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Grassy Trail / UT000126 Monitoring Update May 13, 2017

Michael Hansen <mhansen@rbgengineering.com> Mon, May 22, 2017 at 11:03 AM
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Here is our Grassy Trail Monitoring Update from April 9 to May 13, 2017.
The spillway has been over topping since about 4/22/17.
A small slump was noted above the spillway near the Left Abutment.
North of the Right Abutment above Inclinometer # I-4 the slope is very wet with evidence of some surficial movement.

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Project Report MIS 5-13-17.pdf
1822K

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PROJECT REPORT

Project No.	201404-006		
Project	Grassy Trail – West Ridge Mine Monitoring		
Dates	Site Visits and readings - April 15, 22, 29, May 6,and 13, 2017		
Report By	Michael N. Hansen	**Position**	Engineering Geologist

Observations / Activities

New readings from Inclinometers I-1, I-2 and 1-3 have not shown any significant movement. Plots of the inclinometer readings taken on May 6, 2017 are attached. Work along the roadway north of the dam has damaged I-4 and it has not been read. With some additional cleaning and work, we may be able to continue using I-4. With the saturation of the slope in this area, we would like to get this inclinometer read. The condition of this slope is discussed later in this update.

One accelerometer is located on the crest of the dam. This instrument has not detected any mining induced seismic (MIS) activity between April 9, to May 13, 2017. The "events" which have been recorded take place while removing and replacing the cover back on the instrument as part of downloading and resetting the Accelerometer. Some events may be wind related.

Since the last report on April 9, 2017, no seismic events have been reported within the area of the mine by the University of Utah Seismograph Stations (UUSS). It should be noted that there were two small events located over seven miles east and south of the dam. Based on the locations of these events, they do not appear to be related to previous mining near the dam.

Ice has melted off of the reservoir and has been overtopping the spillway during the past four weeks by as much as 6 inches. 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.

At this time we are not aware of any new survey data of the dam from Ware Surveying LLC.

During the site visits, reconnaissance of the area found a small surficial slump on the hillside above the left (east) abutment. This slump is not a hazard to the dam and left a small pile of debris at the base of the slope. North of the right abutment above Inclinometer #4, the hillside is very saturated. Some newer scarps are visible at the head of the slide above the road. While there is currently no evidence of deep seated movement, it may be possible for material to come down onto the road and bury Inclinometer # 4.
No evidence of movement was noted within the hillside of the Right (west) Abutment.

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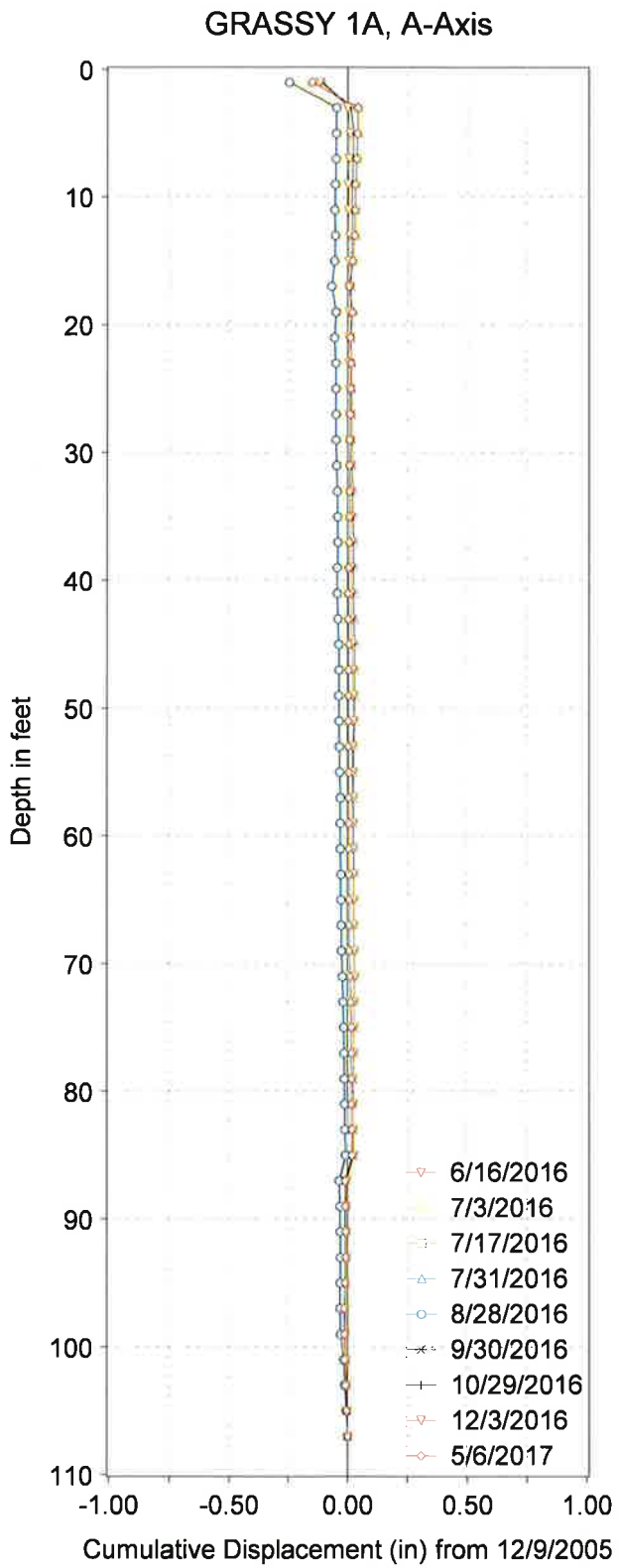
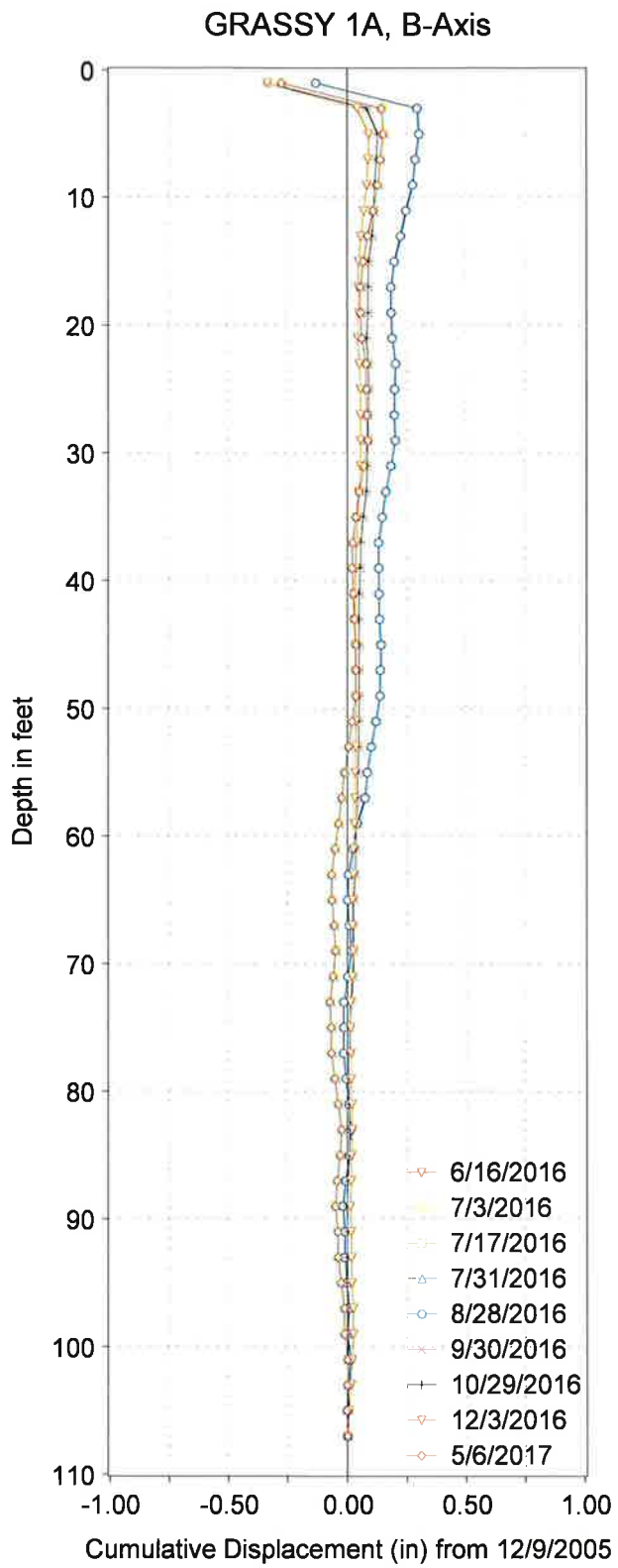
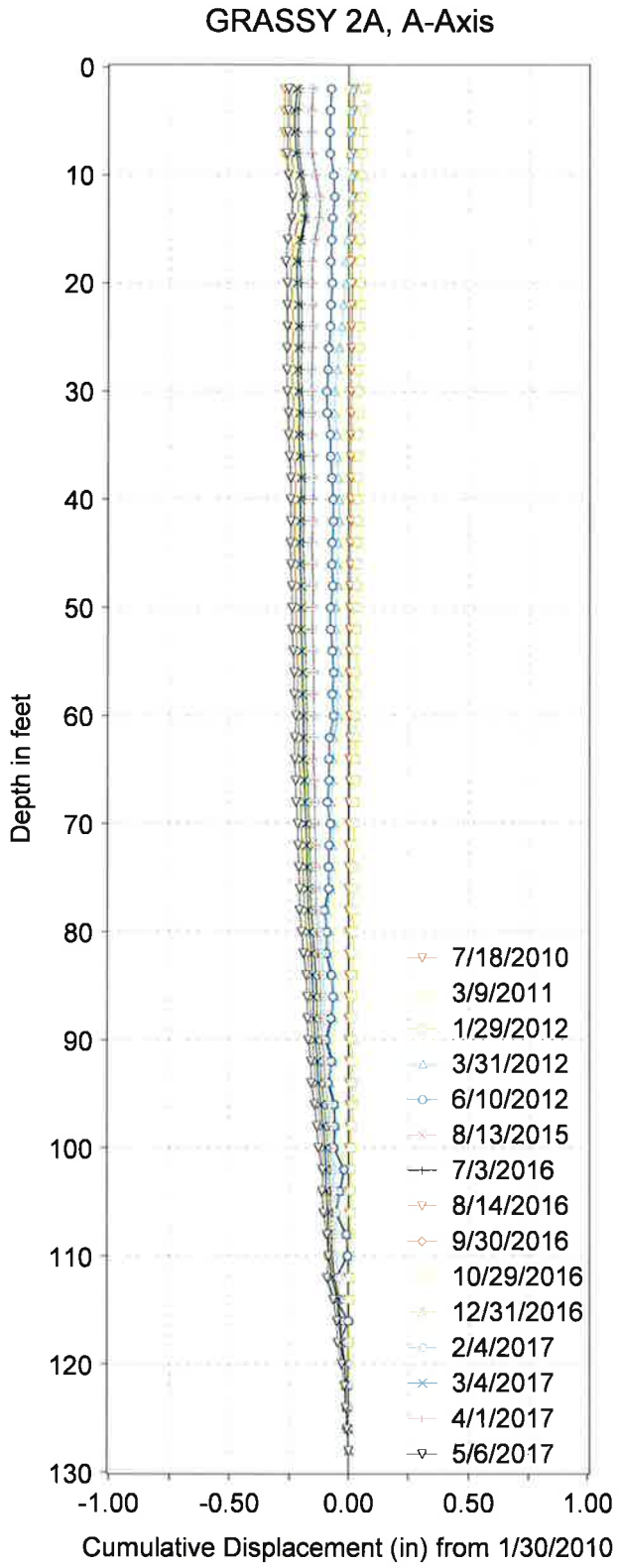
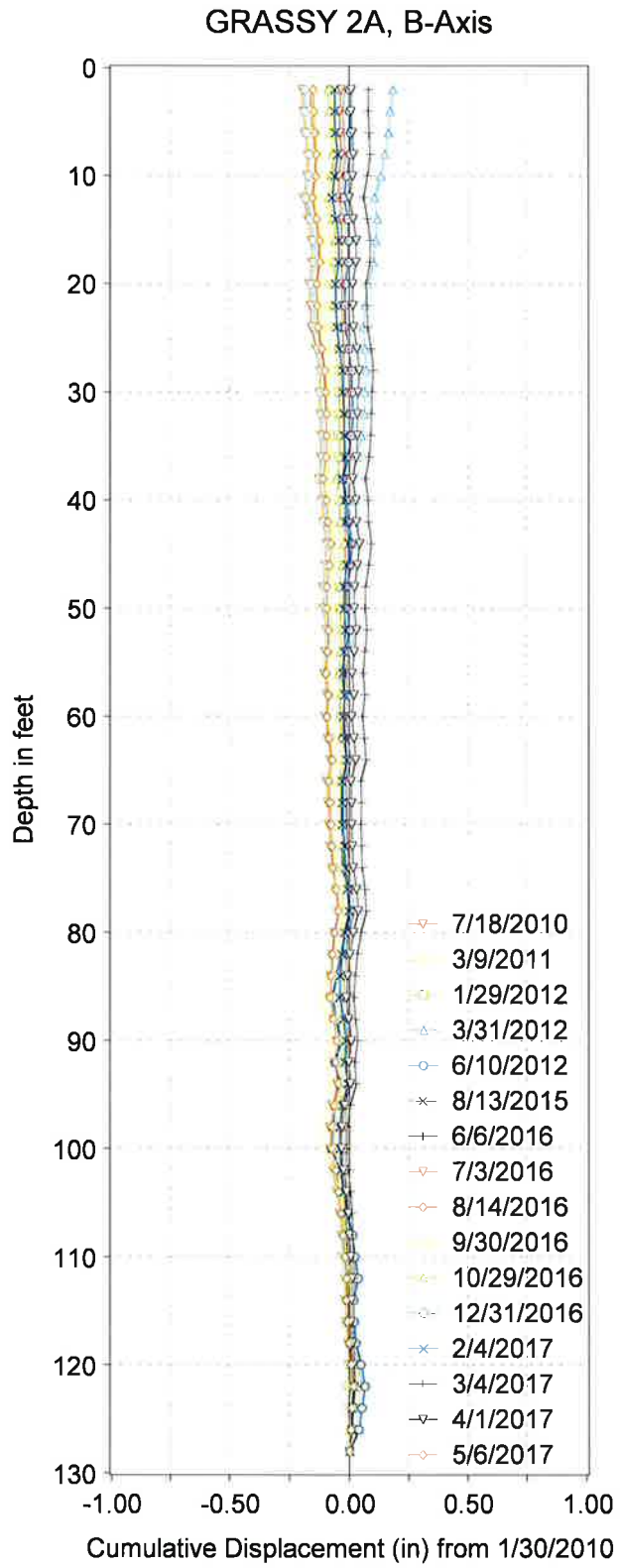




No significant movement observed

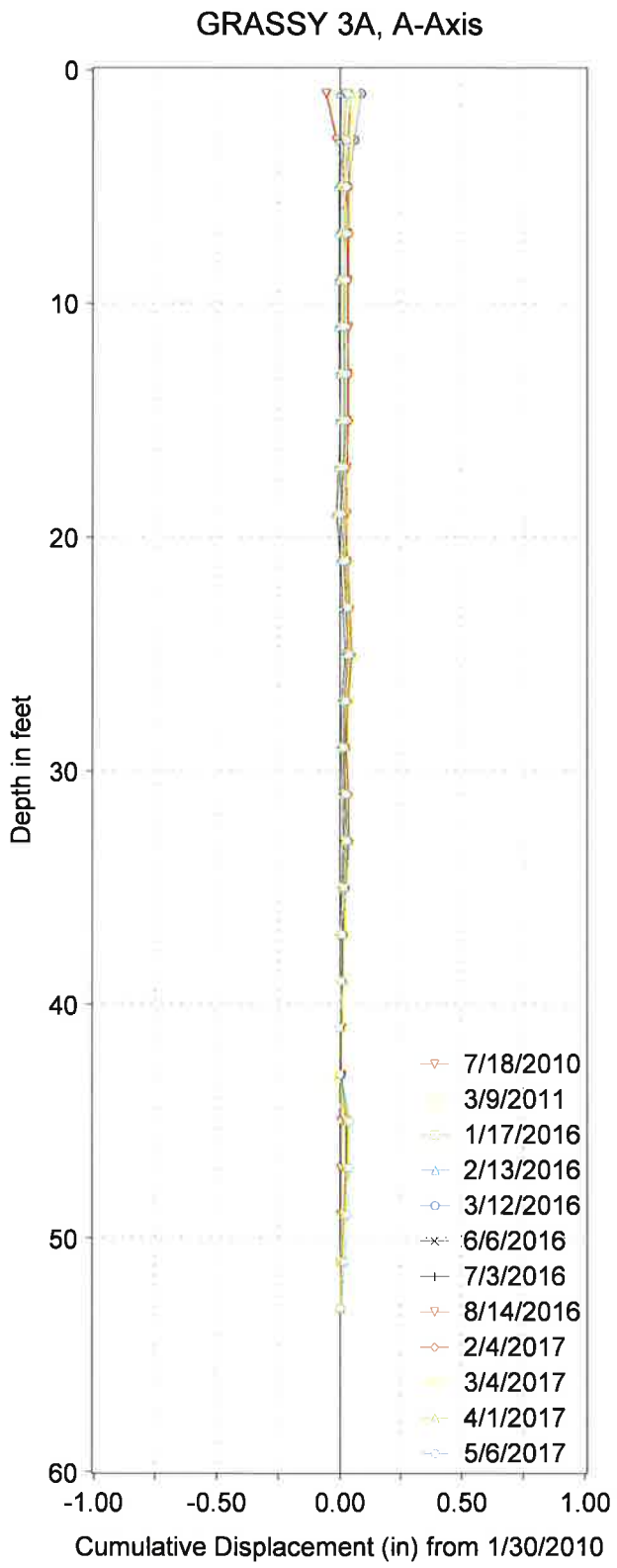
Figure B-1
Inclinometer 1 -Deflection Profiles
Grassy Trail Dam, Carbon County, Utah

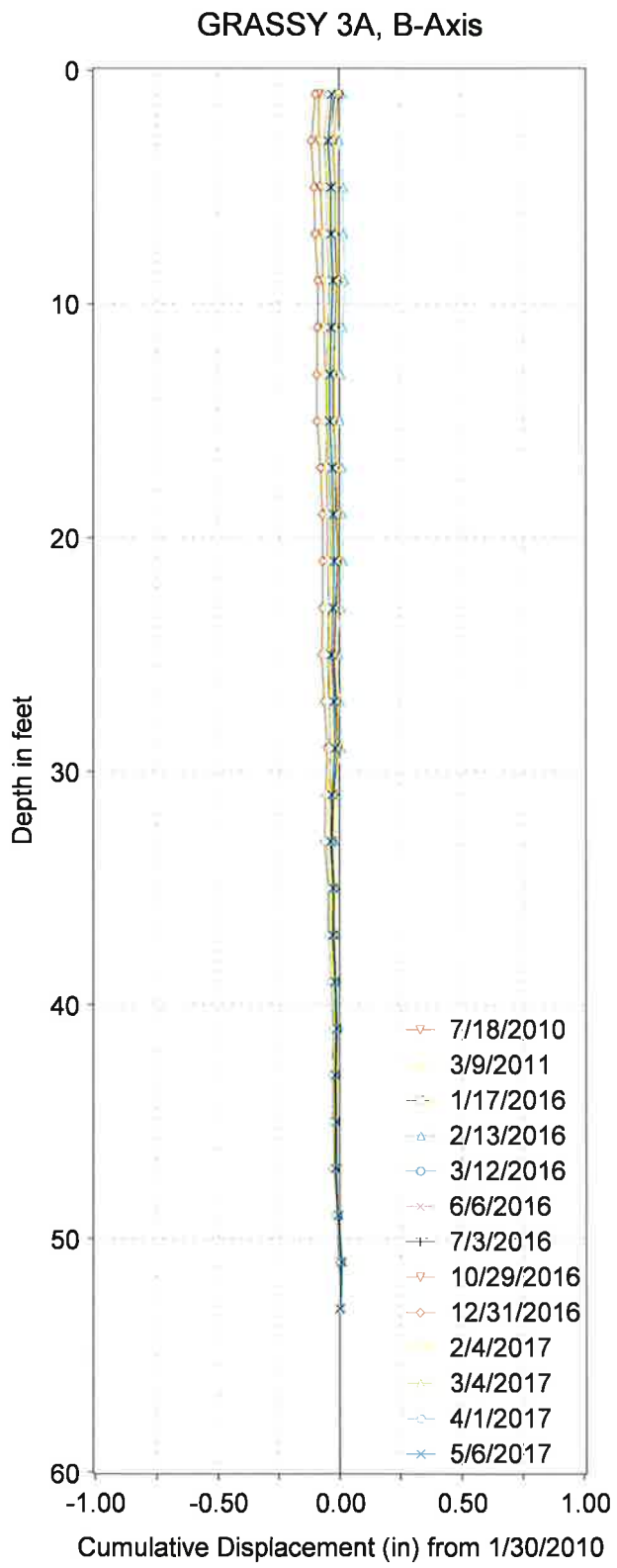




-15 dergree skew
Bias-shift correction

Figure
Inclinometer 2 - Deflection Profile
Grassy Trail Dam, Carbon County, Utah





-30 degree skew

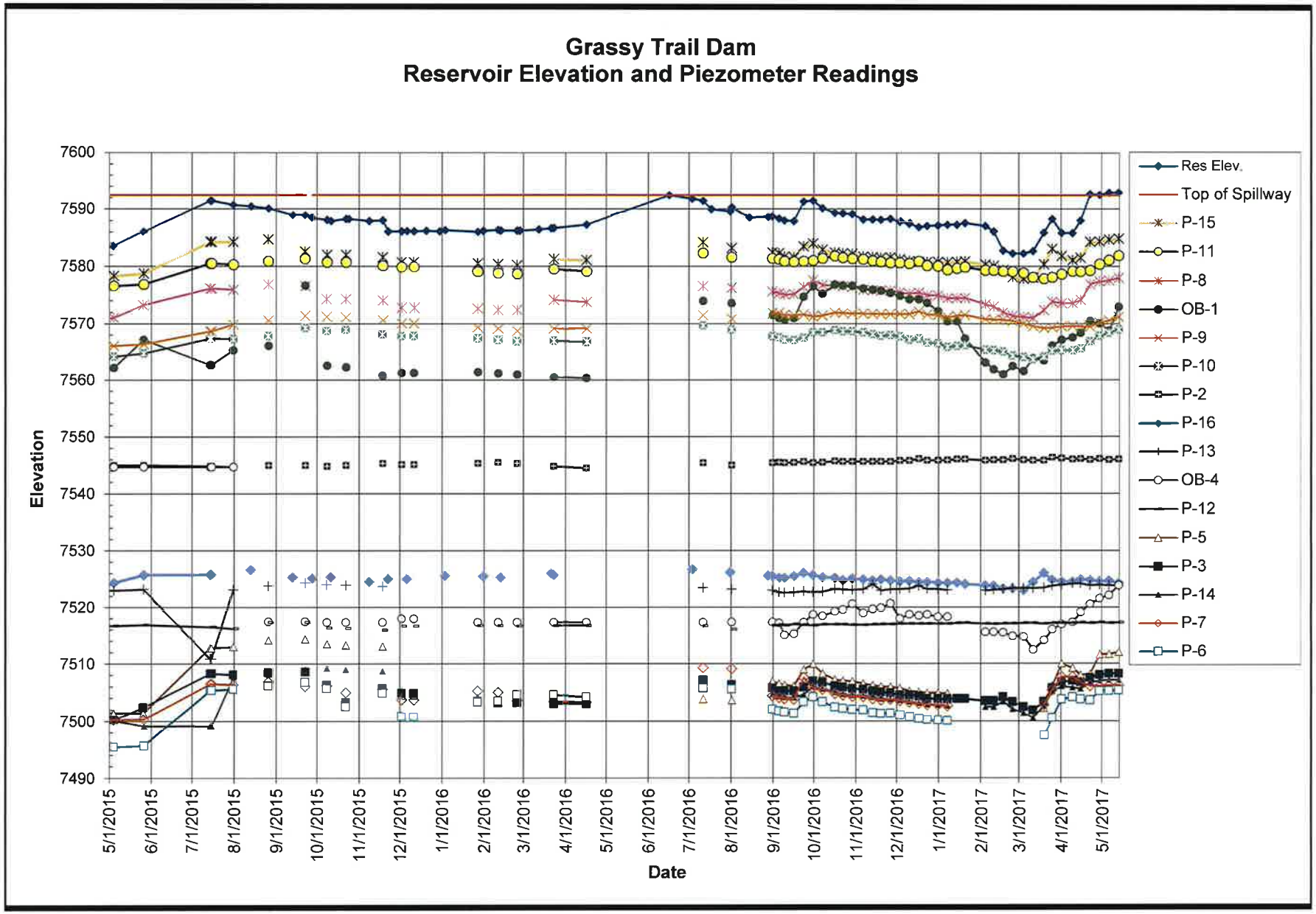
Figure B-5
Inclinometer 3 - Deflection Profile
Grassy Trail Dam, Carbon County, Utah

Grassy Trail Dam MIS Monitoring - Accelerometer located on the Dam Blastware (V10.72-10.74) Event Report Event List

Type	Serial No.	Date	Time	No. Chan	Trigger	Tran Peak (in/s)	Vert Peak (in/s)	Long Peak (in/s)	Tran Accel (g)	Vert Accel (g)	Long Accel (g)	Tran Freq. Hz.	Vert Freq. Hz.	Long Freq. Hz.	Description	Post Event Note first line
LOG	BE9690	9-Apr-17	8:58:54	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	Start Monitoring
W	BE9690	9-Apr-17	8:59:09	3	Vert	0.045	0.085	0.05	0.066	0.172	0.08	73.14	85.33	>100	GrassyTrailDam2015	*Man Made event while opening or closing cover*
W	BE9690	9-Apr-17	8:59:22	3	Vert	0.08	0.025	0.035	0.106	0.04	0.066	85.33	>100	>100	GrassyTrailDam2015	*Man Made event while opening or closing cover*
W	BE9690	9-Apr-17	9:45:26	3	Tran	0.02	0.015	0.015	0.027	0.013	0.027	64	>100	85.33	GrassyTrailDam2015	*Man Made even*
LOG	BE9690	9-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	9-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	10-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	10-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	11-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	11-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	12-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	12-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	13-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	13-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	Start Monitoring
LOG	BE9690	14-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	14-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	Start Monitoring
W	BE9690	15-Apr-17	16:14:26	3	Tran	0.04	0.02	0.025	0.066	0.027	0.053	>100	>100	>100	GrassyTrailDam2015	*Man Made event while opening or closing cover*
W	BE9690	15-Apr-17	16:14:30	3	Vert	0.385	0.125	0.215	0.623	0.133	0.305	73.14	39.38	64	GrassyTrailDam2015	*Man Made event while opening or closing cover*
LOG	BE9690	15-Apr-17	16:14:39	***	***	***	***	***	***	***	***	***	***	***	Keyboard Stop	No events recorded. (Keyboard Exit)
LOG	BE9690	15-Apr-17	17:17:45	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	Start Monitoring
W	BE9690	15-Apr-17	17:17:57	3	Vert	0.095	0.115	0.065	0.186	0.146	0.146	25.6	51.2	>100	GrassyTrailDam2015	*Man Made event while opening or closing cover*
W	BE9690	15-Apr-17	17:18:03	3	Long	0.02	0.02	0.035	0.053	0.04	0.053	85.33	>100	>100	GrassyTrailDam2015	*Man Made event while opening or closing cover*
LOG	BE9690	15-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	15-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	16-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	16-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	17-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	17-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	18-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	18-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	19-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	19-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	20-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	20-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	21-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	21-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	Start Monitoring
W	BE9690	22-Apr-17	8:49:33	3	Tran	0.395	0.255	0.24	1.061	0.398	0.583	>100	73.14	85.33	GrassyTrailDam2015	*Man Made event / wind*
LOG	BE9690	22-Apr-17	8:49:46	***	***	***	***	***	***	***	***	***	***	***	Keyboard Stop	No events recorded. (Keyboard Exit)
LOG	BE9690	22-Apr-17	11:03:48	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	Start Monitoring
LOG	BE9690	22-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	22-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	Start Monitoring
W	BE9690	23-Apr-17	19:49:11	3	Tran	0.02	0.015	0.01	0.027	0.027	0.013	73.14	>100	>100	GrassyTrailDam2015	*Man Made event / wind*
LOG	BE9690	23-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	23-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	24-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	24-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	25-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	25-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	26-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	26-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	27-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	27-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	Start Monitoring
W	BE9690	28-Apr-17	23:22:05	3	Tran	0.02	0.01	0.01	0.027	0.027	0.027	73.14	>100	>100	GrassyTrailDam2015	*Man Made event / wind*
LOG	BE9690	28-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	28-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	Start Monitoring
W	BE9690	29-Apr-17	8:48:52	3	Tran	0.02	0.015	0.01	0.013	0.013	0.013	26.95	24.38	>100	GrassyTrailDam2015	*Man Made event while opening or closing cover*
LOG	BE9690	29-Apr-17	8:48:59	***	***	***	***	***	***	***	***	***	***	***	Keyboard Stop	No events recorded. (Keyboard Exit)
LOG	BE9690	29-Apr-17	10:56:17	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	Start Monitoring
W	BE9690	29-Apr-17	10:56:33	3	Vert	0.085	0.09	0.07	0.106	0.119	0.066	26.95	32	64	GrassyTrailDam2015	*Man Made event while opening or closing cover*
W	BE9690	29-Apr-17	10:56:41	3	Tran	0.065	0.075	0.065	0.093	0.159	0.133	56.89	56.89	56.89	GrassyTrailDam2015	*Man Made event while opening or closing cover*
W	BE9690	29-Apr-17	10:56:54	3	Long	0.02	0.085	0.07	0.04	0.146	0.093	85.33	85.33	51.2	GrassyTrailDam2015	*Man Made event while opening or closing cover*
W	BE9690	29-Apr-17	10:56:59	3	Tran	0.02	0.01	0.015	0.027	0.027	0.027	>100	>100	>100	GrassyTrailDam2015	*Man Made event while opening or closing cover*
W	BE9690	29-Apr-17	11:07:53	3	Tran	0.02	0.01	0.005	0.027	0.027	0.027	73.14	>100	>100	GrassyTrailDam2015	*Man Made event while opening or closing cover*
LOG	BE9690	29-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	29-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	30-Apr-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	30-Apr-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	1-May-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	1-May-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	2-May-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	2-May-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	3-May-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	3-May-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	4-May-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	4-May-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	5-May-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	5-May-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	Start Monitoring
W	BE9690	6-May-17	3:47:22	3	Vert	0.19	0.1	0.085	0.278	0.199	0.106	85.33	85.33	85.33	GrassyTrailDam2015	*Man Made event while opening or closing cover*
LOG	BE9690	6-May-17	3:47:38	***	***	***	***	***	***	***	***	***	***	***	Keyboard Stop	No events recorded. (Keyboard Exit)
LOG	BE9690	6-May-17	5:06:56	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	Start Monitoring
W	BE9690	6-May-17	5:07:30	3	Long	0.055	0.03	0.045	0.08	0.053	0.08	>100	>100	>100	GrassyTrailDam2015	*Man Made event while opening or closing cover*
W	BE9690	6-May-17	5:08:00	3	Long	0.01	0.01	0.035	0.013	0.027	0.04	>100	>100	>100	GrassyTrailDam2015	*Man Made event while opening or closing cover*
LOG	BE9690	6-May-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	6-May-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	7-May-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	7-May-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	8-May-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	8-May-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	9-May-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	9-May-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	10-May-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	10-May-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	11-May-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	11-May-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	No events recorded. (Daily Self Check Exit)
LOG	BE9690	12-May-17	23:59:28	***	***	***	***	***	***	***	***	***	***	***	Daily Check Stop	No events recorded. (Daily Self Check Exit)
LOG	BE9690	12-May-17	23:59:37	***	***	***	***	***	***	***	***	***	***	***	Start Monitoring	Start Monitoring
W	BE9690	13-May-17	3:56:36	3	Tran	0.235	0.16	0.095	0.464	0.159	0.212	>100	56.89	>100	GrassyTrailDam2015	*Man Made event while opening or closing cover*
LOG	BE9690	13-May-17	3:56:53	***	***	***	***	***	***	***	***	***	***	***	Keyboard Stop	No events recorded. (Keyboard Exit)

GRASSY TRAIL DAM PIEZOMETER & OBSERVATION WELL READINGS

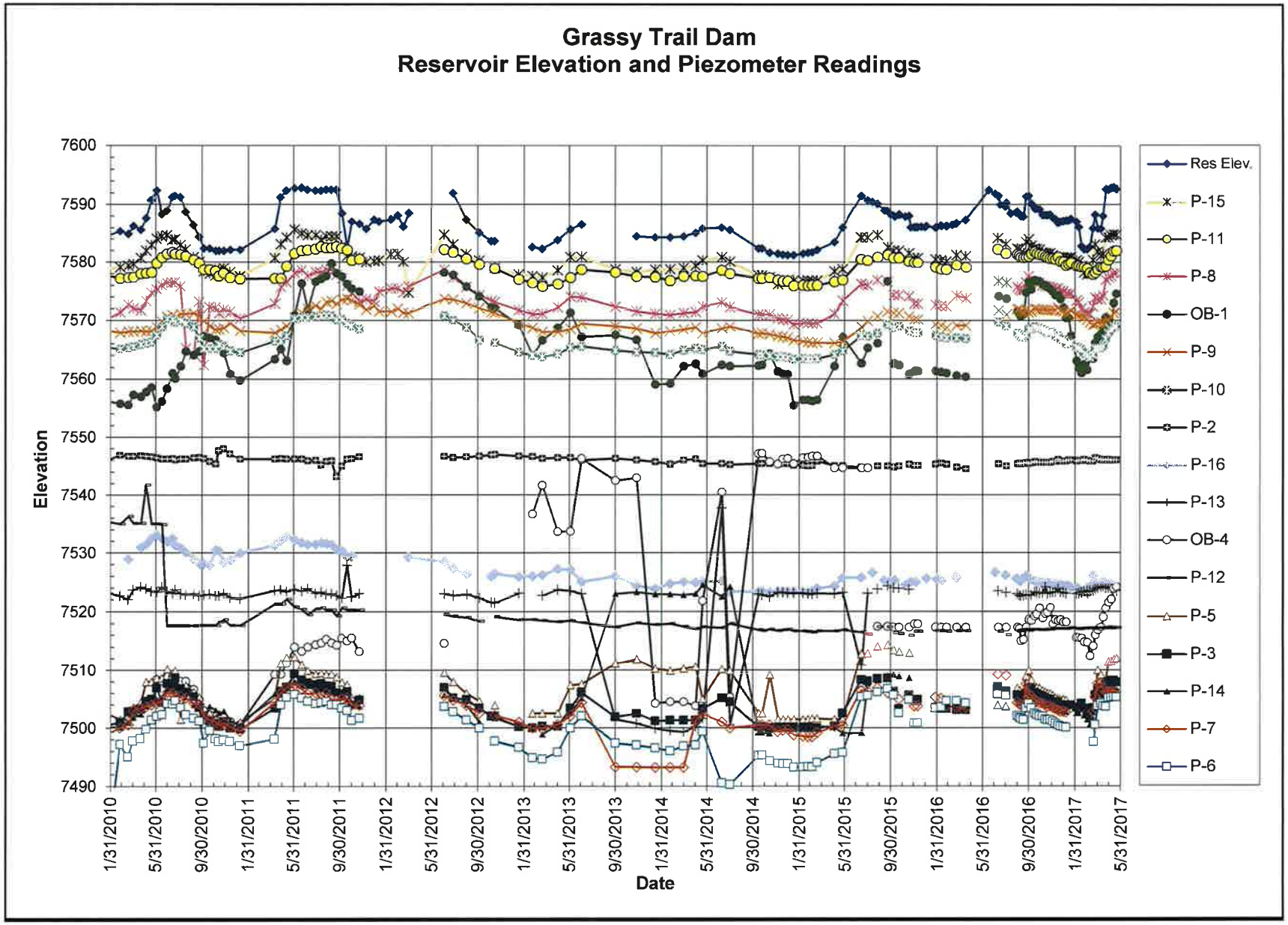
TAKE READINGS AT RIM ELEV			05-2		79-4	98-3		05-4		79-3	05-3A	05-3		98-2	98-4	98-6	06-1	06-1
			5+62		5+15	4+14		~4+14		3+63	2+77	2+71						
Dam Crest Elev		7600.0	PIEZ.	PIEZ.	O.W.	PIEZ.		PIEZ.		O.W.	PIEZ	PIEZ	PIEZ	PIEZ	PIEZ	PIEZ	PIEZ	PIEZ
Spillway Elev.		7592.5	8	9	1	2	3	13	14	4	10	11	12	5	6	7	15	16
Rim Elev. (ft)			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	FOUND	EMBANK/FOUND	EMBANK	FOUND	EMBANK	FOUND	EMBANK/FOUND	EMBANK	EMBANK	FOUND	FOUND	FOUND	FOUND	FOUND	BED ROCK
Date	Initials	Reservoir Elevation	45.75' (47')	55' (66.4')	110'	76.2' (76.3')	110.7'	36.5' (37.9')	58.8' (59.4')	110'	49.5' (51')	28.5' (29.7')	84.0' (72.2')	27.3'	32.5'	26.5'	35.5'	100.0'
01/16/15	Values taken from Dam Safety web page submitted by East Carbon City (ECC)	7581.25	7569.3	7566.6	7555.5	7545.1	7500.0	7523.1	7500.0	7545.4	7563.4	7575.9	7516.7	7501.5	7493.3	7498.8	7576.8	7523.5
02/10/15		7581.50	7569.5	7566.4	7556.4	7545.1	7500.0	7523.1	7500.0	7546.4	7563.5	7576.0	7516.7	7501.5	7493.3	7498.6	7576.8	7523.5
02/23/15		7581.67	7569.4	7566.3	7556.4	7545.0	7500.0	7523	7500.0	7546.5	7563.4	7575.9	7516.6	7501.5	7493.4	7498.5	7576.8	7523.4
03/06/15		7581.75	7569.3	7566.1	7556.2	7545.1	7500.0	7522.9	7500.1	7546.7	7563.4	7576.0	7516.5	7501.6	7493.3	7498.5	7576.8	7523.2
03/19/15		7582.17	7569.4	7566.2	7556.4	7545.8	7500.0	7523.1	7500.3	7546.7	7563.5	7576.0	7516.7	7501.6	7494.1	7499.2	7576.8	7523.5
05/04/15		7583.50	7571.1	7566.1	7562.2	7545.0	7500.3	7523	7500.1	7544.7	7564.2	7576.6	7516.7	7501.5	7495.6	7500.3	7578.4	7524
05/26/15		7586.08	7573.3	7566.4	7567.2	7545.0	7502.5	7523.2	7499.1	7544.7	7564.8	7576.9	7516.9	7501.5	7495.8	7500.4	7578.8	7524.4
07/14/15		7591.50	7576.2	7568.7	7562.7	7544.8	7508.3	7510.9	7499.2	7544.7	7567.4	7580.5	7516.5	7512.8	7505.4	7506.5	7584.3	7525.8
07/15/15		7591.50	7576.2	7568.7	7562.7	7544.8	7508.3	7510.9	7499.2	7544.7	7567.4	7580.5	7516.5	7512.8	7505.4	7506.5	7584.3	7525.8
07/31/15		7590.75	7576.0	7569.9	7565.3	7544.7	7508.1	7523.1	7507.6	7544.7	7567.3	7580.3	7516.2	7513	7505.6	7506.4	7584.3	7525.9
08/13/15		7590.50																
08/26/15		7590.13	7576.9	7570.7	7566.1	7545.0	7508.5	7523.8	7508.2	7517.5	7567.8	7580.9	7517.4	7514.2	7506.2	7506.9	7584.7	7526.7
09/13/15	MH	7588.95																
09/22/15	ECC	7588.92	7576.6	7571.5	7576.7	7545	7508.6	7524.3	7509	7517.5	7569.3	7581.3	7517.4	7514.4	7506.8	7506.1	7582.6	7525.4
09/27/15	MH	7588.50																
10/08/15	ECC	7588.17	7574.3	7571.3	7562.6	7544.8	7506.3	7524	7509.2	7517.4	7568.7	7580.7	7516.4	7513.5	7505.7	7506.2	7582	7525.2
10/11/15	MH	7587.95																
10/22/15	ECC	7588.33	7574.3	751.2	7562.3	7545	7506.3	7523.9	7509	7517.4	7568.9	7580.7	7516.3	7513.3	7502.6	7505	7582	7525.4
10/24/15	MH	7588.30																
11/08/15	MH	7588.00																
11/18/15	ECC	7588.08	7574.1	750.7	7562.8	7544.3	7506.7	7523.7	7508.7	7517.4	7568.1	7580.1	7516	7513.1	7504.9	7505.6	7581.6	7524.6
11/22/15	MH	7586.10																
12/02/15	ECC	7586.17	7572.8	7570.1	7561.3	7545.1	7504.9	NA	NA	7518	7567.8	7579.9	7516.7	7504.6	7500.9	7503.8	7580.7	7525.1
12/06/15	MH	7586.18																
12/11/15	ECC	7586.17	7572.8	7570.1	7561.3	7545.1	7504.9	NA	NA	7518	7567.8	7579.9	7516.7	7504.6	7500.9	7503.8	7580.7	7525.1
12/20/15	MH	7586.25																
12/30/15	ECC	7586.167																
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	EEC	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	7503.4	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	7566.7	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	7566.6	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	7523.1			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	7523.1	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	7566.9	7579.3	7517.2	7511.6	7505.2	7506.1	7584.3	7525.0
04/29/17	MH	7592.60	7577.4	7570.2	7570.1	7546.1	7508.0	7524.0	7507.0	7521.6	7567.9	7580.4	7517.4	7511.7	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	7512.0	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



RB&G ENGINEERING, INC.

Figure Reservoir Elevation and Piezometer Readings
May 2015 to May 13, 2017

Grassy Trail Dam and Reservoir



RB&G ENGINEERING, INC.

Figure Reservoir Elevation and Piezometer Readings
January 2010 to May 13, 2017

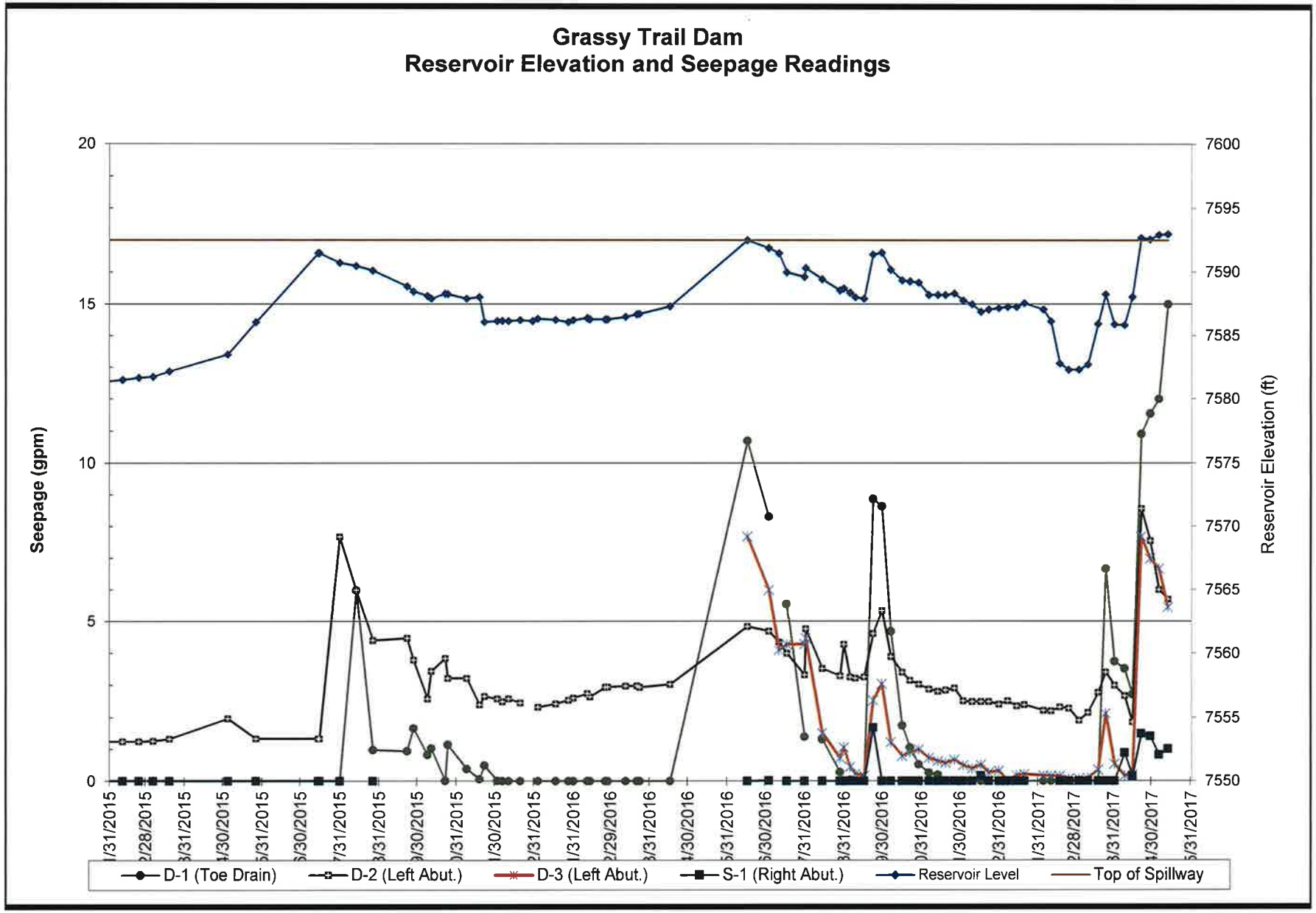
Grassy Trail Dam and Reservoir

GRASSY TRAIL DAM SEEPAGE READINGS

Dam Crest Elev(ft)		7600.0		Drain1:Toe Drain		Drain 2: Left Abutment (East Seep)		Drain 3: Left Abutment (East Additional collection)		Seep 4: Right Abutment (West Seep)	
Spillway Elev. (ft)		7592.5									
		Seep Location:									
Date	Initials	Reservoir Elev.	Reservoir Characteristics	GAL/MIN	Water Characteristics	GAL/MIN	Water Characteristics	add spring 2016		GAL/MIN	Water Characteristics
11/13/14	Values taken from Dam Safety web page submitted by East Carbon City (ECC)	7581.667		0.001		1.579				0.001	
12/5/14		7581.5		0.006		1.563				0.001	
12/18/14		7581.333		0.006		1.546				0.001	
12/31/14		7581.25		0.006		1.531				0.001	
1/16/15		7581.25		0.006		1.25				0.001	
2/10/15		7581.5		0.006		1.245				0.001	
2/23/15		7581.667		0.006		1.25				0.001	
3/6/15		7581.75		0.006		1.261				0.001	
3/19/15		7582.167		0.006		1.327				0.001	
5/4/15		7583.5		0.006		1.974				0.001	
5/26/15		7586.083		0.006		1.333				0.001	
7/14/15		7591.5		0.006		1.339				0.001	
7/15/15		7591.5		0.006		1.339				0.001	
7/31/15		7590.75		0.006		7.692				0.001	
8/13/15	ECC	7590.5		6	* likely a typo	6					
8/26/15	ECC	7590.1		0.984	clear	4.412	*trace sediment			0.001	
9/22/15	ECC	7588.9		0.952	clear	4.478				0.001	
9/27/15	MH	7588.50	clear	1.67	clear	3.80	*trace sediment			NM	Not Measureat
10/8/15	ECC	7588.17		0.933		2.59	clear			0.001	
10/11/15	MH	7587.95	clear	1.03	clear	3.45	clear			NM	Not Measureat
10/22/18	ECC	7588.33		0.006		3.85				NM	
10/24/15	MH	7588.30	clear	1.15	clear	3.23	clear			NM	
11/8/15	MH	7587.95	trace ice on edges	0.39	clear	3.23	clear			NM	
11/18/15	ECC	7588.08		0.06		2.40				NM	
11/22/15	MH	7586.10	trace ice on edges	0.050	clear	2.66	clear			NM	ice
12/2/15	ECC	7586.2	frozen	0.006		2.59				NM	ice
12/6/15	MH	7586.2	frozen	Dry		2.50				NM	ice
12/11/15	ECC	7586.167	frozen	Dry		2.59				NM	ice
12/20/15	MH	7586.25	frozen	Dry		2.46				NM	ice
12/30/15	ECC	7586.167	frozen	Dry						NM	
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
2/11/16	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	slighty 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		drip	
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	
10/9/20	MH	2.7		1.86		0.16		0.74		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 melt
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	a lot melted	2.727		1.86		0.19		0.159	
04/22/17	MH	7592.70	Ice Melted flow over top	10.91		8.57		7.69	some sedment	1.500	
04/29/17	MH	7592.60	over top spillway	11.540		7.55		6.99	some sedment	1.420	
05/06/17	MH	7592.95	over top spillway	12.000	stream backed	6.00		6.67	some sedment	0.830	
05/13/17	MH	7593.00	over top spillway	15.000	up to pipe	5.70		5.45	some sedment	1.020	

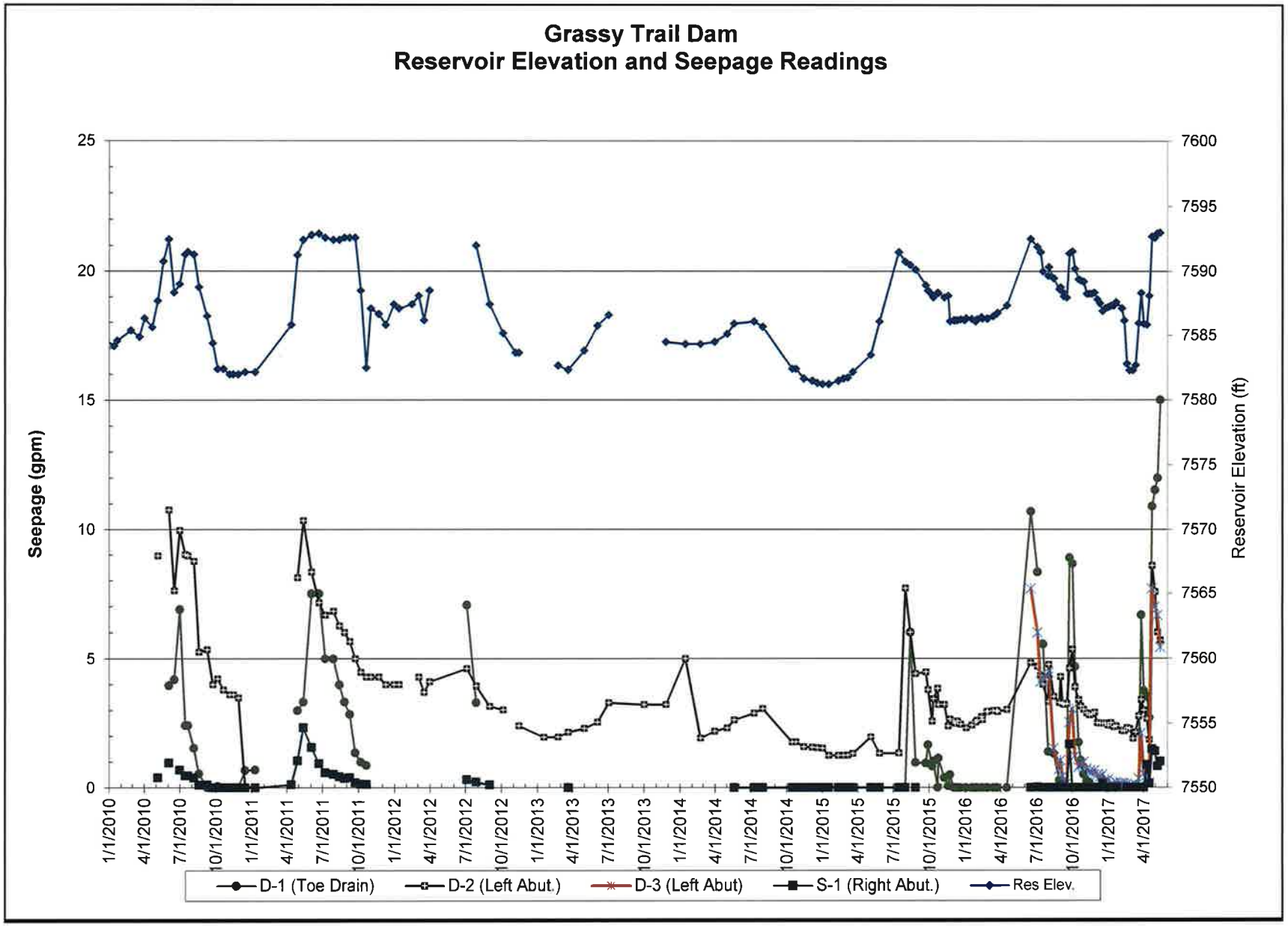
* notes MH = Michael Hansen RB&G Engineering
ECC= East Carbon City / Sunnyside

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



RB&G ENGINEERING, INC.

Figure Reservoir Elevation and Seepage Readings
January 2015 to May 13, 2017
Some additonal readings by RB&G Eng
Grassy Trail Dam and Reservoir



RB&G ENGINEERING, INC.

Figure Reservoir Elevation and Seepage Readings
January 2010 to May 13, 2017
Some additonal readings by RB&G Eng
Grassy Trail Dam and Reservoir

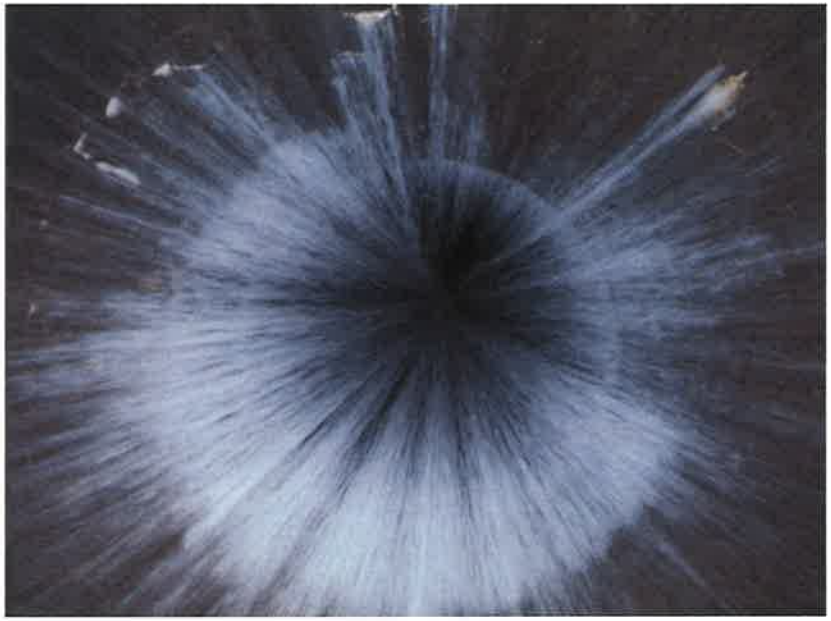
April 22, 2017

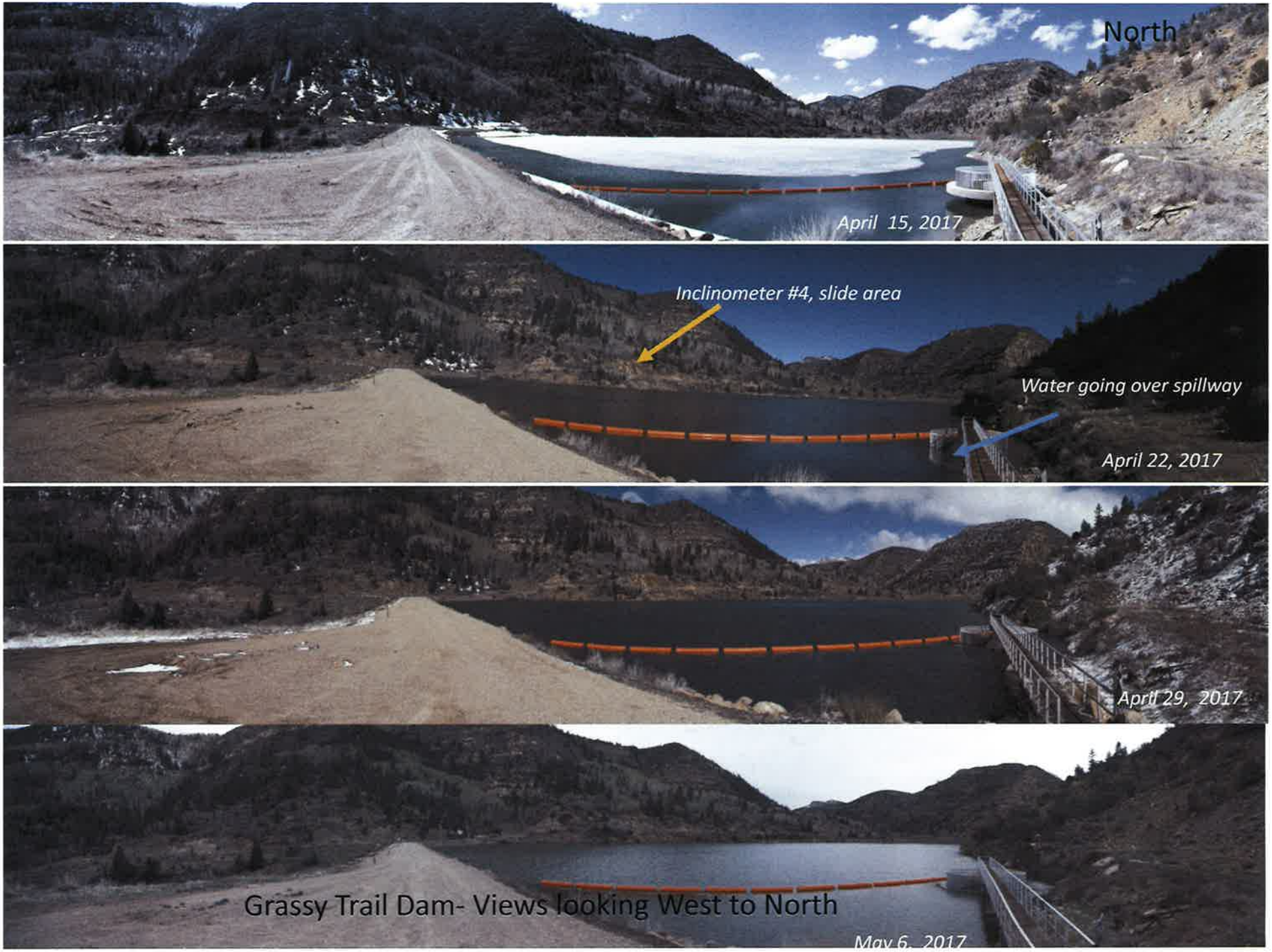
View looking Northwest of dam
near Inclinometer #4

Head scarps above Inc #4
This area appears wet and unstable through most years with some small slumps coming down onto the west edge of the road. The area currently appears less stable than usually.

April 22, 2017

Spillway




North
April 15, 2017
Inclinometer #4, slide area
Water going over spillway
April 22, 2017
April 29, 2017
Grassy Trail Dam- Views looking West to North
May 6, 2017

Grassy Trail Dam- View looking East

View looking North at downstream slope and toe of dam

Grassy Trail Dam- View looking West to North

May 13, 2017

Grassy Trail Dam- View looking East

May 13 2017

View looking North at downstream slope and toe of dam

View looking Northeast at down stream slope

May 13, 2017