OGMCOAL DNR <ogmcoal@utah.gov>

Fwd: Grassy Trial Reservoir monitoring Sept 27 to Nov 8, 2015

Steve Christensen <stevechristensen@utah.gov> Tue, Nov 24, 2015 at 4:45 PM
To: OGMCOAL DNR <ogmcoal@utah.gov>

West Ridge- Seismic Monitoring

-------- Forwarded message --------
From: **Madsen, Karin** <kmadsen@coalsource.com>
Date: Tue, Nov 24, 2015 at 8:37 AM
Subject: Grassy Trial Reservoir monitoring Sept 27 to Nov 8, 2015
To: "Madsen, Karin" <kmadsen@coalsource.com>, "jmckenzi@blm.gov" <jmckenzi@blm.gov>, "mglasson@blm.gov" <mglasson@blm.gov>, "Stan_Perkes@blm.gov" <Stan_Perkes@blm.gov>, "Steve_Falk@blm.gov" <Steve_Falk@blm.gov>, "steve_rigby@blm.gov" <steve_rigby@blm.gov>, "jllewelyn@co.carbon.ut.us" <jllewelyn@co.carbon.ut.us>, "ecc@emerytelcom.net" <ecc@emerytelcom.net>, "sunny1@emerytelcom.net" <sunny1@emerytelcom.net>, "Michael Hansen (Mhansen@rbgengineering.com)" <Mhansen@rbgengineering.com>, "bretdixon@utah.gov" <bretdixon@utah.gov>, "danadean@utah.gov" <danadean@utah.gov>, "davemarble@utah.gov" <davemarble@utah.gov>, "jblake@utah.gov" <jblake@utah.gov>, "karlhouskeeper@utah.gov" <karlhouskeeper@utah.gov>, "marcstilson@utah.gov" <marcstilson@utah.gov>, "stevedemczak@utah.gov" <stevedemczak@utah.gov>, "tomfaddies@utah.gov" <tomfaddies@utah.gov>, "stevechristensen@utah.gov" <stevechristensen@utah.gov>, "daronhaddock@utah.gov" <daronhaddock@utah.gov>, "Hibbs, David" <dhibbs@coalsource.com>

Please see the attached Report for Seismic Monitoring for Sept. 27, Oct. 11 & 25, and Nov. 8, 2015.

Have a very happy Thanksgiving!

Karin Odendahl-Madsen
Engineering Technician
UtahAmerican Energy Inc.
435-888-4026

From: Michael Hansen [mailto:Mhansen@rbgengineering.com]
Sent: Tuesday, November 24, 2015 8:26 AM
To: Madsen, Karin
Cc: jmckenzi@blm.gov; mglasson@blm.gov; Stan_Perkes@blm.gov; Steve_Falk@blm.gov; steve_rigby@blm.gov; jllewelyn@co.carbon.ut.us; dshaver@coalsource.com; ecc@emerytelcom.net; sunny1@emerytelcom.net; Brad Price; Rob johnson; bretdixon@utah.gov; danadean@utah.gov; davemarble@utah.gov; jblake@utah.gov; karlhouskeeper@utah.gov; marcstilson@utah.gov; petehess@utah.gov; stevedemczak@utah.gov; tomfaddies@utah.gov; waynehedberg@utah.gov; waynewestern@utah.gov
Subject: Grassy Trial Reservoir monitoring Sept 27 to Nov 8, 2015

Karin
See attached Project Report for Seismic Monitoring Sept. 27, Oct. 11 & 25, and Nov. 8, 2015.

Michael Hansen

Michael N. Hansen, P.G.
Engineering Geologist

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PROJECT REPORT

Project No.	201404-006		
Project	Grassy Trail – West Ridge Mine Monitoring		
Day / Dates	Sunday September 27 & Sunday October 11 & 25 & November 8, 2015	**Weather**	
Report By	Michael N. Hansen	**Position**	Engineering Geologist

Observations / Activities

Inclinometers I-2, I-3, and I-4 have been read every two weeks on September 27, October 11, October 24 and November 8, 2015. Since September 13 to November 8, 2015, inclinometers I-2, I-3 and I-4 have not shown any significant movement. Plots of the inclinometer readings are attached.

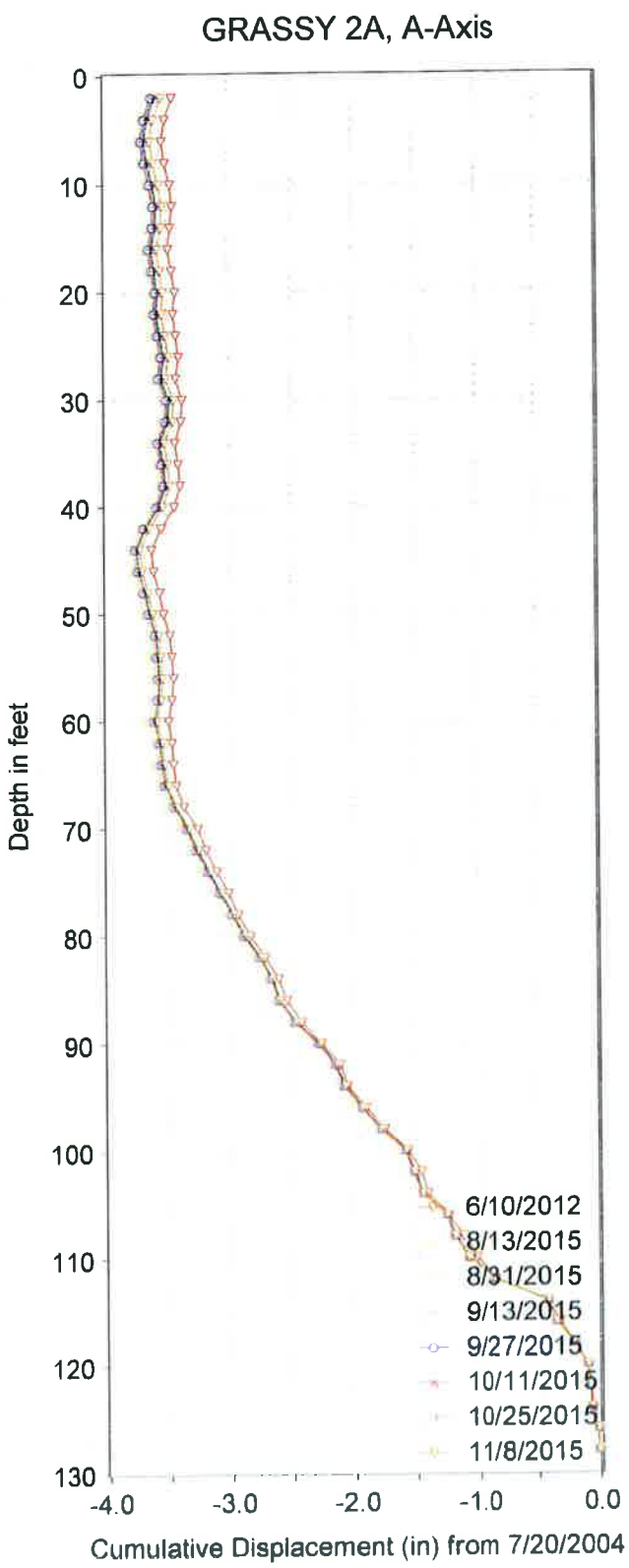
One accelerometer is located on the crest of the dam. The solar panel on the second accelerometer is being repaired.

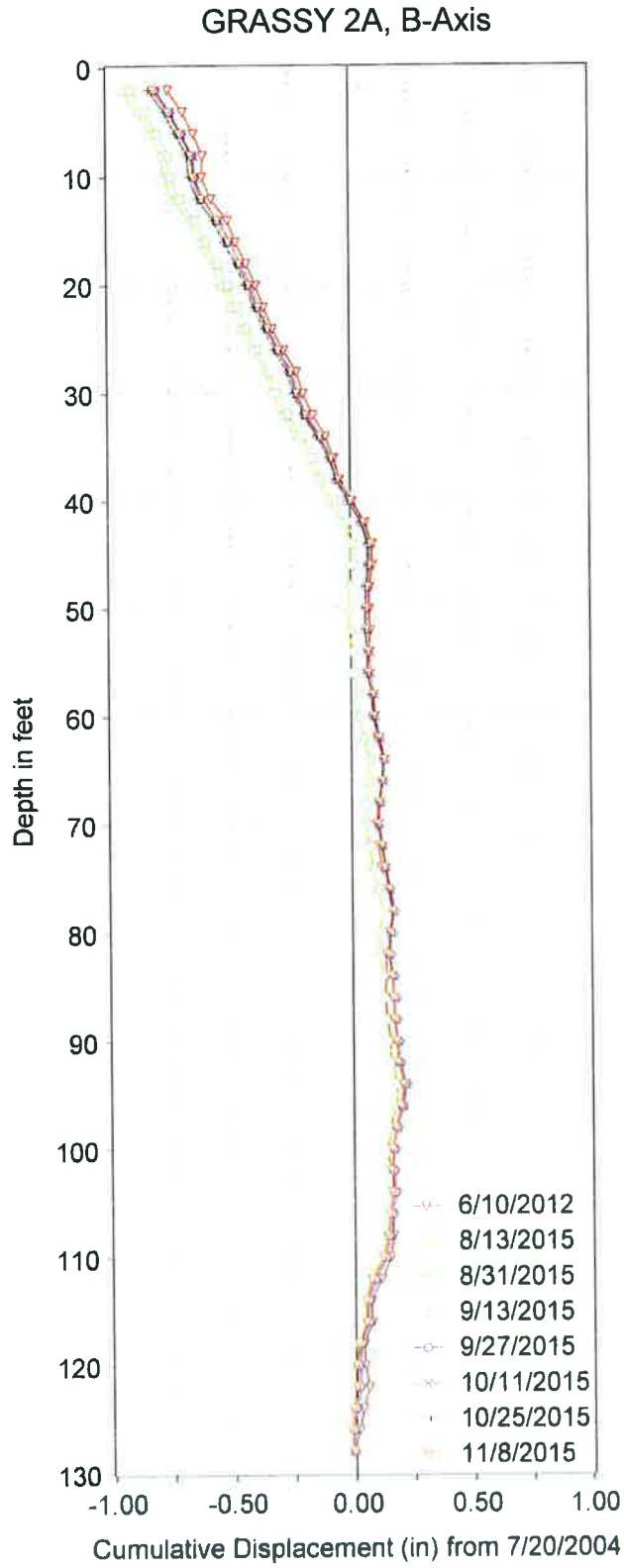
The accelerometer located on the crest of the dam has been read every two weeks, and has not shown any mining induced seismic activity between September 13 to November 8, 2015.

Since the last report on September 13 no seismic events have been reported within the area of the mine by UUSS. The nearest reported seismic event took place on October 26 and was located 4.1 miles southeast of Sunnyside. Because of this distance this event does not appear to be related to current mining at West Ridge Mine.

Reservoir elevation and piezometer readings are being taken by East Carbon City every 2 weeks and available online at the Dam Safety Website. Additional readings of the reservoir elevation and seepage are also being taken by RB&G during site visits. At the time of our site visits the water level in the reservoir had dropped from 3.55 feet below the spillway on September 13, down to 4.55 feet on October 11, back up to 4.2 feet October 24, and back down to 4.55 feet on November 8. Plots of the reservoir elevations and piezometer and seepage readings are attached.

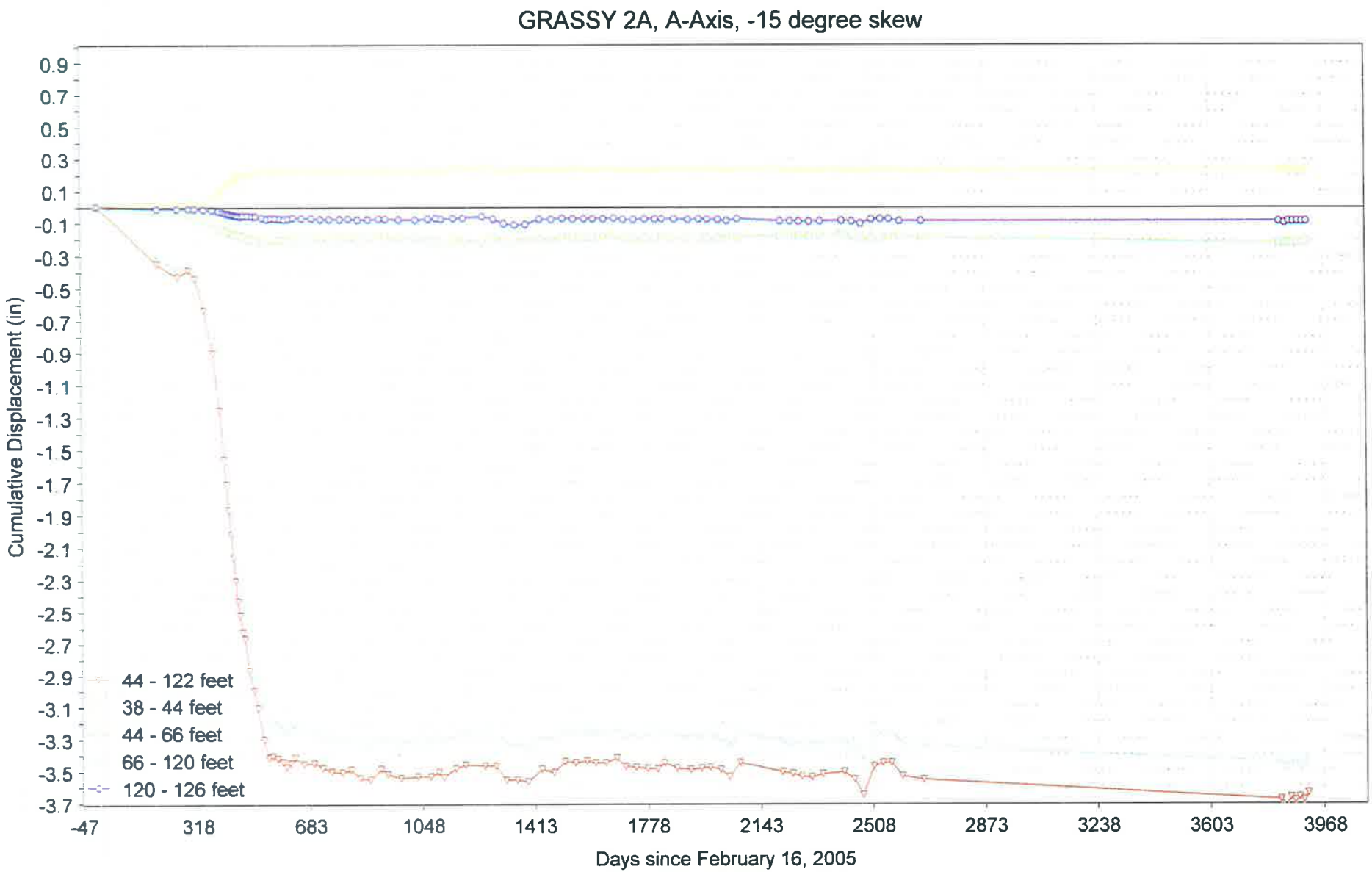
During the site visit, no sign of significant landslide movement was noted on the hillsides or at the dam.





-15 dergree skew
Bias-shift correction

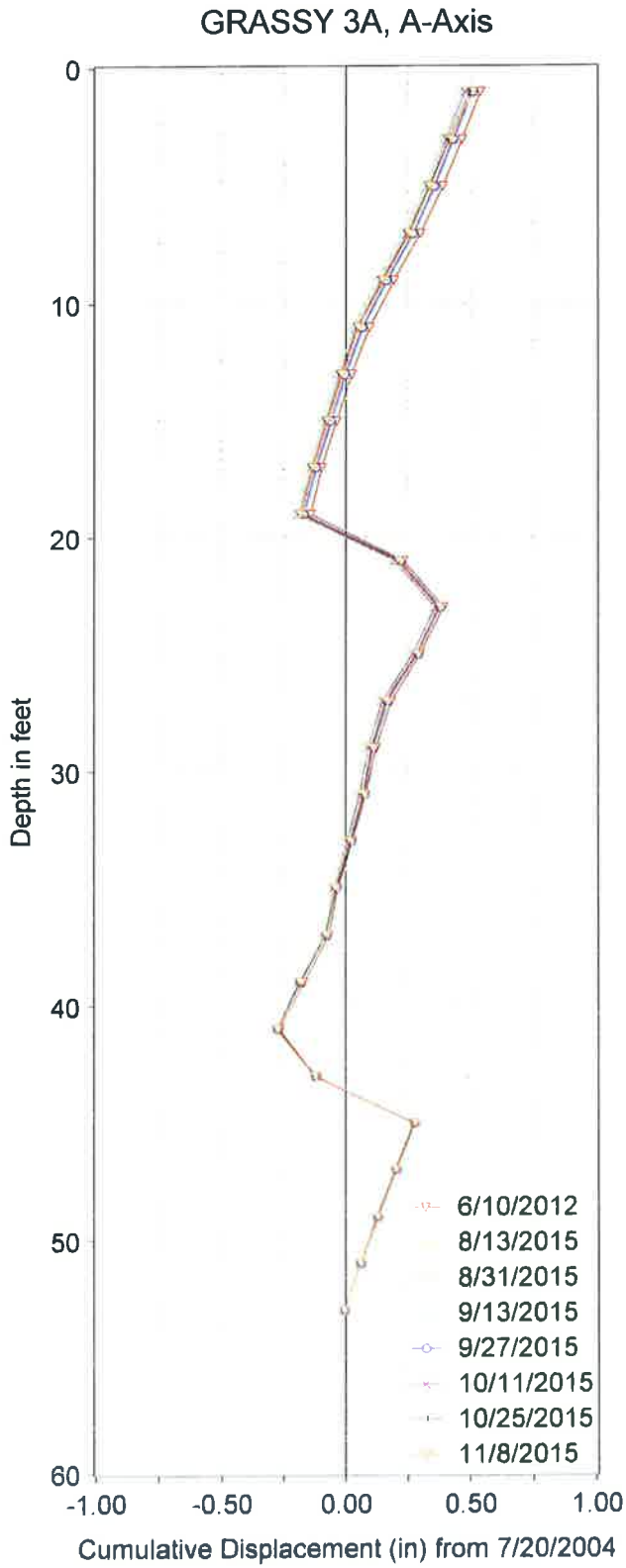
Figure
Inclinometer 2 - Deflection Profile
Grassy Trail Dam, Carbon County, Utah

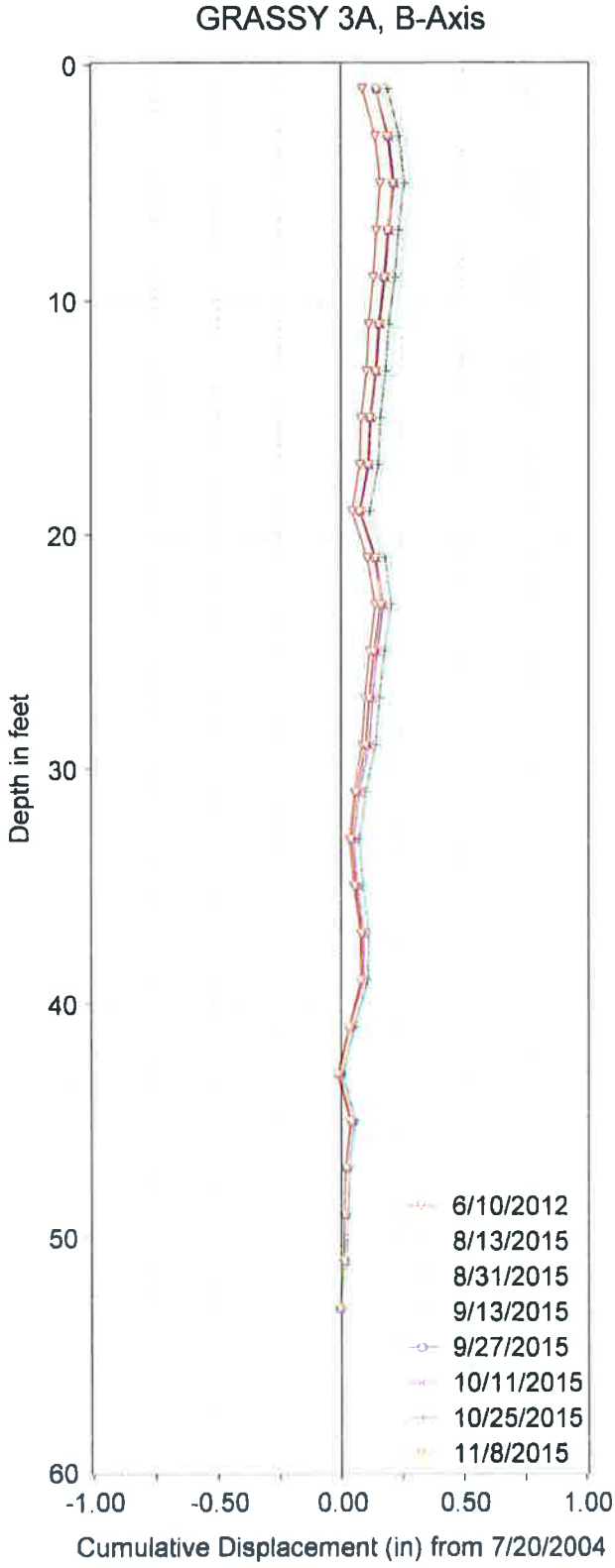


Inclinometer I-2 Located on Dam 11/08/15
with -15 degree skew

Figure

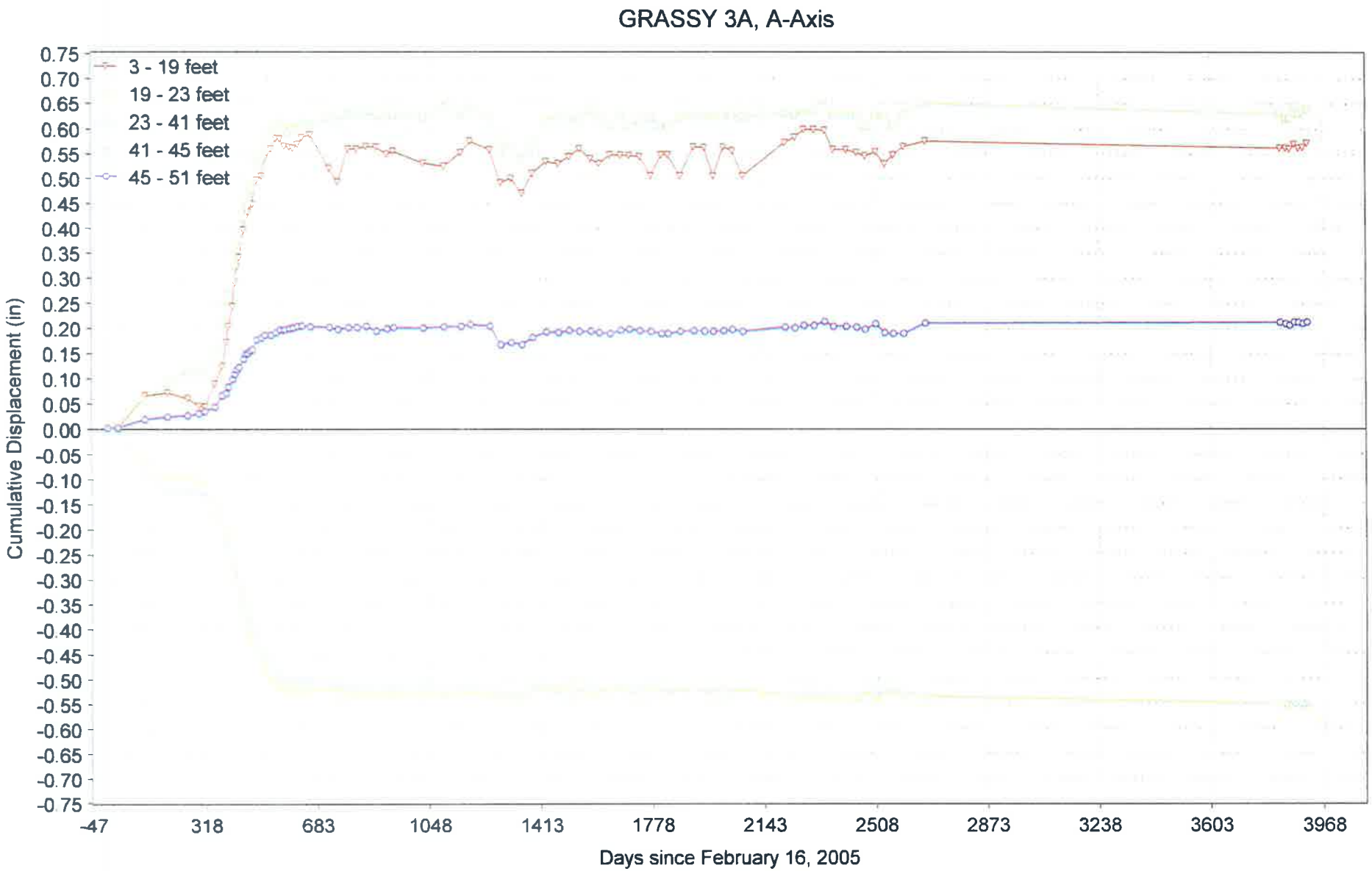
Inclinometer 2 - Deflection versus Time
Grassy Trail Dam, Carbon County, Utah



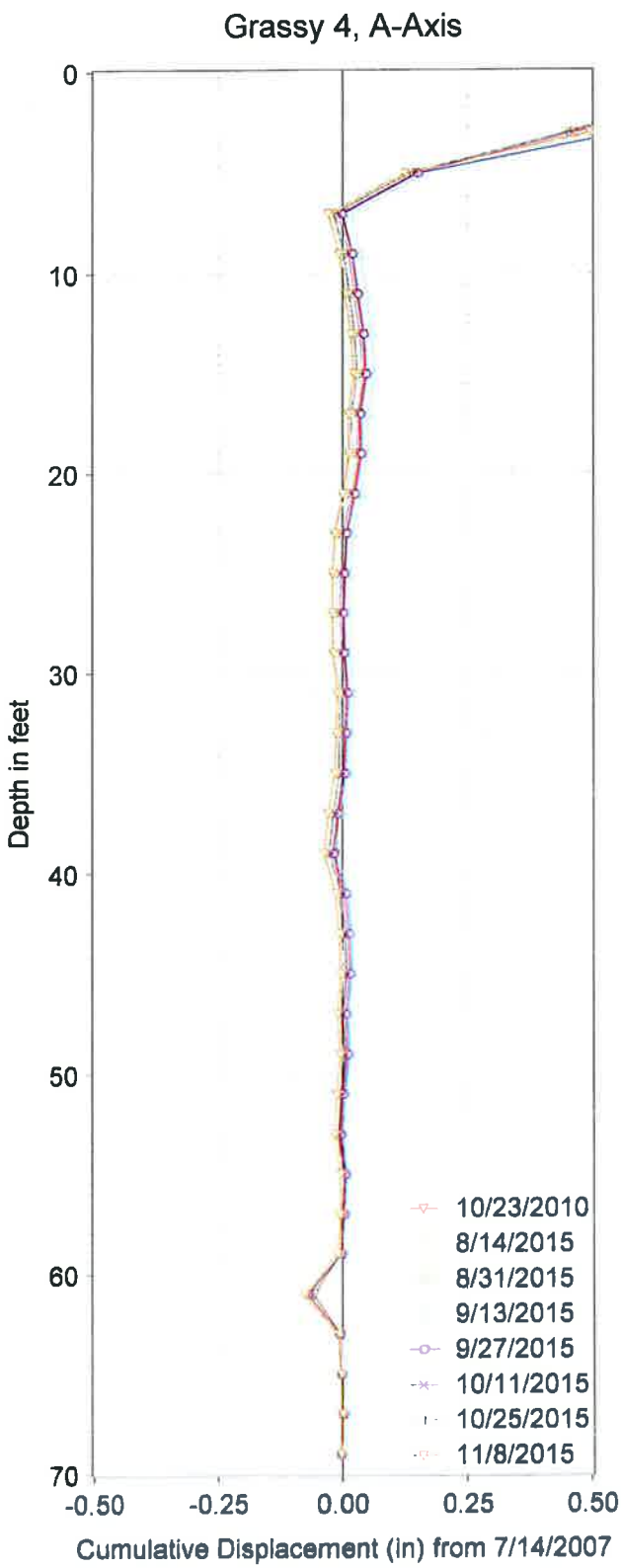


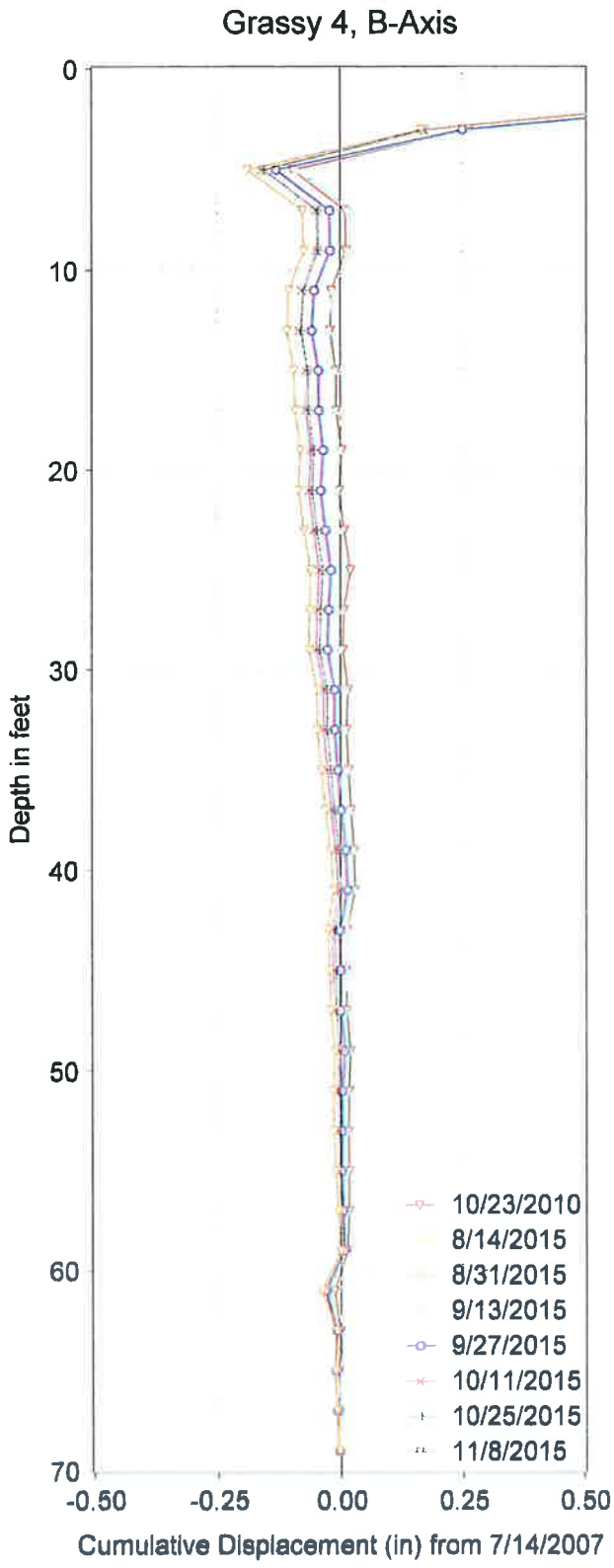
-30 degree skew

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



I-3 West/Right Abutment 11/8/15	Figure Inclinometer 3 - Deflections versus Time Grassy Trail Dam, Carbon County, Utah

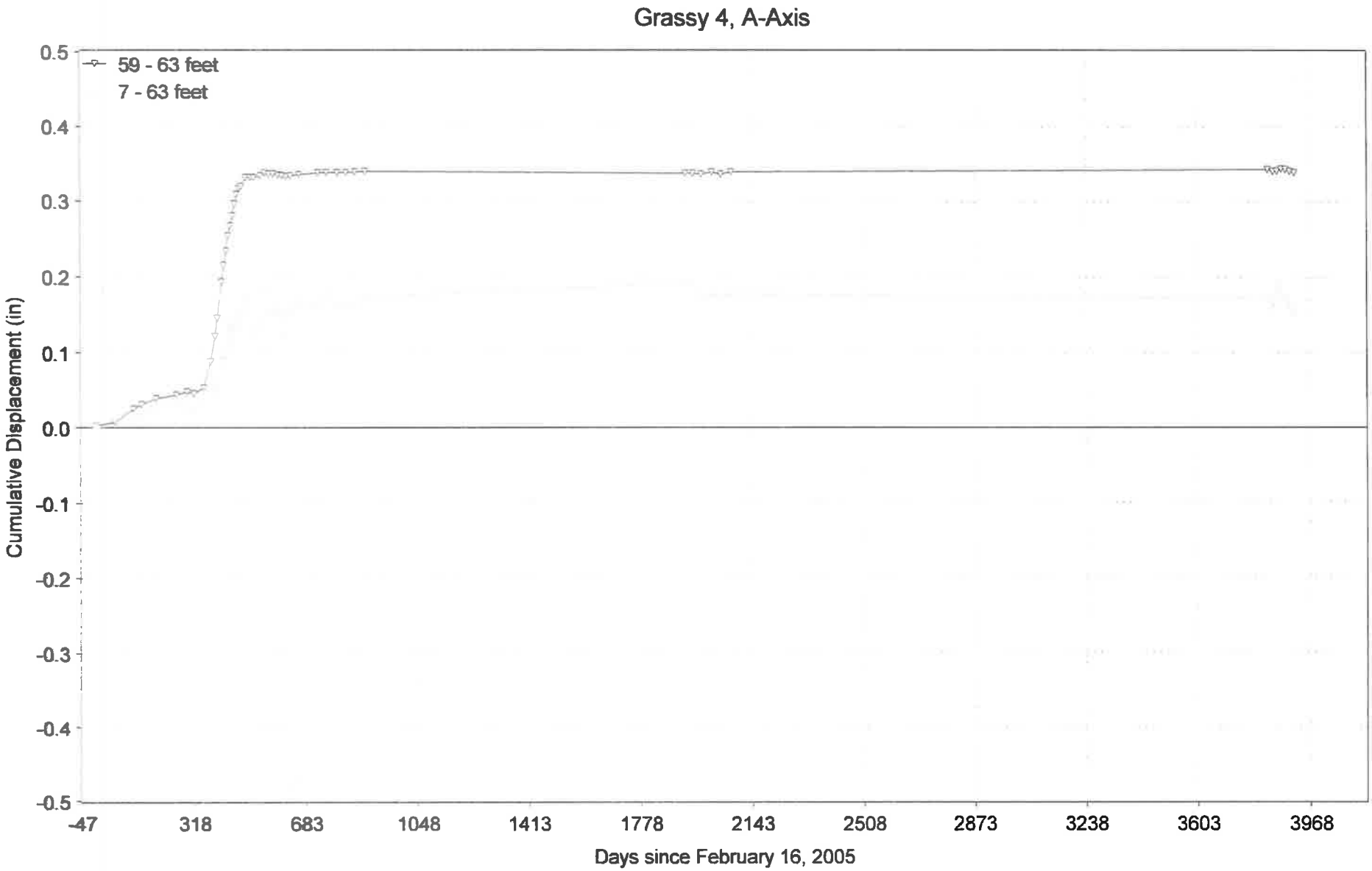




Repairs made 5/26/10 new survey
may not match true with old surveys

Top few feet are loose

Figure
Inclinometer 4 - Deflection Profile
Grassy Trail Dam, Carbon County, Utah



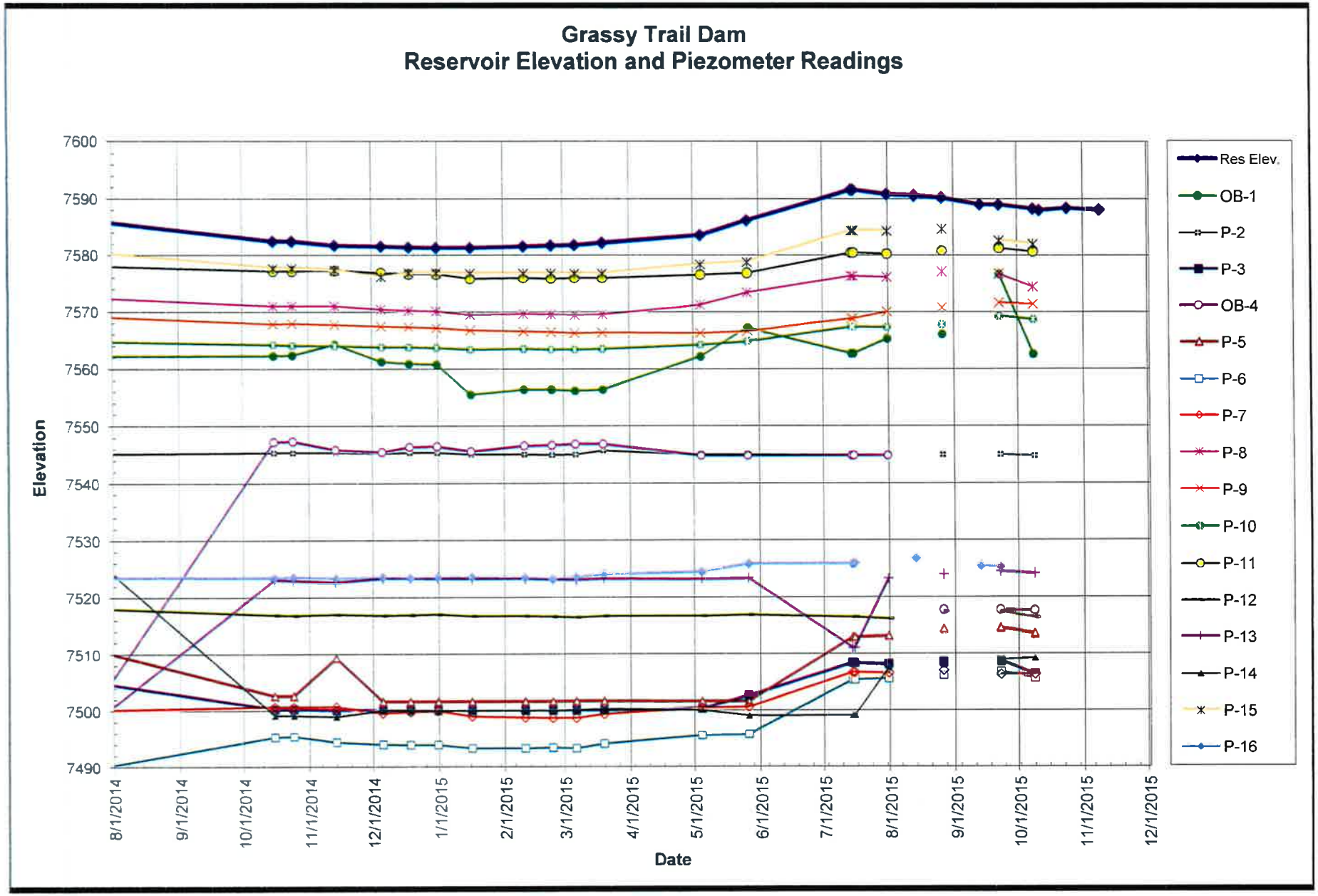
Figure

Inclinometer 4 - Deflection verse Time
Grassy Trail Dam, Carbon, County, Utah

11/8/15

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		
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')	65' (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'
10/15/2014	Values taken from Dam Safety web page	7582.42	7570.9	7567.7	7562.3	7545.4	7500.2	7522.9	7499.2	7547.1	7564.2	7577.2	7516.9	7502.5	7495.3	7500.5	7577.7	7523.5
10/24/2014		7582.42	7570.9	7567.6	7562.4	7545.4	7500.2	7522.8	7499.2	7547.2	7564.1	7577.2	7516.8	7502.5	7495.4	7500.5	7577.7	7523.4
11/13/2014		7581.67	7570.9	7567.6	7564.3	7545.4	7500.0	7522.5	7499.0	7545.7	7564.0	7577.3	7517.0	7509.2	7494.4	7500.5	7577.4	7523.5
12/5/2014		7581.50	7570.3	7567.3	7561.3	7545.3	7500.0	7523.2	7500.1	7545.3	7563.8	7576.9	7516.8	7501.5	7494	7499.4	7576.2	7523.3
12/18/2014		7581.33	7570.1	7567.2	7560.9	7545.4	7500.0	7523.2	7500.1	7546.2	7563.8	7576.7	7516.9	7501.5	7493.9	7499.6	7576.9	7523.5
12/31/2014		7581.25	7570.0	7567.0	7560.8	7545.4	7500.0	7523.1	7500.0	7546.3	7563.7	7576.7	7517.0	7501.5	7493.9	7499.8	7576.9	7523.4
1/16/2015		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
2/10/2015		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
2/23/2015		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
3/6/2015		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
3/19/2015		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
5/4/2015		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
5/26/2015		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
7/14/2015		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
7/15/2015		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
7/31/2015		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
8/13/2015		7590.50																
8/26/2015		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
9/13/2015	MH	7588.95																
09/22/2015		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
9/27/2015	MH	7588.50																
10/8/2015		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
10/11/2015	MH	7587.95																
10/24/2015	MH	7588.30																
11/8/2015	MH	7587.95																



RB&G ENGINEERING, INC.

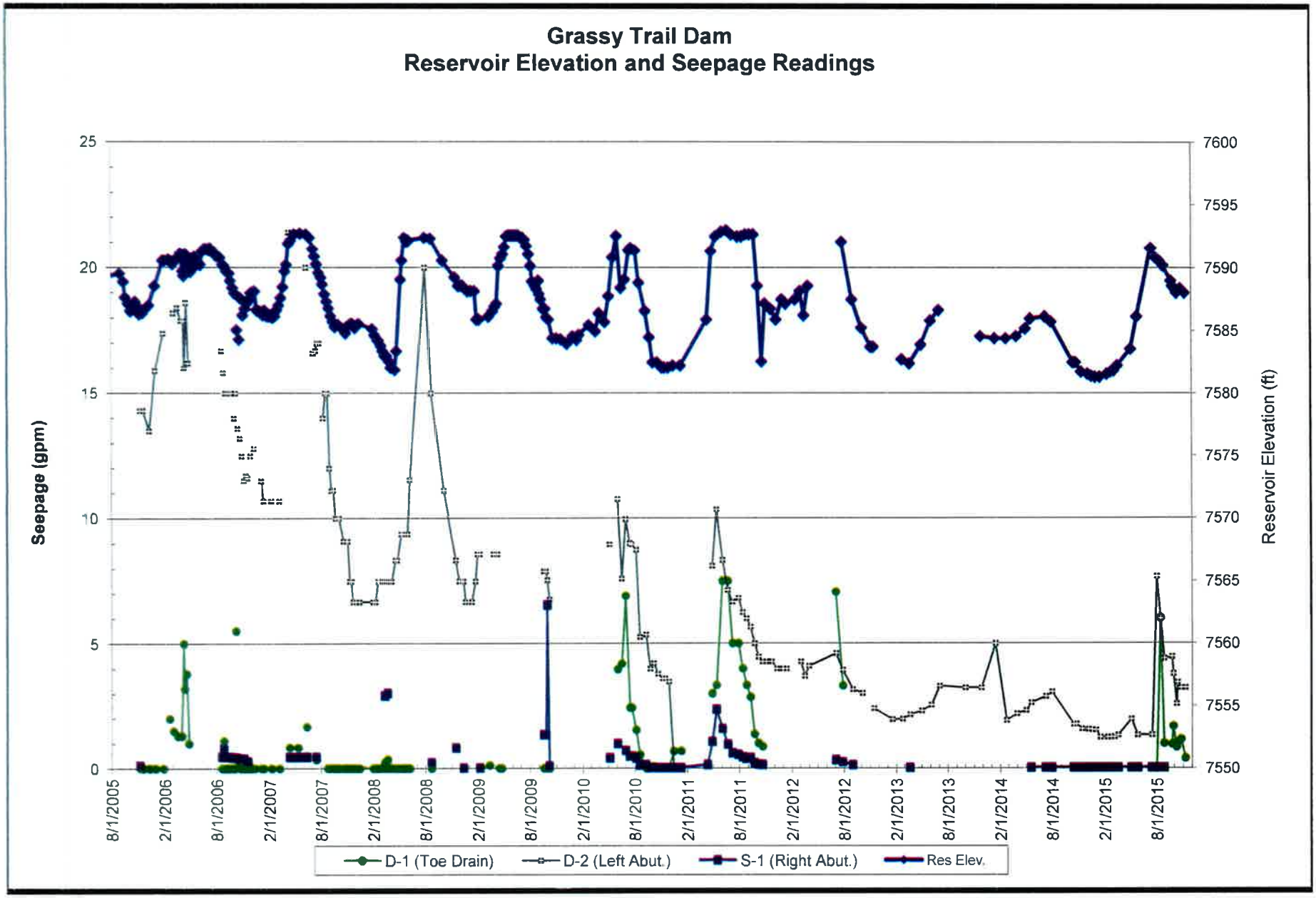
Figure Reservoir Elevation and Piezometer Readings
August 2014 to October 8 2015 (Res Elev to Nov 8, 2015 by RB&G Eng)
Reservoir Elevation 9/13/12

Grassy Trail Dam and Reservoir

GRASSY TRAIL DAM SEEPAGE READINGS

Dam Crest Elev(ft)		7600.0									
Spillway Elev. (ft)		7592.5									
		Seep Location:	Seep1:Toe Drain			Seep 2: Left Abutment (East Seep)		Seep 3: Right Abutment (West Seep)			
Date	Initials	Reservoir Elev.	Reservoir Characteristics	GAL/MIN	Water Characteristics	GAL/MIN	Water Characteristics	GAL/MIN	Water Characteristics	Weather Conditions	Temperature (°F)
10/15/2014	Values taken from Dam Safety web page (East C	7582.417		0.006		1.765		0.001			
10/24/2014		7582.417		0.006		1.775		0.001			
11/13/2014		7581.667		0.001		1.579		0.001			
12/5/2014		7581.5		0.006		1.563		0.001			
12/18/2014		7581.333		0.006		1.546		0.001			
12/31/2014		7581.25		0.006		1.531		0.001			
1/16/2015		7581.25		0.006		1.25		0.001			
2/10/2015		7581.5		0.006		1.245		0.001			
2/23/2015		7581.667		0.006		1.25		0.001			
3/6/2015		7581.75		0.006		1.261		0.001			
3/19/2015		7582.167		0.006		1.327		0.001			
5/4/2015		7583.5		0.006		1.974		0.001			
5/26/2015		7586.083		0.006		1.333		0.001			
7/14/2015		7591.5		0.006		1.339		0.001			
7/15/2015		7591.5		0.006		1.339		0.001			
7/31/2015		7590.75		0.006		7.692		0.001			
8/13/2015		7590.5		6	* likely a typo	6					
8/26/2015		7590.1		0.984	clear	4.412	*trace sediment	0.001			
9/22/2015		7588.9		0.952	clear	4.478		0.001			
9/27/2015	MH	7588.5	clear	1.67	clear	3.80	*trace sediment	NM	not measureable		
10/08/2015		7588.2		0.833		2.586	clear	0.001			
10/11/2015	MH	7588.0	clear	1.03	clear	3.45	clear	NM			
10/24/2015	MH	7588.3	clear	1.15	clear	3.23	clear	NM			
11/8/2015	MH	7588.0	trace Ice on edges	0.39	clear	3.23	clear	NM			
						Left abut drain has been redone and is not collecting all of the seepage					

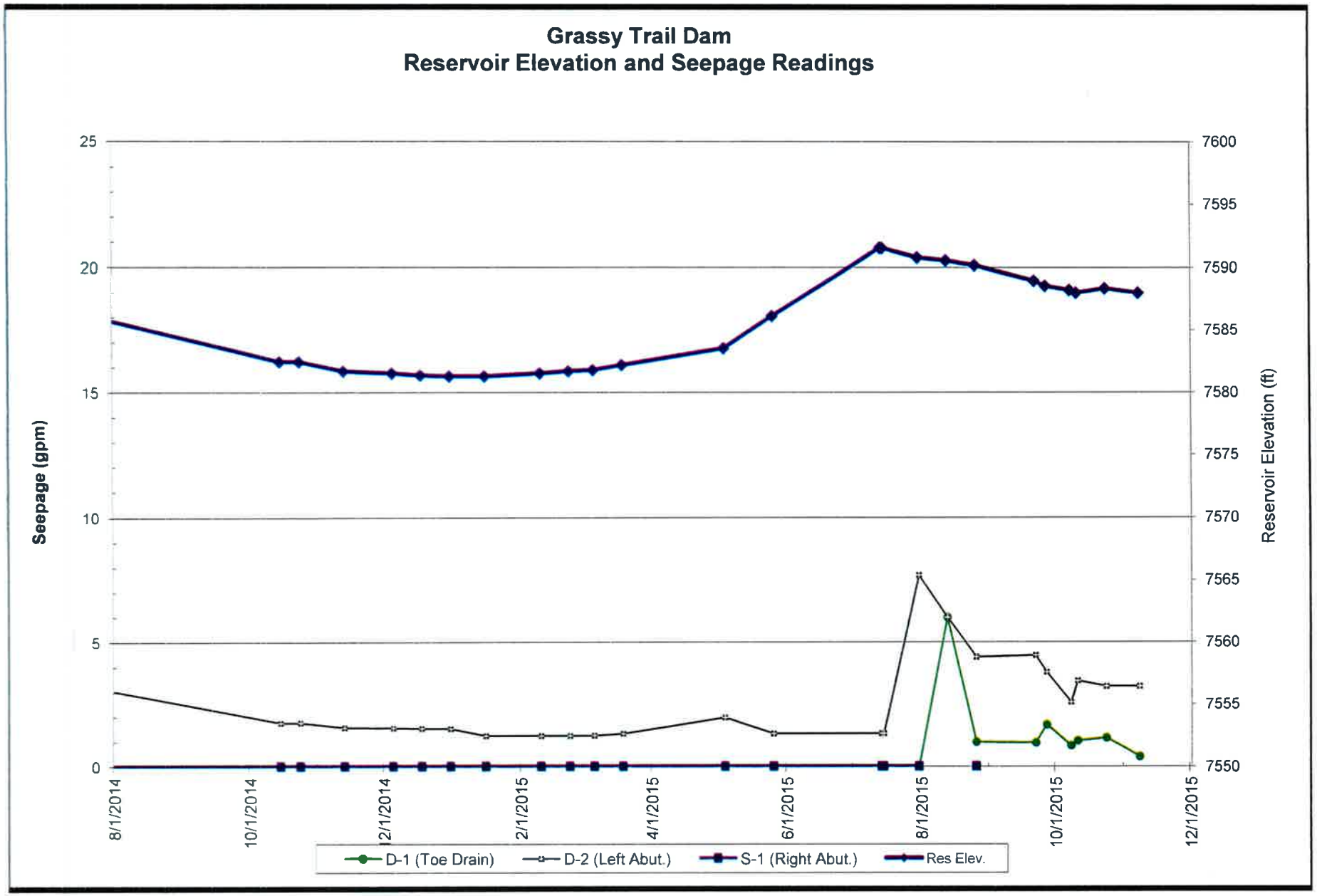
* notes - Michael Hansen RB&G Engineering



RB&G ENGINEERING, INC.

Figure Reservoir Elevation and Seepage Readings
August 2005 to November 8 2015
Some additonal readings by RB&G Eng

Grassy Trail Dam and Reservoir



RB&G ENGINEERING, INC.

Figure Reservoir Elevation and Seepage Readings
August 2014 to November 8 2015
Some additonal readings by RB&G Eng

Grassy Trail Dam and Reservoir

View looking Southwest to North

Grassy Trail Dam View looking North

November 8, 2015