
PROJECT REPORT

Project No.	201404-006		
Project	Grassy Trail – West Ridge Mine Monitoring		
Dates	Site Visits and readings – October 7, 14, 21, and 28, 2017		
Report By	Michael N. Hansen	Position	Engineering Geologist

Observations / Activities

Readings from Inclinometers I-1, 17-I-2, 17-I-3 and I-4 have not shown any significant movement. Plots of the inclinometer readings are attached.

One accelerometer is located on the crest of the dam. This instrument has not detected any mining induced seismic (MIS) activity between May 13, 2016 and October 28, 2017. The “events” which have been recorded were likely caused by wind, or take place while removing and replacing the cover on the instrument as part of downloading and resetting the accelerometer.

Since the last report on September 30, 2017, no seismic events have been reported within the area of the mine by the University of Utah Seismograph Stations (UUSS).

Reservoir elevation, seepage and piezometer readings have been taken weekly by RB&G since September 5, 2016. Plots of the reservoir elevations, piezometer and seepage readings are attached.

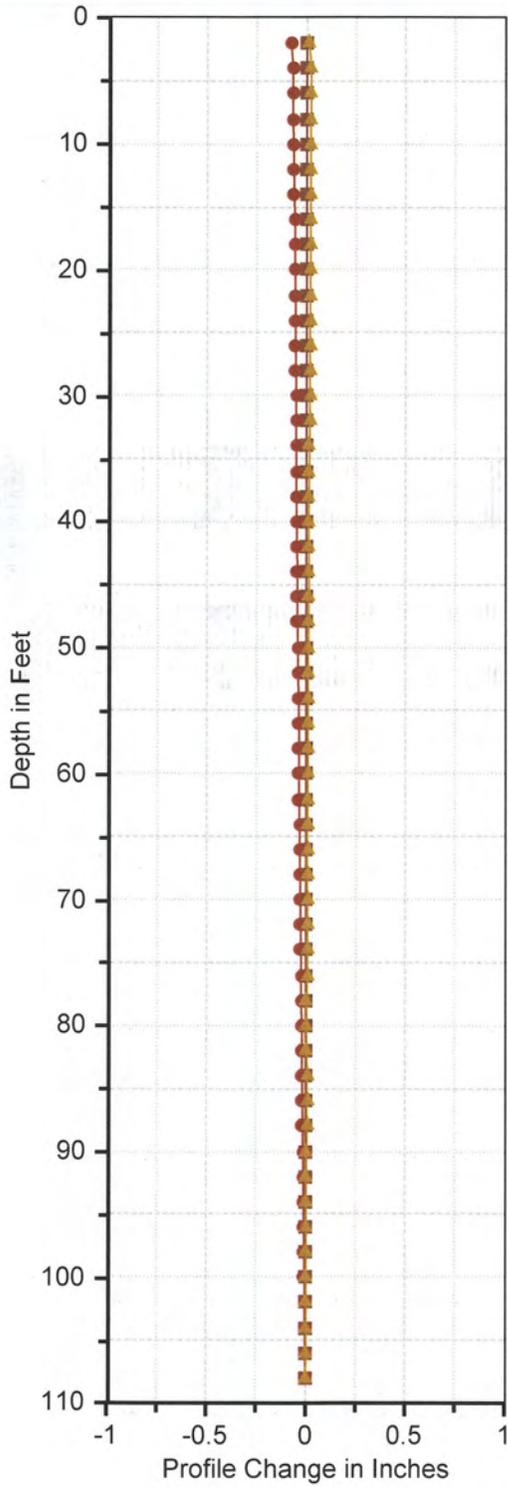
Survey data of the dam provided by Ware Surveying LLC. is included in this report. The survey data was gathered on October 28, 2017, and does not show any current significant movement on the dam.

No evidence of landslide movement was noted on the dam or within the hillsides of the dam abutments.

Michael Hansen P.G.
Engineering Geologist
RB&G Engineering Inc.

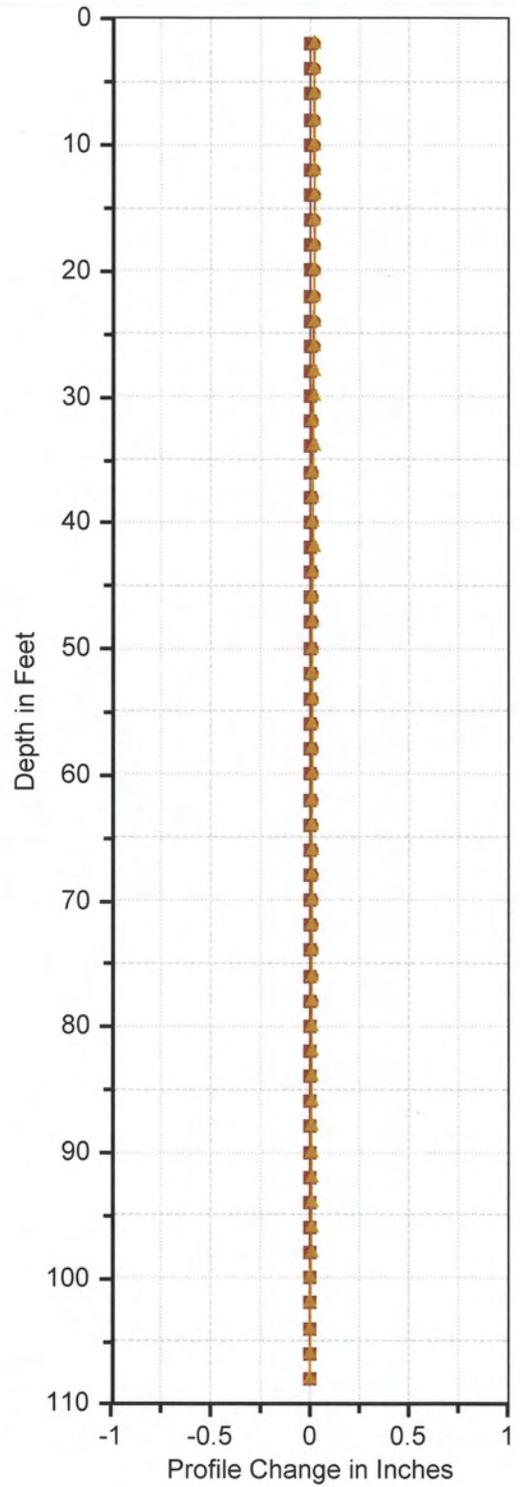
GrassyTrail I-1 A

7/8/2017 9/30/2017 10/21/2017



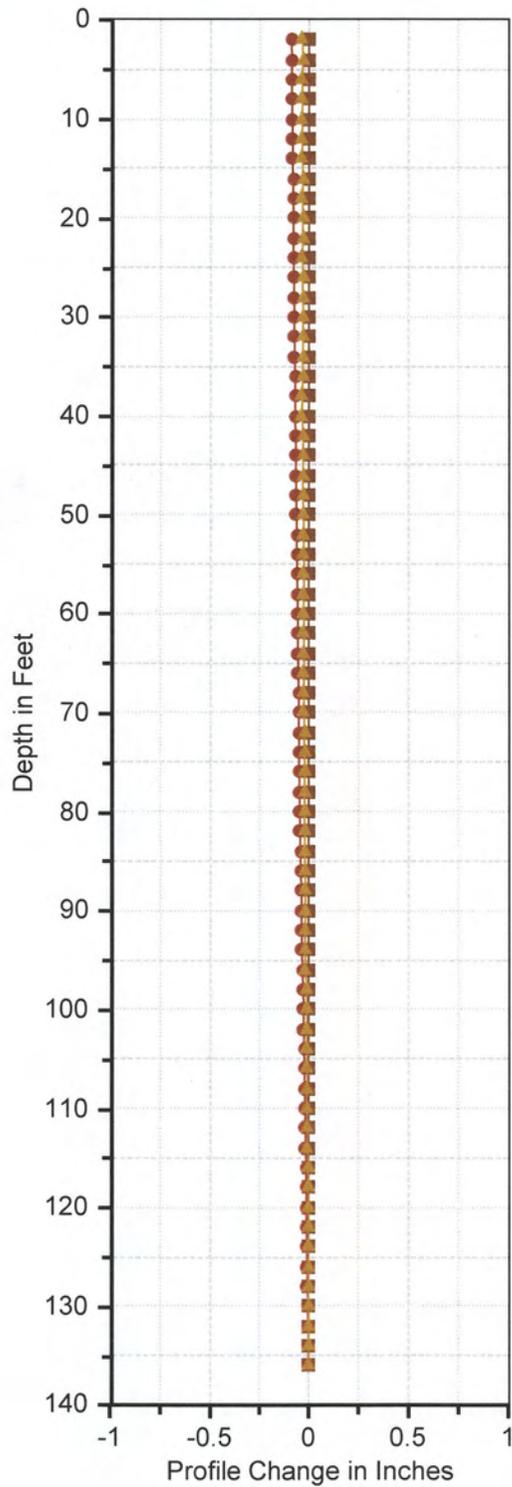
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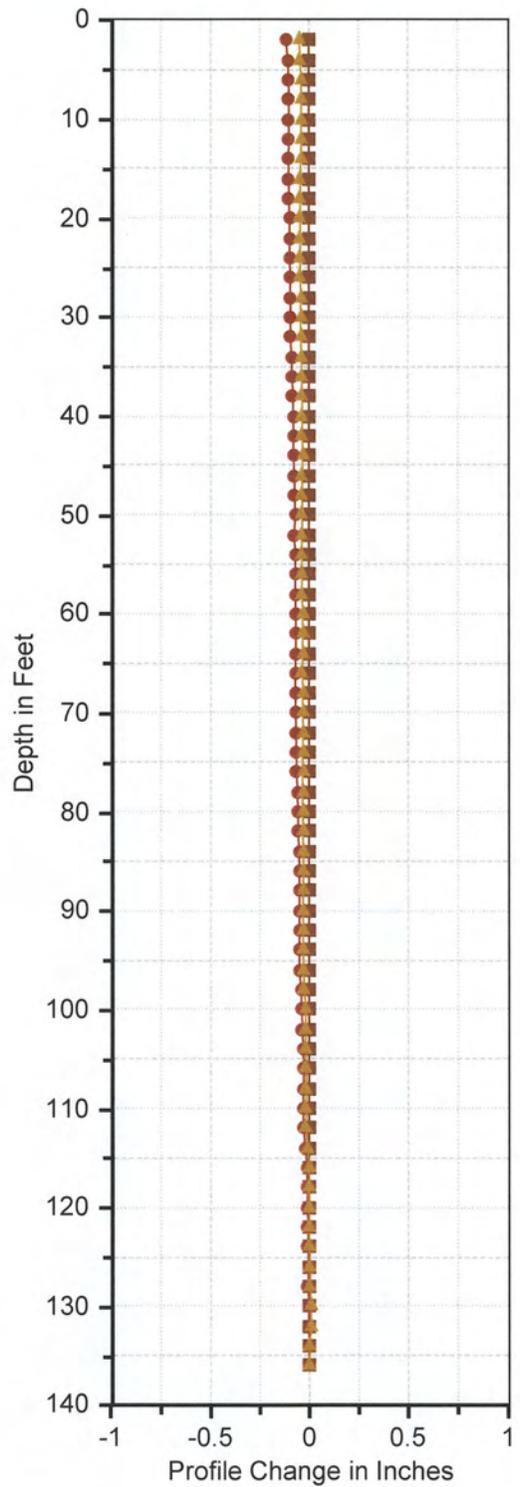
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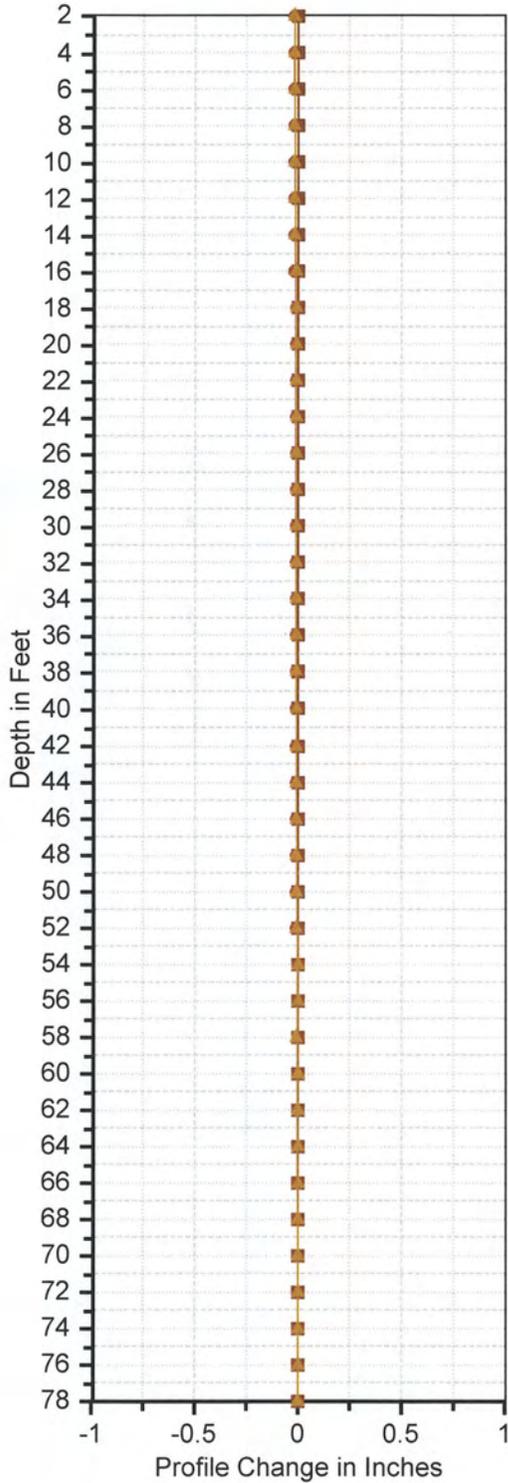
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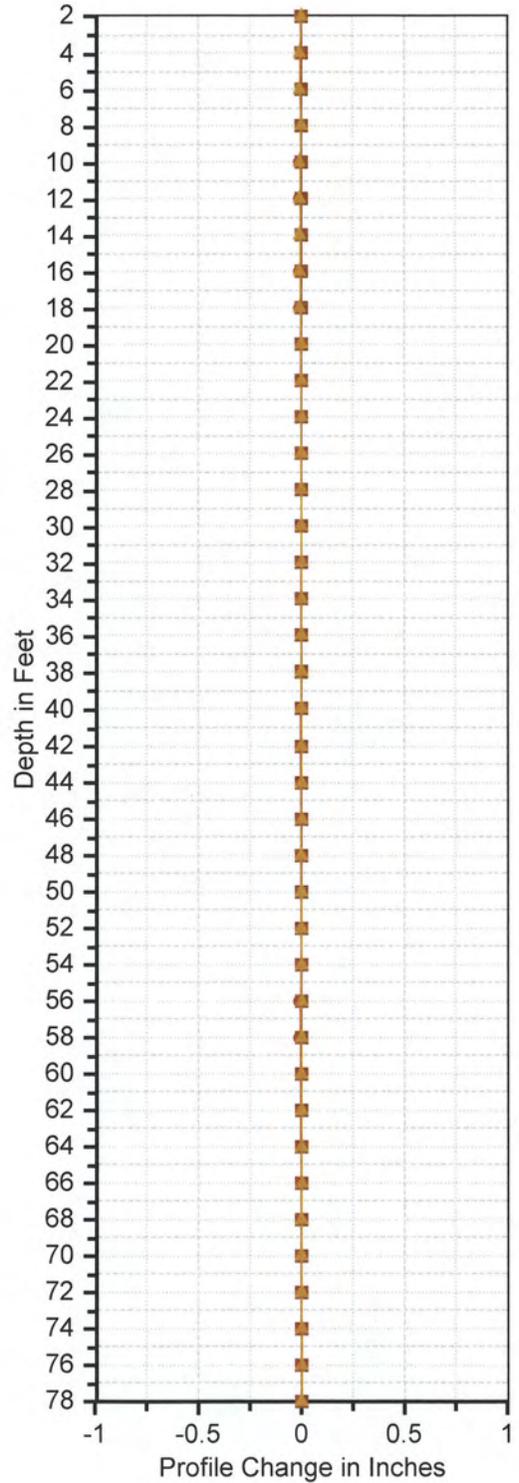
GrassyTrail 17-I-3 A

9/13/2017 9/30/2017 10/21/2017



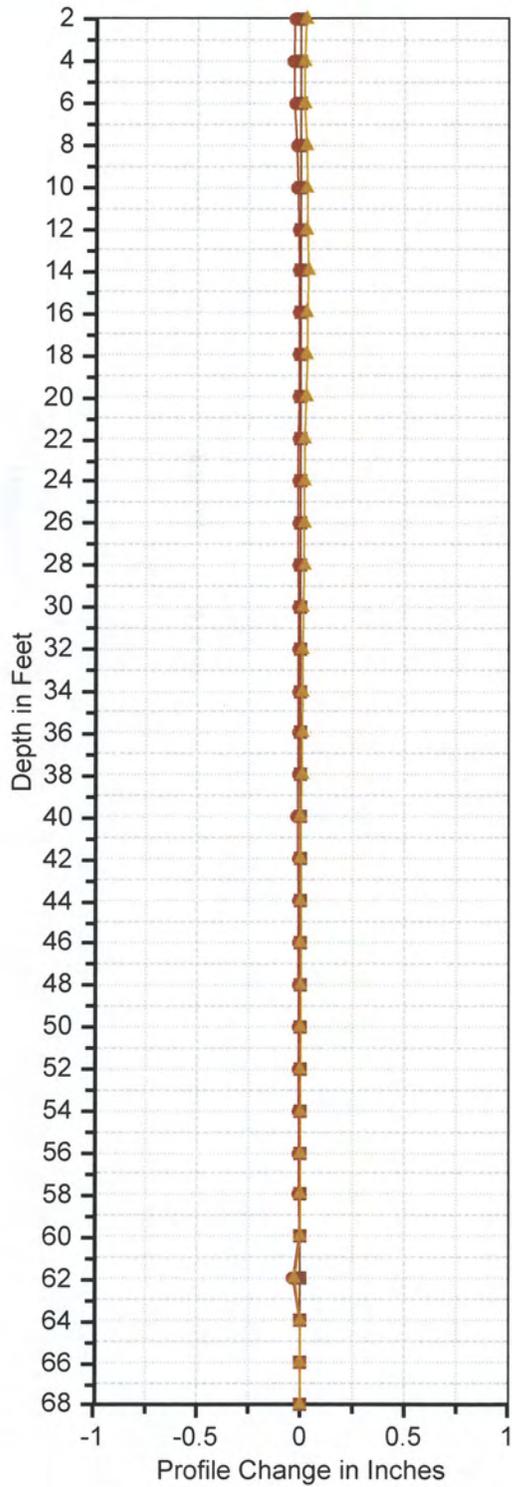
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9/13/2017 9/30/2017 10/21/2017



GrassyTrail I-4 A

7/8/2017 9/30/2017 10/21/2017



GrassyTrail I-4 B

7/8/2017 9/30/2017 10/21/2017

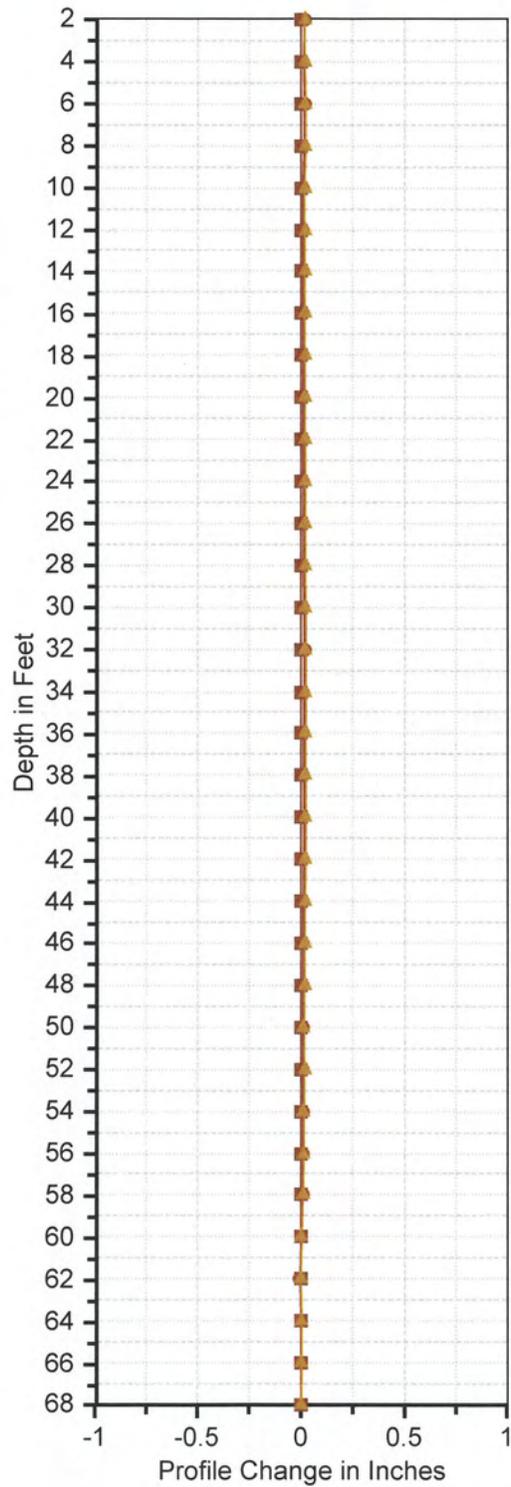


TABLE C-1

GRASSY TRAIL DAM PIEZOMETER & OBSERVATION WELL READINGS

TAKE READINGS AT RIM ELEV.			05-2 5+62		79-4 5+15	98-3 4+14		05-4 -4+14		79-3 3+63	05-3A 2+77	05-3 2+71		98-2	98-4	98-6	06-1	06-1	
Dam Crest Elev.	Spillway Elev.	Rim Elev. (ft)	PIEZ.	PIEZ.	O.W.	PIEZ.		PIEZ.		O.W.	PIEZ.	PIEZ.	PIEZ.	PIEZ.	PIEZ.	PIEZ.	PIEZ.	PIEZ.	
7600.0	7592.5		8	9	1	2	3	13	14	4	10	11	12	5	6	7	15	16	
			7601.5		7601.8	7601.7		7558.9	7558.9	7601.7	7601.8	7601.7	7601.7	7528.8	7512.0	7519.5	7601.5	7601.5	
Tip Elev. (ft) (actual)			7554.5	7535.1	7491.8	7525.4	7491.0	7521.0	7499.5	7491.7	7550.8	7572.0	7529.5	7501.5	7479.5	7493.0			
Piezometer Location			CREST	CREST	CREST	CREST	CREST	D.S. SLOPE	D.S. SLOPE	CREST	CREST	CREST	CREST	TOE	TOE	TOE	CREST	CREST	
			EMBANK	FOLND	EMBANK/FOLND	EMBANK	FOLND	EMBANK	FOLND	EMBANK/FOLND	EMBANK	EMBANK	FOLND	FOLND	FOLND	FOLND	FOLND	FOLND	
Date	Initials	Reservoir Elevation	45.7' (47')	85' (66.4')	110'	76.2' (76.3')	110.7'	36.5' (37.9')	58.8' (68.4')	110'	49.5' (51')	28.5' (29.7')	84.0' (72.2')	27.3'	32.5'	26.5'	35.5'	100.0'	
01/03/16	MH	7586.35																	
01/17/16	MH	7586.26																	
01/27/16	ECC	7586.083	7572.7	7569.3	7561.4	7545.3	7503.5			7517.4	7567.4	7579.1	7516.8	7504	7503.4	7505.3	7580.5	7525.7	
01/31/16	MH	7586.25																	
02/11/16	ECC	7586.417	7572.5	7569.1	7561.2	7545.5	7503.3			7517.4	7567.2	7578.8	7516.8	7503.8	7503.6	7505.1	7580.4	7525.6	
02/13/16	MH	7586.30																	
02/25/16	ECC	7586.30	7572.5	7567	7561	7545.3	7503.3			7517.4	7567	7578.7	7516.7	7503.3	7504.7	7503.7	7580.2	7525.4	
02/27/16	MH	7586.30																	
03/12/16	MH	7586.50																	
03/21/16	MH	7586.70																	
03/23/16	ECC	7586.75	7574.2	7567	7560.6	7544.8	7503.2			7517.4	7567	7579.5	7516.8	7503.1	7504.7	7503.5	7581.3	7526.1	
04/16/16	ECC	7587.33	7573.8	7566.9	7560.4	7544.5	7503.2			7517.4	7566.9	7579.1	7516.8	7503.1	7504.3	7503.4	7581.1	7525.8	
06/16/16	MH	7592.52																	
07/03/16	ECC	7591.90																	
07/11/16	ECC	7591.50	7576.6	7569.7	7574	7545.4	7507.1	7523.5	7505.6	7517.4	7569.7	7582.3	7516.7	7503.9	7505.8	7509.3	7584.2	7526.8	
07/17/16	MH	7590.00																	
07/31/16	MH	7589.65																	
08/01/16	ECC	7590.33	7576.3	7569	7573.6	7545	7506.3	7523.2	7505.5	7517.4	7569	7581.6	7516.1	7503.7	7505.6	7509.1	7583.2	7526.3	
08/14/16	MH	7588.46																	
08/28/16	MH	7588.6																	
08/31/16	ECC	7588.75	7575.7	7571.9	7571.6	7545.4	7505.7	7523	7504.7	7517.4	7567.8	7581.4	7516.8	7506.9	7502.1	7504.4	7582.4	7525.7	
09/05/16	MH	7588.40	7575.4	7571.9	7571.0	7545.5	7505.2	7522.7	7504.3	7515.2	7567.6	7581.2	7516.9	7506.5	7501.8	7504.1	7582.1	7525.5	
09/09/16	MH/KM	7588.05	7575.1	7571.6	7570.7	7545.4	7505.3	7522.6	7504.2	7515.1	7567.2	7580.9	7516.8	7506.3	7501.6	7504.0	7581.7	7525.3	
09/16/16	MH	7587.95	7575.2	7571.5	7571.0	7545.5	7505.2	7522.7	7504.1	7515.3	7567.1	7580.8	7517.0	7506.1	7501.4	7503.8	7581.6	7525.3	
09/23/16	MH	7591.40	7576.5	7571.7	7574.8	7545.6	7505.9	7522.9	7504.6	7517.4	7567.5	7580.9	7516.9	7509.0	7503.4	7507.6	7583.5	7525.6	
09/30/16	MH	7591.55	7577.6	7571.3	7576.6	7545.4	7506.9	7522.7	7506.0	7518.7	7568.5	7581.0	7516.8	7510.0	7504.2	7505.8	7584.0	7526.2	
10/07/16	MH	7590.20	7576.8	7571.5	7575.3	7545.5	7506.7	7522.8	7505.6	7518.5	7568.5	7581.4	7517.0	7508.3	7504.4	7505.5	7582.9	7525.8	
10/16/16	MH	7589.38	7576.7	7572.0	7576.9	7545.7	7506.1	7523.3	7505.0	7519.3	7568.9	7581.8	7517.0	7507.2	7502.5	7504.8	7582.4	7525.5	
10/22/16	MH	7589.30	7576.6	7571.9	7576.8	7545.6	7505.9	7523.2	7504.7	7519.6	7568.7	7581.5	7517.0	7507.0	7502.3	7504.5	7582.3	7525.3	
10/29/16	MH	7589.20	7576.5	7571.9	7576.7	7545.6	7505.7	7523.1	7504.5	7520.6	7568.7	7581.4	7516.9	7506.9	7502.1	7504.3	7582.2	7524.9	
11/06/16	MH	7588.25	7576.0	7571.9	7576.2	7545.6	7505.5	7523.2	7504.4	7519.0	7568.5	7581.2	7516.9	7506.5	7502.0	7504.3	7581.7	7525.2	
11/13/16	MH	7588.25	7575.9	7571.8	7576.0	7545.6	7505.2	7524.1	7504.2	7519.7	7568.2	7581.0	7517.0	7506.2	7501.5	7503.9	7581.7	7525.0	
11/19/16	MH	7588.20	7575.8	7571.8	7575.8	7545.6	7505.0	7523.0	7503.9	7519.9	7567.9	7580.8	7517.0	7506.0	7501.4	7503.7	7581.5	7524.9	
11/26/16	MH	7588.35	7575.8	7571.8	7575.4	7545.6	7504.9	7523.2	7503.8	7520.7	7568.0	7580.7	7517.0	7506.0	7501.4	7503.8	7581.6	7525.0	
12/03/16	MH	7587.80	7575.6	7571.8	7574.9	7545.8	7504.5	7523.3	7503.7	7518.0	7567.8	7580.7	7517.1	7505.7	7501.1	7503.6	7581.3	7524.8	
12/10/16	MH	7587.50	7575.3	7571.8	7574.3	7545.8	7504.5	7523.3	7503.4	7518.7	7567.2	7580.5	7517.1	7505.2	7500.8	7503.3	7581.0	7524.7	
12/17/16	MH	7586.90	7575.5	7572.2	7574.3	7546.1	7504.4	7523.8	7503.2	7518.5	7567.4	7580.9	7517.1	7505.1	7500.5	7503.1	7580.8	7524.8	
12/23/16	MH	7587.10	7575.0	7571.7	7573.7	7545.8	7503.9	7523.3	7502.9	7518.7	7568.7	7580.2	7517.1	7504.9	7500.3	7502.9	7580.8	7524.5	
12/31/16	MH	7587.20	7575.0	7571.6	7572.2	7545.8	7503.9	7523.3	7502.8	7518.3	7568.6	7580.1	7517.1	7504.9	7500.2	7502.9	7580.8	7524.6	
01/07/17	MH	7587.30	7574.5	7571.2	7570.5	7545.9	7503.9	7523.1	7502.7	7518.3	7565.9	7579.5	7517.1	7504.8	7500.1	7502.7	7580.7	7524.4	
01/14/17	MH	7587.30	7574.5	7571.4	7570.5	7546.0	7503.9				7566.1	7579.7	7517.2				7580.8	7524.4	
01/20/17	MH	7587.60	7574.6	7571.6	7567.4	7546.0	7503.9	Covered with snow			7566.2	7579.9	7517.3	Covered with snow			7580.9	7524.5	
01/27/17	MH	unable to make it to dam due to snow, got stuck																	
02/04/17	MH	7587.10	7573.4	7570.9	7563.1	7545.8	7503.5	7523.0	7502.5	7515.6	7565.4	7579.4	7517.1				7580.4	7524.2	
02/10/17	MH	7586.15	7573.1	7570.8	7561.9	7545.9	7503.5	7523.1	7502.5	7515.6	7565.3	7579.4	7517.1				7580.1	7524.0	
02/17/17	MH	7582.80	7572.1	7570.8	7561.0	7545.9	7504.2	7523.2	7503.4	7515.5	7565.1	7579.2	7517.2				7579.4	7523.9	
02/24/17	MH	7582.30	7571.4	7570.5	7562.5	7546.1	7503.4	7523.4	7502.1	7514.9	7564.4	7579.2	7517.2				7578.2	7523.4	
03/04/17	MH	7582.30	7571.2	7570.1	7561.6	7545.9	7502.5	7523.4	7501.4	7514.8	7564.1	7578.9	7517.2	Dry @			7577.9	7523.4	
03/11/17	MH	7582.70	7571.1	7569.6	7563.9	7545.8	7501.9	7523.4	7500.6	7512.5	7563.7	7578.2	7517.2	7502.3	7497.6	7502.8	7578.1	7523.1	
03/19/17	MH	7585.95	7572.4	7569.3	7563.5	7545.8	7503.4	7523.5	7502.7	7514.2	7564.2	7577.9	7517.1	7506.1	7500.6	7505.4	7580.4	7524.5	
03/25/17	MH	7588.30	7573.9	7569.4	7566.2	7546.4	7505.7	7523.8	7505.2	7516.1	7565.3	7578.2	7517.2	7510.0	7503.8	7507.7	7583.1	7526.2	
04/01/17	MH	7585.90	7573.6	7569.6	7567.2	7546.2	7506.8	7524.0	7506.0	7517.0	7565.3	7578.7	7517.2	7509.2	7504.2	7507.7	7581.9	7525.0	
04/09/17	MH	7585.85	7573.6	7569.7	7567.6	7546.0	7507.0	7524.2	7505.8	7517.4	7565.3	7579.2	7517.2	7508.0	7503.8	7506.8	7581.1	7524.7	
04/15/17	MH	7588.08	7574.2	7569.6	7568.4	7546.1	7506.7	7524.2	7505.6	7519.2	7565.7	7579.2	7517.3	7508.2	7503.7	7506.1	7581.5	7524.6	
04/22/17	MH	7592.70	7577.0	7569.6	7570.5	7546.0	7507.5	7523.9	7506.7	7520.6	7568.9	7579.3	7517.2	7513.1	7505.2	7506.1	7584.3	7524.0	
04/29/17	MH	7592.80	7577.4	7570.2	7570.1	7546.1	7508.0	7524.0	7507.0	7521.6	7567.9	7580.4	7517.4	7512.9	7505.3	7506.2	7584.4	7524.9	
05/06/17	MH	7592.95	7577.6	7570.7	7568.8	7546.0	7508.2	7523.9	7507.1	7522.2	7568.5	7581.1	7517.2	7512.8	7505.4	7506.2	7584.7	7524.7	
05/13/17	MH	7593.00	7578.1	7571.3	7573.0	7546.0	7508.2	7523.9	7507.1	7523.9	7569.0	7581.9	7517.3	7512.2	7505.3	7506.2	7584.9	7524.8	
05/20/17	MH	7592.70	7578.1	7571.5	7574.6	7546.0	7507.9	7523.5	7506.8	7524.2	7569.0	7582.0	7517.3	7511.6	7505.0	7506.0	7584.8	7524.4	
05/28/17	MH	7592.85	7578.3																

Grassy Trail Dam Reservoir Elevation and Piezometer Readings

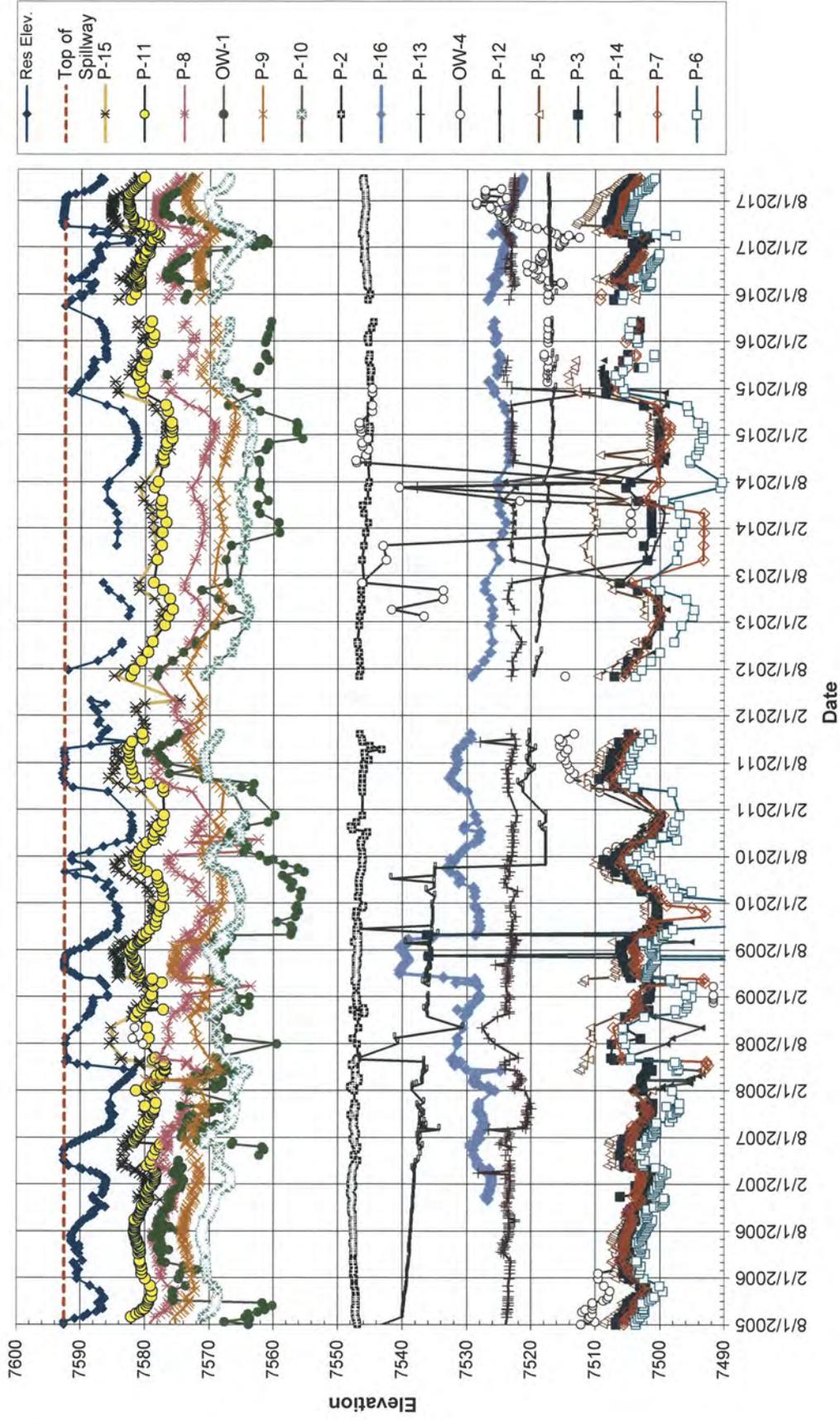


Figure C-1A Reservoir Elevation and Piezometer Readings
August 2005 to Oct 28, 2017

Grassy Trail Dam and Reservoir

Grassy Trail Dam Reservoir Elevation and Piezometer Readings

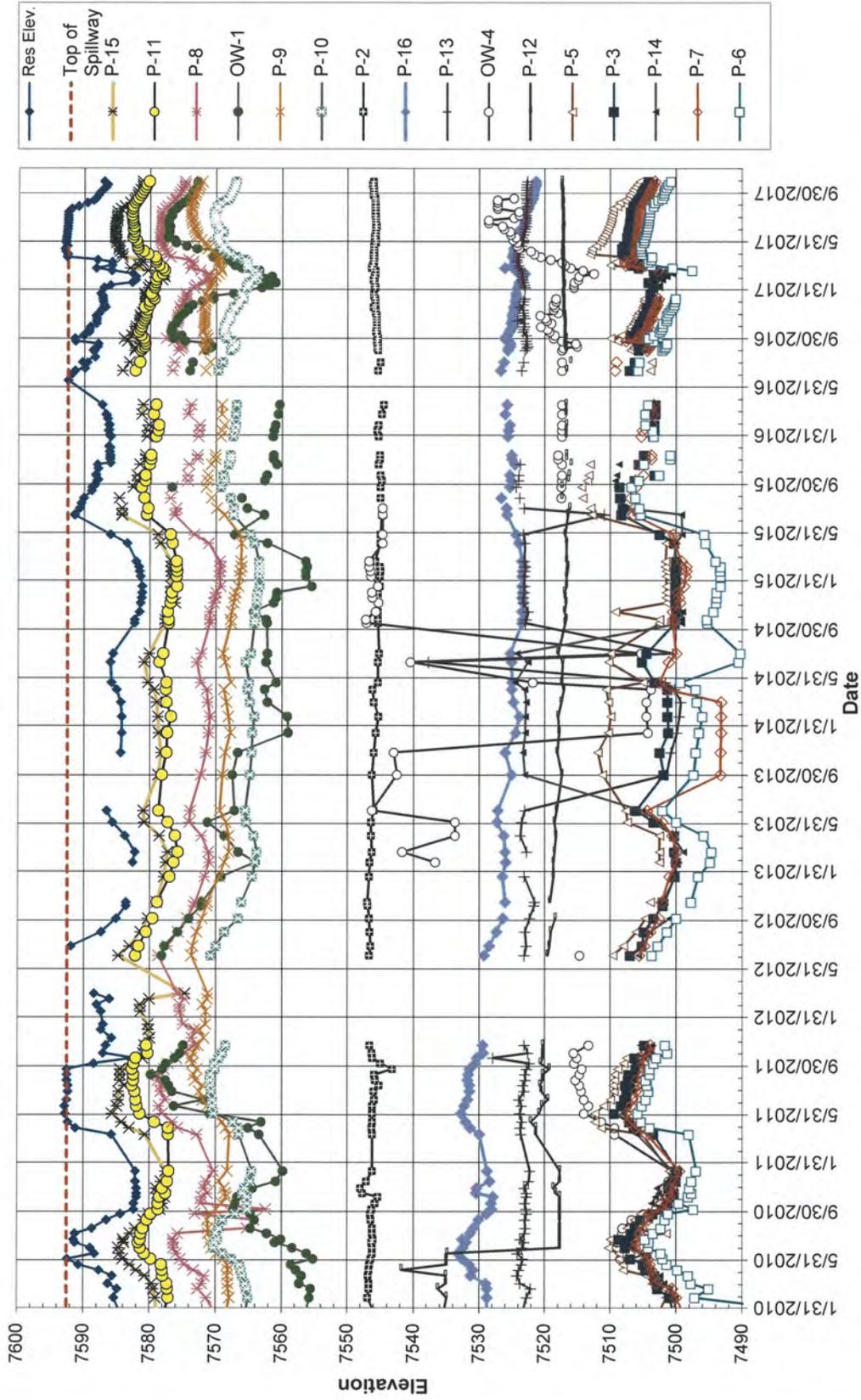


Figure Reservoir Elevation and Piezometer Readings
January 2010 to Oct 28, 2017

Grassy Trail Dam and Reservoir

Grassy Trail Dam Reservoir Elevation and Piezometer Readings

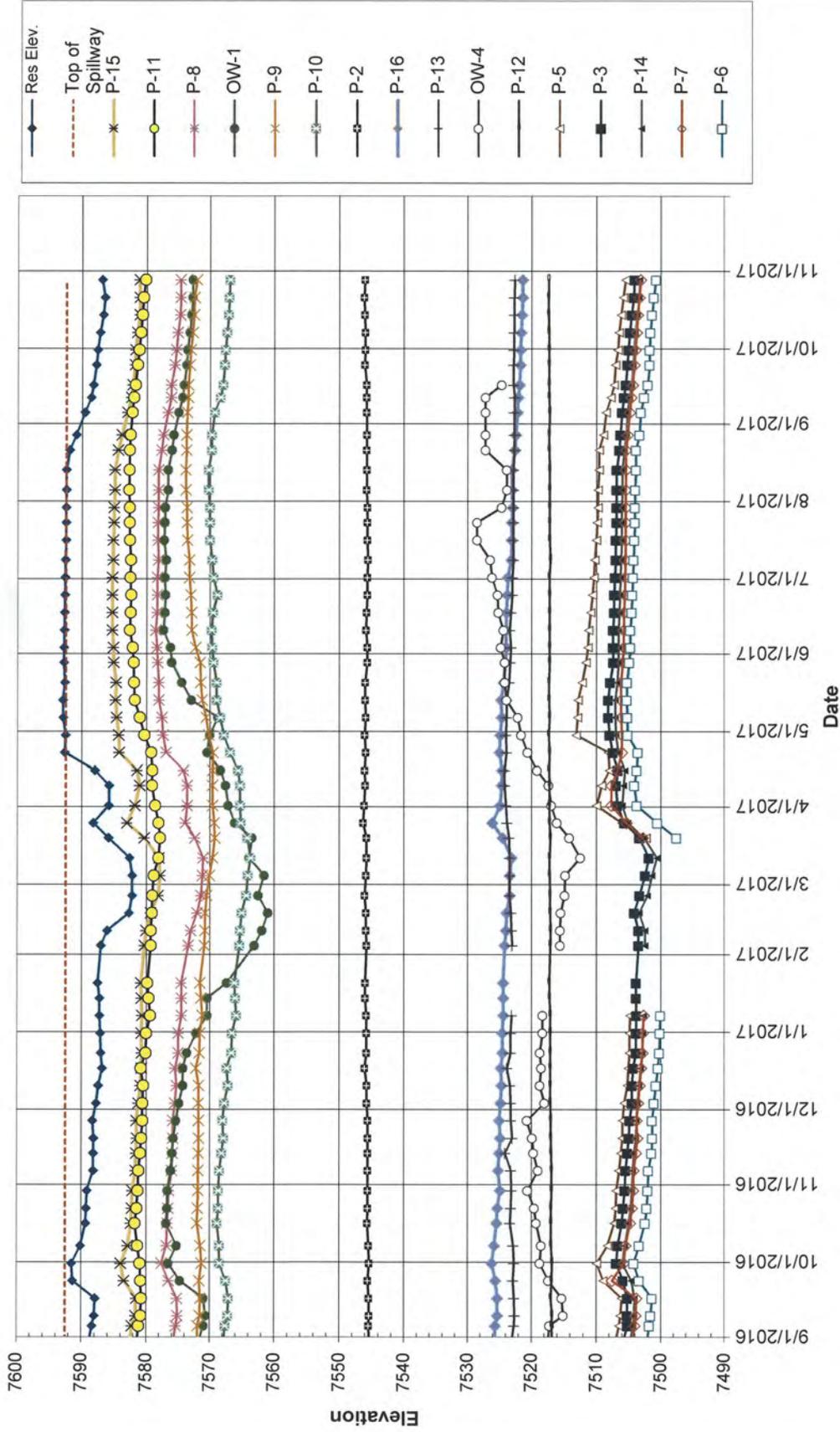


Figure C-1B
Reservoir Elevation and Piezometer Readings
Sept 2016 to Oct 28, 2017 (taken by RB&G Eng)
Grassy Trail Dam and Reservoir

TABLE C-2

GRASSY TRAIL DAM SEEPAGE READINGS													
Dam Crest Elev (ft) Spillway Elev. (ft)		7600.0 7592.5	Seep Location:			Drain1: Toe Drain		Drain 2: Left Abutment (East Seep)		Drain 3: Left Abutment (East Additional collection)		Seep 4: Right Abutment (West Seep)	
Date	Initials	Reservoir Elev.	Reservoir Characteristics	GAL/MIN	Water Characteristics	GAL/MIN	Water Characteristics	add spring 2016		GAL/MIN	Water Characteristics		
1/3/16	MH	7586.35	frozen	Dry		2.33					NM	ice	
1/17/16	MH	7586.26	frozen	Dry		2.43					NM	ice	
1/27/16	ECC	7586.083	frozen	Dry		2.54					NM	ice	
1/31/16	MH	7586.25	frozen	Dry		2.61	*trace sediment				NM	ice	
2/1/16	ECC	7586.417	frozen	Dry		2.75					NM	ice	
2/13/16	MH	7586.3	frozen	Dry		2.64	*trace sediment				NM	ice	
2/25/16	ECC	7586.3	frozen	Dry		2.94					NM	ice	
2/27/16	MH	7586.3	frozen	Dry		2.95					NM	ice	
3/12/16	MH	7586.5	frozen	Dry		2.98					NM	ice	
3/21/16	MH	7586.7	frozen	Dry		2.99					NM	ice	
3/23/16	ECC	7586.75	frozen	Dry		2.94							
4/16/16	ECC	7587.33		Dry		3.03							
6/16/16	MH	7592.52	slightly over spillway	10.70		4.84			GAL/MIN	Characteristics	0.002		
7/3/16	MH	7591.9		8.33		4.69			6.00		0.02		
7/11/16	ECC	7591.5				4.35			4.11				
7/17/16	MH	7590		5.56		4.00			4.29		0.001		
7/31/16	MH	7589.65		1.40		3.33			4.30		dry		
8/1/16	ECC	7590.33				4.76			4.48				
8/14/16	MH	7588.46		1.32		3.53			1.53		dry		
8/28/16	MH	7588.6		0.28		3.30			0.73		dry		
8/31/16	ECC	7588.75				4.29			1.07				
9/5/16	MH	7588.4		0.04	clear	3.26	clear		0.46	clear	dry		
9/9/16	MH	7588.05		dry		3.23	clear		0.23	clear	dry		
9/16/16	MH	7587.95		dry		3.26			0.17		dry		
9/23/16	MH	7591.4		8.89		4.62			2.54		1.69		
9/30/16	MH	7591.6		8.65		5.36			3.06		dnp		
10/7/16	MH	7590.2		4.69		3.90			1.23		dry		
10/16/16	MH	7589.4		1.76		3.41			0.79		Dry		
10/22/16	MH	7589.3		1.06		3.16			0.90		Dry		
10/29/16	MH	7589.2		0.53		3.03			1.00		Dry		
11/4/17	MH	7588.3		0.26		0.29			43029.00		Dry		
11/13/16	MH	7588.3		0.194		2.82			0.63		Dry		
11/19/16	MH	7588.3		Dry		2.86			0.57		Dry		
11/26/16	MH	7588.4		Dry		2.91			0.67		Dry		
12/3/16	MH	7587.8	some ice	Dry		2.52			0.50		Dry		
12/10/16	MH	7587.5	Frozen all ice	Dry		2.5			0.4	some sed	Dry		
12/17/16	MH	7586.9	Frozen	drip		2.5			0.52	some sed	0.17	Very wet snow mat	
12/23/16	MH	7587.1	Frozen	Dry		2.5			0.27	some sed	Dry	ice	
12/31/16	MH	7587.2	Frozen	Dry		2.4			0.33	some sed	Dry	ice	
01/07/17	MH	7587.3	Frozen	Dry		2.5			Drip		Dry	ice	
01/14/17	MH	7587.2	Frozen	Dry		2.36			0.19		Dry	ice	
01/20/17	MH	7587.6	Frozen	Dry		2.4			0.21		Dry	ice	
01/27/17	MH		unable to make it to dam due to snow, got stuck										
02/04/17	MH	7587.1	Frozen	Dry		2.22			0.17		Dry	ice	
02/10/17	MH	7586.2	Frozen	Dry		2.21			0.17		Dry	ice	
02/17/17	MH	7582.8	Frozen	snow covered		2.33			0.16		Dry	ice	
02/24/17	MH	7582.3	Frozen	snow covered		2.29			0.08		Dry	ice	
03/04/17	MH	7582.3	Frozen	snow covered		1.91			0.07		Dry	ice	
03/11/17	MH	7582.70	Frozen	snow covered		2.16			0.11		trickle	snow covered	
03/19/17	MH	7585.95	Frozen	snow covered		2.78			0.36		trickle	snow covered	
03/25/17	MH	7588.30	Frozen	6.67		3.41			2.14		trickle	snow covered	
04/01/17	MH	7585.90	Frozen	3.75		3.00			0.54		trickle	snow covered	
04/09/17	MH	7585.85	mostly frozen	3.53		2.68			0.17		0.89		
04/15/17	MH	7588.08	mostly melted	2.73		1.86			0.19		0.16		
04/22/17	MH	7592.70	Ice Melted/flow over top	10.91		8.57			7.69	some sediment	1.50		
04/29/17	MH	7592.60	over top spillway	11.54		7.55			6.99	some sediment	1.42		
05/06/17	MH	7592.95	over top spillway	12.00	stream backed	6.00			6.67	some sediment	0.83		
05/13/17	MH	7593.00	over top spillway	15.00	up to pipe	5.70			5.45	some sediment	1.02		
05/20/17	MH	7592.70	over top spillway	9.04		4.64			3.92	some sediment	0.56		
05/28/17	MH	7592.85	over top spillway	7.79		4.35			3.55	some sediment	0.48		
06/03/17	MH	7592.85	over top spillway	8.82		4.17			3.53	less sediment	0.47		
06/10/17	MH	7592.80	over top spillway	8.22		4.05			3.33	less sediment	0.17		
06/17/17	MH	7592.75	over top spillway	7.59		3.94			3.19		0.16		
06/24/17	MH	7592.73	over top spillway	7.23		3.23			3.51		0.07		
07/01/17	MH	7592.67	over top spillway	7.01		3.91			2.56		wet		
07/08/17	MH	7592.62	over top spillway	6.58		3.75			2.46		0.07		
07/16/17	MH	7592.56	over top spillway	6.40		3.75			2.14		wet		
07/23/17	MH	7592.54	over top spillway	6.67		3.65			2.21		0.04		
07/29/17	MH	7592.54	over top spillway	6.82		3.70			2.19		0.11		
08/05/17	MH	7592.51	over top spillway	6.00		3.75			1.92		0.03		
08/13/17	MH	7592.52	over top spillway	6.3		3.75			1.86		0.01		
08/21/17	MH	7592.0	below spillway	5.00		3.57			1.54		DRY		
08/27/17	MH	7591.0		4.07		3.33			0.31		DRY		
09/05/17	MH	7589.65		2.73		3.09			0.15		DRY		
09/11/17	MH	7588.7		3.16		3.16			0.15		DRY		
09/16/17	MH	7587.35		1.11		3.00			0.16		DRY		
09/24/17	MH	7587.9		0.25		2.88			0.08		DRY		
09/30/17	MH	7587.7		0.10		2.80			0.09		DRY		
10/07/17	MH	7587.3		DRY		2.80			0.06		DRY		
10/14/02	MH	7586.8		DRY		2.59			0.06		DRY		
10/21/17	MH	7586.55		DRY		2.48			0.06		DRY		
10/28/17	MH	7587		DRY		2.48			0.05		0.06		

* notes MH = Michael Hansen RB&G Engineering

Left abut drain D-3 has been added, 2016, to collect more seepage

Grassy Trail Dam Reservoir Elevation and Seepage Readings

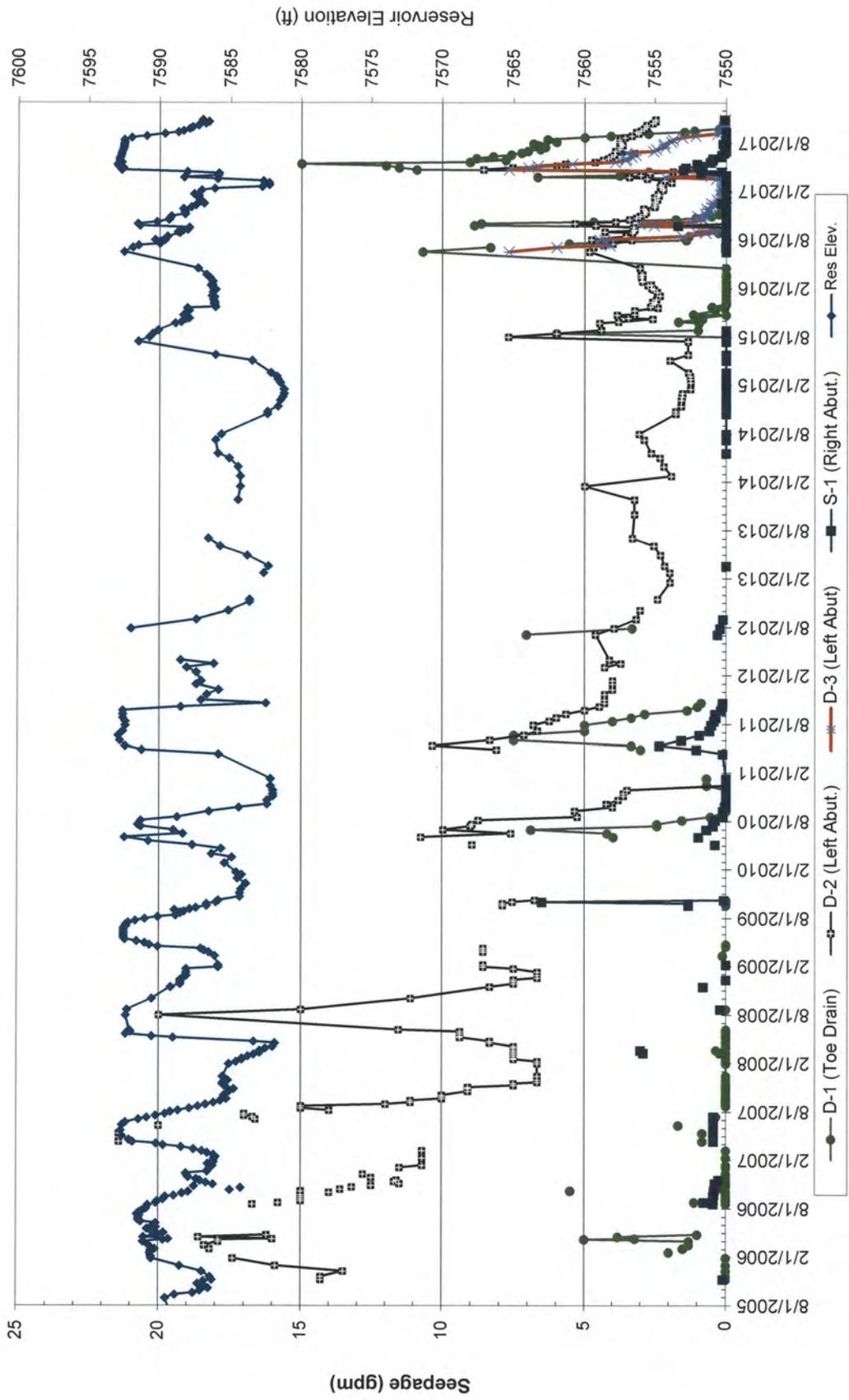


Figure C-2A Reservoir Elevation and Seepage Readings
August 2005 to October 28, 2017
Some additional readings by RB&G Eng
Grassy Trail Dam and Reservoir

Grassy Trail Dam Reservoir Elevation and Seepage Readings

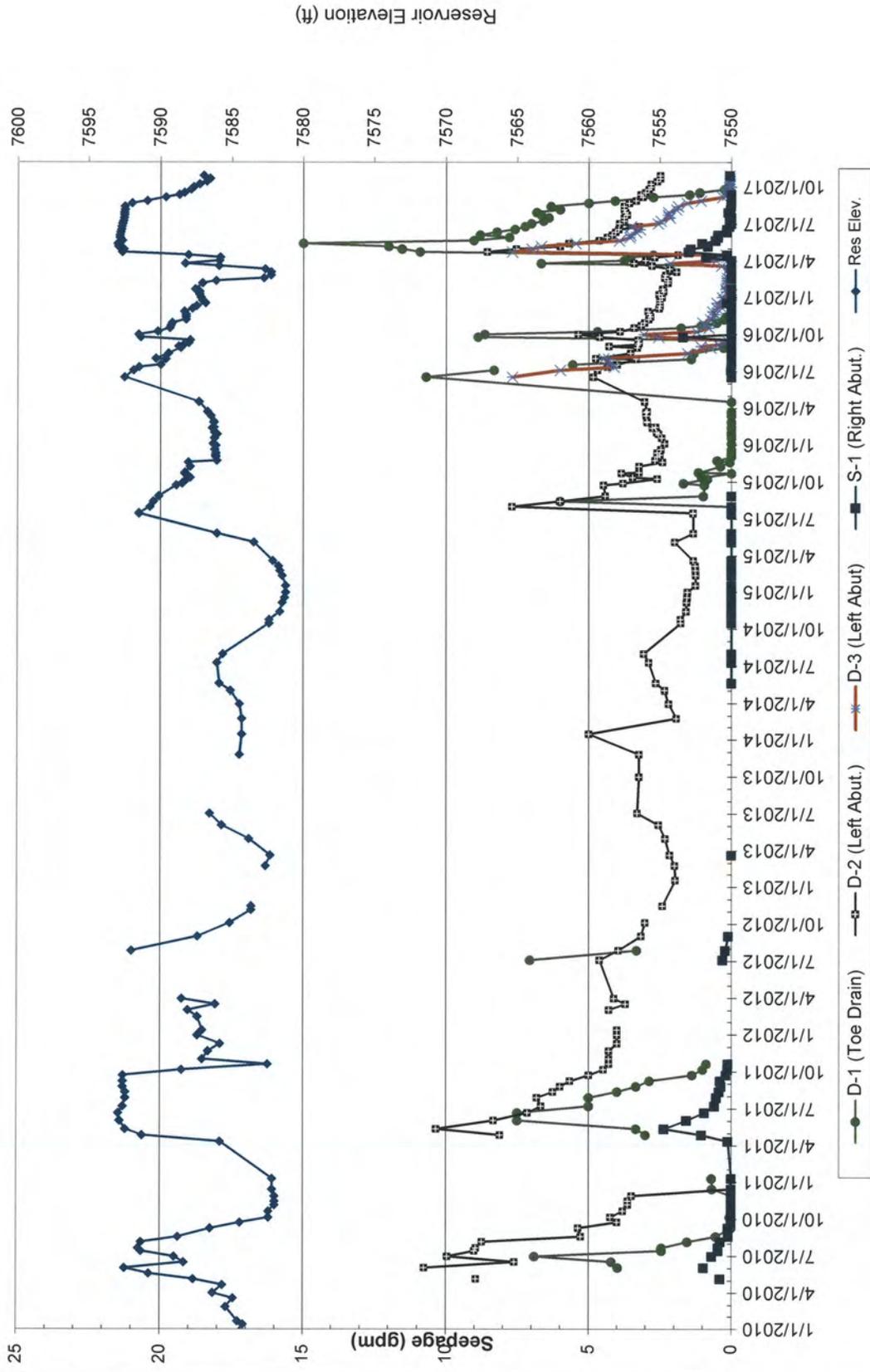


Figure Reservoir Elevation and Seepage Readings
January 2010 to October 28, 2017
Some additional readings by RB&G Eng
Grassy Trail Dam and Reservoir

Grassy Trail Dam Reservoir Elevation and Seepage Readings

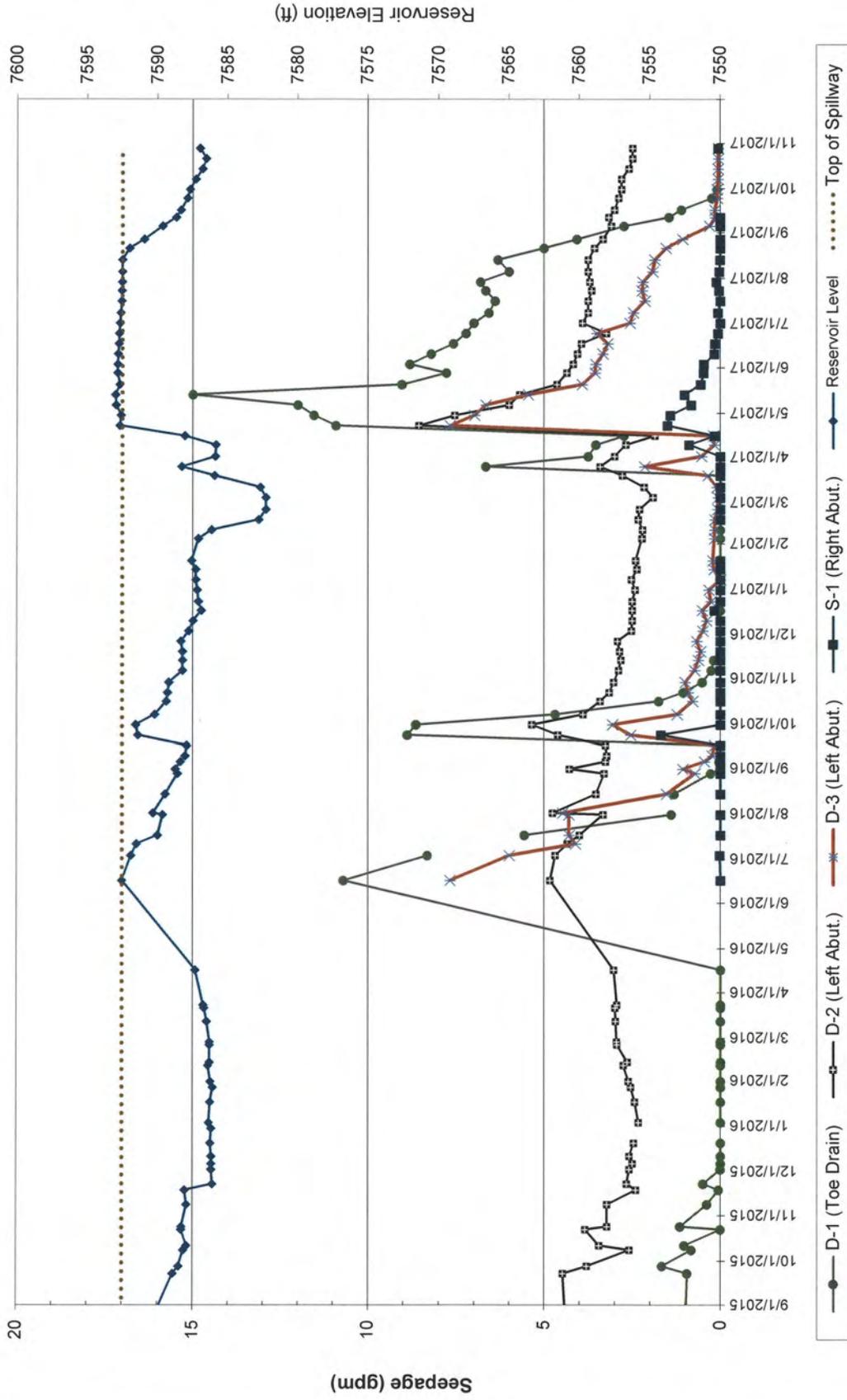


Figure C-2B Reservoir Elevation and Seepage Readings
September 2016 to October 28, 2017
readings taken by RB&G Eng
Grassy Trail Dam and Reservoir

UtahAmerican Energy
West Ridge Mine
 Grassy Trail Reservoir
 Differential Level survey data

10/31/2017

STATION	C-1	C-2	C-3	C-4	C-5	C-6	C-7
NORTHING	38,830.55	38,865.88	38,892.13	38,917.88	38,943.74	38,969.37	38,996.01
EASTING	37,333.20	37,471.64	37,570.28	37,668.82	37,767.40	37,866.16	37,964.74
Differential level survey date.							
07/30/2002 Elevation	7593.49	7590.63	7590.29	7590.67	7590.44	7590.08	7590.08
08/29/2003 Elevation	7593.50	7590.65	7590.31	7590.69	7590.46	7590.08	7590.08
10/27/2004 Elevation	7593.50	7590.62	7590.30	7590.68	7590.45	7590.08	7590.08
08/12/2005 Elevation	7593.52	7590.66	7590.32	7590.69	7590.46	7590.09	7590.08
03/21/2006 Elevation	7593.50	7590.70	7590.30	7590.68	7590.45	7590.09	7590.08
04/14/2006 Elevation	7593.53	7590.73	7590.31	7590.67	7590.44	7590.08	7590.08
05/4/2006 Elevation	7593.54	7590.75	7590.31	7590.66	7590.43	7590.08	7590.08
05/30/2006 Elevation	7593.55	7590.78	7590.31	7590.65	7590.43	7590.07	7590.08
08/11/2006 Elevation	7593.49	7590.79	7590.31	7590.64	7590.43	7590.07	7590.08
09/18/2006 Elevation	7593.51	7590.82	7590.33	7590.66	7590.43	7590.08	7590.08
10/09/2007 Elevation	7593.54	7590.83	7590.33	7590.67	7590.44	7590.08	7590.08
04/28/2008 Elevation	7593.59	7590.84	7590.34	7590.69	7590.45	7590.09	7590.08
05/30/2008 Elevation	7593.56	7590.82	7590.32	7590.65	7590.44	7590.09	7590.08
07/13/2008 Elevation	7593.56	7590.84	7590.33	7590.66	7590.44	7590.08	7590.08
08/29/2008 Elevation	7593.57	7590.83	7590.33	7590.67	7590.44	7590.08	7590.08
09/27/2008 Elevation	7593.56	7590.84	7590.34	7590.68	7590.45	7590.09	7590.08
11/24/2008 Elevation	7593.55	7590.82	7590.32	7590.66	7590.44	7590.08	7590.08
02/23/2009 Elevation	7593.57	7590.83	7590.33	7590.67	7590.45	7590.08	7590.08
03/31/2009 Elevation	7593.57	7590.83	7590.32	7590.67	7590.44	7590.08	7590.08
04/27/2009 Elevation	7593.58	7590.83	7590.33	7590.68	7590.45	7590.08	7590.08
05/29/2009 Elevation	7593.59	7590.84	7590.33	7590.67	7590.44	7590.08	7590.08
06/28/2009 Elevation	7593.57	7590.83	7590.33	7590.67	7590.44	7590.08	7590.08
08/6/2009 Elevation	7593.57	7590.84	7590.33	7590.68	7590.45	7590.08	7590.08
09/9/2009 Elevation	7593.58	7590.84	7590.33	7590.68	7590.45	7590.08	7590.08
10/25/2009 Elevation	7593.56	7590.84	7590.33	7590.68	7590.44	7590.08	7590.08
11/20/2009 Elevation	7593.56	7590.83	7590.32	7590.67	7590.44	7590.08	7590.08
03/05/2010 Elevation	7593.58	7590.84	7590.33	7590.67	7590.45	7590.08	7590.08
04/15/2010 Elevation	7593.60	7590.84	7590.34	7590.68	7590.46	7590.08	7590.08
05/17/2010 Elevation	7593.59	7590.84	7590.33	7590.67	7590.45	7590.08	7590.08
06/24/2010 Elevation	7593.58	7590.84	7590.34	7590.68	7590.45	7590.08	7590.08
07/27/2010 Elevation	7593.56	7590.83	7590.32	7590.68	7590.45	7590.08	7590.08
09/02/2010 Elevation	7593.56	7590.84	7590.33	7590.69	7590.46	7590.08	7590.08
10/15/2010 Elevation	7593.56	7590.84	7590.33	7590.69	7590.46	7590.08	7590.08
11/18/2010 Elevation	7593.56	7590.83	7590.33	7590.67	7590.48	7590.08	7590.08
05/05/2011 Elevation	7593.58	7590.84	7590.33	7590.68	7590.45	7590.08	7590.08
06/03/2011 Elevation	7593.59	7590.84	7590.34	7590.68	7590.46	7590.08	7590.08
07/21/2011 Elevation	7593.58	7590.84	7590.33	7590.68	7590.45	7590.08	7590.08
08/29/2011 Elevation	7593.58	7590.83	7590.34	7590.67	7590.46	7590.08	7590.08
10/4/2011 Elevation	7593.57	7590.83	7590.33	7590.67	7590.45	7590.08	7590.08
11/7/2011 Elevation	7593.58	7590.84	7590.34	7590.67	7590.46	7590.08	7590.08
10/05/2012 Elevation	7593.58	7590.83	7590.33	7590.66	7590.44	7590.08	7590.08
10/22/2013 Elevation	7593.58	7590.84	7590.33	7590.66	7590.44	7590.08	7590.08
11/19/2014 Elevation	7593.59	7590.84	7590.33	7590.67	7590.44	7590.08	7590.08
09/10/2015 Elevation	7593.61	7590.85	7590.34	7590.69	7590.45	7590.08	DESTROYED?
09/24/2016 Elevation	7593.62	7590.85	7590.34	7590.68	7590.44	7590.08	DESTROYED?
11/29/2016 Elevation	7593.61	7590.84	7590.33	7590.68	7590.44	7590.08	DESTROYED?
05/31/2017 Elevation	7593.63	7590.86	7590.35	7590.70	7590.46	7590.08	DESTROYED?
06/24/2017 Elevation	7593.62	7590.87	7590.36	7590.70	7590.46	7590.08	DESTROYED?
07/30/2017 Elevation	7593.60	7590.86	7590.35	7590.69	7590.45	7590.08	DESTROYED?
08/18/2017 Elevation	7593.62	7590.86	7590.35	7590.69	7590.45	7590.08	DESTROYED?
09/29/2017 Elevation	7593.61	7590.86	7590.35	7590.68	7590.45	7590.08	DESTROYED?
10/28/2017 Elevation	7593.60	7590.86	7590.35	7590.69	7590.46	7590.08	DESTROYED?
Difference	0.01	0.00	0.00	-0.01	-0.01	0.00	



WARE SURVEYING, L.L.C.

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UtahAmerican Energy
West Ridge Mine
 Grassy Trail Reservoir
 "Straight line" survey data

10/31/2017

Distance from control point to face of Monitoring Well (MW) in feet									
Date of survey	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	West Mon.	Straight Line Movement
12/14/2006	94.21	141.49	245.90	295.13	394.71	493.96	556.71	na	No
1/31/2007	94.21	141.49	245.90	295.13	394.71	493.96	556.71	na	No
3/1/2007	94.21	141.49	245.90	295.13	394.71	493.96	556.71	na	No
3/29/2007	94.21	141.49	245.90	295.13	394.71	493.95	556.70	na	No
5/30/2007	94.20	141.49	245.89	295.12	394.70	493.94	556.70	na	No
6/5/2007	94.20	141.49	245.89	295.12	394.69	493.94	556.68	na	No
7/2/2007	94.20	141.49	245.89	295.12	394.69	493.94	556.69	na	No
10/9/2007	94.21	141.50	245.90	295.13	394.71	493.95	556.70	na	No
11/10/2007	94.22	141.50	245.90	295.13	394.70	493.95	556.70	na	No
12/27/2007	94.21	141.50	245.91	295.13	394.71	493.95	na	710.95	No
4/28/2008	94.20	141.49	245.90	295.12	394.70	493.95	556.69	710.95	No
5/30/2008	94.20	141.49	245.90	295.12	394.70	493.94	556.69	710.94	No
7/13/2008	94.20	141.49	245.90	295.12	394.70	493.95	556.69	710.94	No
8/29/2008	94.21	141.50	245.90	295.14	394.71	493.96	556.70	710.95	No
9/27/2008	94.21	141.50	245.91	295.14	394.71	493.96	556.70	710.95	No
11/24/2008	94.21	141.51	245.91	295.14	394.71	493.96	556.70	710.95	No
1/26/2009	94.20	141.50	245.91	295.13	394.71	493.96	556.70	710.94	No
2/23/2009	94.20	141.49	245.90	295.13	394.70	493.96	556.69	710.94	No
3/31/2009	94.20	141.50	245.90	295.13	394.71	493.96	556.70	710.95	No
4/27/2009	94.21	141.50	245.90	295.13	394.70	493.95	556.70	710.95	No
5/29/2009	94.20	141.49	245.90	295.12	394.70	493.95	556.69	710.95	No
6/28/2009	94.21	141.51	245.91	295.13	394.71	493.96	556.70	710.95	No
8/6/2009	94.21	141.51	245.91	295.14	394.70	493.96	556.70	710.96	No
9/9/2009	94.22	141.51	245.91	295.14	394.71	493.96	556.70	710.96	No
10/25/2009	94.21	141.51	245.91	295.14	394.71	493.96	556.70	710.96	No
11/20/2009	94.21	141.50	245.90	295.13	394.70	493.95	556.69	710.95	No
3/5/2010	94.21	141.50	245.90	295.13	394.70	493.95	556.69	710.95	No
4/15/2010	94.21	141.50	245.90	295.13	394.70	493.94	556.69	710.94	No
5/17/2010	94.21	141.50	245.90	295.13	394.70	493.95	556.69	710.95	No
6/24/2010	94.21	141.50	245.90	295.13	394.70	493.95	556.69	710.95	No
7/22/2010	94.21	141.50	245.90	295.13	394.70	493.95	556.70	710.95	No
9/2/2010	94.21	141.50	245.90	295.13	394.70	493.95	556.69	710.94	No
10/15/2010	94.21	141.50	245.90	295.13	394.70	493.95	556.69	710.94	No
11/18/2010	94.20	141.49	245.89	295.12	394.70	493.95	556.68	710.94	No
5/5/2011	94.21	141.49	245.89	295.12	394.69	493.94	556.68	710.94	No
6/3/2011	94.20	141.49	245.90	295.12	394.69	493.93	556.68	710.93	No
7/21/2011	94.21	141.50	245.90	295.13	394.69	493.94	556.68	710.94	No
8/29/2011	94.20	141.49	245.89	295.12	394.70	493.94	556.69	710.93	No
10/4/2011	94.21	141.49	245.90	295.13	394.70	493.95	556.69	710.93	No
11/7/2011	94.21	141.49	245.90	295.13	394.70	493.94	556.69	710.93	No
12/5/2011	94.21	141.50	245.90	295.13	394.70	493.94	556.69	710.94	No
1/2/2012	94.21	141.50	245.90	295.14	394.70	493.95	556.69	710.94	No
10/5/2012	94.21	141.49	245.89	295.12	394.68	493.93	556.67	710.91	No
10/22/2013	94.21	141.49	245.89	295.13	394.69	493.93	556.67	710.91	No
11/19/2014	94.22	*141.69*	245.90	295.13	394.69	493.93	556.67	710.92	No*
9/10/2015	94.21	141.69	245.89	295.12	394.68	493.92	556.66	710.90	No
9/24/2016	94.21	141.68	245.89	295.12	394.68	493.92	556.65	710.90	No
11/29/2016	94.20	141.67	245.89	295.12	394.68	493.92	556.65	710.90	No
12/22/2016	94.20	141.67	245.89	295.12	394.68	493.92	556.65	710.90	No
5/31/2017	94.19	141.66	245.88	295.10	394.66	493.91	556.64	710.89	No
6/24/2017	94.20	141.67	245.89	295.11	394.67	493.91	556.65	710.89	No
7/30/2017	94.19	141.67	245.88	295.10	394.66	493.91	556.64	710.88	No
8/18/2017	94.20	141.66	245.88	295.11	394.66	493.91	556.64	710.88	No
9/29/2017	94.20	141.67	245.88	295.11	394.67	493.91	556.64	710.88	No
10/28/2017	94.20	141.67	245.88	295.11	394.67	493.91	556.64	710.88	No
Difference	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	No
Notes	*MW-2 appears to have been bumped, a new distance and straight line mark was recorded								



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UtahAmerican Energy West Ridge Mine

Grassy Trail Reservoir

GPS Survey Data

Anticipated vertical accuracy ~ 0.08'+/-

10/31/2017

STATION	12	13	14	MID	TOE
NORTHING	38,509.85	38,555.42	38,610.87	38,828.21	38,719.59
EASTING	37,047.46	37,064.56	37,099.85	37,580.00	37,664.94
GPS survey date.					
September 2004	7789.87	7771.43	7739.26		
November 2004	7789.84	7771.39	7739.21		
August 2005	7789.75	7771.30	7739.13		
April 2006	7789.46	7771.02	7738.83		
October 2006	7789.39	7770.95	7738.66		
May 2007	7789.45	7771.00	7738.77		
October 2007	7789.45	7771.01	7738.76		
May 2008	7789.57	7771.10	7738.78	7565.52	7515.69
7/13/2008	7789.54	7771.12	7738.82	7565.54	7515.68
8/29/2008	7789.51	7771.08	7738.75	7565.51	7515.63
9/27/2008	7789.49	7771.05	7738.79	7565.52	7515.66
11/24/2008	7789.52	7771.09	7738.76	7565.54	7515.67
3/31/2009	7789.52	7771.07	7738.74	7565.55	7515.65
4/27/2009	7789.50	7771.05	7738.71	7565.53	7515.64
5/29/2009	7789.39	7771.01	7738.72	7565.48	7515.62
6/28/2009	7789.44	7771.08	7738.71	7565.50	7515.63
8/6/2009	7789.49	7771.12	7738.68	7565.49	7515.64
9/9/2009	7789.50	7771.10	7738.67	7565.51	7515.66
10/25/2009	7789.48	7771.11	7738.70	7565.50	7515.67
11/20/2009	7789.49	7771.10	7738.69	7565.49	7515.65
4/15/2010	7789.35	7770.99	7738.80	7565.49	7515.66
5/26/2010	7789.32	7770.91	7738.84	7565.50	7515.66
6/24/2010	7789.36	7770.96	7738.74	7565.46	7515.64
7/22/2010	7789.33	7770.93	7738.75	7565.48	7515.64
9/2/2010	7789.32	7770.91	7738.75	7565.47	7515.64
10/15/2010	7789.34	7770.93	7738.76	7565.49	7515.66
11/18/2010	7789.33	7770.92	7738.73	7565.49	7515.65
5/5/2011	7789.44	7770.93	7738.70	7565.46	7515.62
6/3/2011	7789.46	7770.99	7738.72	7565.50	7515.61
7/21/2011	7789.40	7770.96	7738.75	7565.47	7515.64
8/29/2011	7789.36	7770.96	7738.74	7565.49	7515.62
10/4/2011	7789.33	7770.95	7738.78	7565.48	7515.65
11/7/2011	7789.38	7770.92	7738.77	7565.48	7515.63
10/5/2012	7789.35	7770.91	7738.78	7565.47	7515.62
10/22/2013	7789.37	7770.95	7738.79	7565.47	7515.65
11/19/2014	7789.36	7770.92	7738.78	7565.49	7515.63
9/10/2015	7789.63	7771.15	7739.08	7565.52	7515.65
9/24/2016	7789.54	7771.10	7738.91	7565.51	7515.62
11/29/2016	7789.50	7771.02	7738.97	7565.48	7515.63
5/31/2017	7789.54	7771.07	7738.96	7565.50	7515.65
6/24/2017	7789.49	7771.05	7738.99	7565.47	7515.65
7/30/2017	7789.56	7771.08	7739.03	7565.49	7515.64
8/18/2017	7789.54	7771.10	7739.01	7565.49	7515.66
9/29/2017	7789.48	7771.02	7738.90	7565.50	7515.68
10/28/2017	7789.56	7771.06	7738.94	7565.48	7515.65
Difference	-0.08	-0.04	-0.04	0.02	0.03



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Grassy Trail Dam- Views looking West to North



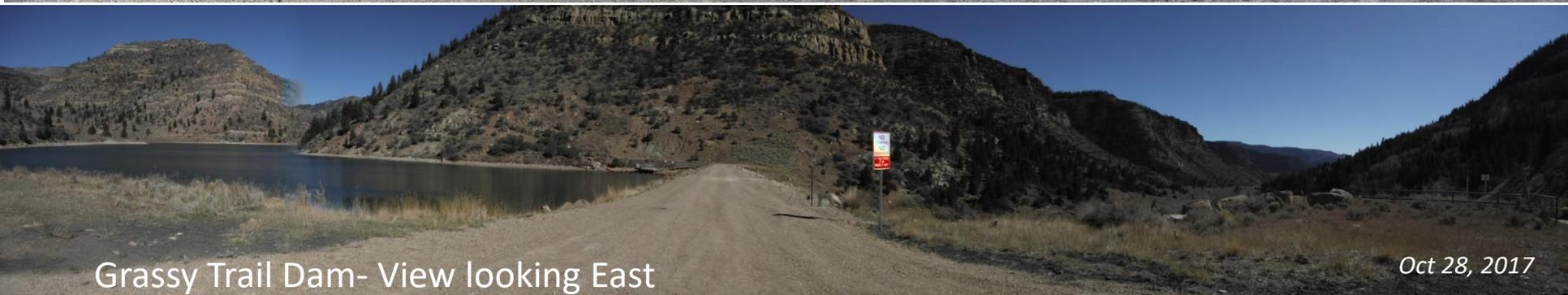
Oct 7, 2017



Oct 14, 2017



Oct 21, 2017



Grassy Trail Dam- View looking East

Oct 28, 2017

