75 in., SURFICIAL DEPOSIT.
	10		S6	9/10	21-100/4 in.					S6: Similar to S4, only gravel up to 0.75 in., SURFICIAL DEPOSIT. Approximate top of Glacial Till at depth 12.0 ft (El. 250.7 ft).
250			S7	10/9	43-100/3 in.					S7: SANDY SILT WITH GRAVEL (ML), ~55% slightly plastic fines, ~25% gravel up to 0.75 in., ~20% widely graded sand, grayish brown, GLACIAL TILL.
			S8	25/24	31-68-73-82					S8: SANDY SILT (ML), ~65% slightly plastic fines, ~25% widely graded sand, ~10% gravel up to 0.5 in., grayish brown, GLACIAL TILL.
			S9	26/24	23-31-41-48					S9: Similar to S8, GLACIAL TILL.
			S10	12/13	10-37-100/1 in.					S10: SANDY SILT (ML), ~65% slightly plastic fines, ~30% widely graded sand, ~5% gravel up to 0.5 in., grayish brown, GLACIAL TILL. Approximate top of Oswego Sandstone at depth 19.0 ft (El. 243.7 ft).
	20		C1	22/23	61	2 3/0.9 ft.	Auger refusal at 19.0 ft.			C1: SANDSTONE WITH SOME SILTSTONE, gray sandstone, dark gray siltstone, hard sandstone, medium siltstone, bedded sandstone, laminated siltstone, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 0.5-15 in., 0.5 in. vertical fracture at 16.5 in.
			C2	57/60	94	2 3 2.5 2.5 2.5	Vertical fracture.			C2: SANDSTONE, gray, hard, bedded, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 4.5-33 in., trace mottling.
240			C3	120/120	92	1.5 2 2 2 2 2 2.5	30° fracture. 30° fracture.			C3: SANDSTONE WITH SOME SILTSTONE, greenish gray to gray sandstone, dark gary siltstone, hard sandstone, medium siltstone, bedded sandstone, laminated siltstone, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 2-26 in., 10° fracture at 53 in., 30° fracture at 55 in., crossbedding from 53-56 in., mottling from 30-31 in. with large Oswego sandstone clast, mottling from 49-50 in., some mottling throughout, trace fossils.
	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): 263
Vertical Datum : NGVD 29
Date Start / End: 6/1/2008 - 6/6/2008
Total Depth (ft) : 249.0

Boring No.
B401

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
230						2 2 1.5			
			C4	121/120	93	2 2 3.5 1.5 3 3 3 3	Shaly partings. Vertical fracture.		C4: SANDSTONE WITH SILTSTONE AND SHALE, gray sandstone, dark gray siltstone and shale, hard sandstone, medium 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 37 in., 0.5 in. vertical fracture from 0-0.5 in., 45° irregular fracture at 102.5 in., highly fractured zones from 93-93.5 in. and 106.5-107.5 in., mottling from 36-45.5 in. and 79-83 in., trace fossils.
	40								
220						3.5 2.5	Pyrite nodules. Highly fractured. 45° fracture. Highly fractured.		
			C5	120/120	93	2.5 5.5 4 2 2.5 4 3 3 3 3	Highly fractured. 3-inch-long incipient vertical fracture with calcite infill.		C5: SANDSTONE WITH SOME SILTSTONE, gray sandstone, dark gray siltstone, hard sandstone, medium siltstone, bedded sandstone, laminated siltstone, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced from highly fractured to 25.5 in., highly fractured zone from 84.5-85.5 in., mottling and irregular bedding from 23.5-26 in., trace mottling throughout.
	50								
210									
			C6	118/120	98	3 4.5 4.5 4.5 5 4 6.5 4 3.5 6	4.5-inch-long incipient vertical fracture with calcite infill. 30° fracture.		C6: SANDSTONE AND INTERBEDDED SILTSTONE, gray sandstone, dark gray siltstone, hard sandstone, medium siltstone, bedded sandstone, laminated siltstone, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 5.5-34 in., 30° fracture at 112.5 in., 4.5 in. incipient vertical fracture from 45-49.5 in., 15 in. green banded layer from 35-50 in., mottling throughout. Approximate top of Oswego Transition Zone at depth 57.3 ft (El. 205.4 ft).
	60								
200									
			C7	122/120	99	3 3 3.5 4.5 4 2.5 3 2.5 4			C7: SANDSTONE TO GRAYWACKE WITH SOME SILTSTONE, gray sandstone and graywacke, dark gray siltstone, hard sandstone and graywacke, medium siltstone, bedded sandstone and graywacke, laminated siltstone, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 2.5-23 in., 14 in. fossil layer with mottling from 102-116 in., mottling layers from 2.5-4.5 in., 5.5-8 in., and 40.5-45.5 in., trace fossils and mottling throughout. Approximate top of Pulaski Formation-Unit A at depth 71.4 ft (El. 191.3 ft).
	70								
190									

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): 263
Vertical Datum : NGVD 29
Date Start / End: 6/1/2008 - 6/6/2008
Total Depth (ft) : 249.0

Boring No. **B401**

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
						4				
			C8	120/120	92	4.5				C8: SANDSTONE TO GRAYWACKE WITH SOME SILTSTONE AND SHALE, gray sandstone and graywacke, dark gray siltstone and shale, hard sandstone and graywacke, medium siltstone and shale, bedded sandstone and graywacke, laminated siltstone and shale, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced <0.5-21.5 in., 2 in. distinctive fossil layer from 79-81 in., 1.5 in. distinctive fossil layer from 82-83.5 in., fossils throughout, mottling throughout, calcite infilling from 44.5-46 in.
						6				
						5				
						4.5	Shaly partings.			
	80					3.5				
						3.5				
						3.5				
						3.5				
180						4				
						3.5				
							Fossils.			
			C9	119/120	96	3.5				C9: SANDSTONE TO GRAYWACKE WITH INTERBEDDED SILTSTONE, gray sandstone and graywacke, dark gray siltstone, hard sandstone and graywacke, medium siltstone, bedded sandstone and graywacke, laminated siltstone, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 0.5-26.5 in., 1.5 in. heavy mottling with siltstone clasts from 30-31.5 in. and 34-35.5 in., cross bedding from 72.5-73.5 in., mottling throughout, 3 in. green mineral veins (marker horizon) from 116-119 in.
						4				
						4.5				
						3				
	90					3.5				
						3.5				
						4				
						3				
170						4.5				
						5.5				
			C10	120/120	94	3.5	Thin green veins.			C10: SANDSTONE WITH INTERBEDDED SILTSTONE AND SHALE, gray sandstone, dark gray siltstone and shale, hard sandstone, medium siltstone and shale, bedded sandstone, laminated siltstone and shale, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 3-30 in., heavy mottling throughout, 1 in. green mineral veins (marker horizon) from 0-1 in.
						2.5				
						3				
						4				
	100					4.5				
						5				
						4.5				
						4.5				
160						4.5				
						3.5				
							Fossils.			
							10° fracture.			
			C11	119/120	99	3	Fossils.			C11: Similar to C10, except with fossils, fractures generally planar, horizontal, and smooth, spaced 4.5-43 in., 10° fracture at 0 in., 10° fracture at 28.5 in., 1 in. fossil layer with calcite filled clasts from 86-87 in., 3 in. fossil layer from 91-94 in., ripple marks at 20 in., 29.5 in., and 56 in., mottling throughout, 4.5 in. incipient vertical fracture from 114-118.5 in.
						3.5				
						4	10° fracture.			
						3.5				
	110					4				
						4.5				
						3.5				Approximate top of Pulaski Formation-Unit B at depth 111.9 ft (El. 150.8 ft).
						4				
150						4.5				
						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): 263
Vertical Datum : NGVD 29
Date Start / End: 6/1/2008 - 6/6/2008
Total Depth (ft) : 249.0

Boring No. **B401**

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
			C12	121/120	89	4	4.5-inch-long incipient fracture.		C12: Similar to C10, except with less mottling and longer sandstone interbeds, fractures generally planar, horizontal, and smooth, spaced 2-20.5 in., 15° irregular fracture at 10.5 in., irregular fracture at 118.5 in., incipient horizontal fracture at 97.5 in., 12 in. incipient vertical fracture from 95.5-107.5 in., 4 in. incipient vertical fracture from 107.5-111.5 in., cross bedding from 0-2 in., 12.5-14 in., and 64-68 in., mottling throughout.
						3.5	15° fracture.		
						3.5			
						3			
	120					3.5			
						3			
						3			
						4			
140						3.5			
						4	12-inch-long incipient fracture.		
							4-inch-long incipient fracture.		
			C13	120/120	85	2.5	45° fracture.		C13: SANDSTONE AND SILTSTONE WITH SHALE, gray sandstone, dark gray siltstone and shale, hard sandstone, medium 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 21.5 in., 2.5 in. vertical fracture from 0-2.5 in., 45° irregular fracture at 6.5 in., 30° fracture at 48.5 in., highly fractured zone from 8.5-9 in. and 31.5-32 in., mottling and interbedding from 38-43 in., fractured from 59.5-61 in., mottling from 108-118 in.
						3	Highly fractured silty shale.		
						4			
						3.5			
	130					3	Highly fractured.		
						3	30° fracture.		
						3.5			
						4			
130						5			
						5			Approximate top of Pulaski Formation-Unit C at depth 128.5 ft (El. 134.2 ft).
			C14	120/120	83	3.5	Shaly partings.		C14: Similar to C13, fractures generally planar, horizontal, and smooth, spaced from highly fractured to 16.5 in., 45° fracture at 41 in., 10° fracture at 62.5 in., 70° irregular non-planar fracture at 72.5 in., 10° fracture at 78 in., 20° fracture at 79.5 in., highly fractured zone from 38.5-39 in., irregular fracture at 59 in., 1 in. fossil layer from 61-62 in., cross bedding from 71.5-75 in. and 91.5-96.5 in., mottling from 0-7 in., 22-23 in., 57.5-61 in., and 94-95 in., clay coating on fracture surfaces at 39 in., 57.5 in., 104 in., and 113 in.
						7			
						3.5			
						4			
						4	Highly fractured.		
	140					5	45° fracture.		
						5	10° fracture.		
						3.5	20° fracture.		
120						7	Fossils.		
						3	70° fracture.		
							10° fracture.		
							Fracture in siltstone with slickensides, indicates minor vertical orientation (dip-slip), no apparent offset of bedding.		
			C15	119/120	96	5			C15: SILTSTONE and SANDSTONE with little SHALE, dark gray siltstone and shale, gray sandstone, medium siltstone and shale, hard sandstone, laminated siltstone and shale, bedded sandstone, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 3.5-28 in., 30° fracture at 36 in., 20° fracture at 67.5 in., 1 in. trace fossil layer from 4.5-5.5 in., 0.5 in. fossil layer from 9.5-10 in., 4 in. fossil layer from 56.5-60.5 in., mottling from 9.5-10.5 in., 23.5-25 in., 33.5-35 in., and 70.5-71 in., irregular bedding around fossil layer from 56.5-60.5 in.
						3.5			
						4			
						3.5			
	150					3.5	30° fracture.		
						3			
						3	20° fracture.		
						4.5	Fossils.		
110						5			
						5			
			C16	121/120	94	3.5			C16: Similar to C15, except increased fossils, fractures generally planar, horizontal, and smooth, spaced 0.5-40.5 in., 30° fracture
						4.5			

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

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		at 33.5 in., 45° non-planar fracture at 60.5 in., 20° fracture at 67.5 in., 4.5 in. trace fossil layer from 10-14.5 in., 1 in. fossil layer from 32-33 in., 1 in. trace fossil layer from 51.5-53 in., 2 in. trace fossil layer with calcite infilling from 59.5-61.5 in., 11 in. fossil layer from 67.5-78.5 in., 2.5 in. irregular fossil layer with large calcite infilling from 102.5-105 in., 0.5 in. clayey silt layer from 108.5-109 in., irregular non-planar bedding from 102.5-105 in. Approximate top of Whetstone Gulf Formation-Unit A at depth 158.8 ft (El. 103.9 ft).
						4	30° fracture.	
						3.5		
	160					4		
						4	45° fracture. 20° fracture.	
						4.5		
100						4	Fossils with pyrite nodules and minor oxidation.	
						2.5		
							Thin clay film in fracture.	
			C17	122/120	100	2		C17: SANDSTONE WITH SILTSTONE AND SOME SILTY SHALE, gray sandstone, dark gray siltstone and silty shale, hard sandstone, medium siltstone and silty shale, bedded sandstone, laminated siltstone and silty shale, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 13-59.5 in., 30° fracture at 59.5 in., 30° fracture with chipping at 108.5 in., chipping from 121-122 in., cross bedding from 34-53 in., mottling from 69-70 in.
						2		
						2		
						1.5		
	170					1.5		
						2	30° fracture.	
						2		
						3		
90						4		
						4		
							30° fracture.	
			C18	119/120	93	3.5		C18: SILTSTONE AND SILTY SHALE WITH SANDSTONE, dark gray siltstone and silty shale, gray sandstone, medium siltstone and silty shale, hard sandstone, laminated siltstone and silty shale, bedded sandstone, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 1-21 in., 30° fracture at 33.5 in., 30° fracture at 34.5 in., 30° fracture at 39 in., 1 in. vertical fracture from 59-60 in., irregular deposition pattern from 29.5-30.5 in. with small sandstone clasts, trace mottling throughout.
						4.5		
						4.5	30° fracture.	
						4.5	30° fracture.	
	180					4.5	30° fracture.	
						4		
						3.5	Vertical fracture.	
						3.5		
80						3		
						2		
			C19	120/120	87	2		C19: Similar to C18, except trace fossil layer, fractures generally planar, horizontal, and smooth, spaced 1.5-16.5 in., 15° irregular fracture at 24 in., 30° fracture at 71.5 in., 10° fracture at 96.5 in., irregular fracture at 15.5 in., 0.5 in. trace fossil layer from 58-58.5 in., mottling from 12.5-13.5 in., 25.5-26.5 in., and 30.5-32 in.
						2.5		
						3	15° fracture.	
						2.5		
	190					4		
						3.5		
						3	30° fracture.	
						3		
70						4.5		
						3.5		
							10° fracture.	
			C20	121/120	90	3		C20: SANDSTONE WITH SOME SILTSTONE, gray sandstone, dark gray siltstone, hard sandstone, medium siltstone, bedded sandstone, laminated siltstone, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 1.5-31 in., 1 in. incipient vertical fracture from 57.5-58.5 in., irregular fracture at 115.5 in., chipping from 42-43.5 in. and
						3.5		
						3.5		
						3		

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): 263
Vertical Datum : NGVD 29
Date Start / End: 6/1/2008 - 6/6/2008
Total Depth (ft) : 249.0

Boring No. **B401**

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
	200					2 2.5 3 2 3 2	1-inch-long incipient vertical fracture.		102.5-103 in., siltstone clasts at 66.5 in., long sandstone interbeds from 12-58.5 in. and 60.5-89.5 in. Approximate top of Whetstone Gulf Formation-Unit B at depth 197.0 ft (El. 65.7 ft).
60									
			C21	122/120	96	3 3 3.5 3 3 1.5 2 1.5 1.5 2	70° fracture. 70° fracture. 30° fracture. 10° fracture. 45° fracture. Fracture in siltstone with slickensides, dip-slip orientation, no apparent offset in bedding some polishing. Highly fractured. Fracture in siltstone with slickensides, dip-slip orientation, no apparent offset in bedding some polishing.		C21: Similar to C20, except increased siltstone and fossil layers, fractures generally planar, horizontal, and smooth, spaced from highly fractured to 57 in., opposing 70° fractures at 15.5 and 17 in. within highly fractured zone from 14.5 in. to 18 in., 30° fracture at 20 in., 10° fracture at 28 in., 45° fracture at 43 in., 4 in. trace fossil layer with mottling, calcite infilling, and sulfide minerals from 100-107 in., mottling, trace mottling throughout.
	210								
50									
			C22	119/120	88	2 2 1.5 1.5 2.5 4 3 4.5 3.5 3.5	45° fracture. Highly fractured silty shale. 10° fracture. 10° fracture. 45° fracture. 30° fracture. 30° fracture. Polishing and minor slickensides in siltstone fractures, dip-slip orientation, no apparent offest in bedding.		C22: SANDSTONE AND SILTSTONE WITH SILTY SHALE, gray sandstone, dark gray siltstone and silty shale, hard sandstone, medium siltstone and silty shale, bedded sandstone, laminated siltstone and silty shale, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced from highly fractured to 53.5 in., 45° fracture at 56.5 in., 10° fracture at 70.5 in., 10° fracture at 76 in., 45° fracture at 82.5 in., 30° fracture at 84 in., 30° fracture at 84.5 in., 10° fracture at 99 in., highly fractured zone from 56.5-58.5 in.
	220								
40									
			C23	118/120	80	3 3.5 4 2.5 2 2 2 3 3 2.5	10° fracture. 45° fracture. Shaly partings.		C23: Similar to C22, fractures generally planar, horizontal, and smooth, spaced <0.5-17.5 in., 45° irregular fracture at 69.5 in., irregular fractures at 67 in. and 108 in., calcite infilling at 69 in., mottling from 62.5-63 in. and 65-67 in.
	230								
30									
			C24	117/120	83	2.5 4 4.5 4 3 2.5	30° fracture. 30° fracture. Vertical fracture.		C24: Similar to C22, fractures generally planar, horizontal, and smooth, spaced 1.5-32.5 in., 30° fracture at 3.5 in, 30° fracture at 11.5 in., 3.5 in. vertical fracture from 53.5-57 in., 1 in. incipient vertical fracture from 63.5-64.5 in., 1 in. clayey silt layer at 13 in., slightly weathered, no notable striations, trace mottling throughout.
	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

Ground Surface Elev. (ft): 263
Vertical Datum : NGVD 29
Date Start / End: 6/1/2008 - 6/6/2008
Total Depth (ft) : 249.0

Boring No.
B401

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 4 3				
20			C25	43/35	100	4 2.5 3	Fossils.			C25: Similar to C22, fractures generally planar, horizontal, and smooth, spaced 2-22 in., trace mottling throughout.
	250									Bottom of boring at depth 249 ft (El. 13.7 ft). Borehole grouted to approx. ground surface upon completion.
10							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.			
	260									
0							Hand pressure produces bedding-parallel fractures in siltstone of Pulaski Formation during handling and transport. Fracture surfaces are generally unweathered unless otherwise noted.			
	270									
-10										
	280									
-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

Final Boring Log Signature Page	Boring No. B401

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. **B406**

Boring Information

Northing : 1282832.4 **Easting :** 543228.4
Horizontal Datum : NAD 27
Ground Surface Elev. (ft): 237.3
Vertical Datum : NGVD 29
Rig Type/I.D: Mobile B57 / Barge 2

Date Start - End: 4/25/2008 - 5/2/2008
Driller Name: P. Dickensen
Logged By : A. Hare, M. MacLeod
Drilling Company : Boart Longyear
Total Depth (ft) : 187.5

Drilling Information

Hammer Ident: NA
Auger I.D: NM
Auger Head Length: NM
Drilling Method: Wireline coring 0 - 187.5 ft.

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: 13.4 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
			C1	26/30	28	2.5 2.5 1/.5 ft				Approximate top of Oswego Sandstone at depth 0 ft (El. 237.3 ft). C1: SANDSTONE, gray, medium hardness, bedded, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, chipped at 2 in.
			C2	53/60	65	2 2 2.5 2.5 2.5	Highly fractured zone.			C2: SANDSTONE, gray, medium hardness, bedded, well sorted, fine grained, unweathered, fractures generally planar and horizontal spaced <1-10 in., gray clay at 11-13 in. C3: Similar to C2, silt lens 10.5-12 in., fractures planar, horizontal, and smooth, spaced 4-8 in.
230			C3	15/12	100	3				Approximate top of Oswego Transition Zone at depth 9.4 ft (El. 227.9 ft).
	10		C4	48/48	35	3 3 3 NM	Highly fractured siltstone. 10-inch-long vertical fracture. 1-inch-thick clay seam, minor oxidation. 1-inch-thick clay seam within shale layers.			C4: SANDSTONE WITH INTERBEDDED 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, 3 in. fossil layer at 7 in., siltstone clasts from 9-10 in., mottling from 22-26 in., 29-30 in., and 34-35 in., 1.5 in. clay seam at 13.5 in., 1 in. clay seam at 35.5 in., 0.5 in. clay seam at 37 in., clay films on fractures at 39 in. and 41.5 in., 1 in. silt seam at 45.5 in., fractures generally planar, horizontal, and smooth, spaced <1-7 in., 10 in. vertical fracture at 19 in.
			C5	63/60	63	5.5 5 3 2.5 2.5	30° fracture. Shaly partings.			C5: SANDSTONE WITH INTERBEDDED 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, mottling from 17-18 in., 41-44 in., 50 in., and 54 in., cross bedding from 6.5-10 in., 41-44 in., and 53-54.5 in., fractures generally planar, horizontal, and smooth spaced <1-7.5 in., 30° inclined fracture at 15.5 in.
220	20		C6	118/120	91	2.75 2.5 2.5 2.5 3 3.5 2.5 2.5 2.5 2.5	3-inch-long incipient fracture with calcite infill.			Approximate top of Pulaski Formation - Unit A at depth 37.2 ft (El. 200.1 ft). C6: SANDSTONE WITH INTERBEDDED SILTSTONE AND SHALE, gray sandstone, medium hardness, bedded, dark gray, soft siltstone and shale, laminated siltstone, fine grained, well sorted unweathered, clasts 42-47 in., 63.5-65.5 in., and 104-107 in., siltstone lenses at 59 in., 65.5-67 in., and 99-101 in., mottling at 17-21 in., 51-52 in., and 54-55 in., fractures generally planar, horizontal and smooth spaced 3-22.5 in.
210			C7	121/120	77	2.5 2.5 3 2.75 2 2.75	5-inch-long incipient fracture with calcite infill. 5-inch-long vertical fracture. 1-inch-thick clay seam.			
	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): 237
Vertical Datum : NGVD 29
Date Start / End: 4/25/2008 - 5/2/2008
Total Depth (ft) : 187.5

Boring No.
B406

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
						2.25				C7: SANDSTONE WITH INTERBEDDED 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, mottling at 19.5-21 in., 34.5-36 in., 112-113 in., and 114-114.5 in., cross bedding at 10-16 in., 37.5-42.5 in., 45-48 in., 75.5-78.5 in., and 81-86 in., fractures generally planar and horizontal spaced <1-15.5 in., 4.5 in. vertical fracture at 29.5 in., 2 in. vertical fracture at 118 in., chipped from 7.5-8.5 in.
						2.25				
						2.25				
						3.25	Shaly partings.			
200							2-inch-long vertical fracture (irregular surface).			
			C8	121/120	78	3	Highly fractured zone.			
						2.5	Fossils.			
	40					2.5				
						2.5				
						3.5				
						3.75				C8: SILTSTONE AND SHALE WITH SANDSTONE, dark gray, soft laminated siltstone and shale, gray sandstone of medium hardness, bedded, well sorted, fine grained, unweathered, 3.5 in. clay seam at 63 in., fossils at 32.5 in., and 100 in., siltstone and shale alternating lenses from 85-100 in., fractures generally planar, horizontal, and smooth spaced 1-38.5 in.
						2	1-inch-thick clay seam.			
						2.5	Shaly partings.			
						2.5				
						2.5				
							Shaly partings.			
190										
			C9	121/120	94	3.5	Fossils.			
						1.5				
						2.5				
	50					2.5				
						2				C9: Similar to C8, fossils at 10 in., alternating lenses 34-41 in., and 82-92 in., fractures generally planar, horizontal, and smooth spaced <1-22 in.
						3.5	Shaly partings.			
						3.5	0.5-inch-thick clay seam.			
						3				
						3.25				
						2				C10: INTERBEDDED SILTSTONE AND SANDSTONE, gray sandstone, dark gray siltstone and shale, medium hard sandstone, soft siltstone and shale, bedded sandstone, laminated siltstone, well sorted, fine grained, unweathered, alternating lenses of siltstone and sandstone throughout core run, mottling at 112-113 in., and 107-108 in., greenish minerals at 51-55 in., fractures generally planar, horizontal, and smooth spaced <1-11 in.
180							Shaly partings.			
			C10	122/120	94	4.25				
						2.5				
						3				
	60					2.75				
						3				Approximate top of Pulaski Formation - Unit B at depth 73.8 ft (El. 163.5 ft).
						3.25	Green mineral veins.			
						3				
						3				
						2.5				
						2				
170										
			C11	117/120	97	2.75				C11: INTERBEDDED SANDSTONE, SILTSTONE, AND SHALE, gray sandstone, medium hardness, bedded, dark gray, soft siltstone, laminated with cross bedding, fine grained, well sorted, unweathered, mottling, cross bedding, and thin lenses throughout core run, burrow feature at 76-79 in., fractures generally planar, horizontal, and smooth spaced 1-33.5 in.
						2.75				
						2.5				
	70					2.5				
						2.5				
						3				
						3				
						2.75				
						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): 237
Vertical Datum : NGVD 29
Date Start / End: 4/25/2008 - 5/2/2008
Total Depth (ft) : 187.5

Boring No. **B406**

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
						3				
160										
			C12	114/120	80	2	Fossils.			C12: SANDSTONE WITH SILTSTONE AND SHALE, gray, medium hardness, bedded sandstone, dark gray, soft, laminated siltstone, well sorted fine grained, unweathered, fossils in sandstone at 4.5-11.5 in., and 22-29.5 in., mottling at 30-43 in., interbedded siltstone lenses 78-97 in., fractures generally planar, horizontal, and smooth spaced <1-27 in.
						2				
						4	Fossils.			
	80					2.25				
						2.75				
						3				
						3.5				
						3.5				
						3.25				
						4.25				
150										Approximate top of Pulaski Formation - Unit C at depth 87.5 ft (El. 149.8 ft).
			C13	117/120	71	3				C13: SANDSTONE AND SILTSTONE WITH SHALE, gray, medium hardness sandstone, bedded, dark gray and black siltstone, soft, laminated, fine grained, well sorted, unweathered, gray clay seam 45-46 in., alternating sandstone and siltstone layers 91.5-97.5 in., fractures generally planar, horizontal, and smooth spaced <1-25.5 in.
						3				
						5				
	90					2.25	Shaly partings.			
						2.75				
						3	1-inch-thick clay seam. Shaly partings.			
						3.5				
						3.5				
						3.25				
						4.25				
140							Shaly partings.			
			C14	114/108	83	2.75				C14: SILTSTONE AND SHALE WITH SANDSTONE, sandstone beds up to 7 in., gray, medium hardness, bedded sandstone, dark gray and black, soft, laminated siltstone and shale, well sorted, fine grained, unweathered, gray clay layers at 15.5 in. and 18.5-20 in., mottling at 43 in., and 75.5 in., lenses 91-98 in., fractures generally planar, horizontal, and smooth spaced <1-9 in.
						4.5	Three 0.5-inch-thick clay seams in shale.			
						4.0				
	100					4				
						4.25				
						4.5				
						4.75				C15: SILTSTONE, dark gray, soft, laminated, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth spaced 5-14 in.
						3				
						4.5				
130			C15	19/12	100	3.25				C16: INTERBEDDED SILTSTONE, SHALE, AND SANDSTONE, gray, medium hardness, bedded sandstone, dark gray and black, soft, laminated siltstone, well sorted, fine grained, unweathered, gray clay seam at 62-64 in., fossil layer at 81.5 in., fractures generally planar, horizontal, and smooth spaced <1-36.5 in.
			C16	122/120	78	3.25				
						2.75				
						2.5				
	110					3.5				
						3.5				Approximate top of Whetstone Gulf Formation - Unit A at depth 123.4 ft (El. 113.9 ft).
						2.5				
						2.5	1-inch-thick clay seam with shale fragments.			
						2.75				
						2.5				
						3.5				
120										

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): 237
Vertical Datum : NGVD 29
Date Start / End: 4/25/2008 - 5/2/2008
Total Depth (ft) : 187.5

Boring No. **B406**

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
			C17	122/120	70	2.5 4 2.75 2.5 3 2.5 3 4 2.25 2.5	Highly fractured siltstone and shale. 0.5-inch-thick clay seam in shale. Shaly partings. 0.5-inch-thick clay seam. 2-inch-long vertical fracture.	C17: Similar to C16, gray clay seam at 29-30 in. and 61 in., clasts at 23 in., 58 in., and 80.5 in., fossils at 18 in. and 82 in., fractures generally planar, horizontal, and smooth spaced <1-17 in.
110	120		C18	120/120	96	2.5 3.5 3 2.5 3 2 2 2 2.75 2.5	0.5-inch-thick clay seam. Fossils. 45° fracture. Thick sandstone layer (7.5 ft).	C18: SANDSTONE WITH SILTSTONE AND SHALE, gray, medium hardness, bedded sandstone, dark gray and black, soft, laminated siltstone, well sorted, fine grained, unweathered, fossils at 1.5 in., 12 in., 26-28 in., and 49-50 in., mottling at 46.5 in., 0.5 in. gray clay seam at 1 in., fractures generally planar, horizontal, and smooth spaced <1-34 in. C19: INTERBEDDED SANDSTONE, SILTSTONE, AND SHALE, gray, medium hardness, bedded sandstone, dark gray and black, soft, laminated siltstone, well sorted, fine grained, unweathered, clay seam at 56-57 in., fractures generally planar, horizontal, and smooth, spaced <1-19 in., 30° fracture at 34 in., irregular fracture and chipping at 103 in.
100	130		C19	117/120	79	2 2.75 2.5 2.5 2.75 3 4 4 4.25 3.5	30° fracture. 1-inch-thick clay seam. Shaly partings. Hard drilling.	Approximate top of Whetstone Gulf Formation - Unit B at depth 148.4 ft (El. 88.9 ft).
90	140		C20	70/60	100	4.5 3.5 4 4.5 4		C20: SILTSTONE AND SHALE WITH INTERBEDDED SANDSTONE, gray, medium hardness, bedded sandstone, dark gray and black, soft, laminated siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth spaced 1-19 in.
80	150		C21	59/60	82	3 4 4 4 3		C21: Similar to C20 with more sandstone, fossils at 13.5 in. and 26 in., cross bedding 51-53 in., fractures spaced <1-11.5 in.
			C22	55/60	70	4 3.5 5		C22: Similar to C20, mottling at 28 in., 36-38 in., and 43 in., gray clay seam at 40-40.5 in., fractures generally planar, horizontal and smooth spaced <1-14 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): 237
Vertical Datum : NGVD 29
Date Start / End: 4/25/2008 - 5/2/2008
Total Depth (ft) : 187.5

Boring No.
B406

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
						6 8	0.5-inch-thick clay seam.			
			C23	29/24	52	5 5	0.5-inch-thick clay seam. 0.5-inch-thick clay seam.			C23: SILTSTONE WITH SHALE, dark gray, soft, laminated, well sorted, fine grained, unweathered, gray clay seam at 3-3.5 in. and 18.5-19 in., thin sandstone lenses at 26.5 in. and 40.5 in., fractures generally planar, horizontal, and smooth spaced <1-7 in.
			C24	35/36	86	7 5 3				C24: INTERBEDDED SILTSTONE AND SHALE WITH SANDSTONE, dark gray, black, soft, laminated siltstone, gray, medium hardness, bedded sandstone, well sorted, fine grained, unweathered, mottling at 0-3 in., 9 in., and 12 in., cross bedding at 32-34 in., fractures generally planar, horizontal, and smooth spaced 1-10 in.
70			C25	118/120	93	3 4 3 4 4 3 4 4 3 4				C25: SANDSTONE WITH INTERBEDDED SILTSTONE AND SHALE, gray, medium hardness, bedded sandstone, dark gray and black, soft, laminated siltstone, well sorted, fine grained, unweathered, cross bedding at 2-4 in. and 11 in., mottling at 21 in. and 25-27 in., siltstone lenses at 57 in. and 77 in., fossils and calcite deposits at 102-111 in., fractures generally planar, horizontal, and smooth spaced 3.5-30 in., irregular, non-planar fracture at 10 in.
	170									
60			C26	120/120	78	4 3.25 4.25 4.25 2 2 1.5 1.75 1.5 1.75	Fossils. 0.5-inch-long vertical fracture. 11-inch-long incipient fracture. 1-inch-thick clay seam with shale fragments. 0.5-inch-thick clay seam.			C26: Similar to C25, gray clay seam at 25.5 in. and 47 in., no apparent offset in bedding, no notable striations, siltstone lenses at 31 in., fractures generally planar, horizontal, and smooth spaced <1-25 in., 0.5 in. vertical fracture at 25 in.
	180									
50										Bottom of boring at depth 187.5 ft (El. 49.8 ft). Borehole grouted to top of lake bed upon completion.
	190						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							Hand pressure produces bedding-parallel fractures in siltstone of Pulaski Formation during handling and transport.			
	200						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. B406

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. **B404**

Boring Information

Northing : 1282643.9 **Easting :** 543302.3
Horizontal Datum : NAD 27
Ground Surface Elev. (ft): 241.3
Vertical Datum : NGVD 29
Rig Type/I.D: Mobile B57 / Barge 2

Date Start - End: 4/22/2008 - 4/25/2008
Driller Name: J. Weeks
Logged By : T. Daigle, M. MacLeod, A. Hare
Drilling Company : Boart Longyear
Total Depth (ft) : 202.5

Drilling Information

Hammer Ident: NA
Auger I.D: NM
Auger Head Length: NM
Drilling Method: 20.4 ft. to mudline from deck. 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: 13.4 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	0/0	100/0 in.	NA				Approximate top of Osewgo Sandstone at depth 0.0 ft (El. 241.3 ft).
240			C1	17/18	39	3				S1: NO RECOVERY. C1: SANDSTONE, greenish gray, hard, fine grained, well sorted unweathered, fractures generally planar and horizontally spaced 1-18 in.
			C2	117/120	91	2				C2: Similar to C1, soft dark gray siltstone bed from 85-59 in., weathered shale to soft clay at 62-63 in., fractures generally planar and horizontally spaced 1-38 in., vertical incipient fractures at 38-40 in. and 63-67 in., generally unweathered.
						2.25				
						3	Incipient fracture.			
						2.5	Shaly partings.			
						3.5	1.0-inch-thick clay seam (contains pieces of shale).			
						2.5				
						2.5				
						3	Incipient fracture.			
						4				
	10					4.5				
230										C3: SANDSTONE AND ARGILLACEOUS SANDSTONE WITH INTERBEDDED SILTSTONE, gray, hard sandstone, dark gray, soft siltstone, fine grained, well sorted, unweathered, fractures generally planar and horizontally spaced 1-18 in., 6 in. vertical fracture at 5 in., mottled bedding 110-113 in.
			C3	121/120	78	2.5	6-inch-long vertical fracture (calcite infill).			
						4.5	0.5-inch-thick clay seam (contains pieces of shale).			
						4	Shaly partings.			
						4				
						5				
						2.5				Approximate top of Oswego Transition Zone at depth 16.9 ft (El. 224.4 ft).
						4	Shaly partings.			
						3.5				
						3.5				
	20					4.5				
220										
			C4	120/120	90	2.5				C4: Similar to C3, shale weathered to soft clay at 54-56 in., thickly bedded fractures generally planar and horizontally spaced 1-22 in., 8 in. vertical fracture at 12 in.
						2.5	8-inch-long vertical fracture (calcite infill).			
						3.5				
						3				
						3				
						2				
						2.5				
						3				
						3.5	Shaly partings.			
	30					2.5				
210										

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): 241
Vertical Datum : NGVD 29
Date Start / End: 4/22/2008 - 4/25/2008
Total Depth (ft) : 202.5

Boring No. **B404**

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
			C5	118/120	92	2.5				C5: Similar to C3, some fossil fragments from 39-40 in., generally poorly defined bedding, fracture generally planar and horizontally spaced 1-13 in.
						3				
						4				
						3				Approximate top of Pulaski Formation - Unit A at depth 36.6 ft (El. 204.7 ft).
						3	12-inch-thick siltstone layer.			
						2				
						2				
						2.5				
						2				
	40					2.5				
200										
			C6	122/120	91	2				C6: ARILLACEOUS SANDSTONE, few siltstone layers, dark gray to gray, medium hard to hard sandstone, intermittent mottled bedding, fossil fragments from 51-54 in. and 117-122 in., shale weathered to soft clay at 62.5-63.5., fractures generally planar and horizontally spaced 1-40 in., highly fractured zone 109-114 in.
						3				
						2.5	5-inch-long incipient fracture (calcite infill).			
						3				
						2.5				
						2.5				
						3.5	1-inch clay seam (contains pieces of shale).			
						3.5				
						3				
	50					3.5				
190										
							Shaly partings.			
			C7	121/120	96	2	Fossil layers.			C7: Similar to C6, small dolomite inclusion at 31 in., fractures generally planar and horizontally spaced 1-31 in., 3 in. vertical fracture at 59 in.
						2.5				
						3	Dolomite vug.			
						2.5				
						2				
						2				
						3				
						3	3-inch-long vertical fracture.			
						3				
	60					3				
180										
							4-inch-long incipient fracture (calcite infill).			
			C8	119/120	97	2				C8: Similar to C6, some mottling 100-119 in., fractures generally planar and horizontally spaced 4-17 in.
						2.5				
						3				
						2.5				
						2				
						2.5				
						2				
						2.5				
						2.5	Thin green veins.			
	70					2.5	Trace fossils.			
170										C9: Similar to C6, some mottling at 3-7in., 67-71 in., and 104-107 in., fractures generally planar and horizontally spaced 1-26 in.
			C9	121/120	98	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): 241
Vertical Datum : NGVD 29
Date Start / End: 4/22/2008 - 4/25/2008
Total Depth (ft) : 202.5

Boring No. **B404**

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				Approximate top of Pulaski Formation - Unit B at depth 75.5 ft (El. 165.8 ft).
						2.5				
						2				
						2				
						2				
						1.5				
						2				
	80					2.5				
						3				
160										C10: SANDSTONE AND ARGILLACEOUS SANDSTONE WITH INTERBEDDED SILTSTONE, gray, hard sandstone, dark gray and hard to medium hard argillaceous sandstone, dark gray, soft siltstone, well sorted, fine grained, unweathered, mottling at 5-10 in. and 29-34 in., fossil fragments at 35-40 in., fractures generally planar and horizontally spaced 1-47 in.
			C10	111/120	89	2.5				
						2				
						2				
						2				
						2	Fossils.			Approximate top of Pulaski Formation - Unit C at depth 87.5 ft (El. 153.8 ft).
						2				
						2	3-inch-long vertical fracture.			
						2				
						2				
	90					2.5				
150										
			C11	122/120	81	2	Irregular fractures along siltstone beds.			C11: SANDSTONE WITH INTERBEDDED SILTSTONE, thick beds of gray, hard sandstone, dark gray, medium hard to soft siltstone interbeds, well sorted, fine grained unweathered, fractures generally planar and horizontal, non planar fractures at 62-63 in., 72-73 in., and 100 in., 80° incipient fracture at 71-75 in.
						2				
						2				
						2.5				
						4				
						2.5				
						2.5	45° fracture.			
						3	80° fracture.			
						4				
	100					3.5				
140										
			C12	80/96	54	5	1-inch-long vertical fracture			C12: SILTSTONE WITH INTERBEDDED SANDSTONE AND SOME SHALE, 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 7 in., 1 in. vertical fracture at 5 in., 4 in. vertical fracture at 34 in., 1 in. vertical fracture at 55 in., 45° fracture at 69 in., irregular fractures at 24 in., 29 in., 33 in., and 78 in.
						5				
						4				
						4	4-inch-long vertical fracture.			
						4.5				
						3.5	1-inch-long vertical fracture			
						7.5	Highly fractured zone.			
						7.5	45° fracture.			
							Highly fractured zone.			
	110						Highly fractured.			
130			C13	27/24	100	2.5	Siltstone beds become more fractured.			C13: SANDSTONE WITH INTERBEDDED SILTSTONE, gray sandstone, dark gray siltstone, hard sandstone, medium hard siltstone, bedded sandstone, laminated siltstone, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 8-19 in., 19 in. sandstone interbed from 0-19 in.
						3.5				
			C14	117/120	94	3.5	Highly fractured siltstone.			
						3				
						2.5				
						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): 241
Vertical Datum : NGVD 29
Date Start / End: 4/22/2008 - 4/25/2008
Total Depth (ft) : 202.5

Boring No.
B404

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				C14: SANDSTONE WITH INTERBEDDED SILTSTONE, gray sandstone, dark gray siltstone, hard sandstone, medium hard siltstone, bedded sandstone, laminated siltstone, fine grained well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced 0.5-34 in., siltstone clasts from 0-1 in., 12-14 in., 102-103 in., and 116-117 in., fossil layer from 115-117 in., disturbance indicated by siltstone feature at 94 in., longer interbeds of sandstone and siltstone.
						2				
						2.5				
						3	17-inch incipient fracture with calcite.			
						2.5				
	120					3.5				
120										
							Fossils.			
			C15	120/120	77	3.5				
						2.5				
						2.5				Approximate top of Whetstone Gulf Formation - Unit A at depth 126.0 ft (El. 115.3 ft).
						2.5	45° fracture.			
						3				
						3.5				C15: SILTSTONE WITH INTERBEDDED SANDSTONE AND SOME SHALE, 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 23 in., 45° fracture at 32 in., incipient vertical fracture from 39-55 in., siltstone clasts from 3-4 in., 31-35 in., 74-76 in., and 97-99 in., fossil layers from 33-35 in., 73-76 in., and 109-111 in., cross bedding from 29-33 in., 56-58 in., and 99-101 in., clay layer from 63-65 in.
						5	Highly fractured zone.			
						4	Highly fractured zone.			
						3.5	16-inch-long incipient fracture.			
	130					4				
110										
			C16	110/120	47	4				
						3.5				
						4				C16: SANDSTONE WITH INTERBEDDED 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, fracture generally planar, horizontal, and smooth, spaced 0.5-9 in., 30° fracture at 57 in., irregular fractures throughout, siltstone clasts from 6-8 in., 26-29 in., 45-46 in., and 96-97 in., fossil layer from 6-7 in. and 60-62 in., clay layer at 27 in.
						3.5				
						3				
						2.5				
						2.5	30° fracture.			
						2.5				
						2.5	Fossils.			
	140					2.5				
100										
			C17	123/120	74	2				
						2				
						2				
						4	5-inch clay seam.			C17: SILTSTONE WITH INTERBEDDED SANDSTONE WITH SHALE, dark gray siltstone and shale, gray sandstone, medium hard sandstone 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 13 in., 45° fracture at 64 in., alternating siltstone and sandstone lenses and clasts from 116-123 in., crossbedding from 57-62 in., 5 in. clay layer from 35-40 in.
						3	Shaly partings.			
						3	45° fracture.			
						4				
						4.5	Irregular fracture in siltstone.			
						5				
	150									
90										
			C18	119/120	89	3				C18: SILTSTONE AND INTERBEDDED SANDSTONE WITH SHALE, gray sandstone, dark gray siltstone and shale, medium hard siltstone and shale, hard sandstone, bedded sandstone, fine grained, well sorted, unweathered, fractures generally planar, horizontal, and smooth, spaced from highly fractured to 31.5 in., alternating siltstone lenses with clasts throughout, fossils located 112-119 in., 0.5 in. thin clay layer at 47.5 in., slightly weathered, no slickensides.
						3				
						3				
						3				
						3				

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): 241
Vertical Datum : NGVD 29
Date Start / End: 4/22/2008 - 4/25/2008
Total Depth (ft) : 202.5

Boring No. **B404**

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	Highly fractured silty shale.		
						4			
						5			
	160					5			
80									
			C19	116/120	86	3.5			C19: SILTSTONE WITH SOME SANDSTONE, gray sandstone, dark gray siltstone, medium hard sandstone, soft siltstone, bedded sandstone, laminated siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, 2 in. vertical fracture 21-22 in., frequent clasts throughout core.
						3.5			
						3.5	2-inch-long vertical fracture with calcite.		
						4.5	Shaly partings.		
						4			
						3			
						3.5			
						2.5			
						3			
	170					2.5			
70									Approximate top of Whetstone Gulf Formation - Unit B at depth 172.0 ft (El. 69.3 ft).
			C20	121/120	97	3	2-inch-long vertical fracture.		C20: SANDSTONE WITH INTERBEDDED 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 2-46 in., vertical fracture 9-11 in. and 35-37 in., vertical incipient fracture 34-35 in., siltstone clasts 7-8 in., 20-21 in., and 22-23 in., thicker sandstone interbeds from 37-77 in. and 81-109 in.
						2.5			
						2.5			
						2	4-inch-long vertical fracture.		
						2			
						2			
						1.5			
						2			
						2.5			
	180					2			
60									
							Shaly partings.		
			C21	115/120	93	2.5			C21: SANDSTONE WITH INTERBEDDED SILTSTONE AND SHALE, gray sandstone, dark gray and black siltstone and shale, medium hard sandstone, soft siltstone and shale, bedded sandstone, laminated siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, fossils at 14 in., 15 in., 44 in., 83 in., and 96-98 in., mottling present in several layers, siltstone lenses at 114-115 in.
						2.5			
						4			
						4			
						3			
						2			
						1.5			
						2	Fossils.		
						2			
	190					2			
50									
			C22	123/120	92	2			C22: Similar to C21, with more siltstone and shale, fractures generally planar, horizontal, and smooth, spaced 0.5 in. to 18 in., siltstone lenses at 18 in.
						3			
						3			
						4	Shaly partings.		
						2			
						3			
						3.5			
						3.5			

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

NINE MILE POINT SITE CHARACTERIZATION 1 NMP OFFSHORE LOGS.GPJ GEI DATA TEMPLATE.GDT 9/10/08

Final Boring Log

Ground Surface Elev. (ft): 241
Vertical Datum : NGVD 29
Date Start / End: 4/22/2008 - 4/25/2008
Total Depth (ft) : 202.5

Boring No.
B404

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					4 3				
40										
										Bottom of boring at depth 202.5 ft (El. 38.8 ft). Borehole grouted to top of lake bed upon completion.
							General Comments about Core Samples:			
							Bedding-parallel fractures are most frequent in shale and siltstone and less common in sandstone.			
	210						Vertical fractures occasionally present in sandstone beds.			
30										
							Hand pressure produces bedding-parallel fractures in siltstone of Pulaski Formation during handling and transport.			
							Fracture surfaces are generally unweathered unless otherwise noted.			
	220									
20										
	230									
10										
	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. B404

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. **B405**

Boring Information

Northing : 1282777.8 **Easting :** 543199.3
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: 5/14/2008 - 5/18/2008
Driller Name: P. Dickensen
Logged By : T. Daigle, K. Skinner
Drilling Company : Boart Longyear
Total Depth (ft) : 198.5

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 0.5 ft below mudline. Rollerbit to clean out casing, wireline coring 0.5 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	Soil-Sample Description Rock-Lithological Description
			S1	0/1	50/1 in.	NA		S1: NO RECOVERY. Approximate top of Oswego Sandstone at depth 0.0 ft (El. 238.3 ft).
			C1	33/36	42	3, 2.5, 2.5	Highly fractured argillaceous sandstone. 30° fracture.	C1: SANDSTONE, greenish gray, hard, fine grained, well sorted, unweathered, fractures generally planar and horizontal spaced 1-8 in., highly fractured zone 6-8 in., fractures show signs of oxidation and weathering.
			C2	60/60	78	2, 2.5, 2, 2, 2	30° fracture. Highly fractured zone. 45° fracture.	C2: Similar to C1, fractures generally planar and horizontal spaced 1-11 in., highly fractured zone with oxidation on fracture surfaces 38-44 in.
230			C3	117/120	78	2, 2, 2, 3, 2.5, 2.5, 2, 3, 2.5, 2	Highly fractured silty shale. Shaly partings. Incipient vertical fracture.	Approximate top of Oswego Transition Zone at depth 11.7 ft (El. 226.6 ft). C3: SANDSTONE AND ARGILLACEOUS SANDSTONE WITH INTERBEDDED SILTSTONE, gray, hard sandstone, dark gray, medium hard to hard argillaceous sandstone, well sorted, fine grained, unweathered, fractures generally planar and horizontal spaced 1-22 in., highly fractured zone 97-105 in., slight oxidation in fractures at 17 in., incipient vertical fracture 113-115 in.
220	10		C4	122/120	95	2, 2, 2.5, 2, 2, 2, 1.5, 2.5, 2.5, 2.5		C4: Similar to C3, fractures generally planar and horizontal spaced 1-30 in.
210	20		C5	119/120	87	3, 2.5, 3.5, 2	Incipient vertical fracture. Fossil fragments.	Approximate top of Pulaski Formation - Unit A at depth 30.2 ft (El. 208.1 ft).
	30							

Fractures | Graphic Log

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: 5/14/2008 - 5/18/2008
Total Depth (ft) : 198.5

Boring No.
B405

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				
						2.5	Fracture around siltstone clast with slickensides.			C5: SANDSTONE AND ARGILLACEOUS SANDSTONE WITH INTERBEDDED SILTSTONE, gray to dark gray, medium hard to hard, sandstone and argillaceous sandstone, dark gray, soft siltstone, unweathered irregular bedding and mottling present, fossil fragment layer at 55-56 in., fractures generally planar and horizontal spaced 1-16 in., incipient vertical fracture at 4-8 in., 54-56 in., and 117-119 in., fractures at 62-64 in. and 92-94 in. are crescent shaped and have striations on the fracture surface, fracture at 62-64 in., surrounds a sandstone clast in siltstone, fracture at 92-94 in., starts vertical and curves to intersect the edge of the core horizontally.
						2.5				
						2.5				
						3	Incipient vertical fracture.			
						2.5	Fracture along moderately dipping siltstone bed with slickensides.			
200							Incipient vertical fracture.			
			C6	120/120	84	2				C6: Similar to C5, fossil fragments at 56-60 in., fractures generally planar and horizontal spaced 1-29 in., highly fractured zone 115-120 in., 2 in. vertical fracture at 18 in., 3 in. vertical fracture at 108 in., 1 in. incipient vertical fracture at 20 in., 4 in. incipient vertical fracture at 74 in., vertical fractures have calcite infill.
	40					3				
						3	2-inch-long vertical fracture with calcite.			
						2				
						2				
						2.5				
						3.5				
						4	4-inch-long incipient vertical fracture.			
						2	Fossils.			
						3				
							3-inch-long vertical fracture.			
190							1-inch-long incipient vertical fracture.			
			C7	120/120	95	2.5	Highly fractured zone.			C7: Similar to C5, fractures generally planar and horizontal spaced 2-45 in., mostly argillaceous sandstone.
	50					2.5				
						3				
						3				
						2.5				
						2.5				
						2.5				
						2				
						2				
						2.5				
180										
			C8	120/120	91	2				C8: Similar to C5, trace green mineral layer at 79-80 in., fractures generally planar and horizontal spaced 1-23 in., incipient vertical fracture 107-111 in.
	60					2				
						3				
						2	45° fracture.			
						3				
						2.5				
						2.5				
						2.5				
						2.5				C9: SILTSTONE AND ARGILLACEOUS SANDSTONE WITH INTERBEDDED SANDSTONE AND SHALE, gray to dark gray, medium hard to hard sandstone and argillaceous sandstone, medium hard siltstone and soft shale, irregular bedding with grain sizes ranging from medium to fine in sandstone, unweathered, fractures generally planar and horizontal spaced 4.5-23 in., 10° fracture at 30 in.
						2.5	Trace green mineral layer.			
							Incipient vertical fracture.			
170										
			C9	88/120	71	2				
	70					3				
						3.5				Approximate top of Pulaski Formation - Unit B at depth 72.0 ft (El. 166.3 ft).
						2	10° fracture.			
						2				
						2	Shaly partings.			
						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): 238
Vertical Datum : NGVD 29
Date Start / End: 5/14/2008 - 5/18/2008
Total Depth (ft) : 198.5

Boring No.
B405

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				
						2				
160										
			C10	122/120	90	2.5				C10: Similar to C9, heavily mottled areas from 25-34 in., and 42-50 in. with dolomite infilling, sandstone beds increasing down core, fractures generally planar and horizontal spaced 1-34 in., undulating fracture surface at 6 in.
	80					2				
						2	Shaly partings.			
						2	Fossils.			
						1.5	10° fracture.			
						3				
						1.5				
						2	20° fracture.			
						2				
						2	10° fracture.			
						2.5				Approximate top of Pulaski Formation - Unit C at depth 88.5 ft (El. 149.8 ft).
150										
			C11	120/120	75	2.5				C11: Similar to C9, thick sandstone beds 0-50 in., fractures generally planar and horizontal, undulating fractures at 41 in., 45 in., and 61 in., 10° fracture at 54 in., highly fractured zones at 65 in. and 77 in.
	90					2				
						2				
						2				
						2.5				
						4	10° fracture.			
						4	Shaly partings.			
						2				
						1.5				
						2	2-inch-long vertical fracture.			
140										
			C12	121/120	92	6				C12: SILTSTONE WITH INTERBEDDED SANDSTONE AND SHALE, dark gray, soft siltstone and shale, gray, hard sandstone, fine grained, well sorted, unweathered, soft sediment deformation and mottling 62-68 in., fractures generally planar and horizontal spaced 1-20 in., highly fractured zone 28-31 in., inclined fracture at 28-31 in. has striations, incipient vertical fracture at 107-109 in.
	100					3				
						2	Highly fractured silty shale with slickensides.			
						1.5				
						1.5				
						2	Shaly partings.			
						2				
						2				
						2				
						2				
							Incipient vertical fracture.			
130										
			C13	108/120	85	2.5				C13: Similar to C12, sandstone bed thickness is increasing down core, fractures generally planar and horizontal spaced 2-28 in.
	110					1.5				
						2				
						1.5				
						1.5				
						2				
						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
Vertical Datum : NGVD 29
Date Start / End: 5/14/2008 - 5/18/2008
Total Depth (ft) : 198.5

Boring No.
B405

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										
	120		C14	121/108	100	3				C14: Similar to C12, fractures generally planar and horizontal spaced 1-15 in., highly fractured zone 22-28 in., incipient vertical fracture 28-32 in. and 111-114 in.
						2				
						2	Highly fractured siltstone.			
						2				
						1.5	4-inch-long incipient fracture with calcite infill.			
						2.5				
						2	15° fracture.			
						2				
						2				
										Approximate top of Whetstone Gulf Formation - Unit A at depth 127.1 ft (El. 111.2 ft).
110			C15	14/12	100	2	3-inch-long incipient vertical fracture			C15: Similar to C12, planar inclined fracture at 15° at 7 in.
			C16	105/120	85	3	15° fracture.			C16: Similar to C12 until 50 in. where it becomes unweathered bedded sandstone, fossil fragment layer at 54 in., mottling at 96 in., fractures generally planar and horizontal spaced 1-30 in., some fractures have undulating surfaces.
	130					2				
						1.5				
						2				
						1.5				
						1.5	Fossils.			
						1.5				
						1.5				
						1				
						1				
							Siltstone mottling.			
100										
			C17	124/108	100	1.5				C17: SANDSTONE AND SILTSTONE WITH INTERBEDDED SHALE, gray, hard sandstone, dark gray, soft siltstone and shale, sandstone to 80 in., then siltstone and shale, fractures generally planar and horizontal spaced 1-24 in., unweathered, highly fractured zone 122-124 in.
	140					1.5				
						1.5				
						1.5				
						1.5				
						2.5				
						2				
						2	Highly fractured silty shale.			
						2				
							20° fracture.			
90			C18	13/12	100	4	Highly fractured silty shale.			C18: Similar to C17, single planar, horizontal fracture at 5 in.
			C19	118/120	94	3				C19: Similar to C17, thick siltstone bed 0-50 in., thin sandstone interbeds 50-118 in., fractures generally planar and horizontal spaced 1-43 in.
	150					3				
						3				
						2.5				
						2				
						1.5				
						1.5				
						2				
						2	15° fracture.			
						2				
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): 238
Vertical Datum : NGVD 29
Date Start / End: 5/14/2008 - 5/18/2008
Total Depth (ft) : 198.5

Boring No.
B405

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
										Approximate top of Whetstone Gulf Formation - Unit B at depth 160.3 ft (El. 78.0 ft).
	160		C20	115/120	96	2				
						1.5				
						2				
						2	Incipient vertical fracture.			C20: Similar to C17, fractures generally planar and horizontal spaced 4-23 in., incipient vertical fracture 40-42 in.
						1.5				
						2.5				
						2				
						2				
						1.5				
						1.5				
70										
			C21	122/120	100	2				C21: SANDSTONE WITH INTERBEDDED SILTSTONE AND SHALE, gray, hard sandstone, dark gray, soft siltstone and shale, fine grained, well sorted, unweathered, thick sandstone beds with thin siltstone interbeds, recovered a 64-in. long unfractured piece of core.
	170					2				
						2				
						1				
						1				
						1.5				
						1.5				
						1.5				
						1.5				
						NM				
60							Fossils.			
			C22	123/120	89	3	Irregular fractures in siltstone.			C22: Similar to C21, fossil fragments 5-8 in., 49-54 in., 71-72 in., and 74-75 in., fractures generally planar and horizontal spaced 1-31 in., incipient vertical fracture 70-73 in.
	180					2.5				
						1.5				
						1.5	Fossils.			
						1.5				
						2.5				
						1.5				
						1.5				
						1.5	Incipient vertical fracture.			
						NM				
50										
			C23	121/120	90	1.5				C23: Similar to C21, fractures generally planar and horizontal spaced 1-30 in., 45° fractures with striations at 103 in. and 112 in., no apparent offset in bedding.
	190					2				
						2.5				
						2.5				
						2				
						1.5				
						2				
						1.5				
						1.5				
						NM				
							40° fractures with slickensides in siltstone. 45° fracture.			
40										
	200									Bottom of boring at depth 198.5 ft (El. 39.8 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: 5/14/2008 - 5/18/2008
Total Depth (ft) : 198.5

Boring No.
B405

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
							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.			
30										
	210						Hand pressure produces bedding-parallel fractures in siltstone of Pulaski Formation during handling and transport.			
							Fracture surfaces are generally unweathered unless otherwise noted.			
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

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

Final Boring Log Signature Page	Boring No. B405

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. **B406**

Boring Information

Northing : 1282832.4 **Easting :** 543228.4
Horizontal Datum : NAD 27
Ground Surface Elev. (ft): 237.3
Vertical Datum : NGVD 29
Rig Type/I.D: Mobile B57 / Barge 2

Date Start - End: 4/25/2008 - 5/2/2008
Driller Name: P. Dickensen
Logged By : A. Hare, M. MacLeod
Drilling Company : Boart Longyear
Total Depth (ft) : 187.5

Drilling Information

Hammer Ident: NA
Auger I.D: NM
Auger Head Length: NM
Drilling Method: Wireline coring 0 - 187.5 ft.

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: 13.4 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
			C1	26/30	28	2.5 2.5 1/.5 ft				Approximate top of Oswego Sandstone at depth 0 ft (El. 237.3 ft). C1: SANDSTONE, gray, medium hardness, bedded, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth, chipped at 2 in.
			C2	53/60	65	2 2 2.5 2.5 2.5	Highly fractured zone.			C2: SANDSTONE, gray, medium hardness, bedded, well sorted, fine grained, unweathered, fractures generally planar and horizontal spaced <1-10 in., gray clay at 11-13 in. C3: Similar to C2, silt lens 10.5-12 in., fractures planar, horizontal, and smooth, spaced 4-8 in.
230			C3	15/12	100	3				Approximate top of Oswego Transition Zone at depth 9.4 ft (El. 227.9 ft).
	10		C4	48/48	35	3 3 3 NM	Highly fractured siltstone. 10-inch-long vertical fracture. 1-inch-thick clay seam, minor oxidation. 1-inch-thick clay seam within shale layers.			C4: SANDSTONE WITH INTERBEDDED 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, 3 in. fossil layer at 7 in., siltstone clasts from 9-10 in., mottling from 22-26 in., 29-30 in., and 34-35 in., 1.5 in. clay seam at 13.5 in., 1 in. clay seam at 35.5 in., 0.5 in. clay seam at 37 in., clay films on fractures at 39 in. and 41.5 in., 1 in. silt seam at 45.5 in., fractures generally planar, horizontal, and smooth, spaced <1-7 in., 10 in. vertical fracture at 19 in.
			C5	63/60	63	5.5 5 3 2.5 2.5	30° fracture. Shaly partings.			C5: SANDSTONE WITH INTERBEDDED 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, mottling from 17-18 in., 41-44 in., 50 in., and 54 in., cross bedding from 6.5-10 in., 41-44 in., and 53-54.5 in., fractures generally planar, horizontal, and smooth spaced <1-7.5 in., 30° inclined fracture at 15.5 in.
220	20		C6	118/120	91	2.75 2.5 2.5 2.5 3 3.5 2.5 2.5 2.5 2.5	3-inch-long incipient fracture with calcite infill.			Approximate top of Pulaski Formation - Unit A at depth 37.2 ft (El. 200.1 ft). C6: SANDSTONE WITH INTERBEDDED SILTSTONE AND SHALE, gray sandstone, medium hardness, bedded, dark gray, soft siltstone and shale, laminated siltstone, fine grained, well sorted unweathered, clasts 42-47 in., 63.5-65.5 in., and 104-107 in., siltstone lenses at 59 in., 65.5-67 in., and 99-101 in., mottling at 17-21 in., 51-52 in., and 54-55 in., fractures generally planar, horizontal and smooth spaced 3-22.5 in.
210			C7	121/120	77	2.5 2.5 3 2.75 2 2.75	5-inch-long incipient fracture with calcite infill. 5-inch-long vertical fracture. 1-inch-thick clay seam.			
	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): 237
Vertical Datum : NGVD 29
Date Start / End: 4/25/2008 - 5/2/2008
Total Depth (ft) : 187.5

Boring No.
B406

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
						2.25				C7: SANDSTONE WITH INTERBEDDED 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, mottling at 19.5-21 in., 34.5-36 in., 112-113 in., and 114-114.5 in., cross bedding at 10-16 in., 37.5-42.5 in., 45-48 in., 75.5-78.5 in., and 81-86 in., fractures generally planar and horizontal spaced <1-15.5 in., 4.5 in. vertical fracture at 29.5 in., 2 in. vertical fracture at 118 in., chipped from 7.5-8.5 in.
						2.25				
						2.25				
						3.25	Shaly partings.			
200							2-inch-long vertical fracture (irregular surface).			
			C8	121/120	78	3	Highly fractured zone.			
						2.5	Fossils.			
	40					2.5				
						2.5				
						3.5				
						3.75				C8: SILTSTONE AND SHALE WITH SANDSTONE, dark gray, soft laminated siltstone and shale, gray sandstone of medium hardness, bedded, well sorted, fine grained, unweathered, 3.5 in. clay seam at 63 in., fossils at 32.5 in., and 100 in., siltstone and shale alternating lenses from 85-100 in., fractures generally planar, horizontal, and smooth spaced 1-38.5 in.
						2	1-inch-thick clay seam.			
						2.5	Shaly partings.			
						2.5				
						2.5				
							Shaly partings.			
190										
			C9	121/120	94	3.5	Fossils.			
						1.5				
						2.5				
	50					2.5				
						2				C9: Similar to C8, fossils at 10 in., alternating lenses 34-41 in., and 82-92 in., fractures generally planar, horizontal, and smooth spaced <1-22 in.
						3.5	Shaly partings.			
						3.5	0.5-inch-thick clay seam.			
						3				
						3.25				
						2				C10: INTERBEDDED SILTSTONE AND SANDSTONE, gray sandstone, dark gray siltstone and shale, medium hard sandstone, soft siltstone and shale, bedded sandstone, laminated siltstone, well sorted, fine grained, unweathered, alternating lenses of siltstone and sandstone throughout core run, mottling at 112-113 in., and 107-108 in., greenish minerals at 51-55 in., fractures generally planar, horizontal, and smooth spaced <1-11 in.
180							Shaly partings.			
			C10	122/120	94	4.25				
						2.5				
						3				
	60					2.75				
						3				Approximate top of Pulaski Formation - Unit B at depth 73.8 ft (El. 163.5 ft).
						3.25	Green mineral veins.			
						3				
						3				
						2.5				
						2				
170										
			C11	117/120	97	2.75				C11: INTERBEDDED SANDSTONE, SILTSTONE, AND SHALE, gray sandstone, medium hardness, bedded, dark gray, soft siltstone, laminated with cross bedding, fine grained, well sorted, unweathered, mottling, cross bedding, and thin lenses throughout core run, burrow feature at 76-79 in., fractures generally planar, horizontal, and smooth spaced 1-33.5 in.
						2.75				
						2.5				
	70					2.5				
						2.5				
						3				
						3				
						2.75				
						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): 237
Vertical Datum : NGVD 29
Date Start / End: 4/25/2008 - 5/2/2008
Total Depth (ft) : 187.5

Boring No. **B406**

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
						3				
160										
			C12	114/120	80	2	Fossils.			C12: SANDSTONE WITH SILTSTONE AND SHALE, gray, medium hardness, bedded sandstone, dark gray, soft, laminated siltstone, well sorted fine grained, unweathered, fossils in sandstone at 4.5-11.5 in., and 22-29.5 in., mottling at 30-43 in., interbedded siltstone lenses 78-97 in., fractures generally planar, horizontal, and smooth spaced <1-27 in.
						2				
						4	Fossils.			
	80					2.25				
						2.75				
						3				
						3.5				
						3.5				
						3.25				
						4.25				
150										Approximate top of Pulaski Formation - Unit C at depth 87.5 ft (El. 149.8 ft).
			C13	117/120	71	3				C13: SANDSTONE AND SILTSTONE WITH SHALE, gray, medium hardness sandstone, bedded, dark gray and black siltstone, soft, laminated, fine grained, well sorted, unweathered, gray clay seam 45-46 in., alternating sandstone and siltstone layers 91.5-97.5 in., fractures generally planar, horizontal, and smooth spaced <1-25.5 in.
						3				
						5				
	90					2.25	Shaly partings.			
						2.75				
						3	1-inch-thick clay seam. Shaly partings.			
						3.5				
						3.5				
						3.25				
						4.25				
140							Shaly partings.			
			C14	114/108	83	2.75				C14: SILTSTONE AND SHALE WITH SANDSTONE, sandstone beds up to 7 in., gray, medium hardness, bedded sandstone, dark gray and black, soft, laminated siltstone and shale, well sorted, fine grained, unweathered, gray clay layers at 15.5 in. and 18.5-20 in., mottling at 43 in., and 75.5 in., lenses 91-98 in., fractures generally planar, horizontal, and smooth spaced <1-9 in.
						4.5	Three 0.5-inch-thick clay seams in shale.			
						4.0				
	100					4				
						4.25				
						4.5				
						4.75				C15: SILTSTONE, dark gray, soft, laminated, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth spaced 5-14 in.
						3				
						4.5				
130			C15	19/12	100	3.25				C16: INTERBEDDED SILTSTONE, SHALE, AND SANDSTONE, gray, medium hardness, bedded sandstone, dark gray and black, soft, laminated siltstone, well sorted, fine grained, unweathered, gray clay seam at 62-64 in., fossil layer at 81.5 in., fractures generally planar, horizontal, and smooth spaced <1-36.5 in.
			C16	122/120	78	3.25				
						2.75				
						2.5				
	110					3.5				
						3.5				Approximate top of Whetstone Gulf Formation - Unit A at depth 123.4 ft (El. 113.9 ft).
						2.5				
						2.5	1-inch-thick clay seam with shale fragments.			
						2.75				
						2.5				
						3.5				
120										

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): 237
Vertical Datum : NGVD 29
Date Start / End: 4/25/2008 - 5/2/2008
Total Depth (ft) : 187.5

Boring No. **B406**

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
			C17	122/120	70	2.5 4 2.75 2.5 3 2.5 3 4 2.25 2.5	Highly fractured siltstone and shale. 0.5-inch-thick clay seam in shale. Shaly partings. 0.5-inch-thick clay seam. 2-inch-long vertical fracture.	C17: Similar to C16, gray clay seam at 29-30 in. and 61 in., clasts at 23 in., 58 in., and 80.5 in., fossils at 18 in. and 82 in., fractures generally planar, horizontal, and smooth spaced <1-17 in.
110	120		C18	120/120	96	2.5 3.5 3 2.5 3 2 2 2 2.75 2.5	0.5-inch-thick clay seam. Fossils. 45° fracture. Thick sandstone layer (7.5 ft).	C18: SANDSTONE WITH SILTSTONE AND SHALE, gray, medium hardness, bedded sandstone, dark gray and black, soft, laminated siltstone, well sorted, fine grained, unweathered, fossils at 1.5 in., 12 in., 26-28 in., and 49-50 in., mottling at 46.5 in., 0.5 in. gray clay seam at 1 in., fractures generally planar, horizontal, and smooth spaced <1-34 in. C19: INTERBEDDED SANDSTONE, SILTSTONE, AND SHALE, gray, medium hardness, bedded sandstone, dark gray and black, soft, laminated siltstone, well sorted, fine grained, unweathered, clay seam at 56-57 in., fractures generally planar, horizontal, and smooth, spaced <1-19 in., 30° fracture at 34 in., irregular fracture and chipping at 103 in.
100	130		C19	117/120	79	2 2.75 2.5 2.5 2.75 3 4 4 4.25 3.5	30° fracture. 1-inch-thick clay seam. Shaly partings. Hard drilling.	Approximate top of Whetstone Gulf Formation - Unit B at depth 148.4 ft (El. 88.9 ft).
90	140		C20	70/60	100	4.5 3.5 4 4.5 4		C20: SILTSTONE AND SHALE WITH INTERBEDDED SANDSTONE, gray, medium hardness, bedded sandstone, dark gray and black, soft, laminated siltstone, well sorted, fine grained, unweathered, fractures generally planar, horizontal, and smooth spaced 1-19 in.
80	150		C21	59/60	82	3 4 4 4 3		C21: Similar to C20 with more sandstone, fossils at 13.5 in. and 26 in., cross bedding 51-53 in., fractures spaced <1-11.5 in.
			C22	55/60	70	4 3.5 5		C22: Similar to C20, mottling at 28 in., 36-38 in., and 43 in., gray clay seam at 40-40.5 in., fractures generally planar, horizontal and smooth spaced <1-14 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): 237
Vertical Datum : NGVD 29
Date Start / End: 4/25/2008 - 5/2/2008
Total Depth (ft) : 187.5

Boring No.
B406

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
						6 8	0.5-inch-thick clay seam.			
			C23	29/24	52	5 5	0.5-inch-thick clay seam. 0.5-inch-thick clay seam.			C23: SILTSTONE WITH SHALE, dark gray, soft, laminated, well sorted, fine grained, unweathered, gray clay seam at 3-3.5 in. and 18.5-19 in., thin sandstone lenses at 26.5 in. and 40.5 in., fractures generally planar, horizontal, and smooth spaced <1-7 in.
			C24	35/36	86	7 5 3				C24: INTERBEDDED SILTSTONE AND SHALE WITH SANDSTONE, dark gray, black, soft, laminated siltstone, gray, medium hardness, bedded sandstone, well sorted, fine grained, unweathered, mottling at 0-3 in., 9 in., and 12 in., cross bedding at 32-34 in., fractures generally planar, horizontal, and smooth spaced 1-10 in.
70			C25	118/120	93	3 4 3 4 4 3 4 4 3 4				C25: SANDSTONE WITH INTERBEDDED SILTSTONE AND SHALE, gray, medium hardness, bedded sandstone, dark gray and black, soft, laminated siltstone, well sorted, fine grained, unweathered, cross bedding at 2-4 in. and 11 in., mottling at 21 in. and 25-27 in., siltstone lenses at 57 in. and 77 in., fossils and calcite deposits at 102-111 in., fractures generally planar, horizontal, and smooth spaced 3.5-30 in., irregular, non-planar fracture at 10 in.
	170									
60			C26	120/120	78	4 3.25 4.25 4.25 2 2 1.5 1.75 1.5 1.75	Fossils. 0.5-inch-long vertical fracture. 11-inch-long incipient fracture. 1-inch-thick clay seam with shale fragments. 0.5-inch-thick clay seam.			C26: Similar to C25, gray clay seam at 25.5 in. and 47 in., no apparent offset in bedding, no notable striations, siltstone lenses at 31 in., fractures generally planar, horizontal, and smooth spaced <1-25 in., 0.5 in. vertical fracture at 25 in.
	180									
50										Bottom of boring at depth 187.5 ft (El. 49.8 ft). Borehole grouted to top of lake bed upon completion.
	190						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							Hand pressure produces bedding-parallel fractures in siltstone of Pulaski Formation during handling and transport.			
	200						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. B406

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. **B407**

Boring Information

Northing : 1282905.5 **Easting :** 543142.6
Horizontal Datum : NAD 27
Ground Surface Elev. (ft): 236.6
Vertical Datum : NGVD 29
Rig Type/I.D: Mobile B57 / Barge 2

Date Start - End: 6/4/2008 - 6/6/2008
Driller Name: P. Dickensen
Logged By : A. Cummings
Drilling Company : Boart Longyear
Total Depth (ft) : 196.0

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 to 1.0 ft. below mudline, rollerbit to clean out casing, wireline 1.0 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	0/0	100/0 in.	NA				S1: NO RECOVERY. Approximate top of Oswego Sandstone at depth 0.0 ft (El. 236.6 ft).
			C1	54/60	44	2.5 1.5 1.5 1.5 1.5	Highly fractured zone. 7-inch-long incipient vertical fracture.			C1: SANDSTONE, greenish gray, hard to medium hard, slightly weathered, fine grained, well to moderately sorted, cross bedding present, generally laminated, fractures moderately weathered with discoloration, fractures planar, 7 in. incipient vertical fracture at 3.8 ft., highly fractured zone at 1.2 ft.
230			C2	120/120	73	1.5 2.5 2 1.5 1.5 2 1.5 2 2 2	40° fracture. Minor shaley partings. 11-inch-long incipient fracture.			C2: Similar to C1, fractures generally planar and unweathered, 40° fracture at 6.8 ft., some minor shaley partings at 8.0 ft., 11 in. incipient vertical fracture at 9.4 ft., fractures spaced <0.5 to 19 in.
	10									
220			C3	119/120	76	1.5 1.5 2 1 2 2 2 2.5 2.5 2.5	4-inch-long incipient vertical fracture. 4-inch-long incipient vertical fracture.			C3: SANDSTONE WITH INTERBEDDED SILTSTONE, sandstone greenish gray, hard, some argillaceous, unweathered, well to moderately sorted, fine grained, laminated, cross bedding present, siltstone dark gray and soft, sometimes occuring as clasts, otherwise laminated, fractures generally planar and unweathered, spaced 3 in. to 37 in., 4 in. incipient vertical fractures at 19.9 ft., 24.6 ft., and 25.3 ft. Approximate top of Oswego Transition Zone at depth 19.5 ft (El. 217.1 ft).
	20									
210			C4	123/120	93	2 4 3.5 2.5 2.5 2 2	4-inch-long incipient vertical fracture.			C4: SANDSTONE WITH INTERBEDDED SILTSTONE, sandstone greenish gray, hard, well sorted, unweathered, generally massive though some lamination is present, fine grained, siltstone dark gray and soft with disrupted bedding, unweathered, minor black, soft shale present, fractures planar and unweathered, spaced <0.5 to 17 in.
	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): 237
Vertical Datum : NGVD 29
Date Start / End: 6/4/2008 - 6/6/2008
Total Depth (ft) : 196.0

Boring No.
B407

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			
						3			
200			C5	119/120	73	3.5			C5: SILTSTONE WITH INTERBEDDED SANDSTONE AND SHALE, siltstone dark gray and soft, unweathered, bedding irregular, sandstone gray, hard, well sorted, fine grained, unweathered, massively bedded, shale soft, unweathered, black, and irregularly bedded, fractures planar and unweathered, spaced 1 to 37 in., highly fractured zone at 44.7 ft., 1 in. incipient vertical fracture at 43.5 ft., fossils at 39.4 ft. and 40.1 ft. Approximate top of Pulaski Formation-Unit A at depth 36.8 ft (El. 199.8 ft).
						3.5			
						3			
						2.5			
	40					2.5	Fossils.		
						2.5	Fossils.		
						2.5			
						2.5			
						2.5			
						2.5	1-inch-long incipient vertical fracture. Highly fractured zone.		
190			C6	119/120	98	2			C6: SILTSTONE WITH INTERBEDDED SANDSTONE, siltstone dark gray, soft, unweathered, irregularly bedded, sandstone gray, some argillaceous, unweathered, laminated with some crossbedding present, fractures generally planar and unweathered, spaced 2 in. to 47 in., fossils at 48.0 ft. and 51.6 ft., calcite clasts at 46.9 ft.
						2.5	Calcite clasts.		
						2.5	Fossils.		
						3			
	50					3			
						2.5			
						2.5			
						2.5	Fossils.		
						2			
						2			
180			C7	120/120	90	2.5			C7: Similar to C6, fractures spaced 0.5 in. to 26 in., green mineral veins at 62.6 ft., shaley partings at 65.9 ft.
						2			
						2.5			
						2			
	60					2.5			
						2.5			
						2			
						2.5			
						2.5	Green mineral veins.		
						2.5			
170			C8	122/120	95	2.5	Shaly partings.		C8: SILTSTONE WITH INTERBEDDED SANDSTONE, siltstone dark gray, soft, unweathered, irregularly bedded, sandstone gray, hard, fine grained, well sorted, unweathered, massively bedded, some argillaceous and fossiliferous, minor soft black shale, fractures generally planar and unweathered, spaced 1 in. to 45 in., 1 in. incipient vertical fracture at 74.0 ft., natural gas detected, 2 in. incipient vertical fracture at 66.0 ft., fossils at 68.9 ft. Approximate top of Pulaski Formation-Unit B at depth 67.7 ft (El. 168.9 ft).
						2.5	2-inch-long incipient vertical fracture.		
						2			
						2	Fossils.		
	70					2			
						2			
						1.5	Natural gas detected.		
						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): 237
Vertical Datum : NGVD 29
Date Start / End: 6/4/2008 - 6/6/2008
Total Depth (ft) : 196.0

Boring No.
B407

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	1-inch-long incipient vertical fracture.	
160			C9	121/120	98	2 1.5 2 2 2 2 1.5 1.5 2 2	3-inch-thick fossil bed. 2-inch-thick fossil bed.	C9: SILTSTONE WITH INTERBEDDED SANDSTONE AND SHALE, siltstone dark gray, soft, unweathered, and irregularly bedded, though more laminated towards the bottom of the core, sandstone gray, hard, fine grained, unweathered, well sorted, laminated with cross bedding, increasing in frequency towards bottom of core, shale black, unweathered, and soft, fractures planar and unweathered, spaced 2 to 29 in., 3 in. fossil bed at 79.2 ft., 2 in. fossil bed at 79.7 ft. Approximate top of Pulaski Formation-Unit C at depth 81.1 ft (El. 155.5 ft).
	80							
150			C10	119/120	69	1.5 1.5 2 2.5 2 2.5 2 2 2 2.5	60° fracture. 60° fracture. 60° fracture. Highly fractured zone with slickensides, dip slip orientation, minor polishing, no apparent offset in bedding. 1-inch-long vertical fracture. 3-inch-long incipient vertical fracture. 9-inch-long incipient vertical fracture.	C10: SANDSTONE WITH INTERBEDDED SILTSTONE AND SHALE, sandstone gray, hard, fine grained, unweathered, well sorted, both laminated and massively bedded, some cross bedding, siltstone dark gray and soft, unweathered, laminated with minor disturbed bedding, shale black and soft, unweathered, with laminated and disturbed bedding, fractures generally planar and unweathered, spaced <0.5 to 21 in., 60° fractures at 89.9 ft., 91.0 ft., and 91.5 ft., 1 in. vertical fracture at 92.0 ft., 3 in. incipient vertical fracture at 92.2 ft., 9 in. incipient vertical fracture at 92.6 ft., highly fractured zone at 90.8-92.6 ft.
	90							
140			C11	125/120	83	3 2.5 2.5 3 3 2.5 2.5 2.5 2 2		C11: SHALE WITH INTERBEDDED SANDSTONE AND SILTSTONE, shale black and soft, unweathered, laminated with very minor disturbed bedding, sandstone gray and hard, fine grained, unweathered, well sorted, cross bedding present, otherwise massive, siltstone dark gray and soft, unweathered, laminated, fractures generally planar and unweathered, spaced 0.5 to 18 in., highly fractured zone at 98.0 ft.
	100							
130			C12	120/120	73	3 2.5 3 2.5 2 2 2 2 2.5 2.5	60° fracture. 60° fracture with striations. 60° fracture with striations. Shaly partings. Natural gas detected. 50° fracture. Shaly partings.	C12: SILTSTONE AND SANDSTONE WITH INTERBEDDED SHALE, siltstone dark gray and soft, unweathered, laminated, sandstone similar to C11, forms 38 in. massive bed at 110.8 ft., shale soft, black, unweathered, and laminated, shaley partings at 110.6 ft., fractures generally planar and unweathered, 60° fractures with striations at 108.1 ft. and 108.6 ft., 60° fracture without striations at 107.9 ft., 50° fracture with striations at 113.9 ft., 4 in. incipient vertical fracture at 115.7 ft., natural gas detected.
	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): 237
Vertical Datum : NGVD 29
Date Start / End: 6/4/2008 - 6/6/2008
Total Depth (ft) : 196.0

Boring No.
B407

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			C13	123/120	89	2 1.5 2 2 2.5 1.5 2 2.5 2 2	4-inch-long incipient vertical fracture. Shaly partings. 1-inch-long incipient vertical fracture. Fossils. 3-inch-long incipient vertical fracture. Fossils.			C13: Similar to C12, fractures planar and unweathered, spaced 1 in. to 33 in., 1 in. vertical incipient fracture at 119.1 ft., 3 in. incipient vertical fracture at 124.3 ft., fossils at 122.2 ft., 125.0 ft., and 125.9 ft. Approximate top of Whetstone Gulf formation-Unit A at depth 118.7 (El. 117.9 ft).
	120									
110			C14	120/120	98	2.5 3 2.5 2 2 2 2 2 2 2	Fossils. 40° fracture. Fossils. Fossils. Fossils.			C14: SANDSTONE WITH INTERBEDDED SHALE AND SILTSTONE, sandstone medium hard, moderately to well sorted, unweathered, fine grained, fossiliferous, generally laminated with some cross bedding but occasionally massive, forms thick sequences through most of the core, shale black, soft, unweathered, and laminated, sometimes occuring as clasts, siltstone dark gray, soft, unweathered, and laminated, fractures planar and unweathered, spaced 1 in. to 39 in., 40° fracture at 127.6 ft., fossils at 127.7 ft., 128.6 ft.-129.4 ft., and 129.9 ft.
	130									
100			C15	112/120	85	1.5 1.5 2 2.5 2 2 2.5 2.5 2.5 2	50° fracture. 50° fracture. 50° fracture.			C15: Similar to C14, fractures spaced <0.5 to 39 in., 50° fractures at 144.0 ft., 144.2 ft., and 144.4 ft., no notable fossil content.
	140									
90			C16	124/120	93	2 2.5 2.5 2.5 2 1.5 2.5 2.5 2.5 1.5	4-inch-long vertical fracture. 45° fracture. 45° fracture. 45° fracture. Fossils.			C16: SHALE WITH INTERBEDDED SANDSTONE AND SILTSTONE, shale soft, black, unweathered, and laminated, though some disturbed bedding is present, sandstone gray, hard, massively bedded, unweathered, well sorted, fine grained, siltstone dark gray, soft, unweathered, and laminated, fractures both planar and angular, but unweathered, spaced <0.5 to 31 in., 45° fractures at 148.0 ft., 148.2 ft., and 149.9 ft., 50° fracture with striations at 155.7 ft., unweathered, no apparent offset in bedding, fossils at 155.2 ft. and 155.8 ft. Approximate top of Whetstone Gulf Formation-Unit B at depth 152.6 ft (El. 84.0 ft).
	150									
80			C17	121/120	86	5.5 2	50° fracture with striations. Fossils.			C17: Similar to C16, fractures generally planar and unweathered, spaced <0.5 to 22 in., 50° fracture at 157.7 ft., 1 in. vertical

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): 237
Vertical Datum : NGVD 29
Date Start / End: 6/4/2008 - 6/6/2008
Total Depth (ft) : 196.0

Boring No.
B407

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	50° fracture.			fractures at 159.1 ft. and 161.9 ft.
						3				
						2.5	1-inch-long vertical fracture.			
	160					2				
						2.5				
						3				
						2.5	1-inch-long vertical fracture.			
						2				
70			C18	120/120	93	2.5	3-inch-long vertical fracture.			C18: SANDSTONE WITH INTERBEDDED SHALE AND SILTSTONE, sandstone gray, hard, unweathered, fine grained, well sorted, both laminated and massive, some argillaceous, shale soft, black, unweathered, and laminated, siltstone minor and dark gray, soft, and laminated, fractures generally planar and unweathered, spaced 2 in. to 52 in., 3 in. vertical fracture at 166 ft.
						2				
						2.5				
						2				
	170					2				
						1.5				
						2				
						2				
						2				
						1.5				
60			C19	122/120	100	2.5				C19: Similar to C18, fractures planar and unweathered, spaced 10 in. to 43 in., fossil beds at 176.7 ft. and 181.4 ft.
						3.5	Fossils.			
						3				
						3.5				
	180					2				
						2				
						2				
						1.5	Fossils.			
						1.5				
						1.5				
50			C20	122/120	90	4				C20: SHALE WITH INTERBEDDED SANDSTONE AND SILTSTONE, shale black, soft, unweathered, and laminated, sandstone similar to C18, siltstone dark gray, soft, unweathered, and laminated, fractures generally planar and unweathered, spaced 1 in. to 23 in., 1 in. vertical fractures at 188.0 ft. and 190.0 ft., 3 in. vertical fracture at 188.8 ft.
						3				
						3	1-inch-long vertical fracture.			
						3	3-inch-long vertical fracture.			
	190					2.5				
						2	1-inch-long vertical fracture.			
						2				
						3				
						2.5				
						2				
40							General Comments about Core Samples:			Bottom of boring at depth 196 ft (El. 40.6 ft). Borehole grouted to top of lake bed upon completion.
							Bedding-parallel fractures are			

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): 237
Vertical Datum : NGVD 29
Date Start / End: 6/4/2008 - 6/6/2008
Total Depth (ft) : 196.0

Boring No.
B407

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						most frequent in shale and siltstone and less common in sandstone. Vertical fractures occasionally present in sandstone beds.			
30							Hand pressure produces bedding-parallel fractures in siltstone of Pulaski Formation during handling and transport. Fracture surfaces are generally unweathered unless otherwise noted.			
	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. B407

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. **B408**

Boring Information

Northing : 1283016 **Easting :** 543151
Horizontal Datum : NAD 27
Ground Surface Elev. (ft): 237.1
Vertical Datum : NGVD 29
Rig Type/I.D: Mobile B57 / Barge 2

Date Start - End: 6/6/2008 - 6/8/2008
Driller Name: J. Weeks
Logged By : A. Cummings
Drilling Company : Boart Longyear
Total Depth (ft) : 197.8

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 0.8 ft. below mudline, rollerbit to clean out casing, wireline coring 1.3 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	0/0	50/0 in.	NA				S1: NO RECOVERY.
										Approximate top of Oswego Sandstone at depth 1.3 ft (El. 235.8 ft).
			C1	17/18	50	1 1.5/6 in.				C1: SANDSTONE, greenish gray, fine grained, slightly weathered, well sorted in upper 11 in., becomes poorly sorted with clasts of siltstone in lower 6 in., upper 11 in. laminated with some cross bedding, lower 6 in. features disturbed bedding, fractures planar and moderately weathered with some discoloration, spaced <0.5 in. to 5 in.
			C2	53/60	33	1.5 1.5 1.5 1.5 NM	7-inch-long vertical fracture. 1-inch-long and 2-inch-long incipient vertical fractures.			C2: SANDSTONE, similar to C1, some massive bedding, fractures generally planar and become less weathered with increasing depth, spaced <0.5 in. to 5.5 in., 7 in. vertical fracture at 3.9 ft., 1 in. incipient vertical fracture at 4.6 ft., 2 in. incipient vertical fracture at 5.4 ft.
230										
	10		C3	114/120	77	2 2.5 1.5 1.5 1.5 1 1.5 2 2 1.5				C3: SANDSTONE, greenish gray to gray, medium hard to hard, unweathered, fine grained, well sorted, bedding both massive and laminated with cross bedding, fractures planar and become less weathered with depth, spaced 0.5 in. to 24.5 in., 7 in. vertical fracture at 17.1 ft.
220							7-inch-long incipient vertical fracture.			
	20		C4	122/112	80	1.5 1.5 1.5 2 2.5 3 4 4 3.5	4-inch-long incipient vertical fracture.			C4: SANDSTONE WITH INTERBEDDED SILTSTONE, sandstone similar to C3, siltstone dark gray, soft, unweathered, laminated, occasionally as clasts, fractures generally planar and unweathered, spaced <0.5 in. to 30 in., 4 in. incipient vertical fracture at 24.3 ft., 2 in. incipient vertical fracture at 26.8 ft.
										Approximate top of Oswego Transition Zone at depth 22.3 ft (El. 214.8 ft).
210			C5	120/120	85	5.5 3.5 3.5 2.5 1.5 2	2-inch-long incipient vertical fracture.			C5: SANDSTONE WITH INTERBEDDED SILTSTONE, sandstone gray, medium to hard, unweathered, some argillaceous, well sorted, fine grained, laminated with some minor cross bedding, siltstone dark gray, soft, unweathered, laminated, some minor black, soft shale present as laminations and clasts, fractures planar and unweathered, spaced 1 in. to 17.5 in., highly fractured zones at 28.1 ft., 27.1 ft., and 27.5 ft., fossils at 29.4 ft.
	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): 237
Vertical Datum : NGVD 29
Date Start / End: 6/6/2008 - 6/8/2008
Total Depth (ft) : 197.8

Boring No.
B408

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 2 1.5 2				Approximate top of Pulaski Formation-Unit A at depth 36.8 ft (El. 200.3 ft).
200			C6	122/120	81	2 2.5 2.5 3 4.5 3.5 2.5 4 3 2.5	Fossils. Fossils.			C6: SILTSTONE WITH INTERBEDDED SANDSTONE, siltstone dark gray, soft, unweathered, bedding highly irregular, sandstone gray, hard to medium hard, unweathered, some argillaceous, fine grained, well sorted, bedding irregular or massive, some minor soft black shale present, fractures planar and unweathered, spaced 1 in. to 14 in., fossils at 39.8 ft. and 45.1 ft.
	40									
190			C7	120/120	86	2.5 2.5 2.5 3 2 2.5 2.5 3 2.5 2.5	Fossils.			C7: Similar to C6, fractures planar and unweathered, spaced 0.5 in. to 41.5 in., fossils at 48.3 ft.
	50									
180			C8	121/120	96	2.5 2 2 2 2.5 2 2.5 2 2 2	Green mineral veins.			C8: SANDSTONE AND SILTSTONE WITH INTERBEDDED SHALE, sandstone light gray to gray, unweathered, some argillaceous, hard to medium hard, well sorted, fine grained, both laminated and massive, occasionally disrupted, siltstone dark gray and soft, unweathered, often disrupted but occasionally laminated, shale black, soft, unweathered, and disrupted, fractures planar and unweathered, spaced 2.5 in. to 17 in., green mineral veins at 61.8 ft. Approximate top of Pulaski Formation-Unit B at depth 65.4 ft (El. 171.7 ft).
	60									
170			C9	119/120	99	2.5 2 2 2 2 2.5 2.5 2	Fossils.			C9: SANDSTONE AND SILTSTONE WITH INTERBEDDED SHALE, sandstone light gray, hard, well sorted, unweathered, fine grained, minor argillaceous, bedding massive, otherwise irregular, siltstone dark gray, soft, unweathered, and irregular, shale black soft, unweathered, and irregular, fractures planar and unweathered, spaced 5 in. to 28 in., fossils at 71.7 ft., significant amount of natural gas present, 1 in. incipient vertical fracture at 72.8 ft.
	70									

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): 237
Vertical Datum : NGVD 29
Date Start / End: 6/6/2008 - 6/8/2008
Total Depth (ft) : 197.8

Boring No.
B408

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				
						2.5	1-inch-long incipient vertical fracture. Natural gras detected.			
160										
			C10	112/120	90	2.5				C10: SANDSTONE AND SHALE WITH INTERBEDDED SILTSTONE, sandstone gray, hard, unweathered, minor argillaceous, well sorted, fine grained, typically laminated with cross bedding but occasionally massive, shale black, soft, unweathered, and laminated, but occasionally irregularly bedded, siltstone dark gray, soft, unweathered, and disrupted, fractures planar and unweathered, spaced 1 in. to 20 in., 14 in. incipient vertical fracture with calcite infilling at 81.1 ft., fossils at 78.0 ft. and 78.9 ft. Approximate top of Pulaski Formation-Unit C at depth 81.1 ft (El. 156.0 ft).
						2.5	Fossils.			
						2.5	Fossils.			
	80					3				
						2.5				
						2	14-inch-long incipient vertical fracture with calcite infilling.			
						2				
						2				
						2.5				
						2				
150										
			C11	20/8	100	1/8 in.	Shaly partings.			C11: SANDSTONE, similar to sandstone in C10, fractures planar and unweathered, spaced <0.5 in. to 19 in.
			C12	120/120	72	1.5				C12: SILTSTONE WITH INTERBEDDED SANDSTONE AND SHALE, siltstone dark gray, soft, unweathered, and laminated, sandstone light gray, hard, unweathered, well sorted, fine grained, massively bedded, shale black, soft, unweathered, and typically disrupted, fractures generally planar and unweathered, spaced <0.5 in. to 12 in., two 30 ° fractures with striations at 90.4 ft., highly fractured zone from 91.1 ft. to 91.8 ft.
						2.5				
	90					2.5				
						3.5	30° fractures with slickensides, polishing, dip slip orientation, no apparent offset of bedding.			
						2.5				
						4	Highly fractured zone.			
						4.5	Shaly partings.			
						4				
						4				
						3.5				
140										
			C13	120/120	85	4				C13: Similar to C12, fractures planar and unweathered, spaced 0.5 in. to 12 in., shaley partings at 107.4 ft.
						3.5				
	100					2.5				
						2.5				
						2.5				
						2				
						1.5				
						1.5				
						2				
						1.5				
130										
			C14	116/120	80	2.5	Shaly partings.			C14: SANDSTONE WITH INTERBEDDED SHALE AND SILTSTONE, sandstone gray to light gray, hard to medium hard, unweathered, moderately well sorted, fine grained, minor fossil debris, typically massively bedded, though laminations do occur, shale black, soft, unweathered, and laminated, siltstone dark gray, soft, unweathered, and laminated, fractures planar and unweathered, spaced <0.5 in. to 34 in., 30° fracture at 116.4 ft., shaley partings at 108.2 ft.
						1.5				
	110					2				
						2				
						1.5				
						2				
						2	Fossils.			
						2				
						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): 237
Vertical Datum : NGVD 29
Date Start / End: 6/6/2008 - 6/8/2008
Total Depth (ft) : 197.8

Boring No.
B408

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							30° fracture.			
			C15	123/120	87	2.5	6-inch-long vertical fracture.			C15: SHALE WITH INTERBEDDED SANDSTONE AND SILTSTONE, shale black, soft, unweathered, typically laminated, though some disturbed bedding is present, sandstone gray to light gray, well sorted, unweathered, hard, fine grained, massive, siltstone dark gray, soft, unweathered, and laminated, fractures generally planar and unweathered, spaced 2 in. to 27 in., 6 in. vertical fracture at 117.8 ft., 5 in. incipient vertical fracture at 120.2 ft., fossils at 118.8 ft., 119.8 ft., 125.3 ft., and 124.6 ft.
						2				
	120					2.5				
						2	Fossils.			
						2.5	Fossils.			
						3				
						2.5				
						3				
						2.5				
						2				
										Approximate top of Whetstone Gulf Formation-Unit A at depth 121.1 ft (El. 116.0 ft).
110										
			C16	104/120	87	3	6-inch-long incipient vertical fracture with calcite infilling.			C16: SANDSTONE WITH SILTSTONE AND SHALE, sandstone light gray, hard, well sorted, unweathered, fine grained, some argillaceous, mainly massive, some laminated, siltstone and shale similar to C15, fractures planar and unweathered, spaced 0.5 in. to 67 in., calcite clasts at 128.9 ft., fossils at 130.1 to 131.1 ft.
						3				
	130					2				
						2				
						1.5				
						1.5	Fossils.			
						1.5				
						2				
						1.5				
						1.5				
100										
			C17	138/120	100	2				C17: SHALE WITH INTERBEDDED SANDSTONE AND SILTSTONE, shale black, soft, unweathered, laminated, sandstone light gray, hard, well sorted, fine grained, unweathered, massive, siltstone soft, dark gray, unweathered, and laminated, fractures spaced 0.5 in. to 26 in., generally planar and unweathered, 45° fracture at 147.7 ft., 7 in. incipient vertical fracture with calcite infilling at 141.6 ft., 20 in. of core left behind from C16 recovered in C17.
						2				
	140					2				
						2				
						3				
						3.5	7-inch-long incipient vertical fracture with calcite infilling.			
						3.5				
						3				
						3.5				
						2.5				
										Approximate top of Whetstone Gulf Formation-Unit B at depth 146.3 ft (El. 90.8 ft).
90							Shaly partings.			
			C18	123/120	90	3	45° fracture.			C18: Similar to C17, sandstone becomes more common as depth increases, fractures generally planar and unweathered, spaced 1 in. to 13 in., 10 in. incipient vertical fracture at 153.2 ft., 3 in. incipient vertical fracture at 156.6 ft., fossils at 155.4 ft., 156 ft., and 156.4 ft.
						4				
	150					4.5				
						3				
						2.5				
						2.5				
						2	10-inch-long incipient vertical fracture.			
						3.5				
						2				
						2.5				
							Fossils.			
80							3-inch-long incipient vertical			

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): 237
Vertical Datum : NGVD 29
Date Start / End: 6/6/2008 - 6/8/2008
Total Depth (ft) : 197.8

Boring No.
B408

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
			C19	121/120	99	2.5	fracture. Highly fractured zone.			C19: Similar to C17, fractures planar and unweathered, spaced <0.5 in. to 22 in., highly fractured zone at 157.8 ft.
						3				
	160					3				
						2.5				
						2				
						3.5				
						3.5				
						3				
						3.5				
						3				
70										
			C20	118/120	88	3.5				C20: Similar to C17, fractures generally unweathered, planar, spaced 1 in. to 30 in., 2 in. vertical fractures at 172.5 ft. and 177.2 ft., fossils at 174.1 ft., 174.8 ft., 175.2 ft., 175.6-175.9 ft., and 176.2-176.4 ft.
						2.5				
	170					2				
						2				
						2				
						2				
						2	2-inch-long vertical fracture.			
						2				
						2				
						2	Fossils.			
							Fossils.			
60							Fossils.			
							2-inch-long vertical fracture.			
			C21	121/120	89	2.5				C21: Similar to C17, fractures generally planar and unweathered, spaced 0.5 in. to 20 in., 40° fractures at 183.9 ft. and 186.4 ft., fossils at 178.8 ft., 179.8-180.6 ft., and 181.5 ft.
						2	Fossils.			
	180					2				
						2	Fossils.			
						2	Fossils.			
						2	Fossils.			
						2				
						1.5				
						1.5	40° fracture.			
						1.5				
50							40° fracture.			
			C22	118/120	94	2				C22: Similar to C17, fractures planar and unweathered, spaced 0.5 in. to 26 in.
						2.5				
	190					1.5				
						2				
						1.5				
						1.5				
						2				
						1.5				
						1				
						1				
40										
										Bottom of boring at depth 197.8 ft (El. 39.3 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): 237
Vertical Datum : NGVD 29
Date Start / End: 6/6/2008 - 6/8/2008
Total Depth (ft) : 197.8

Boring No.
B408

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						General Comments about Core Samples:			
							Bedding-parallel fractures are most frequent in shale and siltstone and less common in sandstone.			
30							Vertical fractures occasionally present in sandstone beds.			
	210						Hand pressure produces bedding-parallel fractures in siltstone of Pulaski Formation during handling and transport.			
							Fracture surfaces are generally unweathered unless otherwise noted.			
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. B408

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

Location: Oswego, New York

Final Log Prepared by: _____ Date: 9/4/08

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