



GN Northern Inc.
 11115 E. Montgomery, Suite C
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 Telephone: (509) 248-9798
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BORING NUMBER B-6

PAGE 1 OF 1

CLIENT Swiftwater Custom Homes/Swiftwater Cellars Properties, LLC PROJECT NAME Winemaker's Cabins at Swiftwater Cellars
 PROJECT NUMBER 217-871 PROJECT LOCATION 301 Rope Rider Dr., Cle Elum, Kittitas Co., WA
 DATE STARTED 4/23/18 COMPLETED 4/23/18 GROUND ELEVATION 2227.5 ft HOLE SIZE 8 inches
 DRILLING CONTRACTOR Holt Services Inc. GROUND WATER LEVELS:
 DRILLING METHOD Terra Sonic Track-Mounted Rig AT TIME OF DRILLING —
 LOGGED BY KAH CHECKED BY KAH/MYM AT END OF DRILLING —
 NOTES Approx. GPS Coords.: 47°12'33.78"N, 120°59'56.09"W AFTER DRILLING —

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 5/24/18 16:26 - \\SEAGATE-3\FEB68\PUBLIC\4-PROJECT ARCHIVE\217-871 WINEMAKER'S CABINS AT SWIFTWATER CELLARS\217-871 LOGS.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION
0				SILTY SAND WITH GRAVEL, (SM) brown, moist to wet, [Outwash]	
5.0	RC	SM		SILTY GRAVEL WITH SAND, (GM) brown, moist, [Outwash]	2222.5
10				- becomes moist to wet	
17.5	RC	GM		SILTSTONE, light olive-gray, poorly indurated, [Roslyn Formation]	2210.0
26.0	RC			SILTSTONE/CLAYSTONE, gray, [Roslyn Formation]	2201.5
36.0	RC			SHALE, light gray to gray, [Roslyn Formation]	2191.5
40.0	RC			CARBONACEOUS SHALE with thin seams of COAL, [Roslyn Formation]	2187.5
55.0	RC			VOID	2172.5
61.0					2166.5

- SANDSTONE at bottom of void
 - Groundwater not encountered at time of drilling
 - Referenced elevations are approximate and based on plan set provided by JUB Engineers, Inc.

Bottom of borehole at 61.0 feet.



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BORING NUMBER B-7

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CLIENT Swiftwater Custom Homes/Swiftwater Cellars Properties, LLC PROJECT NAME Winemaker's Cabins at Swiftwater Cellars
 PROJECT NUMBER 217-871 PROJECT LOCATION 301 Rope Rider Dr., Cle Elum, Kittitas Co., WA
 DATE STARTED 4/23/18 COMPLETED 4/23/18 GROUND ELEVATION 2221 ft HOLE SIZE 8 inches
 DRILLING CONTRACTOR Holt Services Inc. GROUND WATER LEVELS:
 DRILLING METHOD Terra Sonic Track-Mounted Rig AT TIME OF DRILLING —
 LOGGED BY KAH CHECKED BY KAH/MYM AT END OF DRILLING —
 NOTES Approx. GPS Coords.: 47°12'34.29"N, 120°59'55.59"W AFTER DRILLING —

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 5/24/18 18:26 - INSEAGATE-3FE688PUBLIC+PROJECT ARCHIVE\17-871 WINEMAKERS CABINS AT SWIFTWATER CELLARS\17-871 LOGS.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				FILL: SILTY SAND WITH GRAVEL, (SM) brown, moist
5.0	RC	SM		SILTY SANDY GRAVEL, (GP-GM) brown, moist, [Outwash] 2216.0
12.5	RC	GP-GM		SILTSTONE, light olive-gray, poorly indurated, [Roslyn Formation] 2208.5
17.5	RC			SILTSTONE/CLAYSTONE, gray, [Roslyn Formation] 2203.5
30.0	RC			CARBONACEOUS SHALE with trace seams of COAL, [Roslyn Formation] 2191.0
46.0	RC			INTERBEDDED CARBONACEOUS SHALE and COAL, [Roslyn Formation] 2175.0
52.5	RC			VOID 2168.5
57.5				2163.5

- SANDSTONE at bottom of void
 - Groundwater not encountered at time of drilling
 - Referenced elevations are approximate and based on plan set provided by JUB Engineers, Inc.
 Bottom of borehole at 57.5 feet.



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BORING NUMBER B-8
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CLIENT Swiftwater Custom Homes/Swiftwater Cellars Properties, LLC **PROJECT NAME** Winemaker's Cabins at Swiftwater Cellars
PROJECT NUMBER 217-871 **PROJECT LOCATION** 301 Rope Rider Dr., Cle Elum, Kittitas Co., WA
DATE STARTED 4/24/18 **COMPLETED** 4/24/18 **GROUND ELEVATION** 2207 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Holt Services Inc. **GROUND WATER LEVELS:**
DRILLING METHOD Terra Sonic Track-Mounted Rig **AT TIME OF DRILLING** —
LOGGED BY KAH **CHECKED BY** KAH/MYM **AT END OF DRILLING** —
NOTES Approx. GPS Coords.: 47°12'35.07"N, 120°59'56.00"W **AFTER DRILLING** —

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 5/24/18 18:26 - N5EAGATE-3FE89NPUBLIC\4PROJECT ARCHIVE\217-871 WINEMAKER'S CABINS AT SWIFTWATER CELLARS\217-871 LOGS.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION
0				SANDY SILT, (ML) brown, moist, some gravel, [Outwash]	
10	RC	ML			
13.0	RC			SANDSTONE/SILTSTONE, gray, fine grained, hard, [Roslyn Formation]	2194.0
14.0	RC			SILTSTONE/CLAYSTONE, gray/brown, [Roslyn Formation]	2193.0
20.0	RC			CARBONACEOUS SHALE with thin seams of COAL, [Roslyn Formation]	2187.0
				- no coal seams	
28.5	RC			COAL, black, [Roslyn Formation]	2178.5
31.0	RC			CARBONACEOUS SHALE with thin seams of COAL, [Roslyn Formation]	2176.0
38.0	RC			VOID	2169.0
44.0					2163.0

- SANDSTONE at bottom of void
 - Groundwater not encountered at time of drilling
 - Referenced elevations are approximate and based on plan set provided by JUB Engineers, Inc.
 Bottom of borehole at 44.0 feet.



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BORING NUMBER B-9

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CLIENT <u>Swiftwater Custom Homes/Swiftwater Cellars Properties, LLC</u>	PROJECT NAME <u>Winemaker's Cabins at Swiftwater Cellars</u>
PROJECT NUMBER <u>217-871</u>	PROJECT LOCATION <u>301 Rope Rider Dr., Cle Elum, Kittitas Co., WA</u>
DATE STARTED <u>4/24/18</u> COMPLETED <u>4/24/18</u>	GROUND ELEVATION <u>2213 ft</u> HOLE SIZE <u>8 inches</u>
DRILLING CONTRACTOR <u>Holt Services Inc.</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>Terra Sonic Track-Mounted Rig</u>	AT TIME OF DRILLING <u>—</u>
LOGGED BY <u>KAH</u> CHECKED BY <u>KAH/MYM</u>	AT END OF DRILLING <u>—</u>
NOTES <u>Approx. GPS Coords.: 47°12'35.08"N, 120°59'56.52"W</u>	AFTER DRILLING <u>—</u>

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 5/24/18 16:26 - I\SEAGATE-3\FEB98\PUBLIC4-PROJECT ARCHIVE\217-871 WINEMAKER'S CABINS AT SWIFTWATER CELLARS\217-871 LOGS.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION
0				FILL: SILTY GRAVEL WITH SAND, (GM) brown	
3.5	RC	GM		SILTY GRAVEL WITH SAND, (GM) brown, moist, [Outwash]	2209.5
10.0	RC	GM		SILTSTONE/CLAYSTONE, moist, gray/brown, poorly indurated, [Roslyn Formation]	2203.0
22.5	RC			SILTSTONE, moist, gray, poorly indurated, [Roslyn Formation]	2190.5
25.0	RC			CARBONACEOUS SHALE with thin seams of COAL, [Roslyn Formation]	2188.0
41.5	RC			- becomes interbedded CARBONACEOUS SHALE and COAL	
52.5	RC			COAL, black, [Roslyn Formation]	2171.5
55.0	RC			SANDSTONE, gray, [Roslyn Formation]	2160.5
					2158.0

- Groundwater not encountered at time of drilling
 - Referenced elevations are approximate and based on plan set provided by JUB Engineers, Inc.
 Bottom of borehole at 55.0 feet.



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BORING NUMBER B-10

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CLIENT Swiftwater Custom Homes/Swiftwater Cellars Properties, LLC **PROJECT NAME** Winemaker's Cabins at Swiftwater Cellars
PROJECT NUMBER 217-871 **PROJECT LOCATION** 301 Rope Rider Dr., Cle Elum, Kittitas Co., WA
DATE STARTED 4/24/18 **COMPLETED** 4/24/18 **GROUND ELEVATION** 2226.5 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Holt Services Inc. **GROUND WATER LEVELS:**
DRILLING METHOD Terra Sonic Track-Mounted Rig **AT TIME OF DRILLING** ---
LOGGED BY KAH **CHECKED BY** KAH/MYM **AT END OF DRILLING** ---
NOTES Approx. GPS Coords.: 47°12'33.58"N, 120°59'54.90"W **AFTER DRILLING** ---

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 5/24/18 16:26 - \\SEAGATE-3\FEB86\PUBLIC\4-PROJECT ARCHIVE\217-871 WINEMAKER'S CABINS AT SWIFTWATER CELLARS\217-871 LOGS.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION
0				SANDY SILT, (ML) brown, moist, some gravel, and roots, [Outwash]	
4.0	RC	ML		SANDY SILT, (ML) brown, moist, some gravel, and roots, [Outwash]	2222.5
10.0				SILTY SANDY GRAVEL, (GP-GM) brown olive, moist, [Outwash]	
10.0	RC	GP-GM		SILTY SANDY GRAVEL, (GP-GM) brown olive, moist, [Outwash]	2216.5
15.0				SANDY SILT, (ML) brown, moist to wet, some clay, [Outwash]	
15.0	RC	ML		SANDY SILT, (ML) brown, moist to wet, some clay, [Outwash]	2211.5
20.0				SILTY SAND, (SM) brown, moist, some gravel, [Outwash]	
20.0	RC	SM		SILTY SAND, (SM) brown, moist, some gravel, [Outwash]	2206.5
33.0				SILTSTONE, gray, [Roslyn Formation]	
33.0	RC			SILTSTONE, gray, [Roslyn Formation]	2193.5
33.0	RC			CARBONACEOUS SHALE with thin seams of COAL, [Roslyn Formation]	2193.5
40	RC			- increasing coal content	
55.0				COAL, black, [Roslyn Formation]	
55.0	RC			COAL, black, [Roslyn Formation]	2171.5
60.5				SANDSTONE, gray, [Roslyn Formation]	
60.5	RC			SANDSTONE, gray, [Roslyn Formation]	2166.0
62.0				SANDSTONE, gray, [Roslyn Formation]	
62.0	RC			SANDSTONE, gray, [Roslyn Formation]	2164.5

- Groundwater not encountered at time of drilling
 - Referenced elevations are approximate and based on plan set provided by JUB Engineers, Inc.

Bottom of borehole at 62.0 feet.



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BORING NUMBER B-11

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CLIENT Swiftwater Custom Homes/Swiftwater Cellars Properties, LLC **PROJECT NAME** Winemaker's Cabins at Swiftwater Cellars
PROJECT NUMBER 217-871 **PROJECT LOCATION** 301 Rope Rider Dr., Cle Elum, Kittitas Co., WA
DATE STARTED 4/25/18 **COMPLETED** 4/25/18 **GROUND ELEVATION** 2219 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Holt Services Inc. **GROUND WATER LEVELS:**
DRILLING METHOD Terra Sonic Track-Mounted Rig **AT TIME OF DRILLING** ---
LOGGED BY KAH **CHECKED BY** KAH/MYM **AT END OF DRILLING** ---
NOTES Approx. GPS Coords.: 47°12'34.05"N, 120°59'54.89"W **AFTER DRILLING** ---

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 5/24/18 16:26 - \\SEAGATE-3\FEB66\PUBLIC\14-PROJECT ARCHIVE\217-871 WINEMAKER'S CABINS AT SWIFTWATER CELLARS\217-871 LOGS.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION
0				FILL: SANDY SILT, (ML) brown, moist to wet, some gravel	
	RC	ML	[Symbol]		2214.0
5.0				SILTY SAND WITH GRAVEL, (SM) brown, damp to moist, [Outwash]	
	RC	SM	[Symbol]		2209.0
10.0				SILTSTONE/CLAYSTONE, olive-brown, moist, poorly indurated, [Roslyn Formation]	
	RC		[Symbol]		2200.0
19.0				SILTSTONE, gray, poorly indurated, [Roslyn Formation]	
	RC		[Symbol]		2189.0
30.0				CARBONACEOUS SHALE with thin seams of COAL, [Roslyn Formation]	
	RC		[Symbol]		2180.5
38.5				COAL, black, [Roslyn Formation]	
	RC		[Symbol]		2177.0
42.0				VOID	
					2171.0
48.0					

- SANDSTONE at bottom of void
 - Groundwater not encountered at time of drilling
 - Referenced elevations are approximate and based on plan set provided by JUB Engineers, Inc.
 Bottom of borehole at 48.0 feet.



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BORING NUMBER B-12

PAGE 1 OF 1

CLIENT Swiftwater Custom Homes/Swiftwater Cellars Properties, LLC **PROJECT NAME** Winemaker's Cabins at Swiftwater Cellars
PROJECT NUMBER 217-871 **PROJECT LOCATION** 301 Rope Rider Dr., Cle Elum, Kittitas Co., WA
DATE STARTED 4/25/18 **COMPLETED** 4/25/18 **GROUND ELEVATION** 2197.5 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Holt Services Inc. **GROUND WATER LEVELS:**
DRILLING METHOD Terra Sonic Track-Mounted Rig **AT TIME OF DRILLING** —
LOGGED BY KAH **CHECKED BY** KAH/MYM **AT END OF DRILLING** —
NOTES Approx. GPS Coords.: 47°12'28.68"N, 120°59'45.62"W **AFTER DRILLING** —

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 5/24/18 18:26 - NSEAGATE-3FE866PUBLCV4-PROJECT ARCHIVE\217-871 WINEMAKERS CABINS AT SWIFTWATER CELLARS\217-871 LOGS.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION
0					
2.0		ML	[Dotted pattern]	SILT, (ML) brown, wet	2195.5
6.0	RC	ML	[Dotted pattern]	SANDY SILT, (ML) brown, moist	2191.5
10.0		SM	[Dotted pattern]	SILTY SAND, (SM) brown, fine grained, moist, some clay	2187.5
16.0	RC		[Cross-hatched pattern]	SILTSTONE/CLAYSTONE, olive-brown, poorly indurated, [Roslyn Formation]	2181.5
19.0			[Cross-hatched pattern]	SILTSTONE, gray, [Roslyn Formation]	2178.5
20.0	RC		[Cross-hatched pattern]	CARBONACEOUS SHALE with trace seams of COAL, [Roslyn Formation]	2178.5
30.0	RC		[Cross-hatched pattern]	- increasing coal content	
42.0	RC		[Cross-hatched pattern]		2155.5
48.0				VOID	2149.5

- SANDSTONE at bottom of void
 - Groundwater not encountered at time of drilling
 - Referenced elevations are approximate and based on plan set provided by JUB Engineers, Inc.
 Bottom of borehole at 48.0 feet.



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BORING NUMBER B-13

PAGE 1 OF 1

CLIENT Swiftwater Custom Homes/Swiftwater Cellars Properties, LLC **PROJECT NAME** Winemaker's Cabins at Swiftwater Cellars
PROJECT NUMBER 217-871 **PROJECT LOCATION** 301 Rope Rider Dr., Cle Elum, Kittitas Co., WA
DATE STARTED 4/25/18 **COMPLETED** 4/25/18 **GROUND ELEVATION** 2186.5 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Holt Services Inc. **GROUND WATER LEVELS:**
DRILLING METHOD Terra Sonic Track-Mounted Rig **AT TIME OF DRILLING** —
LOGGED BY KAH **CHECKED BY** KAH/MYM **AT END OF DRILLING** —
NOTES Approx. GPS Coords.: 47°12'29.10"N, 120°59'44.80"W **AFTER DRILLING** —

















GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 5/24/18 18:26 - ISEAGATE-3FEB989PUBLICM-PROJECT ARCHIVE217-871 WINEMAKERS CABINS AT SWIFTWATER CELLARS217-871 LOGS.GPJ











DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION
0					
2.5	RC	ML	[Symbol]	SILT, (ML) brown	2184.0
10.0	RC	SM	[Symbol]	SILTY SAND, (SM) light brown	2176.5
15.0	RC	ML	[Symbol]	SILT, (ML) olive, moist	2171.5
18.0	RC		[Symbol]	SILTSTONE, gray, [Roslyn Formation]	2168.5
20.0	RC		[Symbol]	CARBONACEOUS SHALE, [Roslyn Formation]	
30.0	RC		[Symbol]	- some seams of COAL	
38.0	RC		[Symbol]	- increasing coal content	2148.5
40.0			[Symbol]	COAL, black, [Roslyn Formation]	2146.5

- SANDSTONE at bottom of void
 - Groundwater not encountered at time of drilling
 - Referenced elevations are approximate and based on plan set provided by JUB Engineers, Inc.
 Bottom of borehole at 40.0 feet.

KEY CHART

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE					
COARSE-GRAINED SOILS			FINE-GRAINED SOILS		
DENSITY	N (BLOWS/FT)	FIELD TEST	CONSISTENCY	N (BLOWS/FT)	FIELD TEST
Very Loose	0 – 4	Easily penetrated with ½-inch reinforcing rod pushed by hand	Very Soft	0 – 2	Easily penetrated several inches by thumb
Loose	4 – 10	Difficult to penetrate with ½-inch reinforcing rod pushed by hand	Soft	2 – 4	Easily penetrated one inch by thumb
Medium -Dense	10 – 30	Easily penetrated with ½-inch rod driven with a 5-lb hammer	Medium-Stiff	4 – 8	Penetrated over ½-inch by thumb with moderate effort
Dense	30 – 50	Difficult to penetrate with ½-inch rod driven with a 5-lb hammer	Stiff	8 – 15	Indented about ½-inch by thumb but penetrated with great effort
Very Dense	> 50	penetrated only a few inches with ½-inch rod driven with a 5-lb hammer	Very Stiff	15 – 30	Readily indented by thumb
			Hard	> 30	Indented with difficulty by thumbnail

USCS SOIL CLASSIFICATION					
MAJOR DIVISIONS			GROUP DESCRIPTION		
Coarse-Grained Soils <50% passes #200 sieve	Gravel and Gravelly Soils <50% coarse fraction passes #4 sieve	Gravel (with little or no fines)		GW	Well-graded Gravel
		Gravel (with >12% fines)		GP	Poorly Graded Gravel
		Sand (with little or no fines)		GM	Silty Gravel
		Sand (with >12% fines)		GC	Clayey Gravel
	Sand and Sandy Soils >50% coarse fraction passes #4 sieve	Sand (with little or no fines)		SW	Well-graded Sand
		Sand (with >12% fines)		SP	Poorly graded Sand
Sand (with >12% fines)			SM	Silty Sand	
Sand (with >12% fines)			SC	Clayey Sand	
Fine-Grained Soils >50% passes #200 sieve	Silt and Clay Liquid Limit < 50			ML	Silt
	Silt and Clay Liquid Limit < 50			CL	Lean Clay
	Silt and Clay Liquid Limit < 50			OL	Organic Silt and Clay (low plasticity)
	Silt and Clay Liquid Limit > 50			MH	Inorganic Silt
	Silt and Clay Liquid Limit > 50			CH	Inorganic Clay
Silt and Clay Liquid Limit > 50			OH	Organic Clay and Silt (med. to high plasticity)	
Highly Organic Soils				PT	Peat
				Top Soil	

LOG SYMBOLS		
	2S	2" OD Split Spoon (SPT)
	3S	3" OD Split Spoon
	NS	Non-Standard Split Spoon
	ST	Shelby Tube
	CR	Core Run
	BG	Bag Sample
	TV	Torvane Reading
	PP	Penetrometer Reading
	NR	No Recovery
	GW	Groundwater Table

MODIFIERS	
DESCRIPTION	RANGE
Trace	<5%
Little	5% – 12%
Some	>12%

MOISTURE CONTENT	
DESCRIPTION	FIELD OBSERVATION
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but not visible water
Wet	Visible free water

SOIL CLASSIFICATION INCLUDES
1. Group Name
2. Group Symbol
3. Color
4. Moisture content
5. Density / consistency
6. Cementation
7. Particle size (if applicable)
8. Odor (if present)
9. Comments

MAJOR DIVISIONS WITH GRAIN SIZE							
SIEVE SIZE							
12"	3"	3/4"	4	10	40	200	
GRAIN SIZE (INCHES)							
12	3	0.75	0.19	0.079	0.0171	0.0029	
Boulders	Cobbles	Gravel		Sand			Silt and Clay
		Coarse	Fine	Coarse	Medium	Fine	

Conditions shown on boring and testpit logs represent our observations at the time and location of the fieldwork, modifications based on lab test, analysis, and geological and engineering judgment. These conditions may not exist at other times and locations, even in close proximity thereof. This information was gathered as part of our investigation, and we are not responsible for any use or interpretation of the information by others.



Drilling operations at borehole B-6 in Area 1



Samples obtained from borehole B-6



Drilling operations at borehole B-7 in Area 1



Samples obtained from borehole B-7



Drilling operations at borehole B-8 in Area 1



Drilling operations at borehole B-8 in Area 1



Samples obtained from borehole B-8



Drilling operations at borehole B-9 in Area 1



Samples obtained from borehole B-9



Drilling operations at borehole B-10 in Area 1



Samples obtained from borehole B-10



Drilling operations at borehole B-12 in Area 2



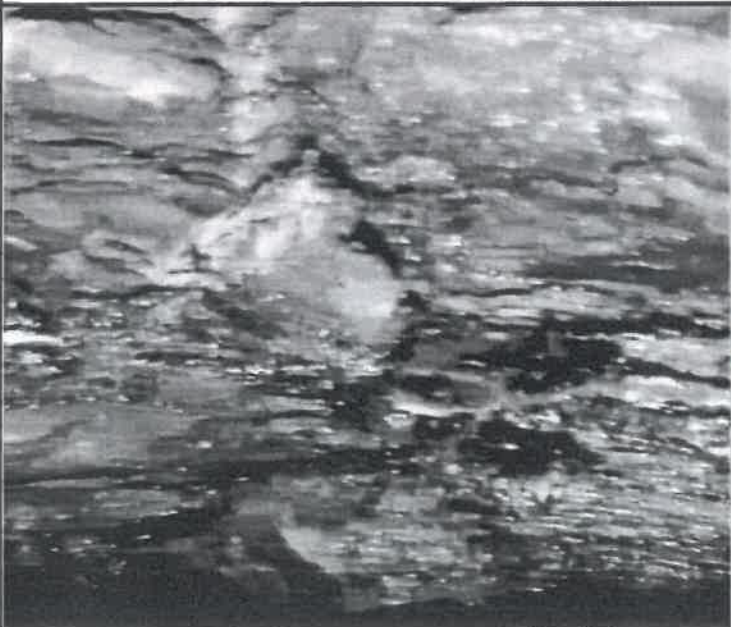
Samples obtained from borehole B-12



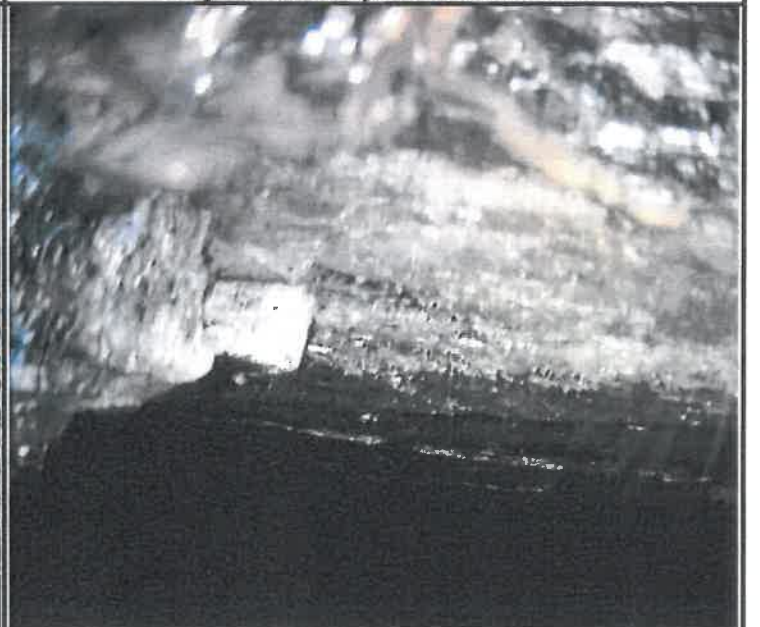
Drilling operations at borehole B-13 in Area 2



Samples obtained from borehole B-13



Roof of open mine shaft within boring B-6



Roof of open mine shaft within boring B-7



Side-wall of open mine shaft within boring B-7



04/23/2018 17:38:36

Floor of open mine shaft within boring B-7



04/24/2018

Side-wall & floor of open mine shaft within boring B-8



04/24/2018

Side-wall & floor of open mine shaft within boring B-8



Floor of open mine shaft within boring B-8



Floor of open mine shaft within boring B-8



Roof of open mine shaft within boring B-11



Floor of open mine shaft within boring B-11



Global Geophysics

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June 4, 2018

Our ref: 108-0323.000

GN Northern, Inc.
722 North 16th Avenue, Suite 31
Yakima, WA 98902

Attention: Mr. Imran Magsi

RE: REPORT FOR THE 2ND PHASE GRAVITY SURVEY TO LOCATE MINE WORKINGS AT SUNCADIA PROPERTY, CLE ELUM, WA

Dear Mr. Magsi:

This letter report presents the results of the geophysical survey performed by Global Geophysics in May 2018 at Suncadia Property, Cle Elum, WA. The objective of the 2nd phase study was to better define the boundaries of mine workings.

GEOPHYSICAL METHODS, INSTRUMENTATION AND FIELD PROCEDURES

The micro-gravity was for locating low density zones such as voids and tunnel.

Micro-gravity

The gravimeter instrument measures the earth's gravitational acceleration. After corrections are made to the gravity measurements for latitude, elevation, tide, drift, regional trend, and terrain at each station, the gravity values represents an excess or deficiency in mass of the subsurface geology.

For this study, gravity measurements were made with a Burris gravity meter (or equivalent) that has a reading resolution of 5 microgal (μgals) and a standard deviation of less than 10 μgals . The average value of gravity on the Earth's surface is 980 milligals. Gravity readings were taken at 10 foot spacing. Data were recorded in a field notebook and stored digitally in the instrument, then downloaded to a laptop computer daily. The computer programs GravMaster and GravModeler were used to process and model the gravity data. Tide, free-air, latitude, Bouguer, drift, regional trend removal, and terrain corrections were applied to the readings.

RESULTS

The gravity data were collected at 82 stations. The gravity stations in Washington State Plane North are shown in Figure 1. After tide and elevation correction, the gravity contour plans are presented in Figure 2. The low gravity zone is outlined. The cause of this low gravity anomaly is likely due to the presence of void and/or increased soil thickness. The linear higher gravity anomaly (dashed brown line) is interpreted as un-mined coal based on B9.

LIMITATION OF GEOPHYSICAL METHODS

Global Geophysics services will be conducted in a manner consistent with the level of care and skill ordinarily exercised by other members of the geophysical community currently practicing under similar conditions subject to the time limits and financial and physical constraints applicable to the services. However, micro-gravity is a remote sensing geophysical method that may not detect all subsurface conditions. Where interpretation from geophysical data is an important element for cost or safety of operations, the data and interpretations should always be checked for reasonableness against known or expected subsurface data, and verified at critical locations by physical means such as borings or excavation.

Sincerely,

Global Geophysics



John Liu, Ph.D., R.G.
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