0021

From: "Michael Hansen" <Mhansen@rbgengineering.com>
To: <James_Kohler@blm.gov>, <Jeff_McKenzie@blm.gov>, <Stan_Perkes@blm.gov>, ...
Date: 7/30/2007 11:09 AM
Subject: Grassy Trail Dam Monitoring July 14, 2007, re-send
Attachments: GrassyT_summ_Incl.pdf; GrassyT_Piez.pdf

It has come to my attention that the July 14 email didn't reach every one, so I'm sending it again.

Two events were recorded on the Hillside, while the Dam Seismic Instrument has stopped functioning.

I was also informed on Friday 7/20/07, that Inclinometer # I-4 was hit and knocked out by a wide-load truck with Questar Gas, doing construction on the pipeline north of the reservoir.

C/007/0049

Michael N. Hansen, P.G.
Engineering Geologist

RB&G ENGINEERING Inc.
1435 West 820 North
Provo Ut. 84601

Ph 801-374-5771
SLC 801-521-5771
Fax 801-374-5773
cell 801-369-4477
email mhansen@rbgengineering.com

RB&G ENGINEERING
Grassy Trail Dam, Seismic Summary for July 14, 2007.

For the period between June 11 and, July 14, 2007 no MIS (Mining Induced Seismicity) earthquakes were recorded within the area near panel #7 (nearest the Dam) by the UUSS. 82 earthquakes have been reported seen June 11 within the area of current minging, with magnitudes ranging between 0.6 and 2.3. During the past two week there been two 2.1 and one 2.3 magnitude earthquakes reported. Two MIS event was recorded on the Hillside instrument, on June 13 and July 10, with PGA values of 0.00994 and 0.00829. The June 13 event was reported as a 1.4 magnitude earthquake by the UUSS while the July 10 event was not documented as an earthquake.

Month Period Ending	Earthquakes	Hillside	Dam
July 14, 2007	82	2	NA

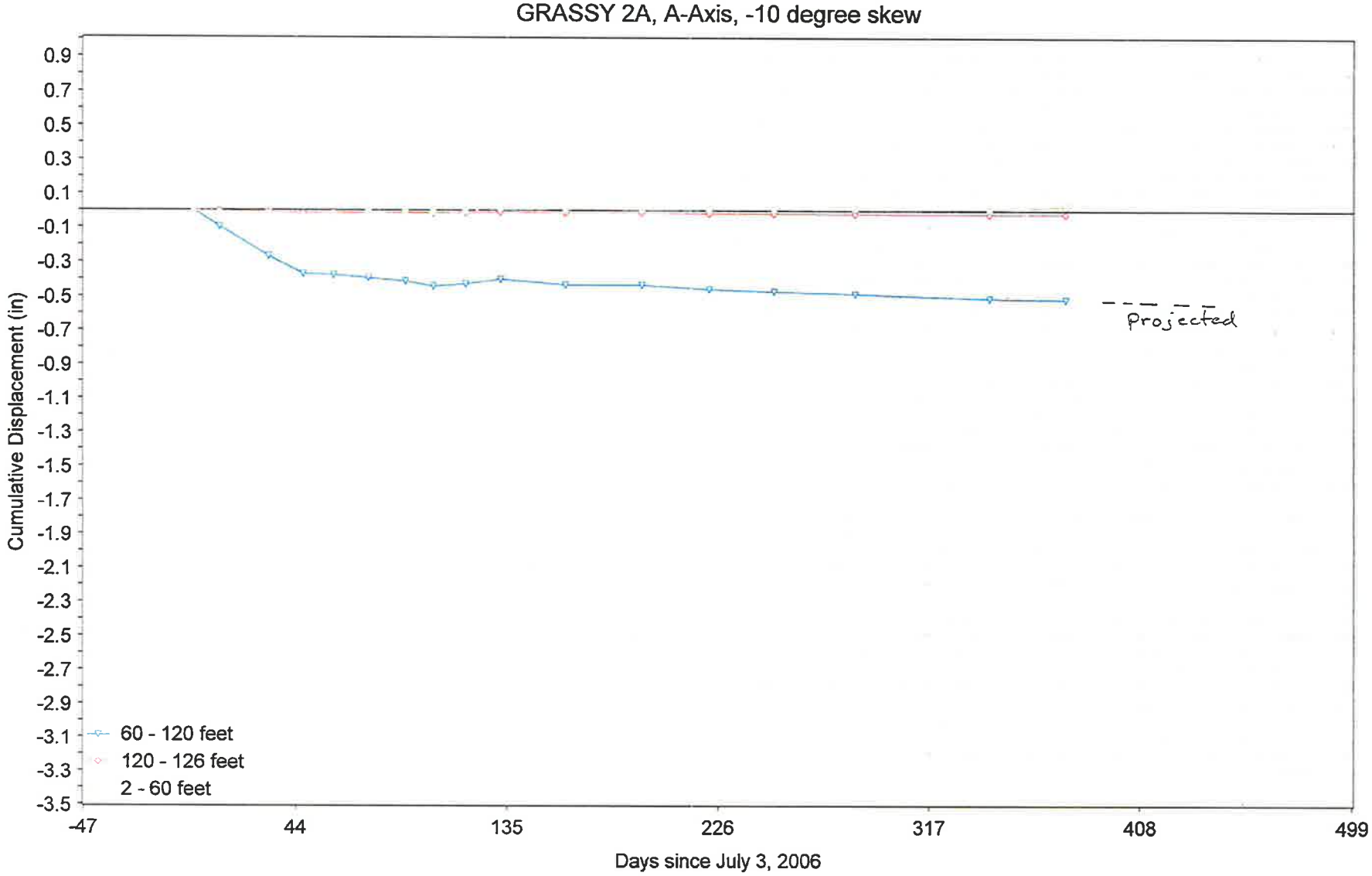
The seismic recording instrument on the Dam is no longer operating correctly and should be sent for repairs. This summer a natural gas transfer line is being installed several miles north of the reservoir with a lot of heavy equipment traffic along the roadway on the west side of the dam. Due to the greater likely hood of man made events on the dam we have left the functioning seismic recorder on the Hillside.

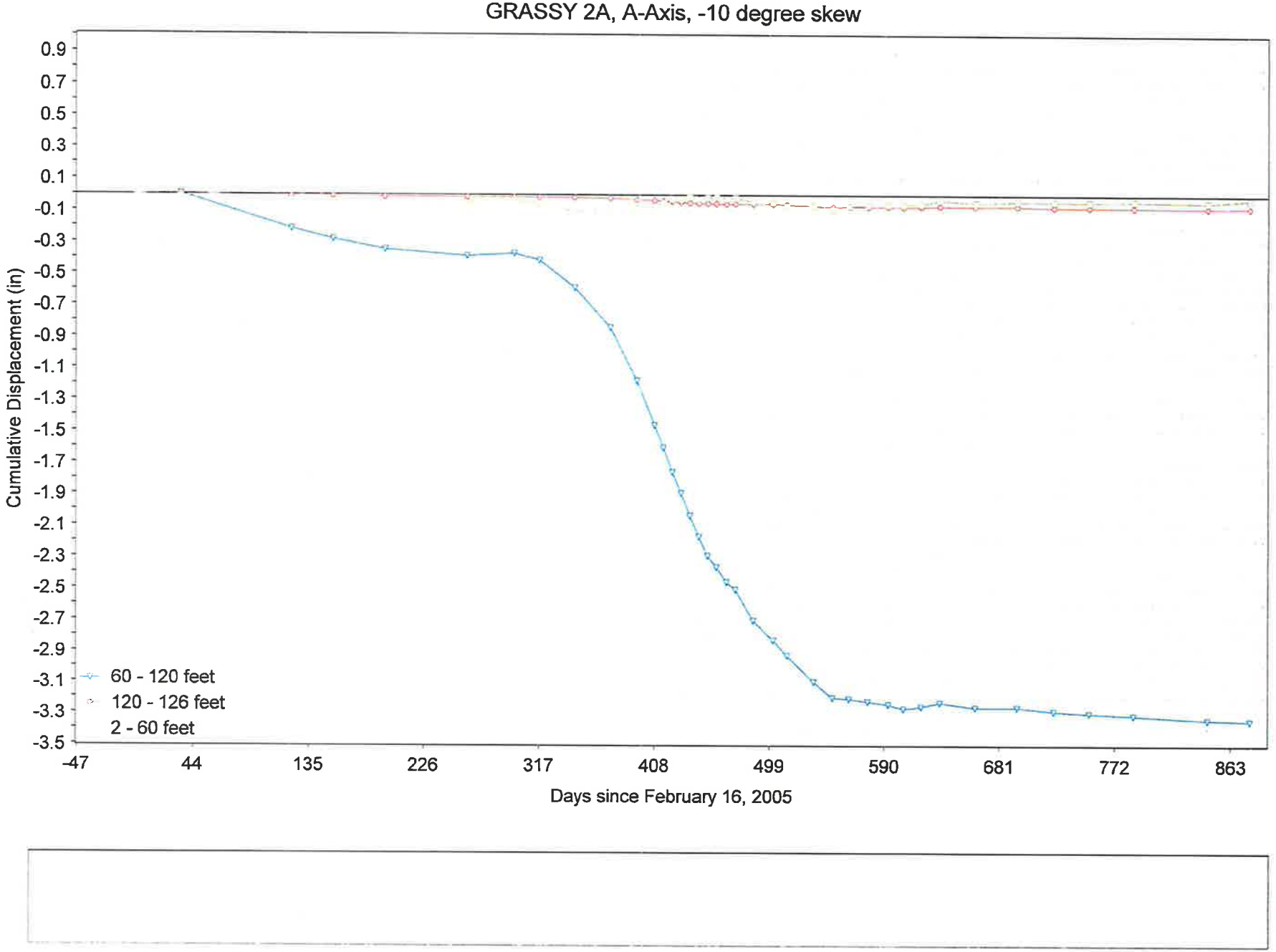
No significant movement has been detected in inclinometers 2 thur 4. It should be noted that I-2 located on the dam continues to show a very slight but gradual movement during the past few months.

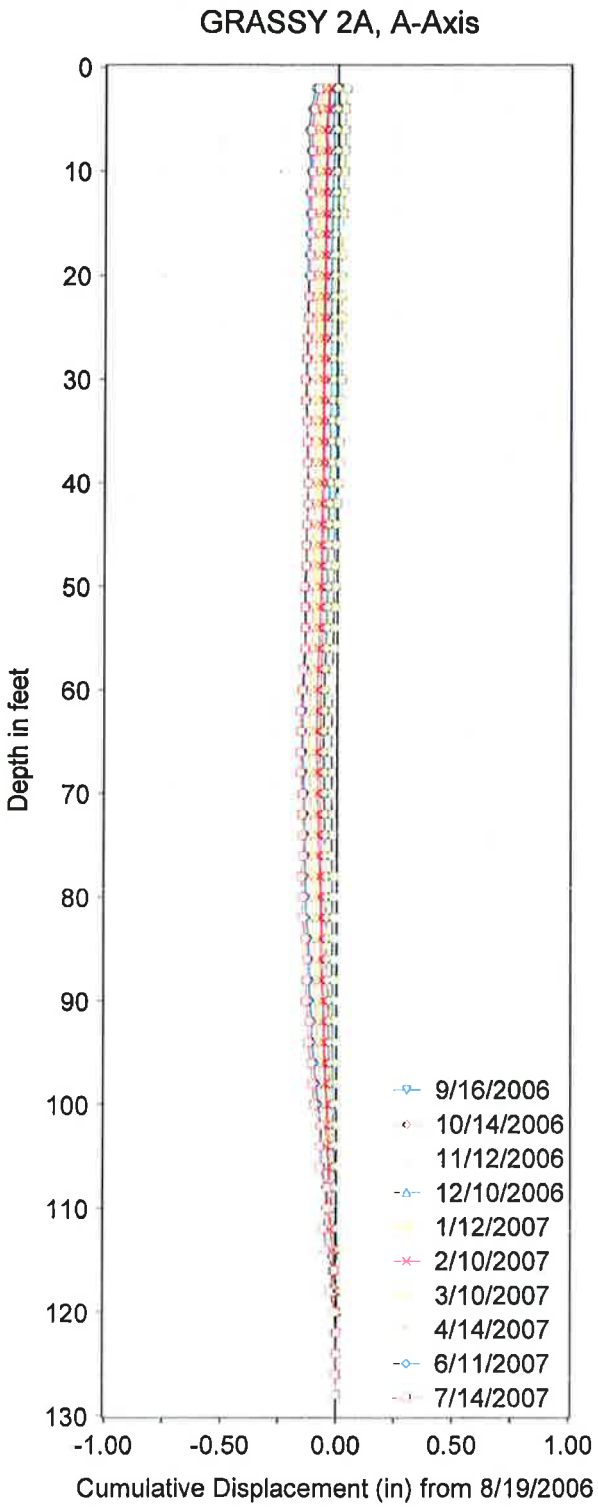
During the site visit the reservoir was down 1.9 feet below the spillway. OB-1 well continues to show erratic reading. No unexpected changes in piezometer readings were observed in the other piezometers during the past month, with the exception of P-9 which changed from 28.7 ft to 27.8 ft, which may be a recording error. It should be noted that there continues to be some clear seepage coming from the Toe Drain.

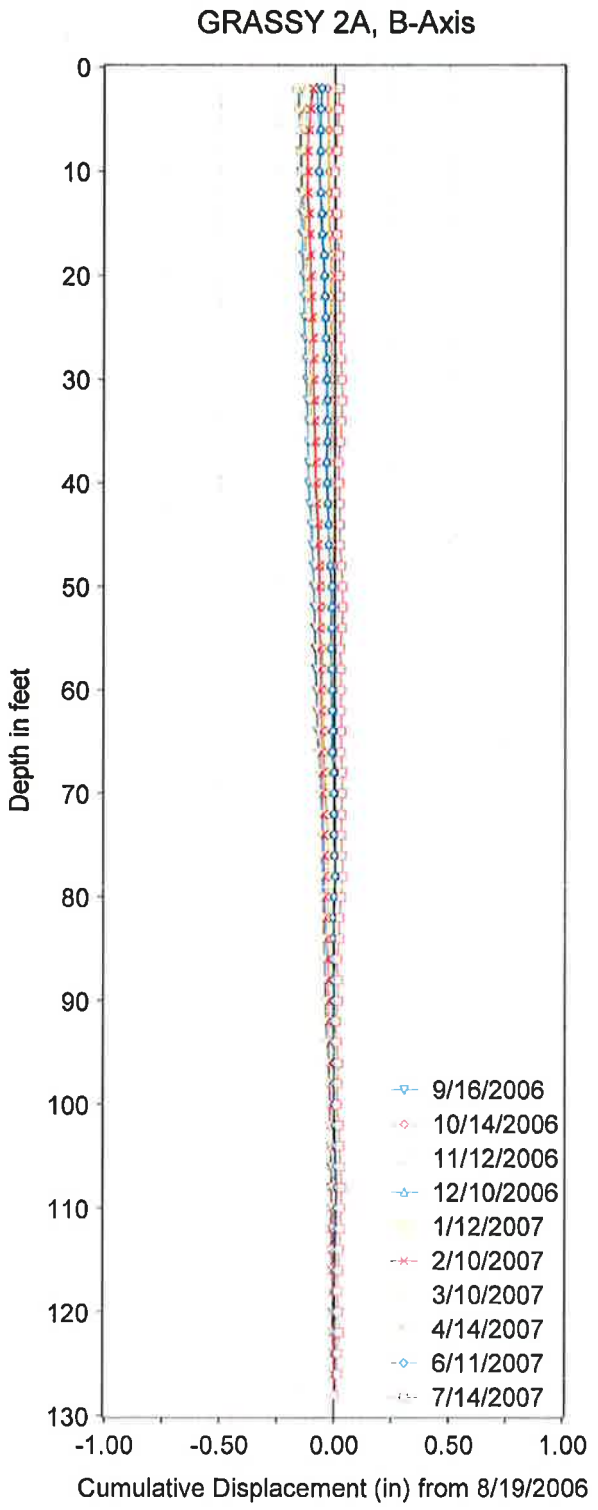
No cracks or signs of movement were noted on the dam or abutments above the dam during the past month.

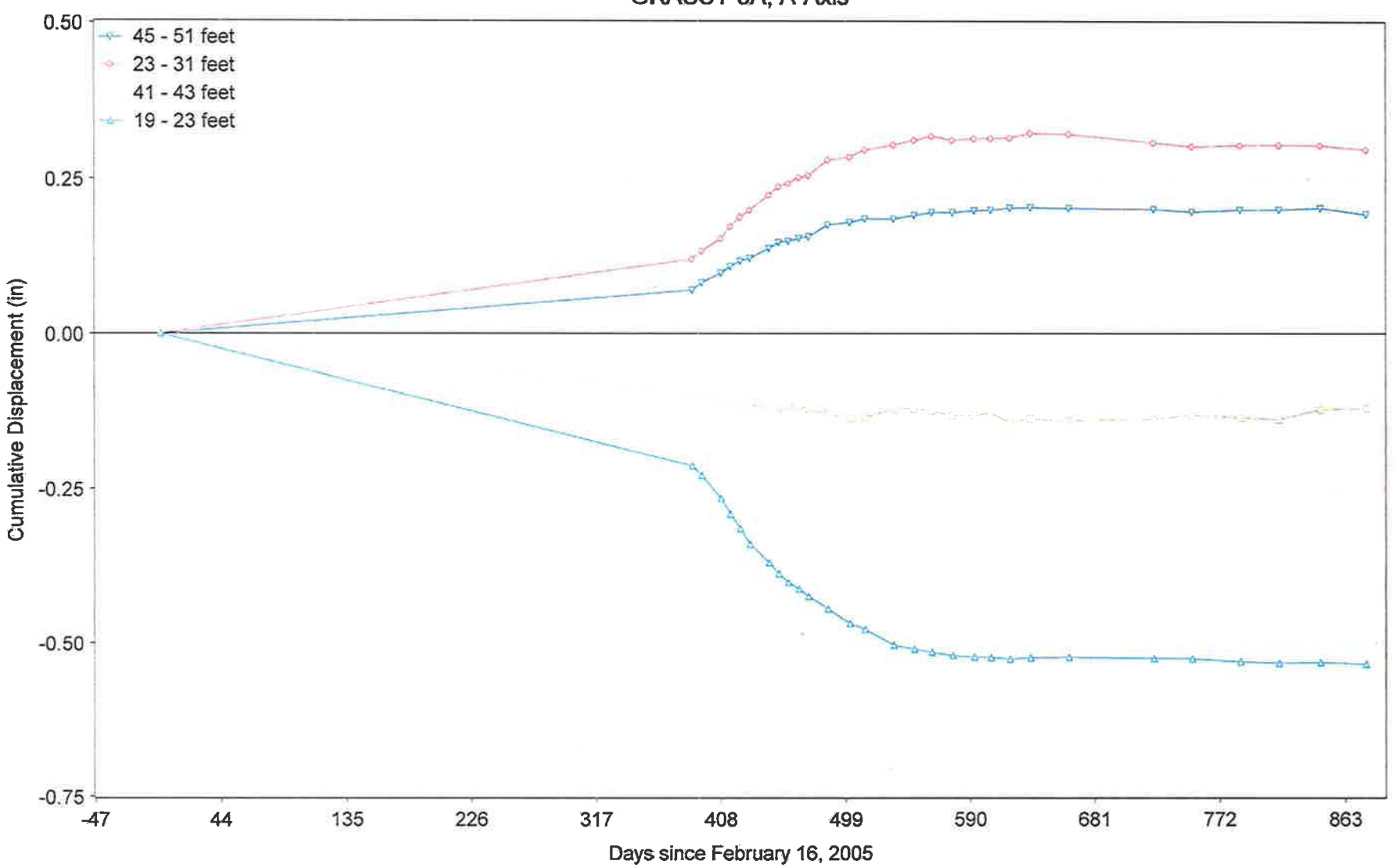
Michael N. Hansen P.G.
Engineering Geologist
RB&G ENGINEERING

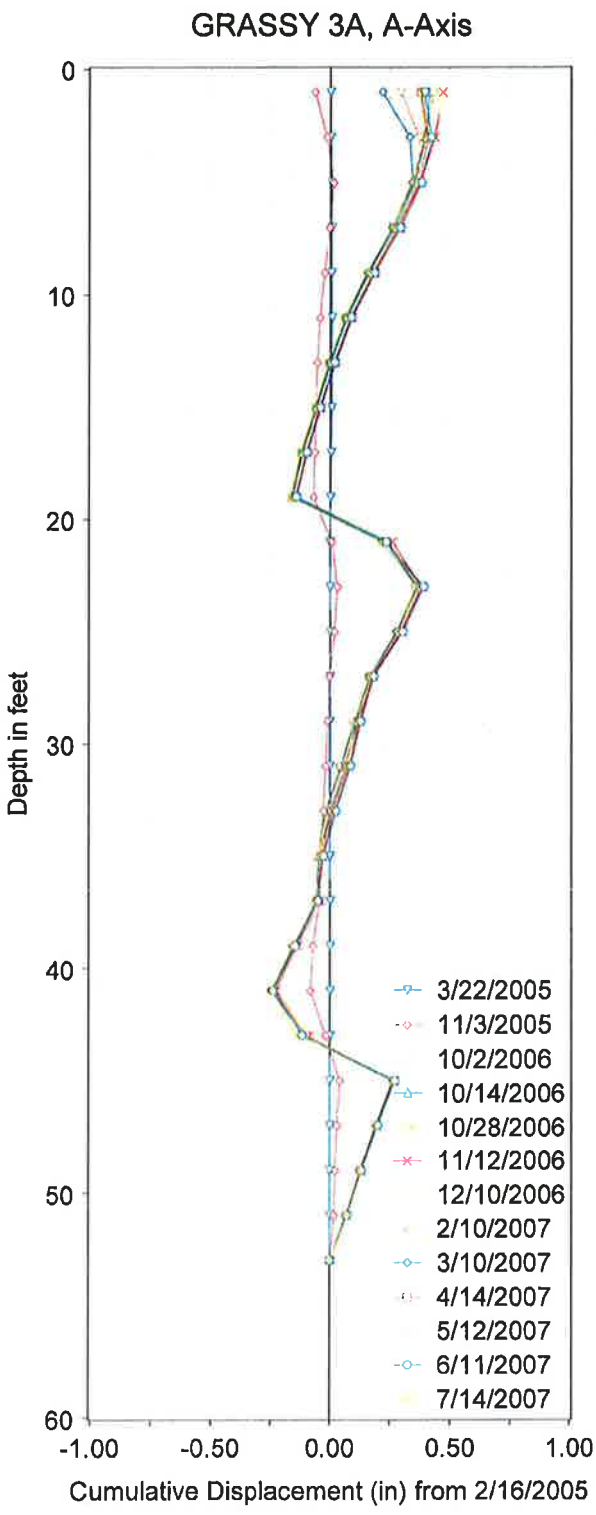

GRASSY 2A, A-Axis, -10 degree skew
Cumulative Displacement (in)
0.9
0.7
0.5
0.3
0.1
-0.1
-0.3
-0.5
-0.7
-0.9
-1.1
-1.3
-1.5
-1.7
-1.9
-2.1
-2.3
-2.5
-2.7
-2.9
-3.1
-3.3
-3.5
-47
44
135
226
317
408
499
Days since July 3, 2006
Projected
60 - 120 feet
120 - 126 feet
2 - 60 feet

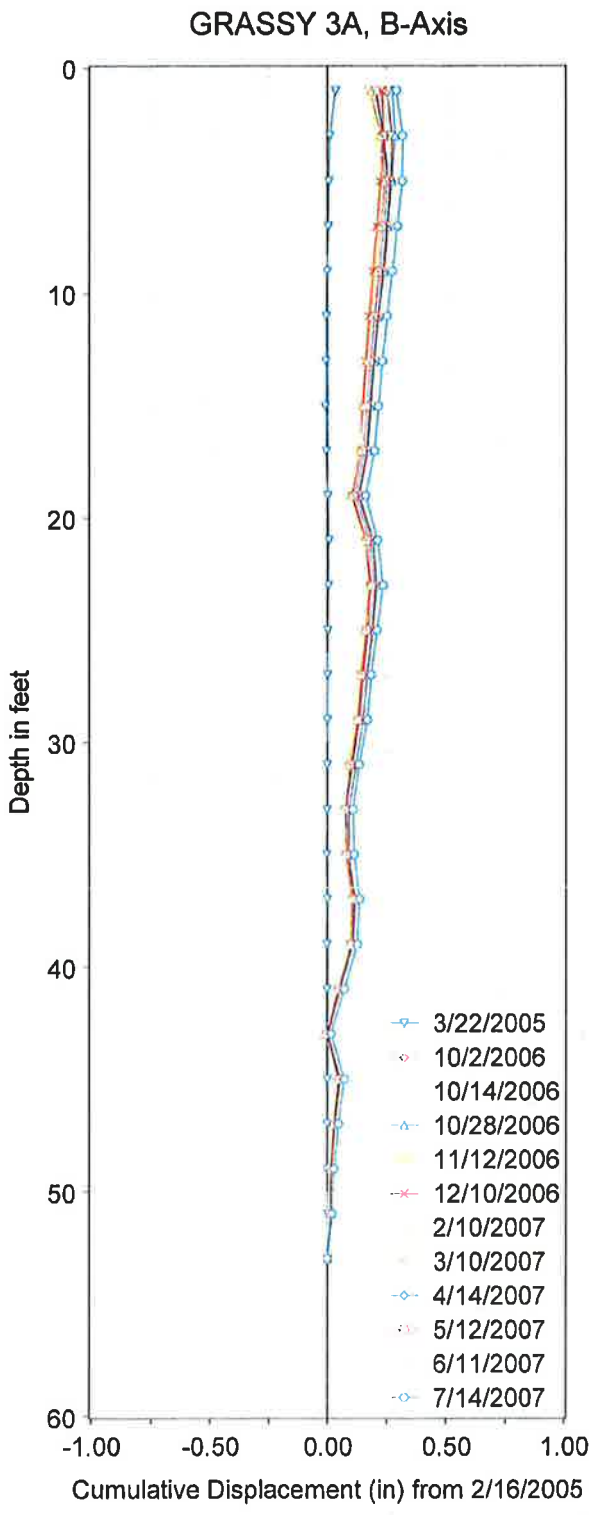

GRASSY 2A, A-Axis, -10 degree skew
Cumulative Displacement (in)
0.9
0.7
0.5
0.3
0.1
-0.1
-0.3
-0.5
-0.7
-0.9
-1.1
-1.3
-1.5
-1.7
-1.9
-2.1
-2.3
-2.5
-2.7
-2.9
-3.1
-3.3
-3.5
60 - 120 feet
120 - 126 feet
2 - 60 feet
-47
44
135
226
317
408
499
590
681
772
863
Days since February 16, 2005


GRASSY 2A, A-Axis
Depth in feet
0
10
20
30
40
50
60
70
80
90
100
110
120
130
-1.00
-0.50
0.00
0.50
1.00
Cumulative Displacement (in) from 8/19/2006
9/16/2006
10/14/2006
11/12/2006
12/10/2006
1/12/2007
2/10/2007
3/10/2007
4/14/2007
6/11/2007
7/14/2007

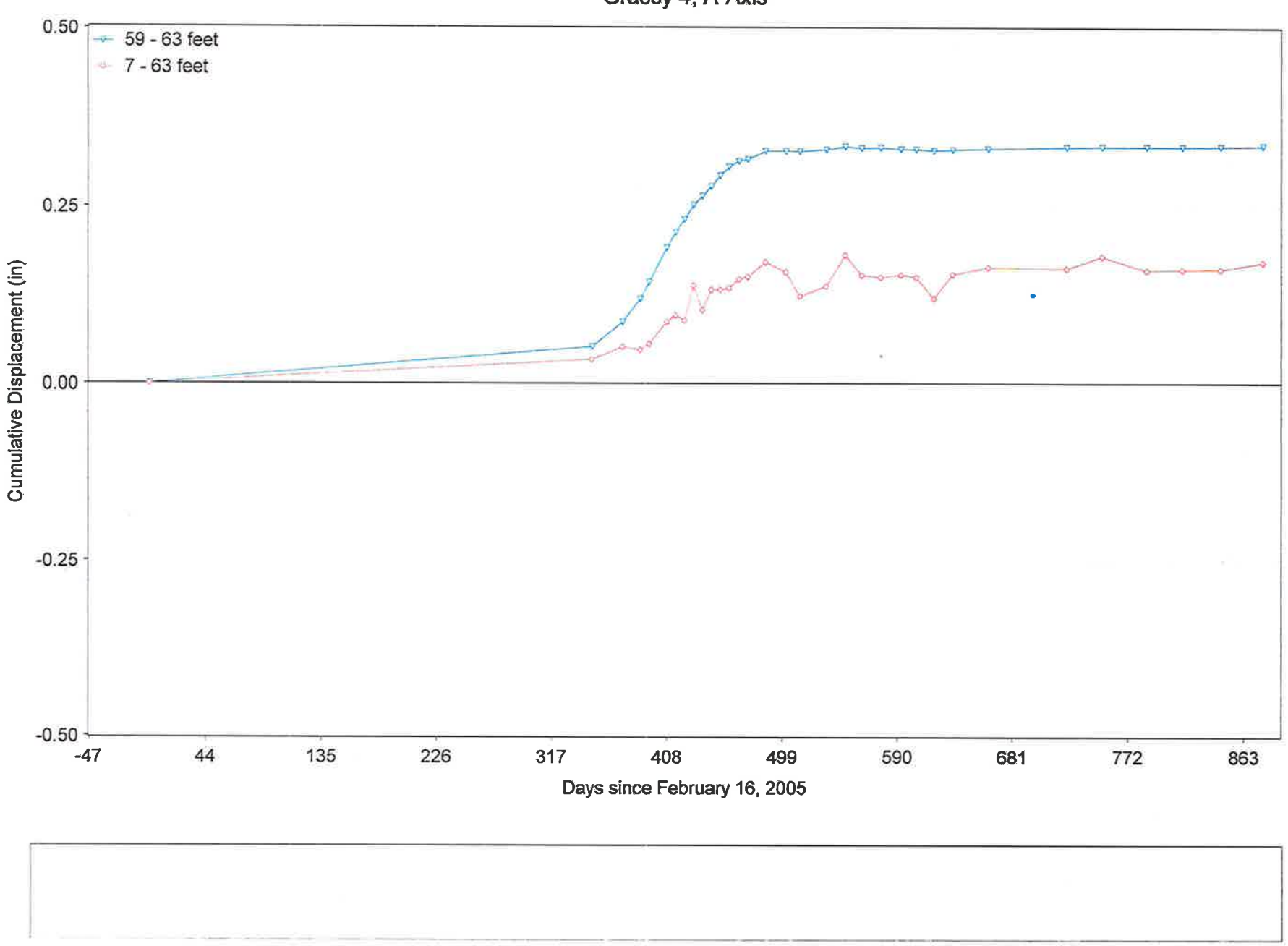

GRASSY 2A, B-Axis
Depth in feet
0
10
20
30
40
50
60
70
80
90
100
110
120
130
-1.00
-0.50
0.00
0.50
1.00
Cumulative Displacement (in) from 8/19/2006
9/16/2006
10/14/2006
11/12/2006
12/10/2006
1/12/2007
2/10/2007
3/10/2007
4/14/2007
6/11/2007
7/14/2007

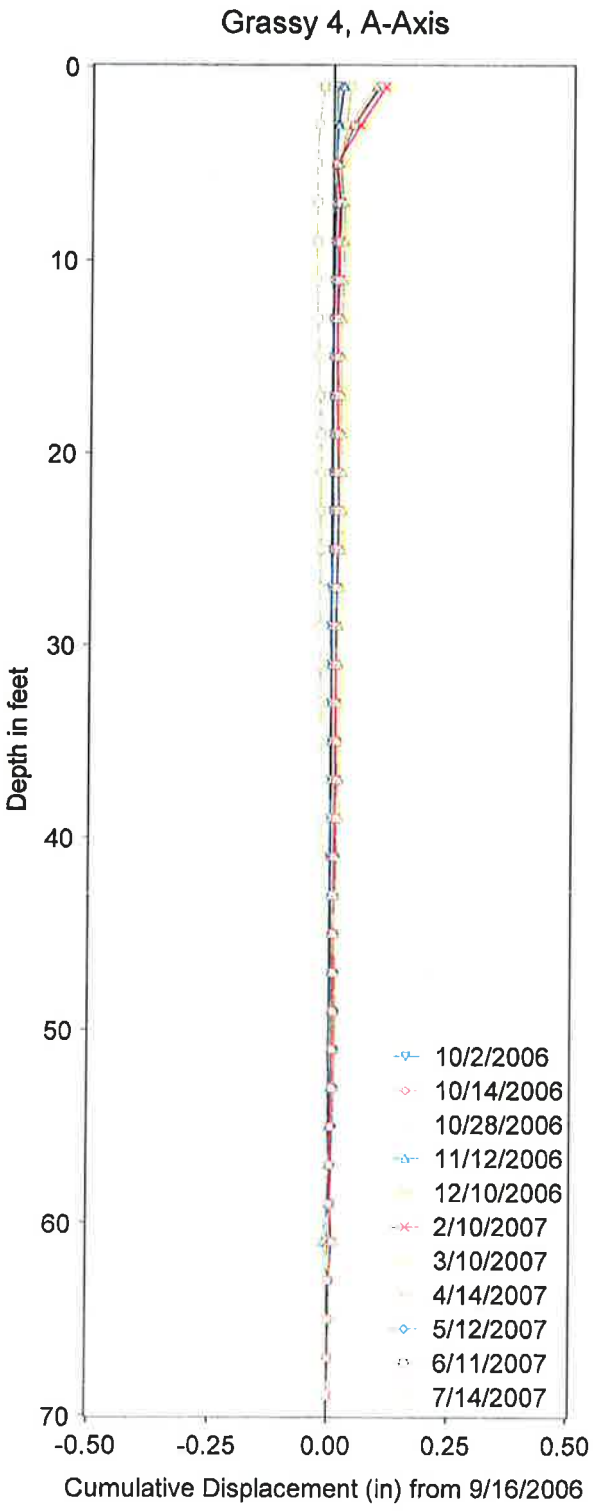

GRASSY 3A, A-Axis
45 - 51 feet
23 - 31 feet
41 - 43 feet
19 - 23 feet
0.50
0.25
0.00
-0.25
-0.50
-0.75
Cumulative Displacement (in)
-47
44
135
226
317
408
499
590
681
772
863
Days since February 16, 2005

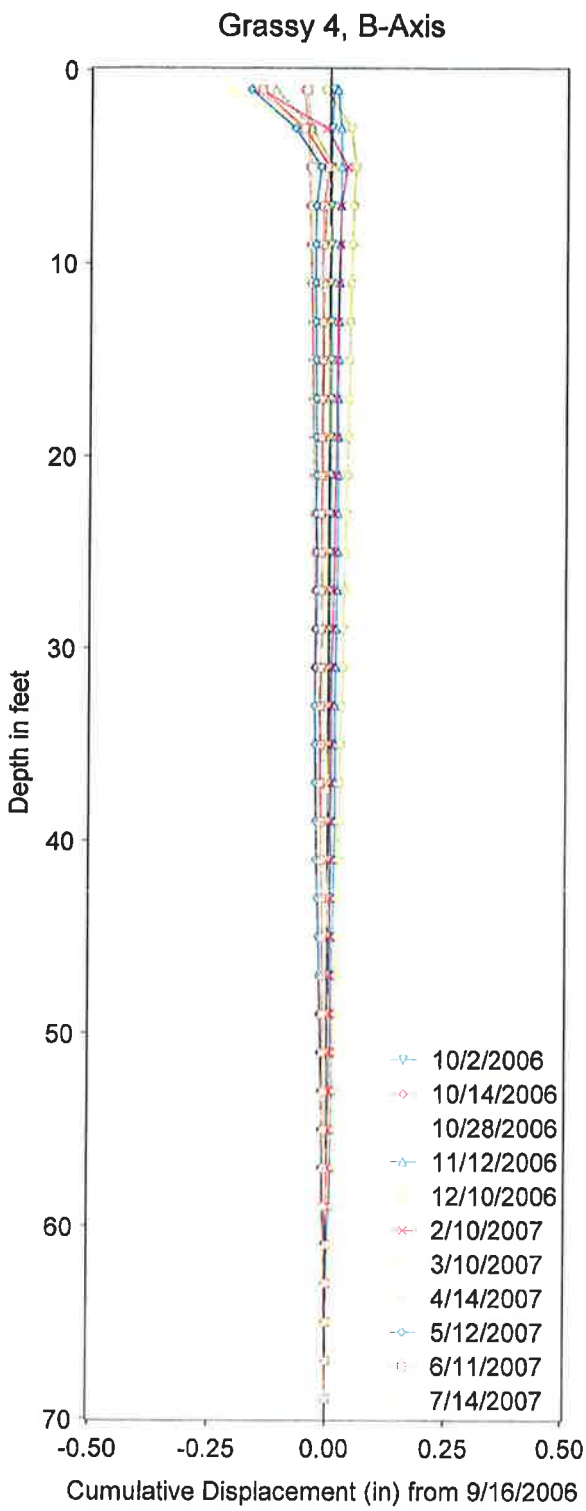




-30 degree skew


Grassy 4, A-Axis
59 - 63 feet
7 - 63 feet
0.50
0.25
0.00
-0.25
-0.50
Cumulative Displacement (in)
-47
44
135
226
317
408
499
590
681
772
863
Days since February 16, 2005


Grassy 4, A-Axis
Depth in feet
0
10
20
30
40
50
60
70
-0.50
-0.25
0.00
0.25
0.50
Cumulative Displacement (in) from 9/16/2006
10/2/2006
10/14/2006
10/28/2006
11/12/2006
12/10/2006
2/10/2007
3/10/2007
4/14/2007
5/12/2007
6/11/2007
7/14/2007


Grassy 4, B-Axis
Depth in feet
0
10
20
30
40
50
60
70
-0.50
-0.25
0.00
0.25
0.50
Cumulative Displacement (in) from 9/16/2006
10/2/2006
10/14/2006
10/28/2006
11/12/2006
12/10/2006
2/10/2007
3/10/2007
4/14/2007
5/12/2007
6/11/2007
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RB&G ENGINEERING Inc.
1435 West 820 North
Provo Ut. 84601

Ph 801-374-5771
SLC 801-521-5771
Fax 801-374-5773
cell 801-369-4477
email mhansen@rbgengineering.com

GRASSY TRAIL DAM SEEPAGE READINGS

Dam Crest Elev(ft)		7600.0		Seep1:Toe Drain		Seep 2: Left Abutment (East Seep)		Seep 3: 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	GAL/MIN	Water Characteristics	Weather Conditions	Temperature (F)
8/19/06	MNH	7590.4		dry		16.7	Clear	0.45	Clear	Sunny	82
8/25/06	MNH	7590.2		1.1	muddy storm run off	15.8	Clear	0.77	Clear	heavy rain/hail	52
9/1/06	MNH	7590.1		dry		15.0	Clear	0.44	Clear	Sunny	83
9/8/06	MNH	7589.6		dry		15.0	Clear	0.44	Clear	Rain	65
9/16/06	MNH	7589.5		dry		15.0	Clear	0.44	Clear	P Cldy trace snow	45
9/22/06	MNH	7588.9		wet, no flow	Clear	15.0	Clear	0.42	Clear	P Cldy to snowy	46 drop to 37
10/2/06	MNH	7587.9		dry		14.0	Clear	0.42	Clear	Overcast/PC	61
10/7/06	MNH	7588.1		5.5	Clear, Storm runoff	15.0	Clear	0.41	Clear	PC	47
10/14/06	MNH	7588.2		0.1	Clear, Storm runoff	13.6	Clear	0.39	Clear	Rain	50
10/22/06	MNH	7587.8	Trace ice	wet drip	Clear, runoff	13.2	Clear	0.36	Clear	clear	22 (8:00AM)
10/28/06	MNH	7586.9		dry		12.5	Clear	0.37	Clear	Sunny	56
11/4/06	MNH	7586.2		dry		11.5	Clear	0.38	Clear	PC trace snow	47
11/12/06	MNH	7586.9		dry		11.7	Clear	Ice		Sunny	31 to 35
11/17/06	MNH	7587.1		dry		11.6	Clear	0.26	Partially frozen	Sunny	45
11/27/06	MNH	7587.7	Trace ice	dry		12.5	Clear	Ice	frozen	Snow windy	29
12/10/06	MNH	7588.0	Frozen	dry		12.8	Clear	Ice	frozen	Snow windy	32
1/4/07	LW	7586.3	Frozen	dry		11.5	Clear	Ice	frozen		
1/11/07	LW	7586.1	Frozen	dry		10.7	Clear	Ice	frozen		
2/8/07	LW	7586.1	Frozen	dry		10.7	Clear	Ice	frozen		
3/8/07	LW	7587.0	Frozen	dry		10.7	Clear	Ice	frozen		
4/12&14/07	CV/MH	7591.8	open	0.83	clear	21.4	Clear	0.44	Clear		
5/12/07	MH	7592.6	over spillway	0.83	clear	21.4	Clear	0.44	Clear	Sunny	70's
6/11/07	MH	7592.51	over spillway	1.67	clear	20.0	Clear	0.44	Clear	windy	70's
6/24/07	CV	7592.3									
7/5/07	CV	7591.4		na		16.6	clear				
7/14/07	MH	7590.6		0.35	clear	16.7	clear	0.44	clear		

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		06-1		98-2	98-4	98-6
			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	2.0	3	13	14	4	10	11	12	15	16	5	6	7
Rim Elev. (ft)			7601.5		7601.8	7601.7		7558.9	7558.9	7601.7	7601.8	7601.7	7601.7	7601.50	7601.50	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	7566.00	7501.50	7501.5	7479.5	7493.0
Piezometer Location			CREST	CREST	CREST	CREST	CREST	D.S. SLOPE	D.S. SLOPE	CREST	CREST	CREST	CREST	CREST	CREST	TOE	TOE	TOE
			EMBANK	FOUND	EMBANK/FOUND	EMBANK	FOUND	EMBANK	FOUND	EMBANK/FOUND	EMBANK	EMBANK	FOUND	FOUND	BEDROCK	FOUND.	FOUND.	FOUND.
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')	34.00 35.50	98.50 100.00	27.3'	32.5'	26.5'
6/1/06	LW	-25.5"	23.5	27.9	23.8	54.2	96.3	34.9	54.3		31.2	20.9	62.8			22.0	9.1	14.1
6/8/06	GK	-27.7"	23.7	27.4	24.4	54.1	96.4	34.7	54.4		31.0	20.7	62.8			22.1	9.4	13.3
6/15/06	LW	-15"	23.0	27.5	24.2	54.0	96.0	34.5	54.4		30.6	20.4	62.8			21.3	8.5	14.0
6/21/06	LW	-13"	23.1	27.7	24.3	54.2	96.0	35.2	54.0		30.7	20.5	62.8			21.2	8.9	13.9
6/29/06	LW	-13"	23.0	27.6	24.2	54.2	96.1	35.0	54.2		30.6	20.4	62.9			21.5	9.3	14.1
7/7/06	LW	-14"	22.8	27.4	22.9	54.2	96.0	35.3	54.1		30.4	20.2	62.9			21.5	9.2	14.0
7/13/06	LW	-12"	22.8	27.4	23.0	54.2	96.2	35.4	54.3		30.5	20.1	62.9			21.6	9.4	14.1
7/20/06	LW	-14"	23.0	27.4	23.3	54.2	96.2	35.5	54.3		30.5	20.1	62.9			21.8	9.6	14.2
7/27/06	LW	-16.75"	23.4	27.2	24.4	54.1	96.5	35.4	54.5		30.5	20	63			22.2	9.8	14.4
8/3/06	LW	-19.5"	23.8	27.3	26.9	54.1	96.7	35.5	54.7		30.5	20	63			22.4	9.9	14.5
8/11/06	GK	-21"	23.9	27.4	27.6	54.1	96.7	35.5	54.8		30.7	20.1	63.0			22.8	10	14.6
8/17/06	LW	-24"	23.8	27.5	25.6	54.1	96.9	35.5	54.8		30.8	20.1	63.0			22.8	10.2	14.8
8/24/06	LW	-28"	23.7	27.6	23.6	54.1	97.0	35.5	54.8		30.8	20.1	63.0			23.1	10.4	14.9
8/31/06	LW	-29"	23.8	27.6	24.6	54.0	97.2	35.4	55.2		30.9	20.2	63.1			23.5	10.5	14.9
9/7/06	LW	-34"	23.9	27.6	24	54.1	97.3	36.4	55.4		31.0	20.3	63.1			23.5	10.7	15.1
9/14/06	LW	-36"	23.8	27.7	23.8	54.1	97.4	36.4	55.3		30.9	20.1	63.1			23.7	10.9	15.2
9/21/06	LW	-43"	24.4	27.9	24.3	54.1	97.1	35.4	55.1		31.6	20.7	63.1			23.4	10.1	14.9
9/29/06	LW	-50"	24.5	27.9	24.4	54.1	97.2	35.4	55.2		31.6	20.7	63.1			23.6	10.1	15
10/5/06	GK	-55"	24.6	27.9	24.6	54.1	97.2	35.5	55.1		31.9	20.9	63.1			23.6	10.2	14.5
10/12/06	LW	-50"	24.6	27.9	24.4	53.9	96.8	35.4	55.1		31.8	21.0	63.2			23.5	9.9	14.4
10/20/06	LW	-59"	24.4	28.1	24.7	53.8	97.1	35.1	55.2		32.0	21.1	63.2			23.8	9.9	14.7
10/26/06	LW	-60"	25.1	28.1	25.1	53.8	97.3	na	na		32.1	21.2	63.3			24.1	10.1	15
11/2/06	LW	-76"	25.8	28.4	25.7	53.9	97.7	35.1	55.9		32.5	21.4	63.3			25.3	11.1	15.2
11/9/06	LW	-70	25.5	28.2	25.4	53.8	98.4	34.8	56.7		32.3	21.3	63.3			25.9	12.1	16
11/16/06	LW	-65	25.6	28.6	25.6	53.9	98.9	35.1	57.1		32.6	21.7	63.3			25	12.4	16.3
11/22/06	LW	-62	25.6	28.8	25.6	54.0	99.1	35.2	57.2		32.7	22.0	63.3			26.1	12.6	16.4
11/30/06	LW	-55	25.6	28.9	25.8	53.9	99.2	na	na		32.7	22.0	63.3	23.85	74.72	26	12.8	16.5
12/7/06	LW	-54	25.4	29.2	25.5	54.1	99.2	35.5	57.3		32.7	22.3	63.4	20.6	74.7	25.9	12.6	16.4
12/14/06	LW	-53	25.3	29.1	25.4	54.0	98.6	35.4	56.7	nm	32.5	22.1	63.4	20.5	74.3	25.2	11.3	15.9
12/21/06	LW	-71	25.8	28.9	25.8	53.8	98.2	35.3	56.2		32.9	22	63.4	21.1	74.7	25.1	10.8	15.6
12/28/06	LW	-72	25.8	28.7	25.8	53.6	98.2	35.2	56.2		32.9	21.9	63.4	21.4	74.9	25.5	11	15.8
1/4/07	LW	-73	26	28.9	26.3	53.8	98.4	35.6	56.5		33.4	22.2	63.4	21.6	75	25.9	11.2	16
1/11/07	LW	-76.5	26	28.8	26.6	53.8	98.5	35.6	56.6		33.6	22.2	63.5	21.7	75	26.3	11.2	16.1
1/18/07	LW	-76.5	26.6	29.5	27.3	54.0	98	35.5	57		34.5	22.4	63.5	21.8	75.3	26.3	11.7	16.3
1/25/07	LW	-76.5	26.5	29.5	27.4	54.2	98	35.6	57		34.5	22.8	63.5	21.8	75.2	26.3	11.6	16.3
2/1/07	LW	-76.5	26.6	29.4	27.4	53.7	99.1	35.6	57		35.1	22.8	63.5	21.9	75.3	26.3	12	16.4
2/8/07	LW	-77	26.5	29.7	27.7	54.0	99.2	35.6	57.4		35	23.2	63.6	21.9	75.3	26.3	12.1	16.5
2/15/07	LW	-78	26.7	29.8	27.8	53.9	99.3	35.7	57.4		35.1	23.3	63.6	21.9	75.3	26.3	12	16.5
2/22/07	LW	-76	26.5	29.8	27.6	53.9	99.3	35.6	57.4		35	23.3	63.6	21.7	75.3	26.3	12.1	16.5
3/1/07	LW	-71	26.3	29.6	26.9	53.8	99.8	35.6	57.4		35	23.3	63.6	21.5	75.3	26.3	12	16.5
3/8/07	LW	-66.5	26.2	29.9	27.1	54.0	99.9	35.5	58		35	23.4	63.6	21.2	75.2	26.3	12.5	16.9
3/15/07	LW	-59.5	25.8	30	26.1	54.1	99.6	35.7	57.8		34.9	23.4	63.6	20.7	74.7	26.3	13	16.8
3/23/07	LW	-49	25.4	29.8	26.4	54.0	99.1	35.6	57.2		34.5	23.2	63.4	20	74.4	25.4	12.4	16.4
3/30/07	LW	-34	24.9	29.8	27.4	54.0	99.2	35.6	57		34.1	23	63.2	20	74.2	25.3	12	16.1
4/5/07	CV	-28	24.65	29.7	27.6	54.1	97.65	35.7	55.6		33.8	22.8	63.7	18.6	73.8	22.4	11.3	15.6
4/12/07	CV	-8	23.6	29	26.9	54.3	96.3	35.3	54.3		32.9	22	63.7	18	73.1	20.7	9.5	14.6
4/19/07	CV	-5	23.6	29.3	26.9	54.4	96.2	35.6	54.3		33	22.7	63.7	18	73.1	21.3	9.3	14.6
5/3/07	CV	1	24	29.6	27	54.8	96.6	35.6	54.8		33.2	22.6	64.2	18.3	73.1	21.4	9.7	14.8
5/24/07	CV	2	24.4	28.6	39.5	54.2	95.5	35	55		33.4	23	64.5	18	72.5	21.0	9	14.8
6/14/07	CV	1	25	29	40.3	54.6	95.8	35.3	55.2		33	23.4	64.3	18.3	72.5	21.4	9.5	14.9
6/24/07	CV	-2	25	28.7	40	54.8	96	35.8	55		33.5	24	64.8	18.9	72	21.9	9.7	15
7/5/07	CV	-13	24.9	27.8	35.2	54.4	95.8	34	54.6		31	24.1	64.1	18.1	72	20.8	9	14.8

?

~ Shaded ave / hard to read handwriting.

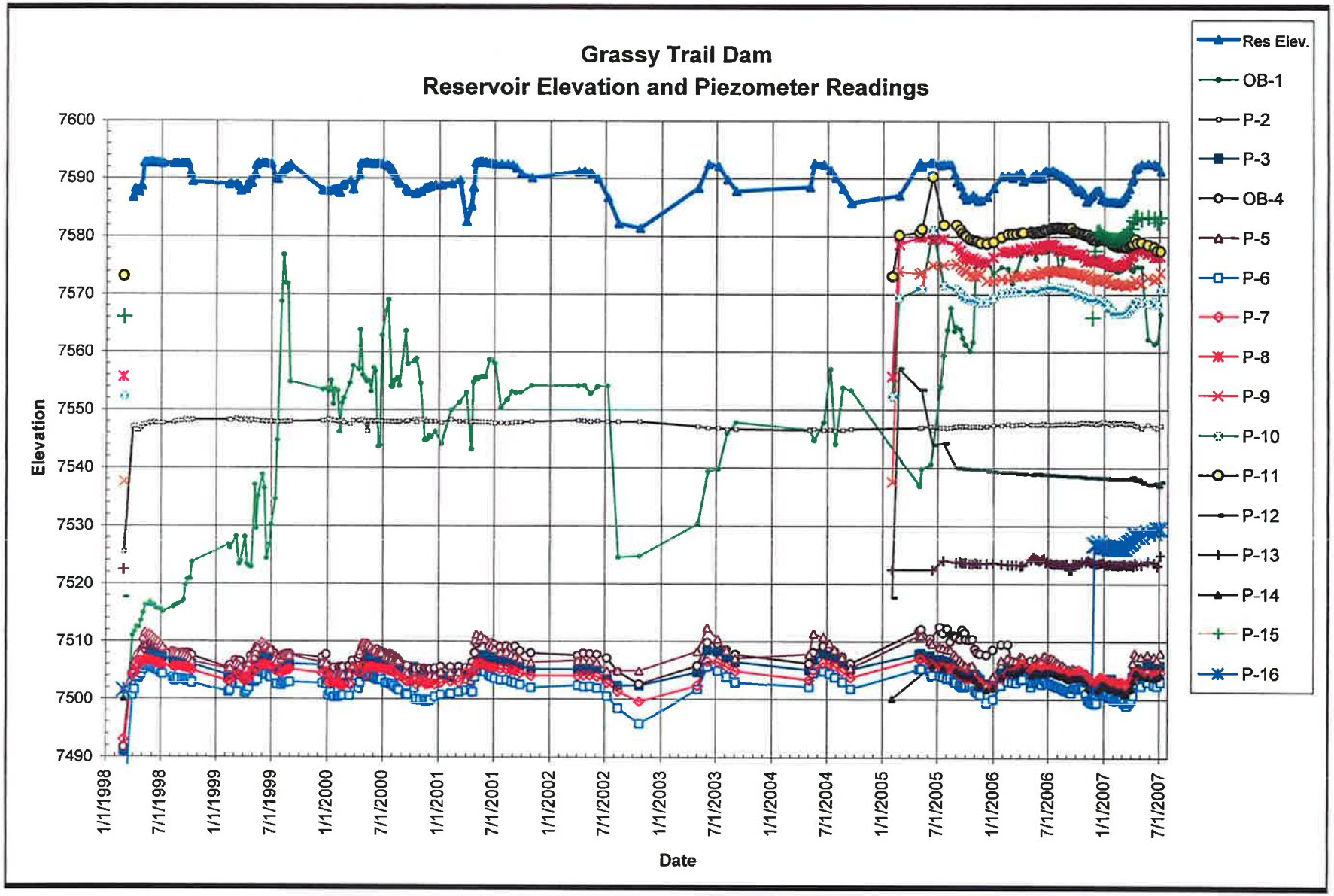

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Figure Reservoir Elevation and Piezometer Readings
March 1998 to July 5, 2007

Grassy Trail Dam and Reservoir

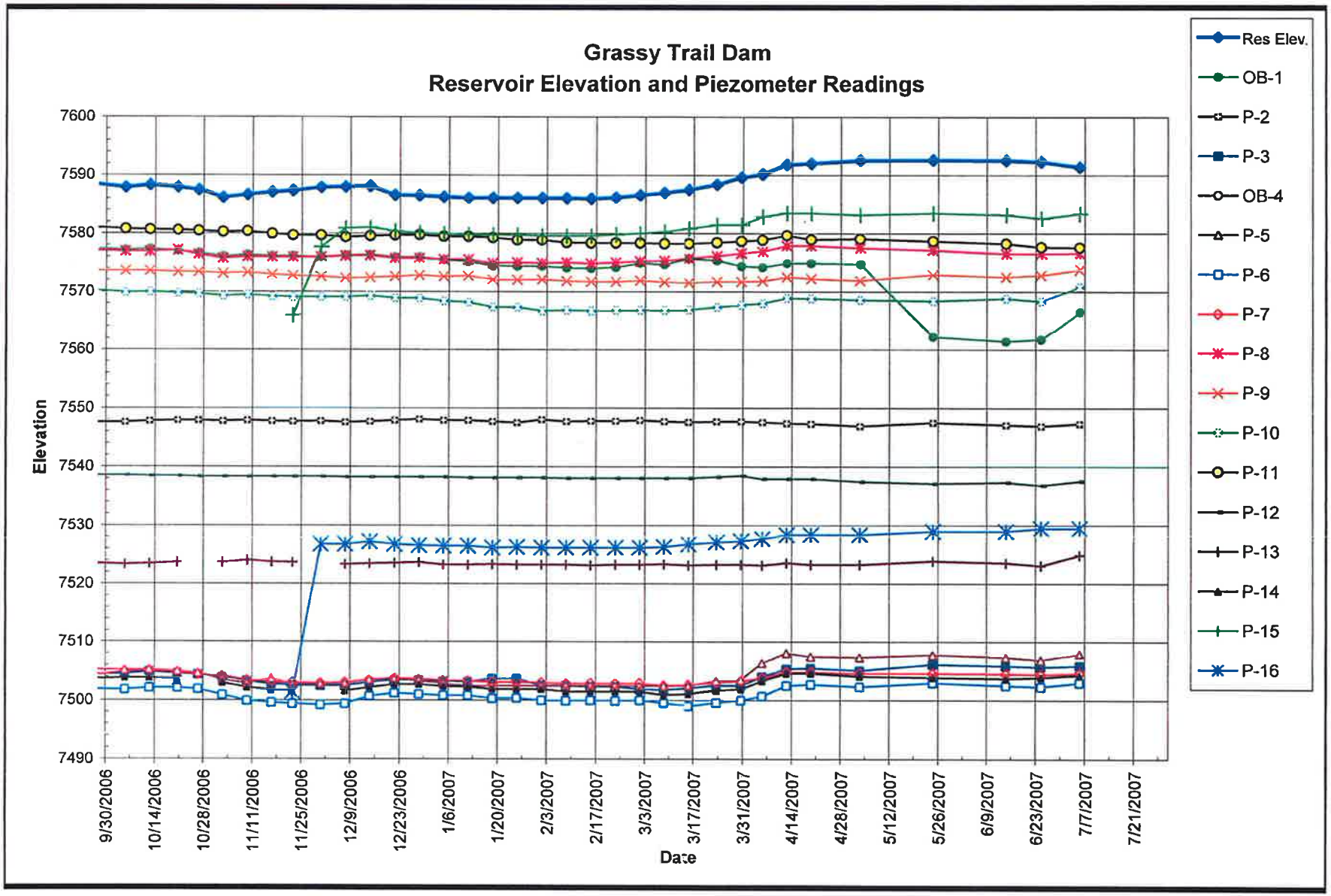

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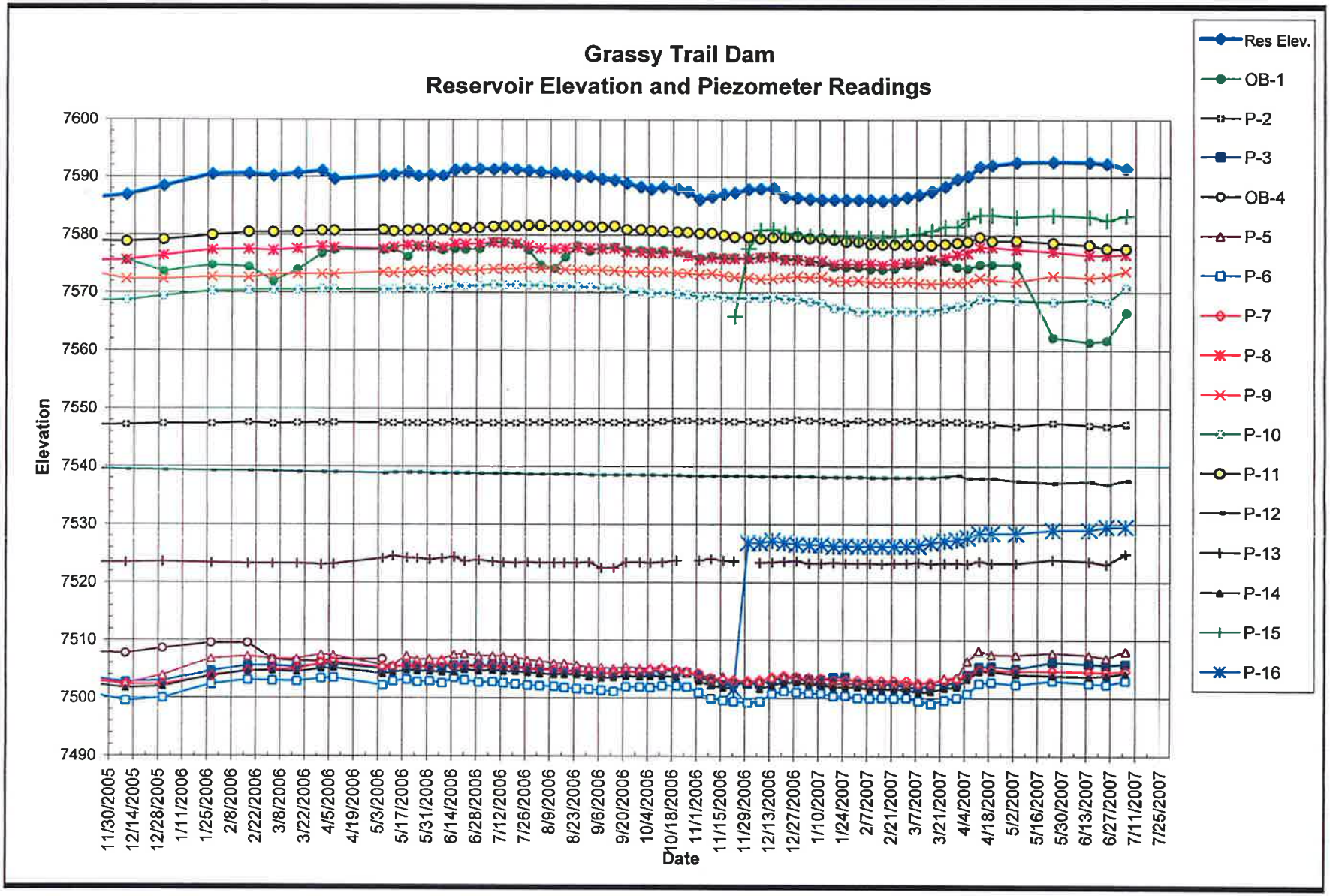
Figure Reservoir Elevation and Piezometer Readings
September 30, 2006 to July 5, 2007

Grassy Trail Dam and Reservoir



RB&G ENGINEERING INC.
Provo, Utah

Figure Reservoir Elevation and Piezometer Readings
November 2005 to July 5, 2007

Grassy Trail Dam and Reservoir