

Appendix IV
Test Boring Logs



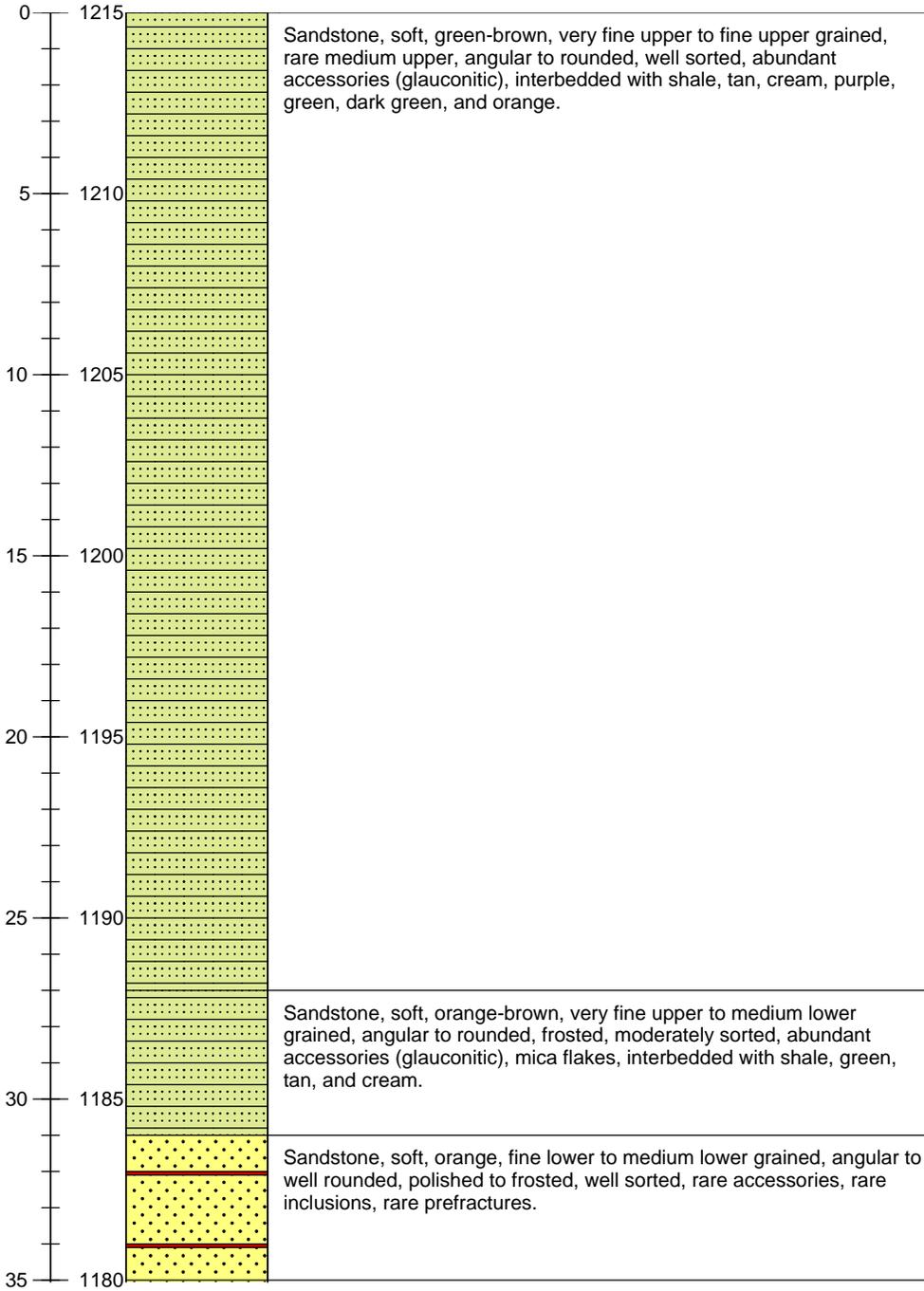
Summit Envirosolutions, Inc.
1217 Bandana Boulevard North
St. Paul, MN 55180-5114

Project Name : Pur Frac LLC
Summit Project No. : 2232-0001
Project Location : Cooks Valley Township, WI
County : Chippewa
Description Performed by: Brian Gulbranson
Surface grade elevation: ~ 1,215 ft amsl

LOG OF BORING PF-1

Date : 9/23/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
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Shell fragments at 31 ft
Hard red sandstone lamina and shell fragments
Hard red sandstone and yellow micaceous shale



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LOG OF BORING PF-1

Date : 9/23/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
35	1180		Sandstone, soft, orange-brown, very fine upper to coarse upper grained, rare very coarse lower, subangular to well rounded, frosted, moderately sorted, trace accessories, rare inclusions, clusters.	Cream shale lamina
40	1175			Green shale lamina Yellow micaceous shale lamina Orange micaceous shale lamina
45	1170		Sandstone, hard, orange-yellow, very fine upper to medium upper grained, rare coarse lower, subangular to well rounded, frosted, moderately sorted, rare accessories, rare prefractures, clusters.	Green and orange shale
50	1165			Green shale lamina
55	1160		Sandstone, hard, yellow-orange, fine lower to coarse upper grained, subangular to well rounded, frosted, moderately sorted, rare accessories, rare inclusions, rare prefractures, clusters.	Olive shale lamina
60	1155			
65	1150		Sandstone, soft, buff, very fine upper to very coarse lower grained, subangular to well rounded, frosted, poorly sorted, rare accessories, rare inclusions, minor silt- and clay-sized coatings.	Hard black sandstone with orange micaceous shale Hard black sandstone with orange micaceous shale Hard red sandstone with orange micaceous shale and brown shale lamina Orange micaceous shale lamina
70	1145			Yellow micaceous shale lamina

End of Boring at 160 feet.

607898 m E, 4988627 m N. Coordinates are UTM Zone 15N (NAD83).

*Elevation extracted from National Elevation Dataset



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Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
70	1145			Green and orange shale lamina
				Hard red sandstone with orange micaceous shale
75	1140		Sandstone, hard, buff-yellow, very fine upper to medium upper grained, predominantly fine lower to fine upper, subangular to well rounded, polished to frosted, well sorted, rare accessories, clusters.	Yellow micaceous shale lamina
				Orange micaceous shale lamina
				Yellow micaceous shale lamina
80	1135		Sandstone, hard, buff-yellow, very fine upper to coarse upper grained, rare very coarse lower, becoming very fine upper to coarse lower, subangular to well rounded, frosted, moderately sorted, rare inclusions, rare prefractures, minor clay-sized coatings, clusters.	Yellow micaceous shale lamina
85	1130			
90	1125		Sandstone, soft, orange-brown, very fine upper to coarse upper grained, angular to well rounded, frosted, poorly sorted, rare inclusions, rare prefractures, silt- and clay-sized coatings.	
95	1120			Orange shale lamina
				Orange shale lamina
100	1115			Olive shale lamina
			Sandstone, hard, orange-yellow, fine lower to coarse lower grained, rare coarse upper, increasing percentage of fine lower to medium upper, subrounded to well rounded, frosted, well sorted, rare inclusions, rare prefractures, minor clay-sized coatings.	Yellow micaceous shale lamina
105	1110			

End of Boring at 160 feet.

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Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
105	1110			Yellow micaceous shale lamina
				Yellow and green micaceous shale lamina
110	1105			Yellow and orange micaceous shale lamina
			Sandstone, hard, yellow, very fine upper to medium lower grained, rare medium upper, subangular to well rounded, frosted, well sorted, rare inclusions, clusters.	
115	1100			Yellow micaceous shale lamina
				Orange micaceous shale lamina
120	1095			Hard black sandstone
				Hard red sandstone
125	1090			Hard red sandstone with orange micaceous shale
				Yellow and orange micaceous shale lamina
130	1085		Sandstone, hard, yellow-orange, very fine upper to coarse lower grained, subangular to well rounded, polished to frosted, poorly sorted, rare accessories, rare inclusions, rare prefractures, clusters.	Green and orange shale lamina
			Sandstone, hard, yellow-orange, very fine upper to medium lower grained, angular to well rounded, polished to frosted, well sorted.	Hard red sandstone and orange micaceous shale
135	1080			Green, orange, and yellow micaceous shale lamina
			Sandstone, hard, yellow-orange, very fine upper to medium upper grained, angular to well rounded, frosted, well sorted, rare inclusions.	Hard black sandstone and orange micaceous shale
				Orange micaceous shale lamina
140	1075			Yellow and orange micaceous shale

End of Boring at 160 feet.

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Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
140	1075		Sandstone, hard, orange-yellow, very fine lower to coarse upper grained, angular to well rounded, frosted, poorly sorted, rare inclusions, rare prefractures, minor clay-sized coatings, clusters, mica flakes.	Yellow shale lamina Brown shale lamina Brown and green glauconitic shale
145	1070			
150	1065			
155	1060		Shale and siltstone, tan, brown, gray, and orange.	Green and orange shale
			Sandstone, soft, orange-yellow, very fine lower to coarse upper grained, angular to well rounded, frosted, poorly sorted, clay-sized coatings, clusters.	Gray shale Green and cream shale
160	1055		Shale, brown, with siltstone, gray, glauconitic.	

End of Boring at 160 feet.

607898 m E, 4988627 m N. Coordinates are UTM Zone 15N (NAD83).

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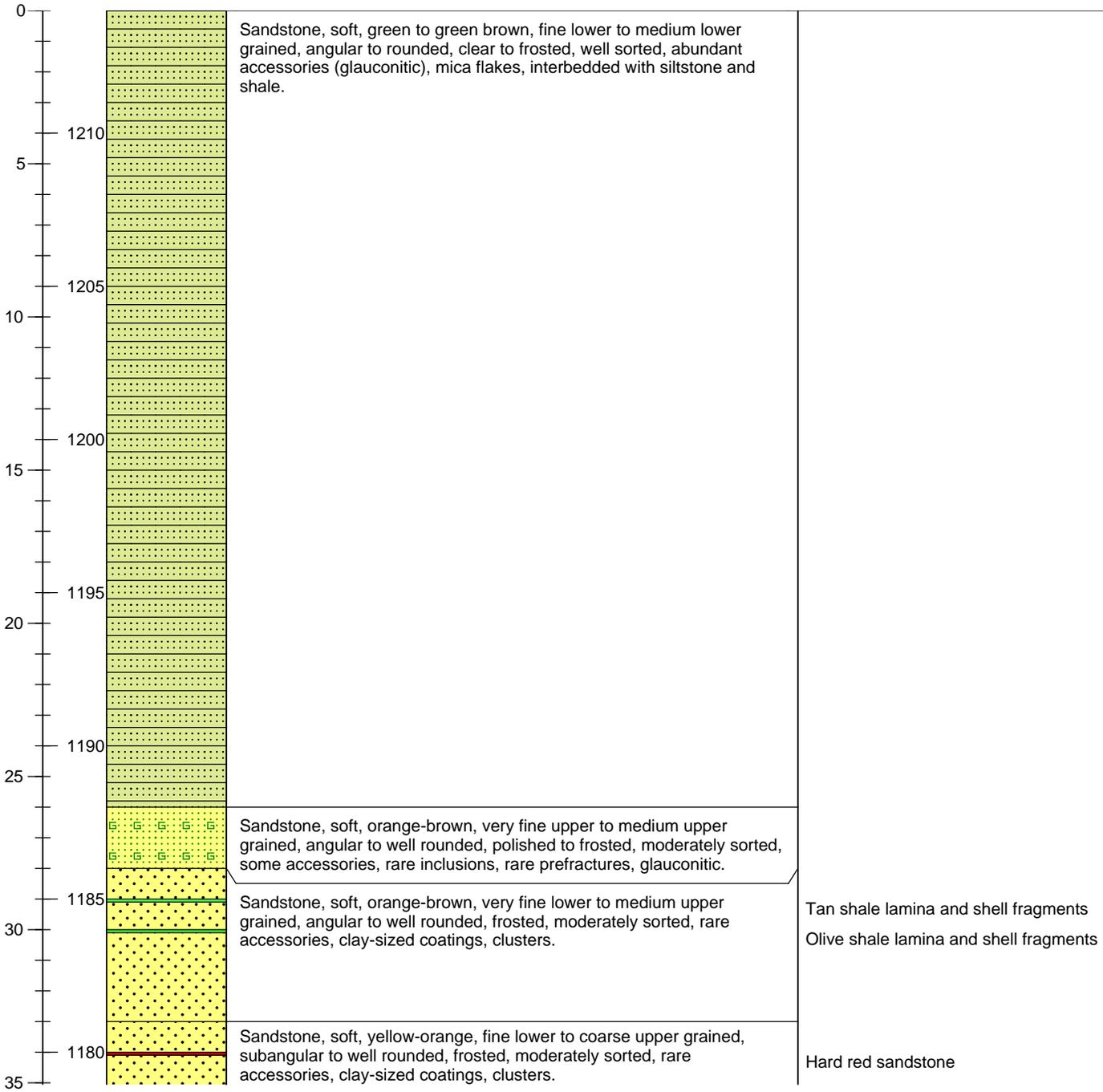
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St. Paul, MN 55180-5114

Project Name : Pur Frac LLC
Summit Project No. : 2232-0001
Project Location : Cooks Valley Township, WI
County : Chippewa
Description Performed by: Brian Gulbranson
Surface grade elevation: ~ 1,214 ft amsl

LOG OF BORING PF-2

Date : 9/23/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
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End of Boring at 150 feet.
608424 m E, 4988512 m N. Coordinates are UTM Zone 15N (NAD83).
*Elevation extracted from National Elevation Dataset



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County : Chippewa
Description Performed by: Brian Gulbranson
Surface grade elevation: ~ 1,214 ft amsl

LOG OF BORING PF-2

Date : 9/23/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
35				Hard red sandstone with orange micaceous shale
1175				Yellow micaceous shale lamina
40				Olive shale lamina
				Green shale lamina
				Cream shale lamina
1170			Sandstone, hard, orange-brown, very fine upper to medium upper grained, rare coarse lower, becoming very fine upper to coarse lower with rare coarse upper, subangular to well rounded, frosted, moderately sorted, rare accessories, rare inclusions, clay-sized coatings, clusters.	
45				Hard black sandstone
				Green shale lamina and gray shale lamina
				Olive shale lamina
1165			Sandstone, hard, yellow-orange, fine lower to medium upper grained, subangular to well rounded, frosted, well sorted, rare inclusions, rare prefractures, clusters.	Hard black sandstone with orange micaceous shale
50			Sandstone, hard, yellow-orange, very fine upper to coarse upper grained, rare very coarse lower, angular to well rounded, frosted, moderately sorted, rare inclusions, rare prefractures, minor clay-sized coatings.	
1160				Brown shale lamina
55				Hard red sandstone
1155			Sandstone, soft, yellow-orange, very fine upper to very coarse lower grained, rare very coarse upper, angular to well rounded, frosted, poorly sorted, rare inclusions, rare prefractures, minor silt- and clay-sized coatings.	Shell fragments at 59 ft
60				Green shale lamina
				Yellow micaceous shale lamina
1150				Green shale lamina
65				Green shale
1145			Sandstone, hard, orange-yellow, very fine upper to coarse upper grained, rare very coarse lower, subangular to well rounded, frosted, poorly sorted, rare accessories, rare inclusions, clusters.	Hard red sandstone
70				Hard red sandstone with orange micaceous shale and shell fragments

End of Boring at 150 feet.

608424 m E, 4988512 m N. Coordinates are UTM Zone 15N (NAD83).

*Elevation extracted from National Elevation Dataset



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Description Performed by: Brian Gulbranson
Surface grade elevation: ~ 1,214 ft amsl

LOG OF BORING PF-2

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Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
70				Green shale laminae interbedded with sandstone
75	1140		Sandstone, soft, orange-yellow, very fine lower to coarse lower grained, angular to well rounded, frosted, poorly sorted, trace accessories, rare inclusions, rare prefractures, clusters.	Hard red sandstone
80	1135		Sandstone, hard, buff, very fine upper to coarse upper grained, rare very coarse lower, subangular to well rounded, frosted, moderately sorted, rare inclusions, minor clay-sized coatings, clusters, mica flakes.	
85	1130			Green shale lamina Hard black sandstone Green shale lamina and white siltstone
90	1125		Sandstone, hard, yellow-orange, very fine lower to coarse lower grained, angular to well rounded, clear to frosted, poorly sorted, rare accessories, rare inclusions, rare prefractures, minor silt- and clay-sized coatings, clusters, mica flakes.	Brown shale lamina Hard red sandstone Olive shale lamina
95	1120		Sandstone, hard, orange-yellow, very fine lower to coarse upper grained, angular to well rounded, clear to frosted, poorly sorted, rare accessories, rare inclusions, clusters, mica flakes.	
100	1115		Sandstone, hard, orange-yellow, very fine upper to coarse lower grained, becoming very fine upper to coarse upper, subangular to well rounded, frosted, poorly sorted, rare accessories, rare prefractures.	
105	1110		Sandstone, hard, buff-yellow, very fine upper to coarse lower grained, rare coarse upper, subangular to well rounded, frosted, moderately sorted, rare inclusions, clusters.	Hard red sandstone with yellow micaceous shale Olive shale

End of Boring at 150 feet.
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Surface grade elevation: ~ 1,214 ft amsl

LOG OF BORING PF-2

Date : 9/23/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
105				Olive shale
110	1105		Sandstone, hard, orange-yellow, very fine lower to medium upper grained, predominantly very fine upper to fine upper, rare coarse lower, angular to well rounded, frosted, well sorted, rare inclusions.	Shell fragments at 112 ft
115	1100			Brown shale lamina
120	1095		Sandstone, hard, yellow-orange, very fine lower to coarse lower grained, angular to well rounded, frosted, poorly sorted, rare inclusions, rare prefractures, clusters.	Shell fragments at 117 ft
125	1090		Sandstone, hard, yellow-orange, very fine lower to medium upper grained, angular to well rounded, frosted, well sorted, rare prefractures.	Hard red sandstone Shell fragments at 120 ft Yellow micaceous shale lamina
130	1085		Sandstone, hard, yellow-orange, very fine lower to coarse lower grained, angular to well rounded, frosted, moderately sorted, rare accessories, rare inclusions, rare prefractures, clusters.	Hard red sandstone Shell fragments at 125 ft Shell fragments at 127 ft
135	1080		Sandstone, hard, yellow-orange, fine lower to medium upper grained, subangular to well rounded frosted, well sorted, rare accessories, rare prefractures.	Hard red sandstone
140	1075			Tan shale lamina Hard red sandstone Hard red sandstone Hard black sandstone and yellow micaceous shale

End of Boring at 150 feet.

608424 m E, 4988512 m N. Coordinates are UTM Zone 15N (NAD83).

*Elevation extracted from National Elevation Dataset



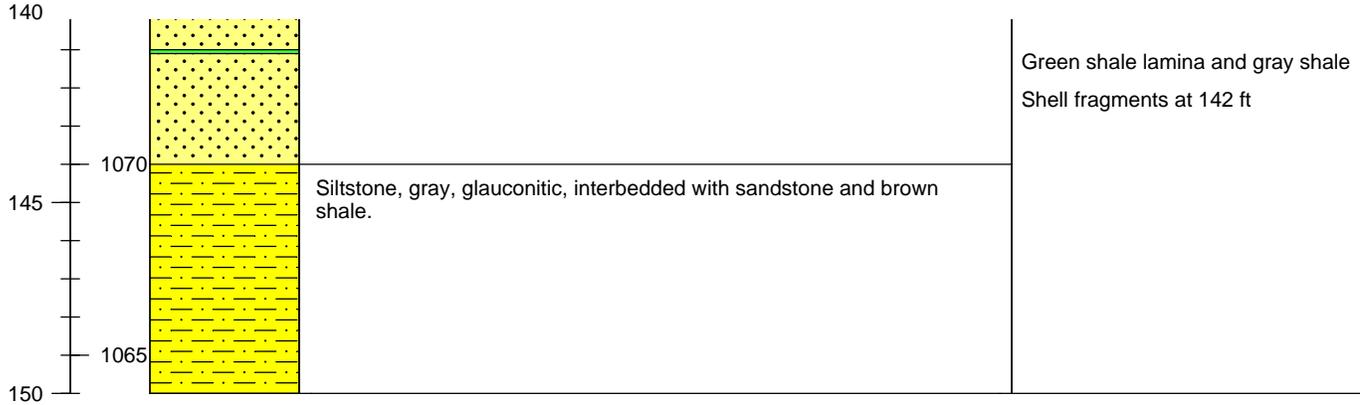
Summit Envirosolutions, Inc.
 1217 Bandana Boulevard North
 St. Paul, MN 55180-5114

Project Name : Pur Frac LLC
 Summit Project No. : 2232-0001
 Project Location : Cooks Valley Township, WI
 County : Chippewa
 Description Performed by: Brian Gulbranson
 Surface grade elevation: ~ 1,214 ft amsl

LOG OF BORING PF-2

Date : 9/23/14
 Company/Method : Thein Well/Air Rotary
 Sample Method : Grab
 Field Observer(s) : BLG
 Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
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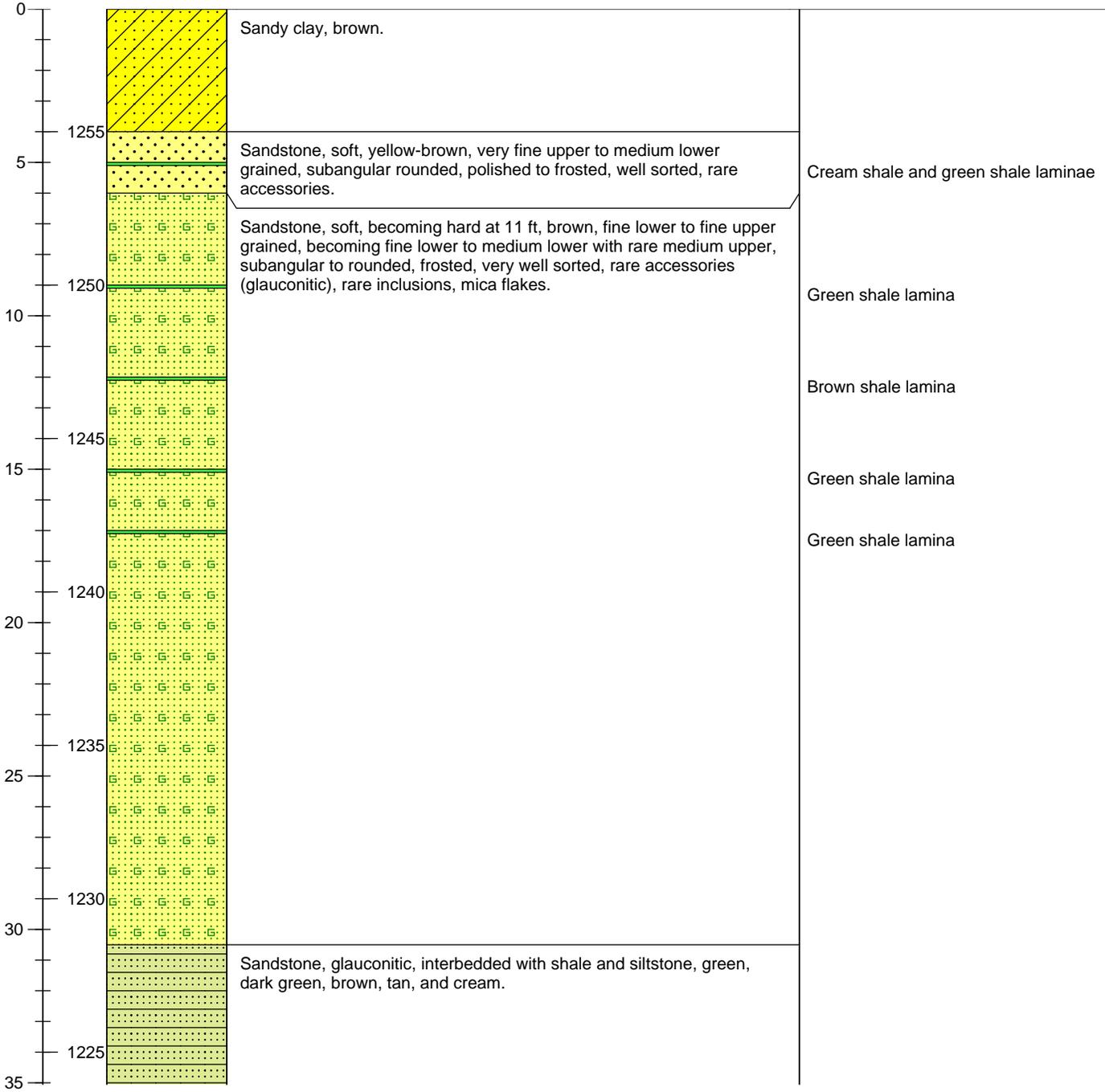
Summit Envirosolutions, Inc.
1217 Bandana Boulevard North
St. Paul, MN 55180-5114

Project Name : Pur Frac LLC
Summit Project No. : 2232-0001
Project Location : Cooks Valley Township, WI
County : Chippewa
Description Performed by: Brian Gulbranson
Surface grade elevation: ~ 1,259 ft amsl

LOG OF BORING PF-3

Date : 9/24/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
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End of Boring at 110 feet.
608560 m E, 4990801 m N. Coordinates are UTM Zone 15N (NAD83).
*Elevation extracted from National Elevation Dataset

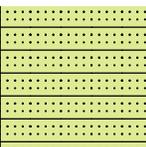
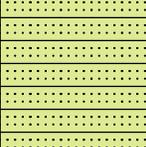
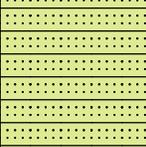
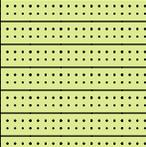
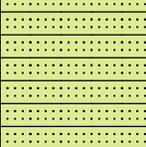
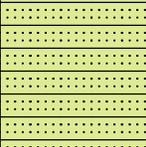
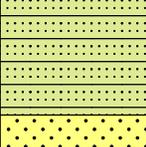
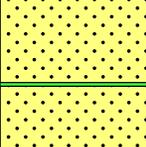
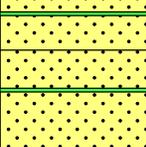
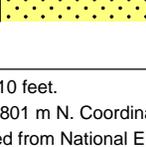


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County : Chippewa
Description Performed by: Brian Gulbranson
Surface grade elevation: ~ 1,259 ft amsl

LOG OF BORING PF-3

Date : 9/24/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
35				
	1220			
40				
	1215			
45				
	1210			
50				
	1205			
55				
	1200			
60				
	1195		Sandstone, soft, yellow, fine lower to coarse lower grained, rare coarse upper, subrounded to well rounded, frosted, well sorted, trace accessories, rare inclusions.	Cream shale lamina
65				Orange shale lamina
	1190		Sandstone, hard, yellow-orange (pink from 67 ft to 68 ft), fine lower to coarse upper grained, subrounded to well rounded, frosted, moderately sorted, rare accessories, rare inclusions, rare prefractures, clusters.	Green shale lamina
70				

End of Boring at 110 feet.

608560 m E, 4990801 m N. Coordinates are UTM Zone 15N (NAD83).

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LOG OF BORING PF-3

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Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
70				Olive shale lamina
75	1185		Sandstone, soft, yellow-orange, very fine upper to coarse upper grained, subangular to well rounded, frosted, moderately sorted, trace accessories, rare inclusions.	Hard red sandstone
80	1180			Olive shale lamina Brown shale lamina
85	1175		Sandstone, soft, buff, fine lower to very coarse lower grained, subrounded to well rounded, frosted, moderately sorted, rare accessories, rare inclusions, rare prefractures.	
90	1170		Sandstone, soft, yellow-orange, fine lower to coarse upper grained, rare very coarse lower, subrounded to well rounded, frosted, moderately sorted, rare inclusions, rare prefractures, minor clay-sized coatings.	
95	1165			Green shale lamina
100	1160			Gray shale lamina
105	1155		Sandstone, hard, yellow, very fine upper to coarse lower grained, subrounded to well rounded, frosted, moderately sorted, rare inclusions, rare prefractures, clay-sized coatings, clusters.	

End of Boring at 110 feet.

608560 m E, 4990801 m N. Coordinates are UTM Zone 15N (NAD83).

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Project Name : Pur Frac LLC
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Project Location : Cooks Valley Township, WI
County : Chippewa
Description Performed by: Brian Gulbranson
Surface grade elevation: ~ 1,147 ft amsl

LOG OF BORING PF-4

Date : 9/24/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
0			Clayey sand, brown.	
1145			Sandstone, soft, orange-brown, very fine upper to very coarse lower grained, subrounded to well rounded, frosted, poorly sorted, rare accessories, rare inclusions, silt- and clay-sized coatings.	Hard red sandstone and yellow micaceous shale
5			Sandstone, soft, buff, very fine upper to coarse upper, rare very coarse lower, subrounded to well rounded, polished to frosted, poorly sorted, trace accessories, rare inclusions, clusters.	Green shale lamina and shell fragments
1140				Hard black sandstone
10			Sandstone, soft, buff, very fine upper to coarse upper, rare very coarse lower, subrounded to well rounded, polished to frosted, poorly sorted, trace accessories, rare inclusions, clusters, interbedded with shale, tan and green.	
1135				
15			Sandstone, hard, buff, very fine upper to coarse upper grained, subangular to well rounded, frosted, poorly sorted, rare inclusions.	Gray shale lamina, hard black sandstone and orange micaceous shale
1130			Sandstone, soft, buff-yellow, very fine upper to coarse lower grained, subangular to well rounded, frosted, moderately sorted, rare inclusions.	Cream shale lamina
20			Sandstone, soft, buff-yellow, very fine upper to coarse upper grained, subangular to well rounded, frosted, moderately sorted, rare inclusions, rare prefractures.	Shell fragments at 19 ft Tan shale lamina Gray shale lamina
1125				Yellow micaceous shale lamina Green micaceous shale lamina Orange micaceous shale lamina
25				Green shale lamina Gray shale lamina
1120				Hard red sandstone, yellow micaceous shale and shell fragments
30				
1115			Sandstone, soft, buff-yellow, very fine upper to coarse upper grained, subangular to well rounded, frosted, moderately sorted, rare inclusions, rare prefractures, interbedded with shale, green, gray, and orange.	
			Sandstone, hard, orange, very fine upper to coarse upper grained, subangular to well rounded, frosted, bimodal sorting, rare accessories,	Gray shale lamina
35				

End of Boring at 70 feet.

609047 m E, 4990316 m N. Coordinates are UTM Zone 15N (NAD83).

*Elevation extracted from National Elevation Dataset



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County : Chippewa
Description Performed by: Brian Gulbranson
Surface grade elevation: ~ 1,147 ft amsl

LOG OF BORING PF-4

Date : 9/24/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
35	1110		rare clusters. Sandstone, hard, yellow-orange, very fine upper to coarse upper grained, angular to well rounded, frosted, poorly sorted, minor clay-sized coatings, clusters, mica flakes.	Orange shale
40	1105		Sandstone, hard, gray-brown, very fine lower to medium upper grained, rare coarse lower, angular to well rounded, frosted, moderately sorted, rare accessories, rare inclusions, rare prefractures, clusters, mica flakes.	Yellow micaceous shale lamina and shell fragments
				Green and orange shale
			Sandstone, hard, gray-brown, very fine upper to coarse upper grained, angular to well rounded, frosted, poorly sorted, rare inclusions, clusters.	Olive shale lamina and shell fragments
45	1100		Sandstone, hard, buff-white, very fine upper to coarse lower grained, rare coarse upper, angular to well rounded, polished to frosted, moderately sorted, rare inclusions, rare prefractures.	
			Sandstone, hard, buff-white, very fine lower to coarse lower grained, angular to well rounded, frosted, poorly sorted, rare inclusions, minor silt- and clay-sized coatings.	Yellow micaceous shale
50	1095		Sandstone, hard, buff-orange, very fine lower to medium upper grained, rare coarse lower, angular to well rounded, frosted, moderately sorted, rare accessories, rare inclusions.	Yellow shale, white shale, and shell fragments
				Shell fragments at 54 ft
55	1090		Sandstone, hard, buff-orange, very fine lower to medium lower grained, predominantly fine lower to fine upper, angular to well rounded, frosted, well sorted, rare accessories.	Hard red sandstone, yellow micaceous shale and shell fragments Hard black sandstone
				Olive shale lamina
				Brown shale lamina and green and orange shale
60	1085		Sandstone, hard, white, very fine upper to coarse lower grained, angular to well rounded, frosted, moderately sorted, rare accessories, rare inclusions, clusters.	Shell fragments at 62 ft
				Green shale lamina
65	1080			
				Hard red sandstone and orange micaceous shale
70				



Summit Envirosolutions, Inc.
1217 Bandana Boulevard North
St. Paul, MN 55180-5114

Project Name : Pur Frac LLC
Summit Project No. : 2232-0001
Project Location : Cooks Valley Township, WI
County : Chippewa
Description Performed by: Brian Gulbranson
Surface grade elevation: ~ 1,121 ft amsl

LOG OF BORING PF-5

Date : 9/24/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
0	1120		Clayey sand, dark brown.	
			Sandstone, soft, orange, very fine upper to coarse lower grained, rare coarse upper, subangular to well rounded, frosted, moderately sorted, rare accessories, rare inclusions.	Hard red sandstone Yellow shale and hard black sandstone
5	1115			Shell fragments at 7 ft
10	1110		Sandstone, hard, buff, very fine upper to medium upper grained, rare coarse upper, subangular to well rounded, frosted, well sorted, rare accessories.	Hard black sandstone
15	1105			Green and orange shale Hard black sandstone
			Sandstone, soft, orange, very fine lower to medium lower grained, angular to well rounded, frosted, well sorted, rare inclusions.	
20	1100		Sandstone, soft, orange, very fine upper to coarse lower grained, angular to well rounded, frosted, moderately sorted, rare accessories, rare inclusions.	Gray shale lamina and hard red sandstone Brown shale lamina
				Green shale lamina
25	1095			Green shale lamina and yellow shale
				Green and orange shale
30	1090			Hard red sandstone
35			Sandstone, soft, orange-yellow, very fine lower to fine upper grained,	

End of Boring at 50 feet.
609074 m E, 4990013 m N. Coordinates are UTM Zone 15N (NAD83).
*Elevation extracted from National Elevation Dataset



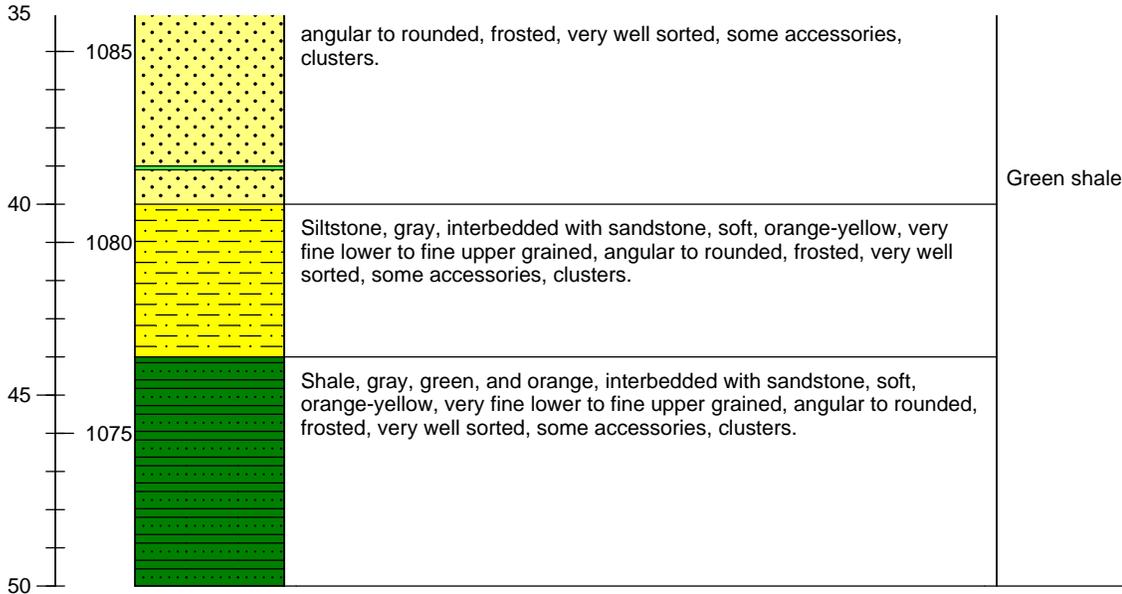
Summit Envirosolutions, Inc.
 1217 Bandana Boulevard North
 St. Paul, MN 55180-5114

Project Name : Pur Frac LLC
 Summit Project No. : 2232-0001
 Project Location : Cooks Valley Township, WI
 County : Chippewa
 Description Performed by: Brian Gulbranson
 Surface grade elevation: ~ 1,121 ft amsl

LOG OF BORING PF-5

Date : 9/24/14
 Company/Method : Thein Well/Air Rotary
 Sample Method : Grab
 Field Observer(s) : BLG
 Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
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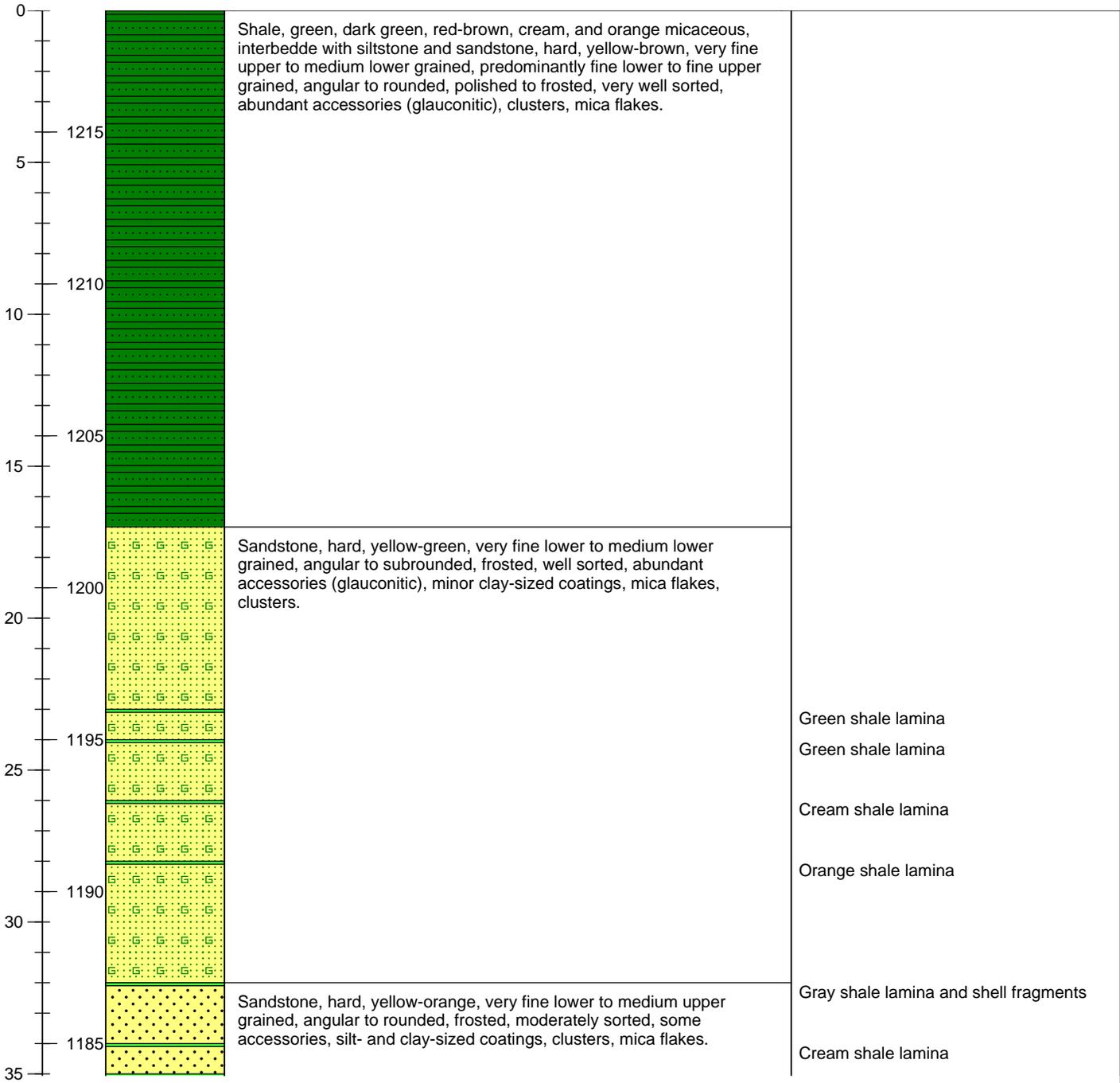
Summit Envirosolutions, Inc.
1217 Bandana Boulevard North
St. Paul, MN 55180-5114

Project Name : Pur Frac LLC
Summit Project No. : 2232-0001
Project Location : Cooks Valley Township, WI
County : Chippewa
Description Performed by: Brian Gulbranson
Surface grade elevation: ~ 1,219 ft amsl

LOG OF BORING PF-6

Date : 9/25/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
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End of Boring at 140 feet.

608594 m E, 4989315 m N. Coordinates are UTM Zone 15N (NAD83).

*Elevation extracted from National Elevation Dataset



Summit Envirosolutions, Inc.
1217 Bandana Boulevard North
St. Paul, MN 55180-5114

Project Name : Pur Frac LLC
Summit Project No. : 2232-0001
Project Location : Cooks Valley Township, WI
County : Chippewa
Description Performed by: Brian Gulbranson
Surface grade elevation: ~ 1,219 ft amsl

LOG OF BORING PF-6

Date : 9/25/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
35				Green and orange shale
				Brown shale lamina
				Yellow shale lamina
40	1180		Sandstone, soft, green, very fine lower to medium lower grained, angular to rounded, frosted, well sorted, trace accessories, silt- and clay-sized coatings, clusters.	Cream shale lamina
			Sandstone, soft, orange-yellow, very fine upper to coarse upper grained, rare very coarse lower, subangular to well rounded, frosted, moderately sorted, rare accessories, clay-sized coatings, clusters.	
45	1175			Yellow shale
				Hard red sandstone with orange micaceous shale
				Hard red sandstone with orange micaceous shale and green and orange shale
50	1170		Sandstone, hard, buff-yellow, very fine upper to coarse lower grained, subangular to well rounded, frosted, well sorted, rare inclusions, rare prefractures, minor clay-sized coatings.	
				Hard red sandstone with orange micaceous shale
				White shale lamina
				Hard red sandstone with orange micaceous shale
55	1165		Sandstone, hard, orange-yellow, fine lower to coarse upper grained, subrounded to well rounded, frosted, moderately sorted, rare inclusions, rare prefractures, silt- and clay-sized coatings, clusters.	
			Shale, green, interbedded with sandstone, hard, orange-yellow, fine lower to coarse upper grained, subrounded to well rounded, frosted, moderately sorted, rare inclusions, rare prefractures, silt- and clay-sized coatings, clusters.	Yellow micaceous shale lamina
60	1160		Sandstone, hard, buff-yellow, very fine upper to coarse upper grained, angular to well rounded, frosted, moderately sorted, rare inclusions, minor clay-sized coatings.	
				Yellow micaceous shale lamina
				Yellow micaceous shale lamina
65	1155		Sandstone, soft, yellow, very fine upper to very coarse lower grained, subangular to well rounded, frosted, moderately sorted, rare inclusions, rare prefractures, minor clay-sized coatings, clusters.	
				Yellow micaceous shale lamina
70	1150			Green and yellow micaceous shale lamina

End of Boring at 140 feet.

608594 m E, 4989315 m N. Coordinates are UTM Zone 15N (NAD83).

*Elevation extracted from National Elevation Dataset



Summit Envirosolutions, Inc.
1217 Bandana Boulevard North
St. Paul, MN 55180-5114

Project Name : Pur Frac LLC
Summit Project No. : 2232-0001
Project Location : Cooks Valley Township, WI
County : Chippewa
Description Performed by: Brian Gulbranson
Surface grade elevation: ~ 1,219 ft amsl

LOG OF BORING PF-6

Date : 9/25/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
70				Green micaceous shale lamina
				Hard red sandstone with orange micaceous shale and green and yellow micaceous shale
	1145		Shale, gray and green, interbedded with sandstone, hard, orange-yellow, fine lower to coarse upper grained, subrounded to well rounded, frosted, moderately sorted, rare inclusions, rare prefractures.	
75			Sandstone, hard, yellow-orange, very fine upper to very coarse lower grained, subangular to well rounded, frosted, poorly sorted, rare prefractures, minor clay-sized coatings, clusters.	
	1140		Shale, white, yellow, green micaceous, and gray, interbedded with sandstone, soft, tan, very fine upper to coarse upper grained, subangular to well rounded, frosted, moderately sorted, rare inclusions, clusters.	
80			Sandstone, hard, buff, fine lower to coarse lower grained, subangular to well rounded, frosted, well sorted, rare inclusions, rare prefractures, minor clay-sized coatings, clusters.	
	1135			Yellow micaceous shale lamina
85				Yellow shale
	1130		Sandstone, hard, buff, very fine upper to coarse upper grained, angular to well rounded, frosted, moderately sorted, rare inclusions, rare prefractures, minor clay-sized coatings.	Yellow micaceous shale lamina
90			Shale, yellow, green, and orange micaceous, interbedded with sandstone, hard, buff, very fine upper to coarse upper grained, angular to well rounded, frosted, moderately sorted, rare inclusions, rare prefractures, minor clay-sized coatings.	Yellow shale
	1125		Sandstone, hard, buff, fine lower to coarse upper grained, becoming very fine upper to coarse upper, subrounded to well rounded, frosted, well sorted, rare prefractures, minor clay-sized coatings.	
95				Olive shale
	1120			Yellow micaceous shale lamina
100				Green micaceous shale lamina
	1115			
105				

End of Boring at 140 feet.

608594 m E, 4989315 m N. Coordinates are UTM Zone 15N (NAD83).

*Elevation extracted from National Elevation Dataset



Summit Envirosolutions, Inc.
1217 Bandana Boulevard North
St. Paul, MN 55180-5114

Project Name : Pur Frac LLC
Summit Project No. : 2232-0001
Project Location : Cooks Valley Township, WI
County : Chippewa
Description Performed by: Brian Gulbranson
Surface grade elevation: ~ 1,219 ft amsl

LOG OF BORING PF-6

Date : 9/25/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
105			Sandstone, hard, orange, very fine upper to coarse lower grained, subangular to well rounded, frosted, moderately sorted, rare inclusions, minor silt- and clay-sized coatings, clusters.	White shale lamina
110	1110		Sandstone, hard, yellow, very fine upper to medium upper grained, subangular to well rounded, frosted, well sorted, rare inclusions, minor clay-sized coatings.	
115	1105		Sandstone, hard, yellow, very fine upper to coarse lower grained, rare coarse upper grained, subangular to well rounded, frosted, well sorted, rare inclusions, rare prefractures.	
120	1100		Sandstone, hard, gray-brown, very fine upper to coarse upper grained, angular to well rounded, frosted, moderately sorted, rare inclusions, rare prefractures.	
				Yellow micaceous shale lamina
				Yellow and orange micaceous shale lamina
125	1095		Sandstone, hard, buff-yellow, very fine upper to coarse lower grained, rare coarse upper, angular to well rounded, frosted, well sorted, rare inclusions.	
130	1090			Yellow micaceous and gray shale laminae
				Hard red sandstone
135	1085			Green and yellow micaceous shale lamina
				Green micaceous shale lamina
				Hard red sandstone with orange micaceous shale
				Yellow micaceous shale lamina
140	1080			Green shale

End of Boring at 140 feet.

608594 m E, 4989315 m N. Coordinates are UTM Zone 15N (NAD83).

*Elevation extracted from National Elevation Dataset



Summit Envirosolutions, Inc.
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Project Name : Pur Frac LLC
Summit Project No. : 2232-0001
Project Location : Cooks Valley Township, WI
County : Chippewa
Description Performed by: Brian Gulbranson
Surface grade elevation: ~ 1,152 ft amsl

LOG OF BORING PF-7

Date : 9/25/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
0			Silty clay, red-brown.	
1150			Loess, dark brown.	
5			Sandstone, soft, yellow, very fine upper to coarse upper grained, subrounded to well rounded, frosted, poorly sorted, rare accessories, silt- and clay-sized coatings, clusters.	Hard red sandstone
1145			Sandstone, soft, yellow, fine lower to very coarse lower, subrounded to well rounded, frosted, poorly sorted, rare accessories, rare inclusions, silt- and clay-sized coatings, clusters.	Brown shale
1140			Sandstone, soft, yellow-orange, fine lower to coarse lower grained, rare coarse upper, subrounded to well rounded, polished to frosted, moderately sorted, rare accessories, rare inclusions, rare prefractures, clusters.	Green shale lamina
15			Sandstone, hard, orange-yellow, very fine upper to coarse upper grained, rare very coarse lower, subangular to well rounded, frosted, moderately sorted, rare accessories, rare inclusions, clusters.	Green and orange shale
1135			Shale, green, yellow, and orange micaceous, interbedded with sandstone, hard, buff, very fine lower to medium upper grained, angular to well rounded, frosted, poorly sorted, rare accessories, silt- and clay-sized coatings, clusters.	Olive shale lamina and green micaceous shale lamina
1130			Sandstone, hard, yellow-orange, very fine lower to coarse upper grained, angular to well rounded, frosted, poorly sorted, rare accessories, rare inclusions, rare prefractures, silt- and clay-sized coatings, clusters, mica flakes.	Green and orange shale
25				Shell fragments at 29 ft
1125				Yellow shale
30				Hard red sandstone and orange micaceous shale
1120				Olive shale lamina
35				

End of Boring at 80 feet.

608566 m E, 4989799 m N. Coordinates are UTM Zone 15N (NAD83).

*Elevation extracted from National Elevation Dataset



Summit Envirosolutions, Inc.
1217 Bandana Boulevard North
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Project Name : Pur Frac LLC
Summit Project No. : 2232-0001
Project Location : Cooks Valley Township, WI
County : Chippewa
Description Performed by: Brian Gulbranson
Surface grade elevation: ~ 1,152 ft amsl

LOG OF BORING PF-7

Date : 9/25/14
Company/Method : Thein Well/Air Rotary
Sample Method : Grab
Field Observer(s) : BLG
Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
35			Sandstone, hard, yellow, very fine upper to coarse upper grained, angular to well rounded, frosted, moderately sorted, rare prefractures, minor clay-sized coatings, clusters.	Gray shale lamina
1115			Sandstone, hard, yellow-orange, very fine lower to coarse upper grained, angular to well rounded, frosted, poorly sorted, rare accessories, silt- and clay-sized coatings, clusters, mica flakes.	Green and orange shale
40			Sandstone, hard, orange-yellow, very fine upper to medium upper grained, angular to well rounded, frosted, bimodal sorting, rare accessories.	
1110			Sandstone, hard, orange, very fine upper to coarse lower grained, subangular to well rounded, frosted, poorly sorted, rare accessories, rare inclusions.	Orange micaceous shale lamina
45			Sandstone, hard, orange, very fine upper to coarse upper grained, subangular to well rounded, frosted, moderately sorted, rare inclusions, minor clay-sized coatings.	Green shale lamina
1105				
50				
1100			Sandstone, hard, orange-brown, very fine lower to coarse lower grained, angular to well rounded, frosted, poorly sorted, rare accessories, rare inclusions, clusters.	Shell fragments at 51 ft
55				
1095			Sandstone, hard, buff, fine lower to medium upper grained, subangular to well rounded, frosted, well sorted, rare accessories, rare inclusions, rare prefractures.	
60				
1090				Yellow micaceous shale lamina
65				
1085				
70			Sandstone, soft, orange, fine lower to coarse lower grained, subrounded	Hard red sandstone with orange micaceous shale and shell fragments

End of Boring at 80 feet.

608566 m E, 4989799 m N. Coordinates are UTM Zone 15N (NAD83).

*Elevation extracted from National Elevation Dataset



Summit Envirosolutions, Inc.
 1217 Bandana Boulevard North
 St. Paul, MN 55180-5114

Project Name : Pur Frac LLC
 Summit Project No. : 2232-0001
 Project Location : Cooks Valley Township, WI
 County : Chippewa
 Description Performed by: Brian Gulbranson
 Surface grade elevation: ~ 1,152 ft amsl

LOG OF BORING PF-7

Date : 9/25/14
 Company/Method : Thein Well/Air Rotary
 Sample Method : Grab
 Field Observer(s) : BLG
 Weather :

Depth in feet	ELEV (ft amsl)	GRAPHIC LOG	MAJOR LITHOLOGY DESCRIPTIONS	MINOR LITHOLOGY DESCRIPTIONS
70			to well rounded, frosted moderately sorted, rare inclusions.	
1080				Hard red sandstone with orange micaceous shale
			Sandstone, soft, orange, very fine upper to medium upper grained, angular to well rounded, frosted, well sorted, rare accessories, rare inclusions, rare prefractures, clusters.	Hard red sandstone with orange micaceous shale
75				Yellow shale
				Orange shale
1075				Green and orange shale
80				Hard red sandstone and green and orange shale