OGMCOAL DNR <ogmcoal@utah.gov>

Fwd: Grassy Trail Inclinometer Installation

Daron Haddock <daronhaddock@utah.gov> Mon, Oct 2, 2017 at 7:36 AM
To: OGMCOAL DNR <ogmcoal@utah.gov>

---------- Forwarded message ----------
From: **Madsen, Karin** <kmadsen@coalsource.com>
Date: Thu, Sep 28, 2017 at 11:08 AM
Subject: Grassy Trail Inclinometer Installation
To: "Steve Christensen <stevechristensen@utah.gov> (stevechristensen@utah.gov)" <stevechristensen@utah.gov>, "Daron Haddock <daronhaddock@utah.gov> (daronhaddock@utah.gov)" <daronhaddock@utah.gov>
Cc: "Hibbs, David" <dhibbs@coalsource.com>

Good Morning,

RB&G Engineering has completed the installation of the 2 inclinometers we agreed to install to complete the requirements for the cessation of seismic monitoring at Grassy Trail Dam.

Please call me with any questions regarding this installation.

Thanks,

Karin Odendahl-Madsen

Environmental Engineering Technician

UtahAmerican Energy Inc.

435-888-4026

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Daron R. Haddock

Coal Program Manager
Utah Division of Oil, Gas & Mining
(801) 538-5325

Memo.09-25-17.pdf
3692K

Grassy Trail
Inclinometers

Carbon County, Utah

RB&G
ENGINEERING, INC.

1435 West 820 North
Provo, Utah 84601
801-374-5771 Provo
801-521-5771 Salt Lake City
801-374-5773 Fax

MEMORANDUM

To: West Ridge Resources

From: Brad Price, P.E.

Date: September 25, 2017

New inclinometers were installed between September 5th and September 12th, 2017 to replace Inclinometers 2 and 3. Inclinometer 2A was installed adjacent to Inclinometer 2 at about Station 5+05. Inclinometer 3A was installed about 15 feet west of Inclinometer 3 at about Station 7+29.

Attached is a Vicinity Map and Site Plan showing the inclinometer locations. Also included is a copy of the boring logs and photos of the core recovered from each boring, along with the 1998 boring logs showing lithology of the embankment and overburden soils.

If there are any questions regarding the information contained herein, please call.

RB&G ENGINEERING, INC.

Bradford E. Price

Bradford E. Price, P.E.

RB&G ENGINEERING, INC.

Figure 1 VICINITY MAP

Grassy Trail Dam Inclinometer Replacement

Carbon County, Utah

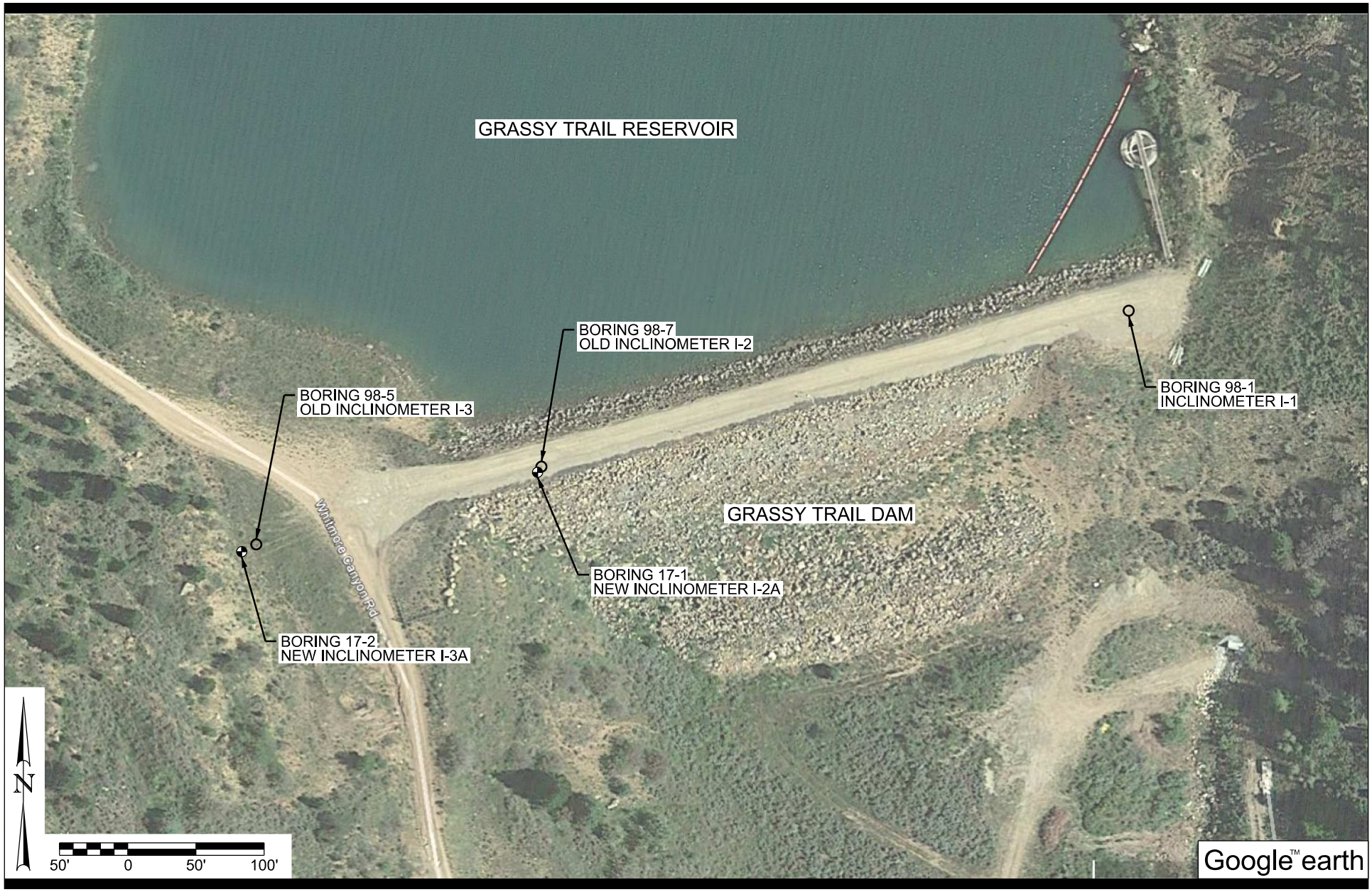

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Figure 2 SITE PLAN & TEST HOLE / INCLINOMETER LOCATIONS

Grassy Trail Dam Inclinometer Replacement

Carbon County, Utah

DRILL HOLE LOG

BORING NO. 17-1 / I-2A

PROJECT: GRASSY TRAIL DAM INCLINOMETER REPLACEMENT
CLIENT:
LOCATION: STATION ~5+05, DAM CREST NEAR RIGHT ABUTMENT
DRILLING METHOD: 08-CME-55 / H.S.A. TO 50', 3-7/8" TO 111', H.Q. CORE
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ▽ 20.0' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200404.006
DATE STARTED: 9/5/17
DATE COMPLETED: 9/12/17
GROUND ELEVATION:
LOGGED BY: M. HANSEN

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Sample Rec. (in)	Sample See Legend	Sample USCS (AASHTO)	Material Description	Inclinometer Installation Detail
							DAM EMBANKMENT (not sampled) See Test Hole 98-7 for Lithology	4"x4" Locking Cover w/2' Stickup; Grout & Bentonite Mixture; 2.75" Inclinometer Casing
							NATIVE ALLUVIUM (not sampled)	

Depth scale: 5, 10, 15, 20, 25, 30, 35, 40, 45

▽ 20

DH_LOG_V8-2014-1 GRASSYTRAIL_2017.GPJ US EVAL.GDT 9/20/17

RB&G ENGINEERING, INC.

LEGEND:

2" OD Split Spoon (SPT)
2.5" OD Split Spoon
3" OD Split Spoon

Split Spoon Sample: 2,3,2,(6) — Blow Count per 6"; $(N_1)_{60}$ Value; *T 0.45* — Torvane (tsf); *PP 2.0* — Pocket Penetrometer (tsf); * — With Liners
Core: 95,60 — Percent Recovery, R.Q.D.
Thin-Walled Tube Sample: Pushed; *T 0.45* — Torvane (tsf); *PP 2.0* — Pocket Penetrometer (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride
Hyd. = Hydrometer

DRILL HOLE LOG

BORING NO. 17-1 / I-2A

PROJECT: GRASSY TRAIL DAM INCLINOMETER REPLACEMENT
CLIENT:
LOCATION: STATION ~5+05, DAM CREST NEAR RIGHT ABUTMENT
DRILLING METHOD: 08-CME-55 / H.S.A. TO 50', 3-7/8" TO 111', H.Q. CORE
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ▽ 20.0' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200404.006
DATE STARTED: 9/5/17
DATE COMPLETED: 9/12/17
GROUND ELEVATION:
LOGGED BY: M. HANSEN

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Sample Rec. (in)	Sample See Legend	Sample USCS (AASHTO)	Material Description	
	55							
	60							Grout & Bentonite Mixture
	65							
	70							
	75						NATIVE ALLUVIUM (not sampled)	2.75" Inclinometer Casing
	80							
	85							
	90							
	95							

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RB&G ENGINEERING, INC.

LEGEND:

2" OD Split Spoon (SPT)
2.5" OD Split Spoon
3" OD Split Spoon

Split Spoon Sample: 2,3,2,(6) — Blow Count per 6"; $(N_1)_{60}$ Value; *T 0.45* — Torvane (tsf); *PP 2.0* — Pocket Penetrometer (tsf); * With Liners
Core: 95,60 — Percent Recovery, R.Q.D.
Thin-Walled Tube Sample: Pushed; *T 0.45* — Torvane (tsf); *PP 2.0* — Pocket Penetrometer (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
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Chem. = pH, Resistivity, Sulfate, Chloride
Hyd. = Hydrometer

DRILL HOLE LOG

BORING NO. 17-1 / I-2A

PROJECT: GRASSY TRAIL DAM INCLINOMETER REPLACEMENT
CLIENT:
LOCATION: STATION ~5+05, DAM CREST NEAR RIGHT ABUTMENT
DRILLING METHOD: 08-CME-55 / H.S.A. TO 50', 3-7/8" TO 111', H.Q. CORE
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ▽ 20.0' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200404.006
DATE STARTED: 9/5/17
DATE COMPLETED: 9/12/17
GROUND ELEVATION:
LOGGED BY: M. HANSEN

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Sample Rec. (in)	Sample See Legend	Sample USCS (AASHTO)	Material Description	
	105							
	110						ALLUVIUM	
	115							Grout & Bentonite Mixture
	120			43	Core 72,32	-	-	
						-	MUDSTONE	
						-	lt. brown, avg. hard rock — SANDSTONE W/CLAY SEAMS	
	125							2.75" Inclinometer Casing
				60	Core 100,100		lt. gray, avg. hard rock — SANDSTONE	
	130					-	lt. gray, avg. hard rock	
				54	Core 90,54	-	~~gray, ext. soft rock~~ — CLAYEY SHALEY MUDSTONE	
						-	gray, very soft rock — SHALEY MUDSTONE	
						-	~~gray~~ — MUDSTONE shaley clayey layers	
						-	brown-gray — MUDDY SILTSTONE	
	135					-	lt. brown — SHALEY MUDSTONE shell fragments	
				62	Core 104,92	-	gray — MUDSTONE marble texture	
						-	dk. gray — SILTSTONE some shell fragments	
						-	gray — MUDSTONE shell fragments	Grout Valve
							MUDSTONE shaley lenses	Sluff
	140						BOH	
	145							

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LEGEND:

- 2" OD Split Spoon (SPT)
- 2.5" OD Split Spoon
- 3" OD Split Spoon
- Split Spoon Sample
- Core
- Thin-Walled Tube Sample

2,3,2,(6) ← Blow Count per 6" $(N_1)_{60}$ Value
T 0.45 ← Torvane (tsf)
PP 2.0 ← Pocket Penetrometer (tsf)
With Liners
Core 95,60 ← Percent Recovery, R.Q.D.
Pushed
T 0.45 ← Torvane (tsf)
PP 2.0 ← Pocket Penetrometer (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride
Hyd. = Hydrometer

RB&G ENGINEERING, INC.

DRILL HOLE LOG

BORING NO. 17-2 / I-3A

PROJECT: GRASSY TRAIL DAM INCLINOMETER REPLACEMENT
CLIENT:
LOCATION: STATION ~7+29, RIGHT ABUTMENT
DRILLING METHOD: 08-CME-55 / H.S.A. TO 39.5', H.Q. CORE
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ▽ 18.0' **AFTER 24 HOURS:** ▼ 18.0'

PROJECT NUMBER: 200404.006
DATE STARTED: 9/6/17
DATE COMPLETED: 9/8/17
GROUND ELEVATION:
LOGGED BY: M. HANSEN

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Sample Rec. (in)	Sample See Legend	Sample USCS (AASHTO)	Material Description		Inclinometer Installation Detail
							ALLUVIUM (not sampled) See Test Hole 98-5 for Lithology		4"x4" Locking Cover w/2' Stickup
	5								
	10								Grout & Bentonite Mixture
	15								
	▽▼								
	20						BEDROCK - MUDSTONE, SANDSTONE & SOME SILTSTONE		2.75" Inclinometer Casing
	25								
	30								
	35								
	40			60	Core 100,96	-	red-brown	MUDSTONE w/some green	
						-	lt. green	SILTY MUDSTONE	
						-	lt. green	SILTY SANDSTONE some siltstone layers	

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LEGEND:

- 2" OD Split Spoon (SPT)
- 2.5" OD Split Spoon
- 3" OD Split Spoon

Split Spoon Sample: 2,3,2,(6) — Blow Count per 6" $(N_1)_{60}$ Value; *T 0.45* — Torvane (tsf); *PP 2.0* — Pocket Penetrometer (tsf); * — With Liners

Core: 95,60 — Percent Recovery, R.Q.D.

Thin-Walled Tube Sample: Pushed; *T 0.45* — Torvane (tsf); *PP 2.0* — Pocket Penetrometer (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride
Hyd. = Hydrometer

RB&G ENGINEERING, INC.

DRILL HOLE LOG

BORING NO. 17-2 / I-3A

PROJECT: GRASSY TRAIL DAM INCLINOMETER REPLACEMENT

CLIENT:

LOCATION: STATION ~7+29, RIGHT ABUTMENT

DRILLING METHOD: 08-CME-55 / H.S.A. TO 39.5', H.Q. CORE

DRILLER: T. KERN

DEPTH TO WATER - INITIAL: ▽ 18.0' **AFTER 24 HOURS:** ▼ 18.0'

PROJECT NUMBER: 200404.006

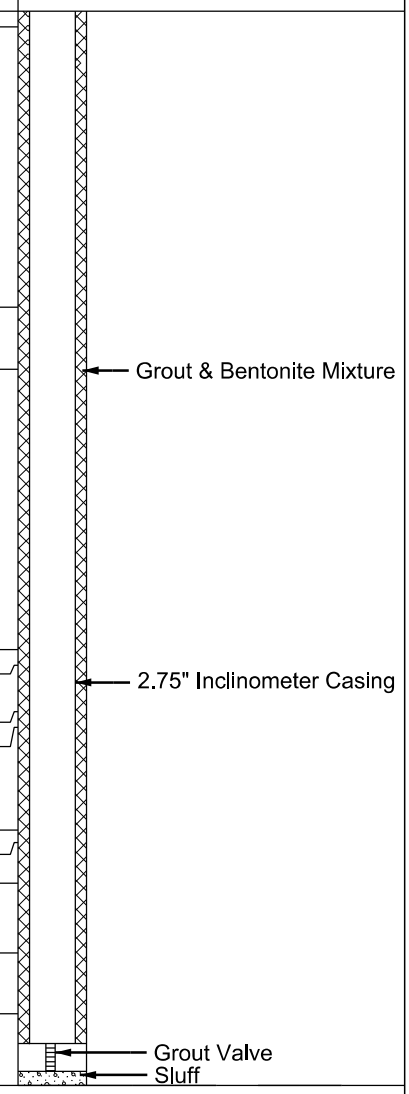
DATE STARTED: 9/6/17

DATE COMPLETED: 9/8/17

GROUND ELEVATION:

LOGGED BY: M. HANSEN

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	
				60		-	lt. green	
				60	Core 100,100	-	lt. brown, soft rock to avg. hard rock	SANDSTONE
	50			59	Core 98,98	-	lt. brown, soft rock to avg. hard rock	
	55					-	lt. gray, soft rock to avg. hard rock	SANDSTONE some carbonaceous lenses
				62	Core 104,85	-	lt. brown, soft rock to avg. hard rock	
	60			60	Core 100,62	-	lt. brown, soft rock to avg. hard rock	SANDSTONE 100% water loss at 61', open fracture w/staining at 61'-62.5'
	65			36	Core 120,43	-	brown, very soft rock to avg. hard rock	SANDSTONE TO MUDSTONE
						-	white, very soft rock to avg. hard rock	CLAYSTONE TO DRY CLAY some siltstone & sandstone layers
				30	Core 100,88	-	black-gray, very soft rock to avg. hard rock	MUDSTONE W/PYRITE
	70					-	gray, avg. hard rock	SILTSTONE some bioturbation
				63	Core 105,88	-	very soft rock	SHALEY MUDSTONE
						-	lt. gray-green, soft rock	SILTY MUDSTONE
						-	lt. gray, soft rock	SILTSTONE fracture w/clay infilling at 73.9'-75'
	75					-	lt. gray, soft rock	
				61	Core 102,70	-	lt. gray-green, soft rock	MUDSTONE
						-	red-brown, very soft rock	SHALEY MUDSTONE highly fractured
	80							BOH
	85							



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RB&G ENGINEERING, INC.

LEGEND:

- 2" OD Split Spoon (SPT)
- 2.5" OD Split Spoon
- 3" OD Split Spoon
- Split Spoon Sample
- Core
- Thin-Walled Tube Sample

2,3,2,(6) — Blow Count per 6"; $(N_1)_{60}$ Value
T 0.45 — Torvane (tsf)
PP 2.0 — Pocket Penetrometer (tsf)
Core — With Liners
95,60 — Percent Recovery, R.Q.D.
Pushed
T 0.45 — Torvane (tsf)
PP 2.0 — Pocket Penetrometer (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride
Hyd. = Hydrometer

Top
119.5’

HQ size core

Bottom 139.5’

RB&G ENGINEERING, INC.

Figure *Core - Drill Hole #17-01*
Project *Grassy Trail Dam Site*
Location *Carbon County, Utah*

Top 39.5’

Bottom 79.5’

HQ size core, core box 2 ft long

RB&G ENGINEERING, INC.

Figure *Core - Drill Hole #17-02*
Project *Grassy Trail Dam Site*
Location *Carbon County, Utah*

Project: GRASSY TRAIL DAM	Project Number: 9712.000	Boring No.: 98-5 Inclinometer No. 3 Sheet 1 of 2
Client: CREAMER & NOBLE ENGINEERS	Logged By: M. HANSEN, V.N.B.	
Boring Depth (ft.): 54 / Elev: 7601.4'	Driller: B. HARTLEY	Starting Date: 3/18/98
Equip./Drill Method: CME-55 / H.S. AUGER TO 5', ROTARY WASH N.W. CASING TO 10', N.Q. CORE		Ending Date: 3/18/98

Elev. (Feet)	Depth (Feet)	Lith-ology	Smpl.	USCS	Blow-counts	Material Description	Incl. No. 3	Comments
7600						Reddish-Brown Sandy Clay W/Gravel		Slope Indicator Pipe
				CL-1	5,9,14			
	5							Low Strength Cement Grout
7595						Bedrock		
	10			CL-2	37,61/5"	Interbedded Light Green and Reddish-Brown Weathered Mudstone (Shale)		
7590					CORE 97,60			
	15							
7585					CORE 80,38			
	20					W/Some Interbedded Gravel		
7580					CORE 94,62	Light Green Fractured Mudstone		
	25							
7575					CORE 100,82			
	30					Blue-Gray Mudstone to Claystone W/Some Brown Layers		
7570					CORE 100,89			
	35					Very Soft Mudstone		
7565					CORE 100,72	Dark Red-Brown Shaley Mudstone		
	40							
7560					CORE 99,76	Blue-Gray Mudstone to Siltstone		
	45					Yellow-Greenish-Brown Sandstone W/Some Fractures		
7555					CORE 100,86			

LEGEND

- 2,3,2 — Blow Count per 6"
- 0.45 — Torvane (tsf)
- Disturbed Sample
- Core 100,60 — Rock Quality Designation (RQD)
- Percent Sample Recovery
- Undisturbed Sample
- Groundwater Elevation

RB&G ENGINEERING INC.
Provo, Utah

Project: GRASSY TRAIL DAM	Project Number: 9712.000	Boring No.: 98-5 Inclinometer No. 3 Sheet 2 of 2
Client: CREAMER & NOBLE ENGINEERS	Logged By: M. HANSEN, V.N.B.	
Boring Depth (ft.): 54	Elev: 7601.4'	Driller: B. HARTLEY	Starting Date: 3/18/98
Equip./Drill Method: CME-55 / H.S. AUGER TO 5', ROTARY WASH N.W. CASING TO 10', N.Q. CORE		Ending Date: 3/18/98

Elev. (Feet)	Depth (Feet)	Lith-ology	Smpl.	USCS	Blow-counts	Material Description	Incl. No. 3	Comments
7550					CORE 100,70	100% Water Loss Yellow-Grayish-Brown Sandstone W/Fractures		Inclinometer #3 Low Strength Cement Grout Sluff
7545	55							
7540	60							
7535	65							
7530	70							
7525	75							
7520	80							
7515	85							
7510	90							
7505	95							

LEGEND

- 2,3,2 — Blow Count per 6"
- 0.45 — Torvane (tsf)
- Disturbed Sample
- Core 100,60 — Rock Quality Designation (RQD); Percent Sample Recovery
- Undisturbed Sample
- Groundwater Elevation

RB&G ENGINEERING INC.
Provo, Utah

Project: GRASSY TRAIL DAM		Project Number: 9712.000	Boring No.: 98-7 Inclinometer No. 2 Sheet 1 of 3
Client: CREAMER & NOBLE ENGINEERS		Logged By: M. STILSON, M. HANSEN, V.N.B.	
Boring Depth (ft.): 132.4	Elev: 7600.2'	Driller: B. HARTLEY	Starting Date: 3/5/98
Equip./Drill Method: CME-55 / H.S. AUGER TO 49', N.Q. CORE TO 58', ROTARY WASH TO 120', N.Q. CORE			Ending Date: 3/11/98

Elev. (Feet)	Depth (Feet)	Lith-ology	Smpl.	USCS	Blow-counts	Material Description	Incl. No. 2	Comments
7600								Slope Indicator Pipe
7595	5							Low Strength Cement Grout
				CL-1	7,6,4	Reddish-Brown Sandy Lean Clay W/Gravel		
7590	10							
7585	15							
				CL-1	8,9,10			
7580	20							
						Boulder		
7575	25					Reddish-Brown Sandy Lean Clay W/Gravel		
				X, CL-1	Pushed 0.75			
				SP-SM	26,13,12	Brown Sandstone		
7570	30					Brown Sandy Clay W/Gravel		
7565	35							
				CL-2	6,7,10			
7560	40							
7555	45					Tan Sandstone Sand W/Gravel and Cobbles		
				SP	21,36,39			

LEGEND

- 2,3,2 — Blow Count per 6"
- 0.45 — Torvane (tsf)
- Disturbed Sample
- Core 100,60 — Rock Quality Designation (RQD); Percent Sample Recovery
- Undisturbed Sample
- Groundwater Elevation

RB&G ENGINEERING INC.
Provo, Utah

Project: GRASSY TRAIL DAM	Project Number: 9712.000	Boring No.: 98-7 Inclinometer No. 2 Sheet 2 of 3
Client: CREAMER & NOBLE ENGINEERS	Logged By: M. STILSON, M. HANSEN, V.N.B.	
Boring Depth (ft.): 132.4 / Elev: 7600.2'	Driller: B. HARTLEY	Starting Date: 3/5/98
Equip./Drill Method: CME-55 / H.S. AUGER TO 49', N.Q. CORE TO 58', ROTARY WASH TO 120', N.Q. CORE		Ending Date: 3/11/98

Elev. (Feet)	Depth (Feet)	Lith-ology	Smpl.	USCS	Blow-counts	Material Description	Incl. No. 2	Comments
7550					CORE 19,0	Tan and Gray Sandstone		Slope Indicator Pipe
7545	55				CORE 32,0			Low Strength Cement Grout
						Reddish-Brown Clayey Gravel W/Sand		
7540	60			CL-2	7,10,9	Brown Clay W/Sand, Gravel and Cobbles		
7535	65							
7530	70			GC	12,11,14	Brown Clayey Sandy Gravel		
7525	75							
7520	80			CL-2	6,7,11	Reddish-Brown Sandy Clay W/Gravel		
7515	85							
7510	90			CL-2	17,9,11			
7505	95					Yellow and Brown Sandy Clay W/Gravel and Cobbles		

LEGEND

- 2,3,2 — Blow Count per 6"
- 0.45 — Torvane (tsf)
- Disturbed Sample
- Core 100,60 — Rock Quality Designation (RQD); Percent Sample Recovery
- Undisturbed Sample
- Groundwater Elevation

RB&G ENGINEERING INC.
Provo, Utah

Project: GRASSY TRAIL DAM	Project Number: 9712.000	Boring No.: 98-7 Inclinometer No. 2 Sheet 3 of 3
Client: CREAMER & NOBLE ENGINEERS	Logged By: M. STILSON, M. HANSEN, V.N.B.	
Boring Depth (ft.): 132.4 / Elev: 7600.2'	Driller: B. HARTLEY	Starting Date: 3/5/98
Equip./Drill Method: CME-55 / H.S. AUGER TO 49', N.Q. CORE TO 58', ROTARY WASH TO 120', N.Q. CORE		Ending Date: 3/11/98

Elev. (Feet)	Depth (Feet)	Lith-ology	Smpl.	USCS	Blow-counts	Material Description	Incl. No. 2	Comments
7500				CL-2	16,28,26			Slope Indicator Pipe
7495	105					Boulder		Low Strength Cement Grout
7490	110			CL-2	15,14,14	Yellow and Brown Sandy Clay W/Gravel and Cobbles		
7485	115							
7480	120			GC	56/6", REF			
					CORE 64,45	Bedrock - Orange Sandstone Silty Sandstone		
7475	125				CORE 100,100	Gray Sandstone		Inclinometer #2
7470	130				CORE 86,75	Greenish-Gray Shaley Mudstone		Sluff
7465	135							
7460	140							
7455	145							

LEGEND

- 2,3,2 — Blow Count per 6"
- 0.45 — Torvane (tsf)
- Disturbed Sample
- Core 100,60 — Rock Quality Designation (RQD); Percent Sample Recovery
- Undisturbed Sample
- Groundwater Elevation

RB&G ENGINEERING INC.
Provo, Utah