0012

From: "Michael Hansen" <Mhansen@rbgengineering.com>
To: <James_Kohler@blm.gov>, <Jeff_McKenzie@blm.gov>, <Stan_Perkes@blm.gov>,
...
Date: 4/23/2007 8:27 AM
Subject: Grassy Trail Dam Monitoring 4/14/07
Attachments: GTdam 4_14_07.pdf; GT4_14_07.pdf

Incoming
c/007/0041 JK

Grassy Trail Dam Monitoring 4/14/07

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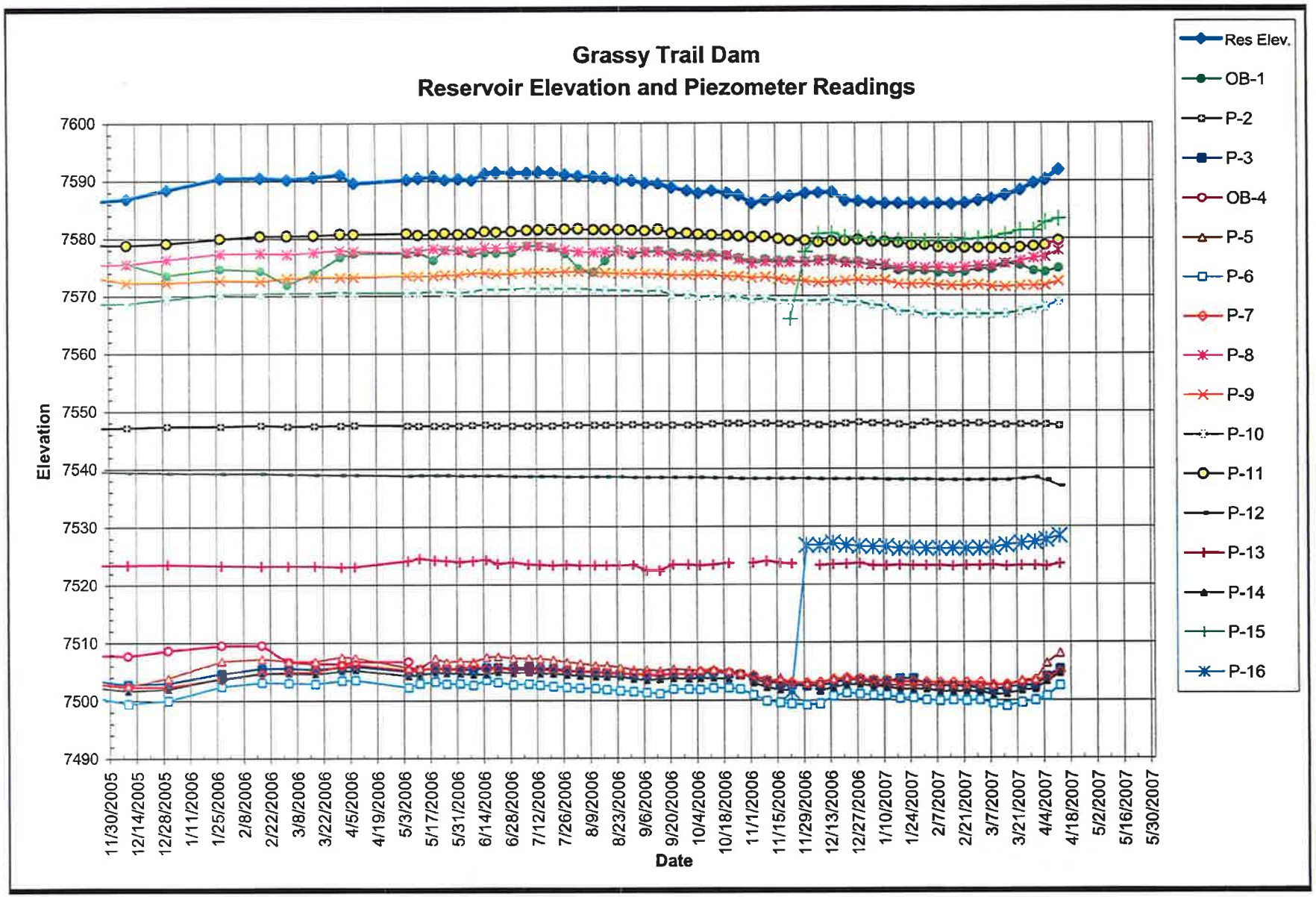
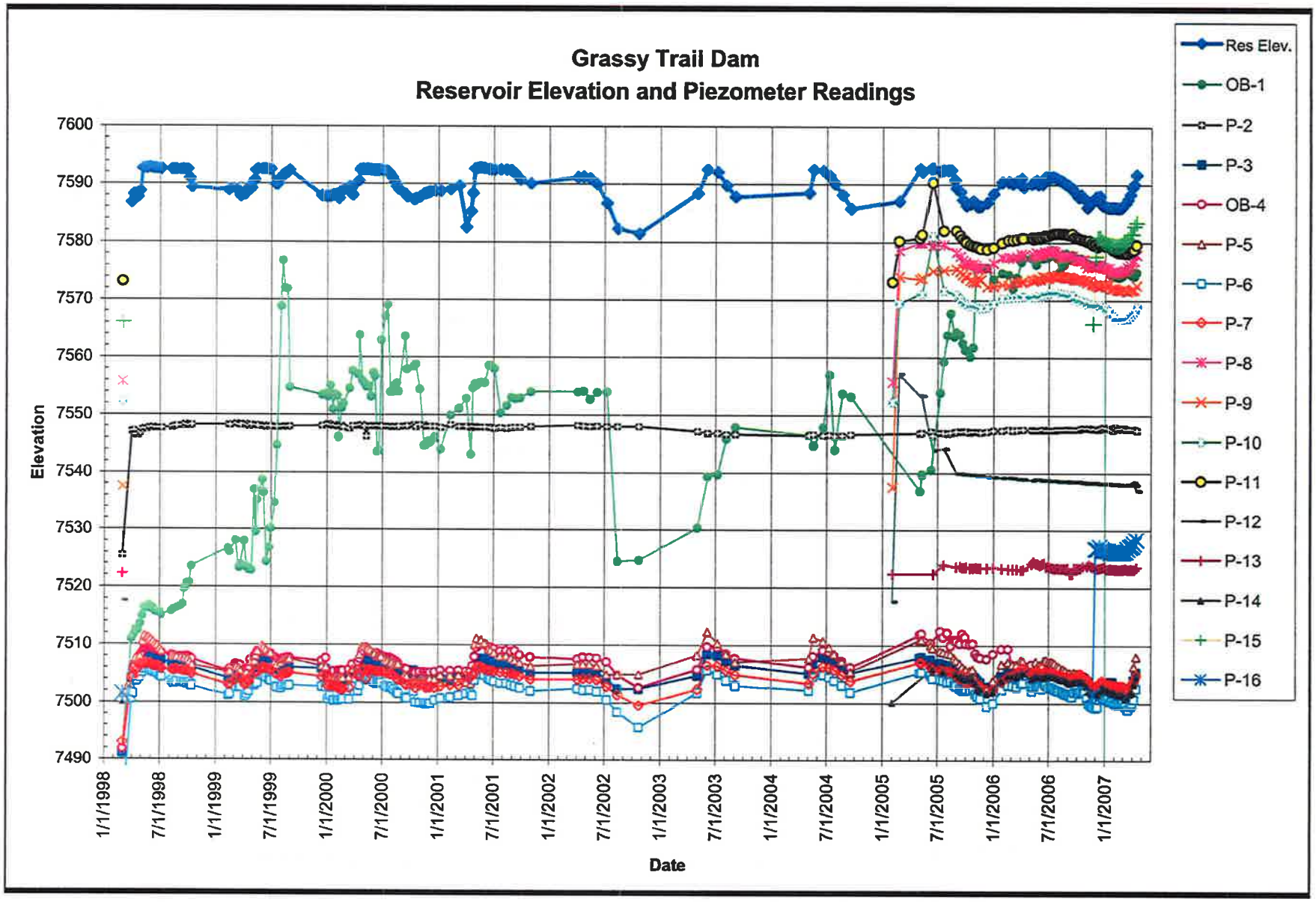


RB&G ENGINEERING INC.
Provo, Utah

Figure Reservoir Elevation and Piezometer Readings
November 2005 to April 12 2007

Grassy Trail Dam and Reservoir



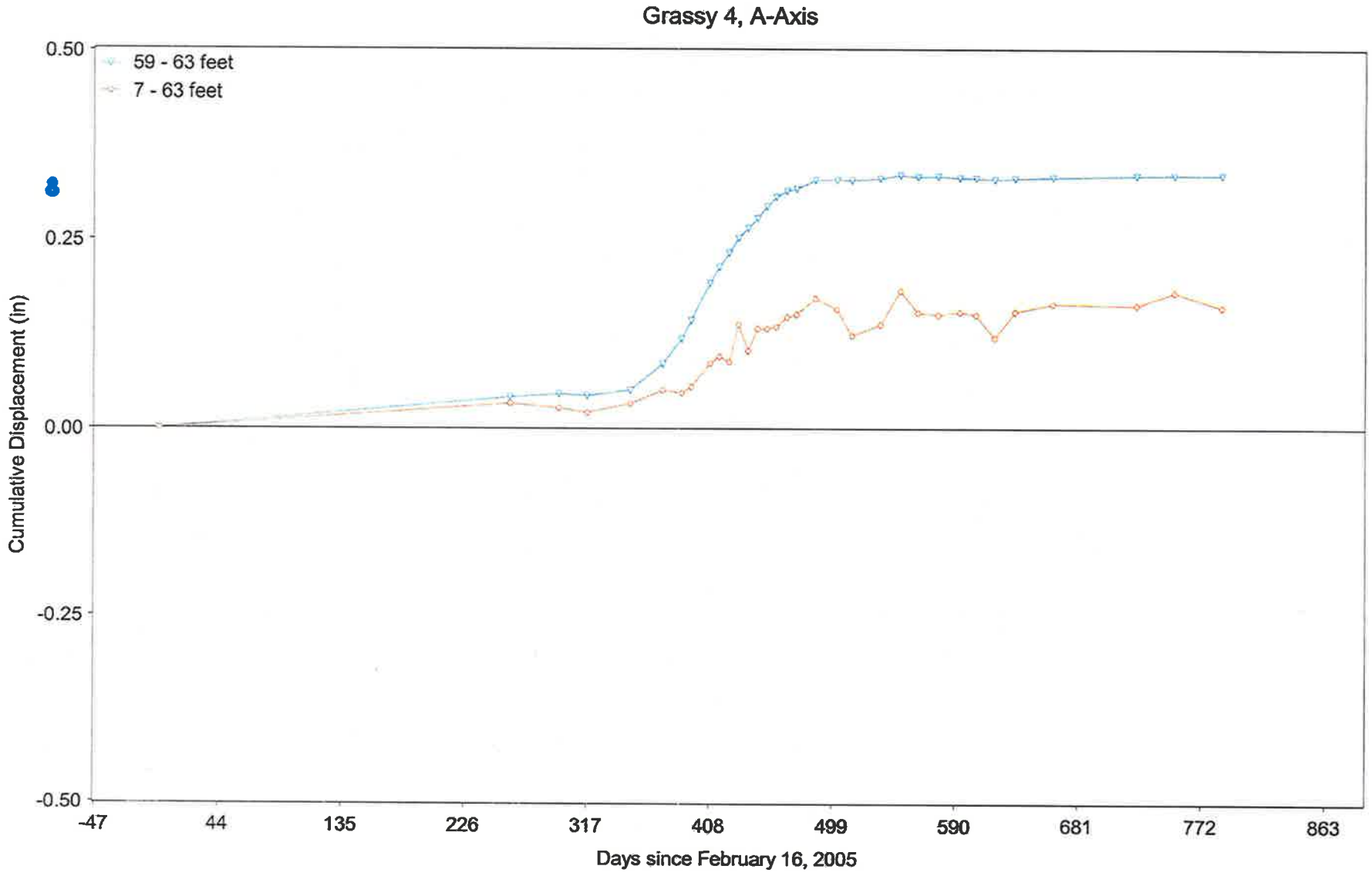
RB&G ENGINEERING INC.
Provo, Utah

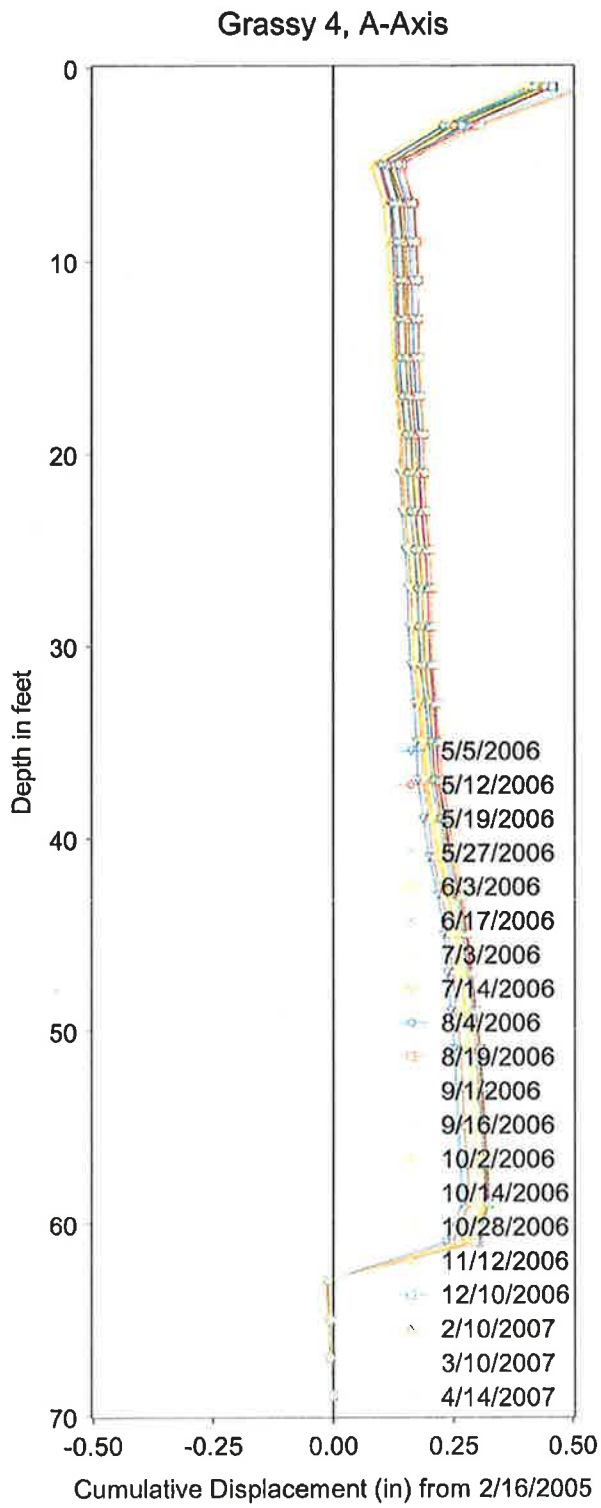
Figure Reservoir Elevation and Piezometer Readings
March 1998 to April 12, 2007

Grassy Trail Dam and Reservoir

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')	34.0' (72.2')	34.00 35.50	98.50 100.00	27.3'	32.5'	26.5'
8/30/05	LW	-36"	23.2	26.2	37.4	54.5	95.6	35.2	53.8	90.9	30.8	19.6	61.7			21.3	9.0	14.6
9/12/05	LW	-44"	23.9	26.6	37.8	54.4	96.1	35.1	54.3	91.3	31.5	20.4	61.7			21.9	9.4	15.2
9/19/05	DC	-59"	24.6	27.1	39.3	54.5	96.4	35.3	54.5	89.7	32.1	21.0	61.8			22.4	9.7	14.5
9/28/05	LW	-65"	24.9	27.4	40.4	54.5	96.6	35.3	54.8	90.2	32.3	21.3	61.8			22.8	9.7	15.7
10/7/05	WD	-72"	25.2	27.6	40.5	54.4	96.6	35.2	54.8	91.3	32.5	21.6	61.8			23.0	9.5	15.8
10/14/05	LW	-69"	25.4	28.1	41.6	54.6	96.8	35.4	54.9	91.4	32.8	22.0	61.9			23.1	9.6	15.7
10/24/05	WD	-63"	25.2	28.3	40.0	54.5	96.7	35.4	54.8	91.3	32.8	22.2	61.8			22.9	9.3	15.7
11/2/05	WD	-68"	25.5	28.4	26.2	54.5	97.2	35.3	55.4	93.0	32.8	22.3	62.0			24.4	10.4	16.0
11/7/05	LW	-75"	26.0	27.7	26.7	54.5	97.7	35.4	56.6	93.6	33.0	22.4	62.0			25.2	10.8	16.2
11/18/05	WD	-73.5"	26.0	28.0	26.1	54.6	98.1	35.4	56.4	93.8	33.2	22.7	62.0			25.7	11.2	16.4
12/9/05	MKS	-66.5" ice	25.9	29.2	26.1	54.5	98.9	35.4	57.2	94.0	33.1	22.8	62.2			26.3	12.5	17.1
12/30/05	MKS	-48" ice	25.1	29.2	28.1	54.3	98.7	35.3	56.9	93.1	32.4	22.5	62.3			24.9	12.0	17.1
1/27/06	MKS	-24" ice	24.1	28.8	27.0	54.3	97.0	35.5	55.0	92.2	31.5	21.7	62.4			22.0	9.6	15.7
2/17/06	MNH	-23" ice	24.0	28.9	27.3	54.1	96.1	35.6	54.2	92.2	31.4	21.2	62.4			21.6	8.9	14.8
3/3/06	MNH	-27" ice	24.2	28.4	29.6	54.3	96.1	35.6	54.2	95.0	31.3	21.2	62.5			22.0	9.0	14.6
3/17/06	MNH	-22" ice	23.9	28.3	27.8	54.2	96.4	35.6	54.4	95.3	31.3	21.1	62.6			22.0	9.2	14.5
3/31/06	MNH	-17" ice	28.3	28.3	25.0	54.2	96.0	35.8	53.9	95.4	31.1	21.0	62.7			21.3	8.6	13.5
4/7/06	MNH	-34" ice	23.7	28.3	24.4	54.1	95.8	35.7	53.7	95.0	31.2	20.9	62.7			21.4	8.5	13.2
5/5/06	MNH	-27"	23.9	28.0	24.4	54.2	96.7	34.7	54.7	95.0	31.3	20.8	62.8			23.2	9.8	14.3
5/11/06	LW	-24"	23.6	28.1	24.1	54.2	96.4	34.3	54.5		31.2	21.0	62.7			23.2	9.1	14.0
5/19/06	LW	-20.5"	23.2	28.0	25.5	54.2	96.1	34.6	54.1		31.0	20.9	62.7			21.5	8.8	13.9
5/25/06	LW	-28"	23.5	27.8	23.7	54.2	96.1	34.7	54.2		31.1	20.7	62.7			22.2	9.2	14.0
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			21.5	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			21.6	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			22.9	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	26.5	53.8	98.5	35.6	56.6		33.6	22.2	63.5	21.7	75	26.30	11.2	16.1
1/18/07	LW	-76.5	26.5	29.5	27.3	54.0	98	35.5	57		34.5	22.4	63.5	21.8	75.3	26.30	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	26.30	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	26.30	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	26.30	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	26.30	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	26.30	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	26.30	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	26.30	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	26.30	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	25.40	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	25.30	12	16.1
4/5/07	CV	-28	24.65	29.7	27.6	54.1	97.65	35.7	55.6		33.6	22.8	63.7	18.6	73.8	22.40	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	64.7	18	73.1	20.70	9.5	14.6


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 2/16/2005
5/5/2006
5/12/2006
5/19/2006
5/27/2006
6/3/2006
6/17/2006
7/3/2006
7/14/2006
8/4/2006
8/19/2006
9/1/2006
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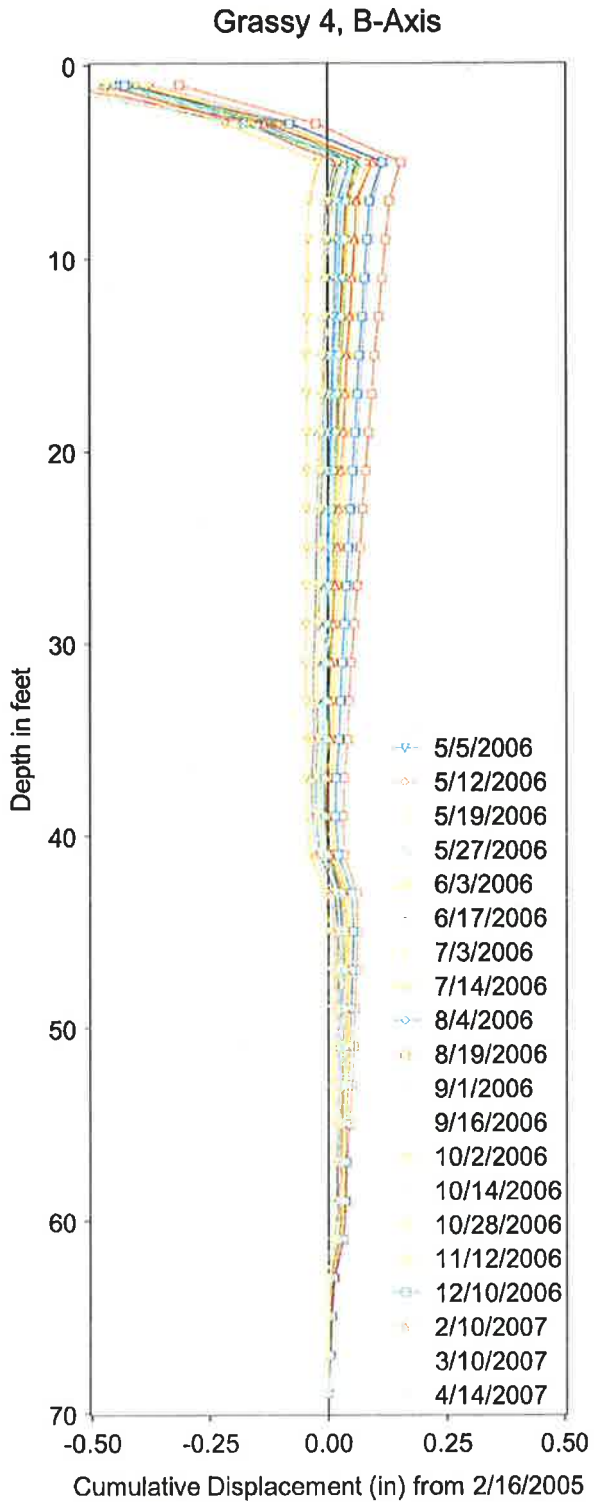
3/10/2007
4/14/2007


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 2/16/2005
5/5/2006
5/12/2006
5/19/2006
5/27/2006
6/3/2006
6/17/2006
7/3/2006
7/14/2006
8/4/2006
8/19/2006
9/1/2006
9/16/2006
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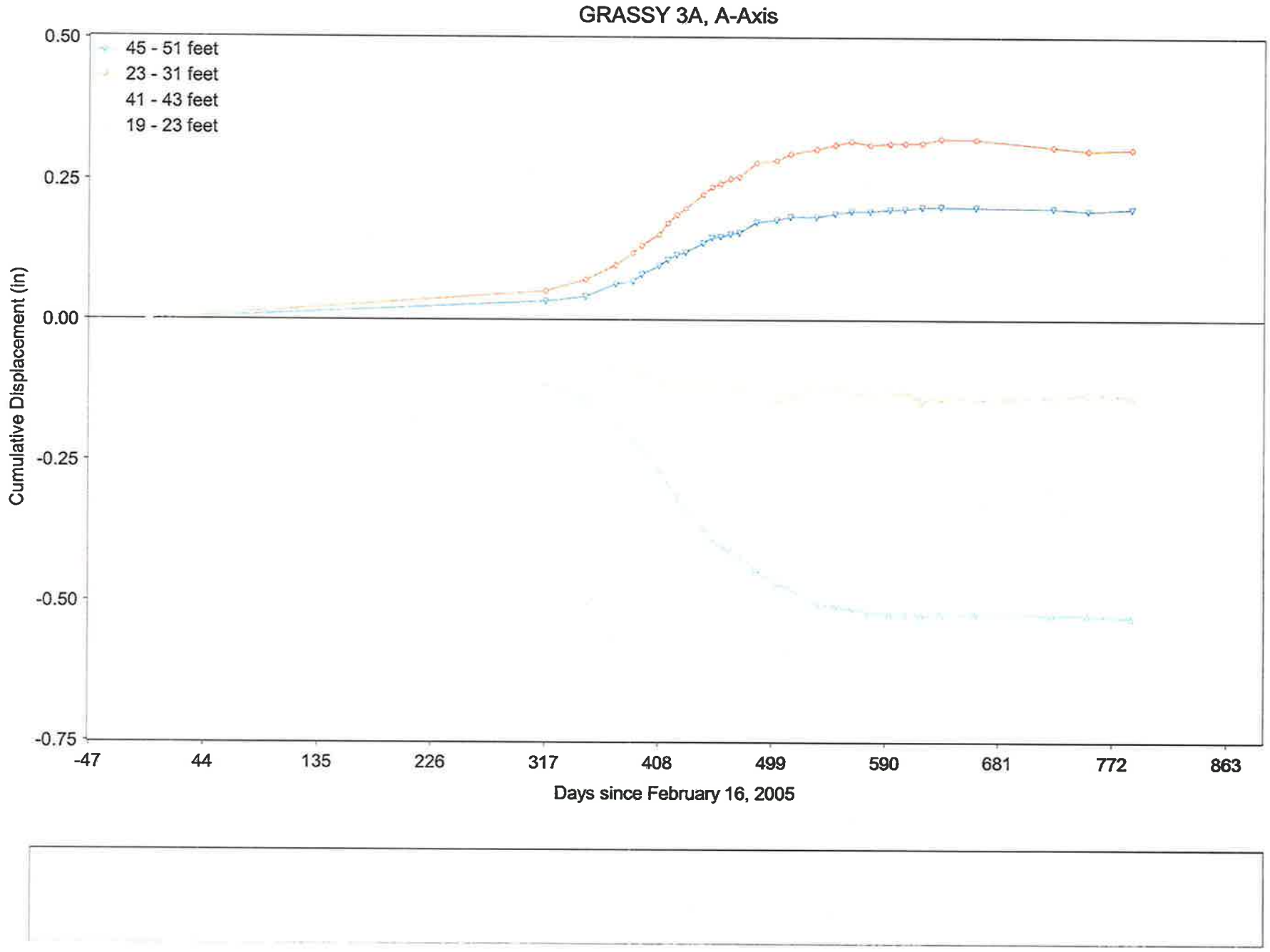
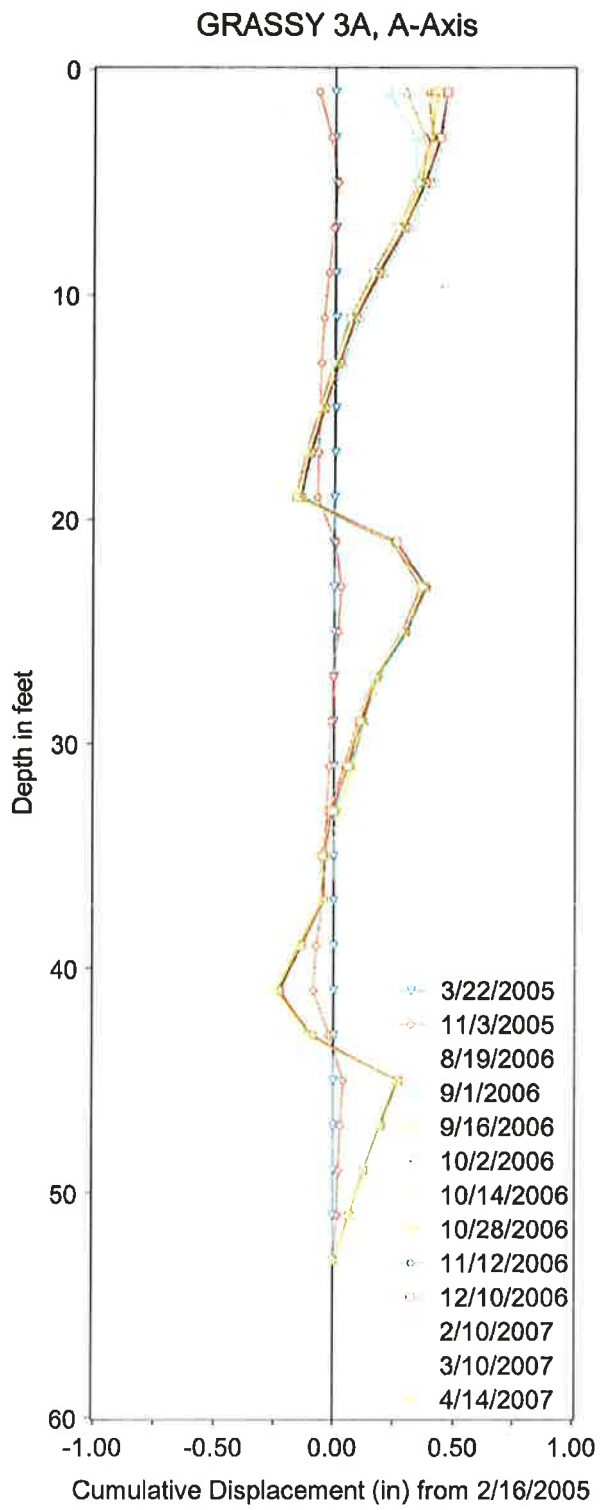
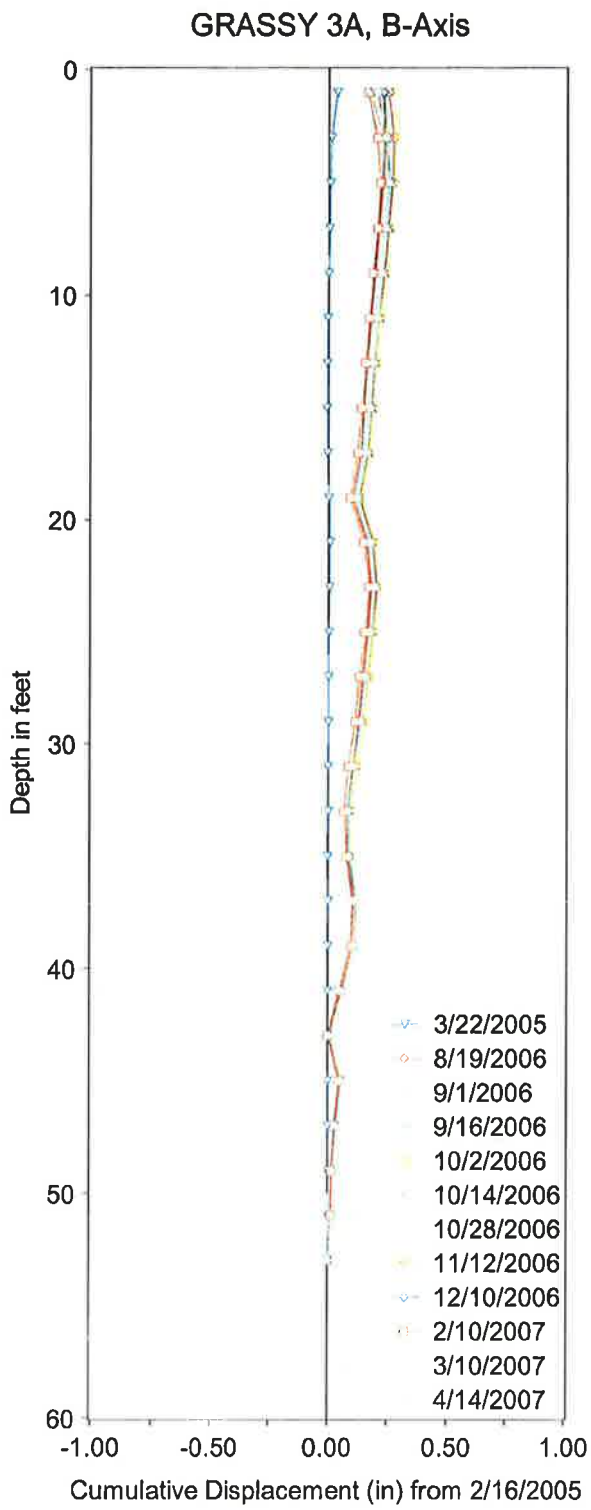
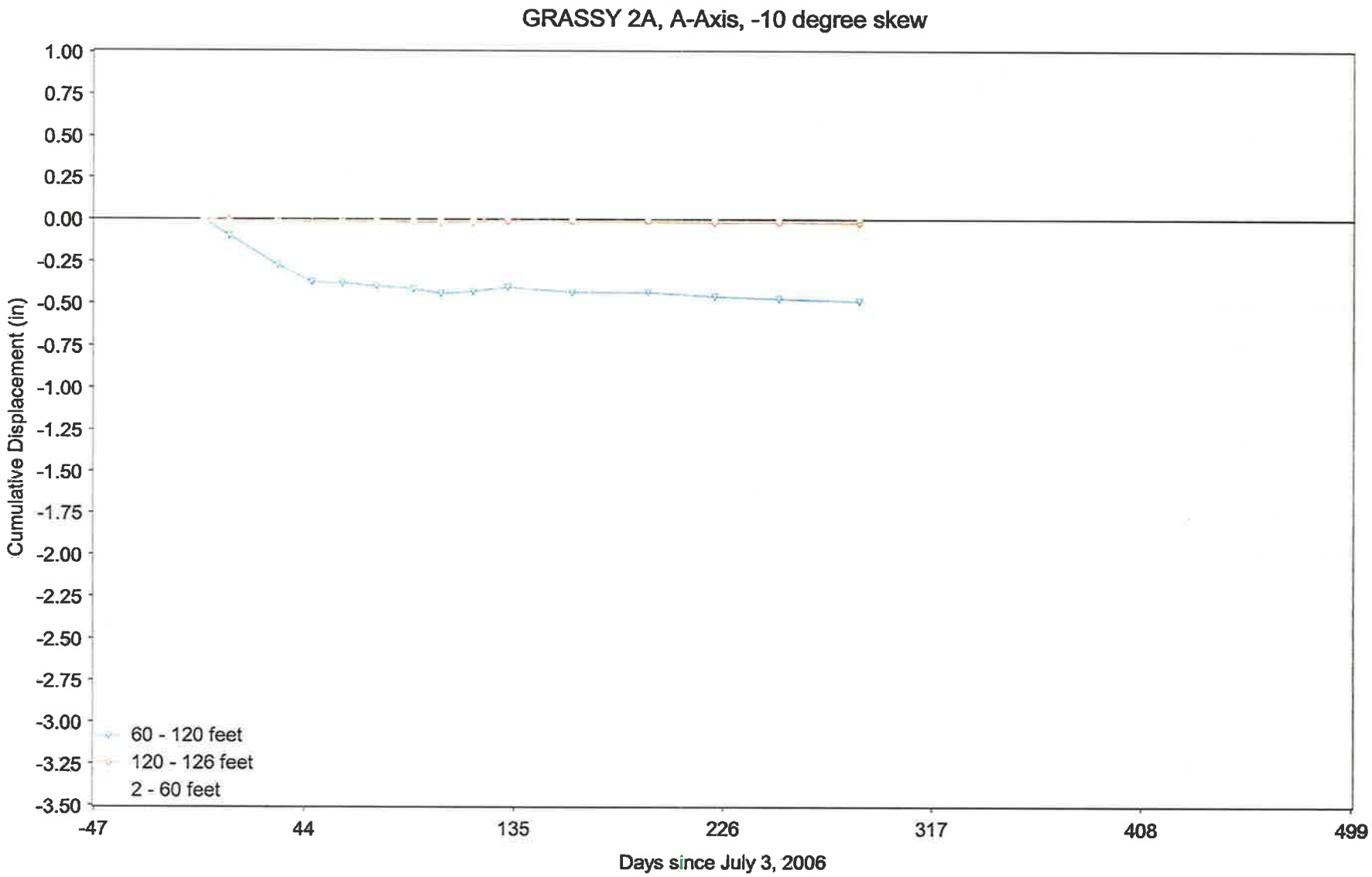
3/10/2007
4/14/2007

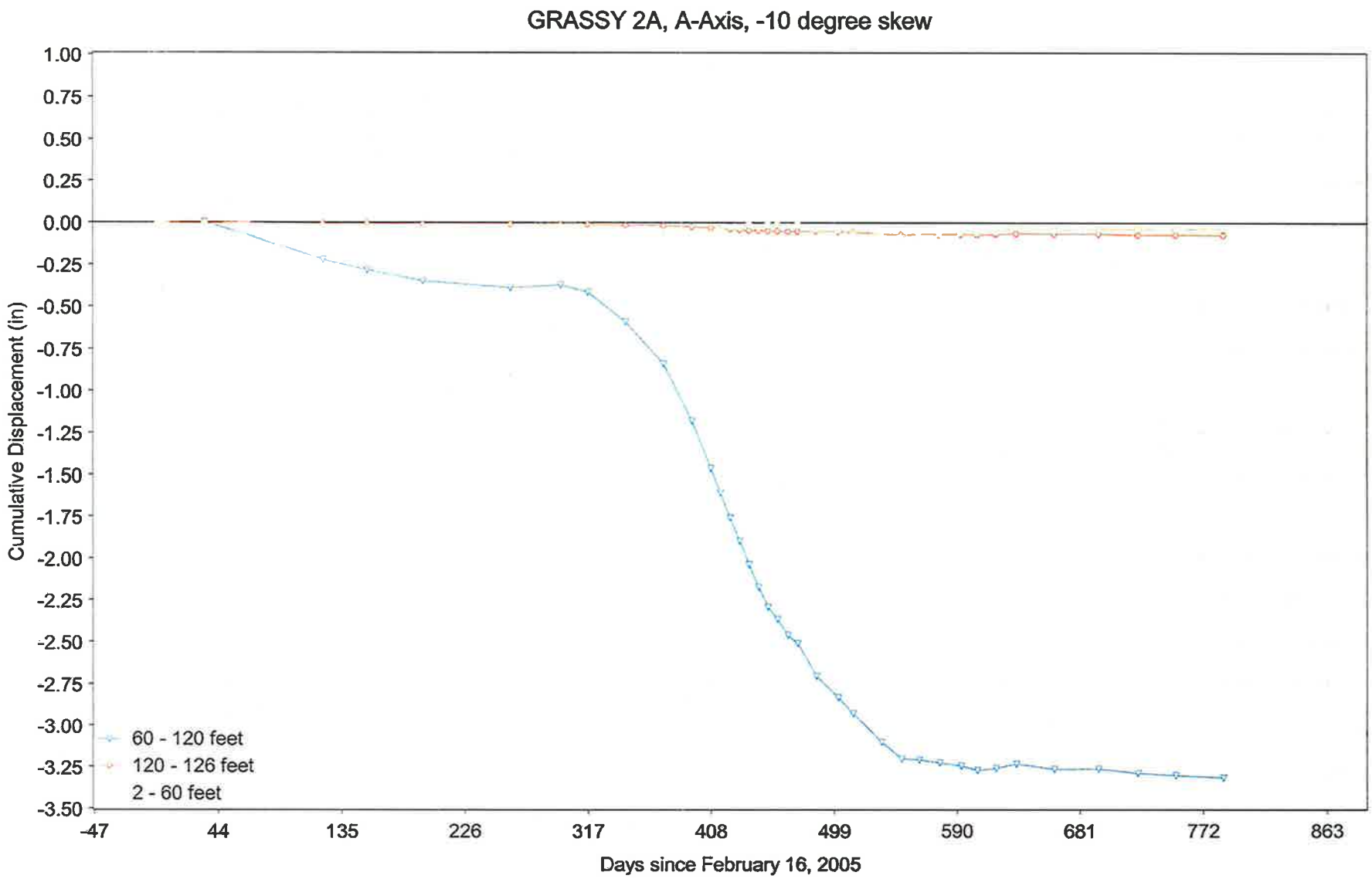

GRASSY 3A, A-Axis
45 - 51 feet
23 - 31 feet
41 - 43 feet
19 - 23 feet
0.50
0.25
0.00
-0.25
-0.50
-0.75
Cumulative Displacement (in)
-47
44
135
226
317
408
499
590
681
772
863
Days since February 16, 2005

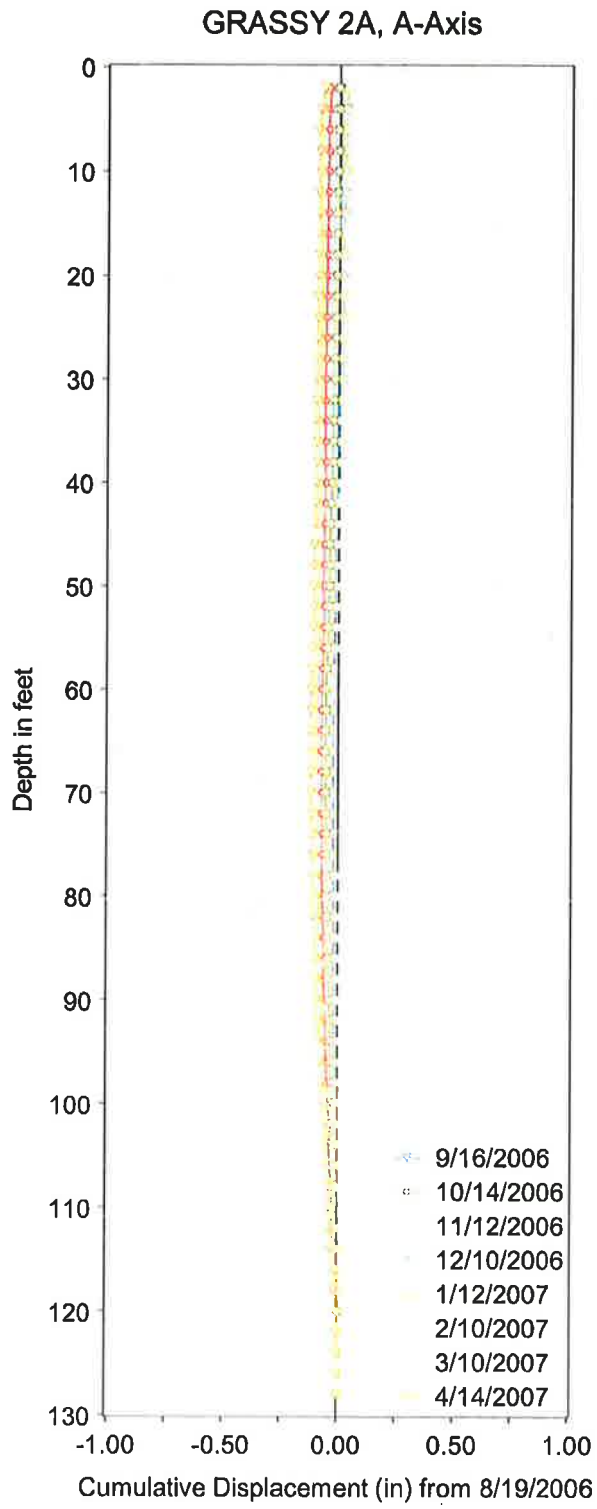




-30 degree skew


GRASSY 2A, A-Axis, -10 degree skew
Cumulative Displacement (in)
1.00
0.75
0.50
0.25
0.00
-0.25
-0.50
-0.75
-1.00
-1.25
-1.50
-1.75
-2.00
-2.25
-2.50
-2.75
-3.00
-3.25
-3.50
60 - 120 feet
120 - 126 feet
2 - 60 feet
-47
44
135
226
317
408
499
Days since July 3, 2006


GRASSY 2A, A-Axis, -10 degree skew
Cumulative Displacement (in)
1.00
0.75
0.50
0.25
0.00
-0.25
-0.50
-0.75
-1.00
-1.25
-1.50
-1.75
-2.00
-2.25
-2.50
-2.75
-3.00
-3.25
-3.50
-47
44
135
226
317
408
499
590
681
772
863
Days since February 16, 2005
60 - 120 feet
120 - 126 feet
2 - 60 feet


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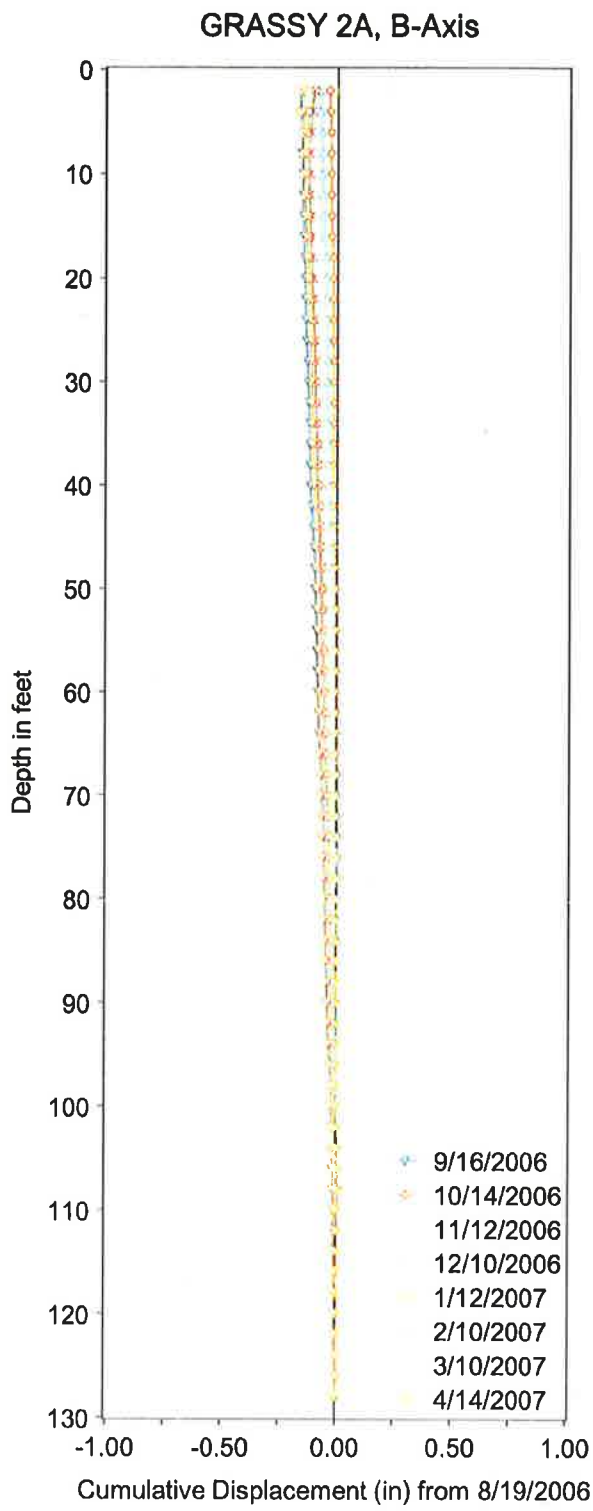
120
130
-1.00
-0.50
0.00
0.50
1.00
Cumulative Displacement (in) from 8/19/2006
9/16/2006
10/14/2006
11/12/2006
12/10/2006
1/12/2007
2/10/2007
3/10/2007
4/14/2007


GRASSY 2A, B-Axis
Depth in feet
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130
-1.00
-0.50
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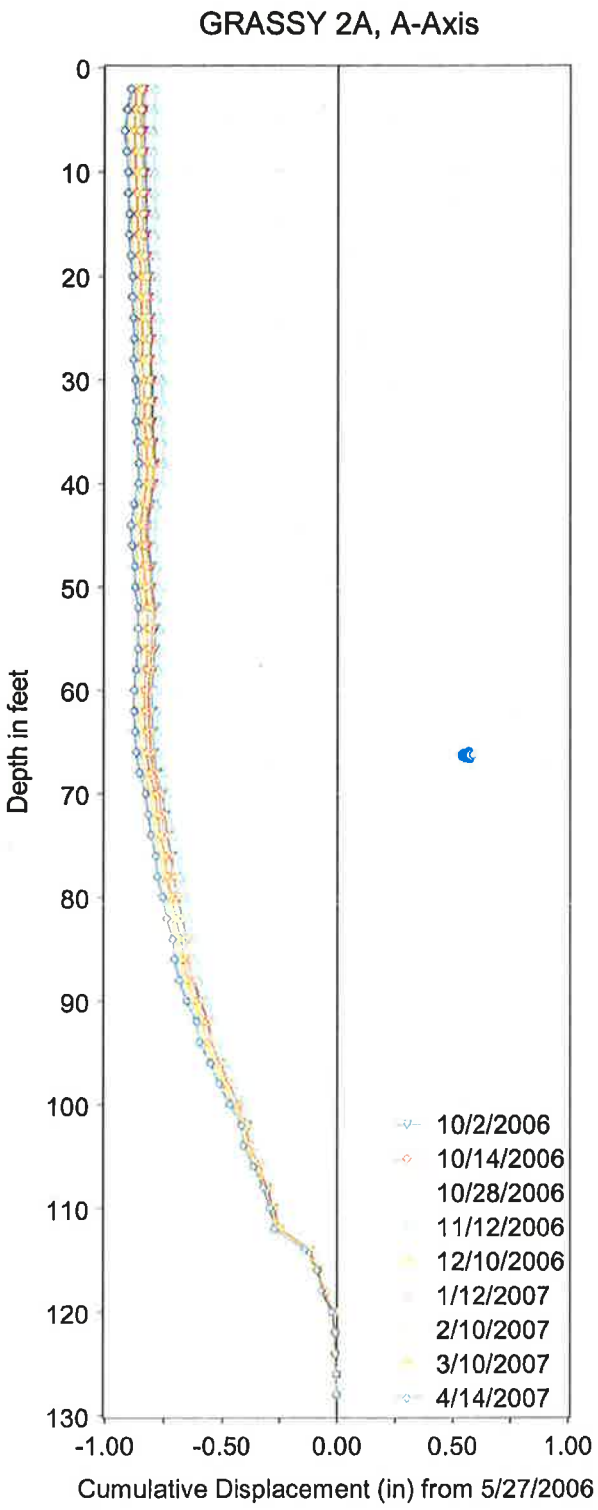
Cumulative Displacement (in) from 8/19/2006
9/16/2006
10/14/2006
11/12/2006
12/10/2006
1/12/2007
2/10/2007
3/10/2007
4/14/2007


GRASSY 2A, A-Axis
Depth in feet
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60
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80
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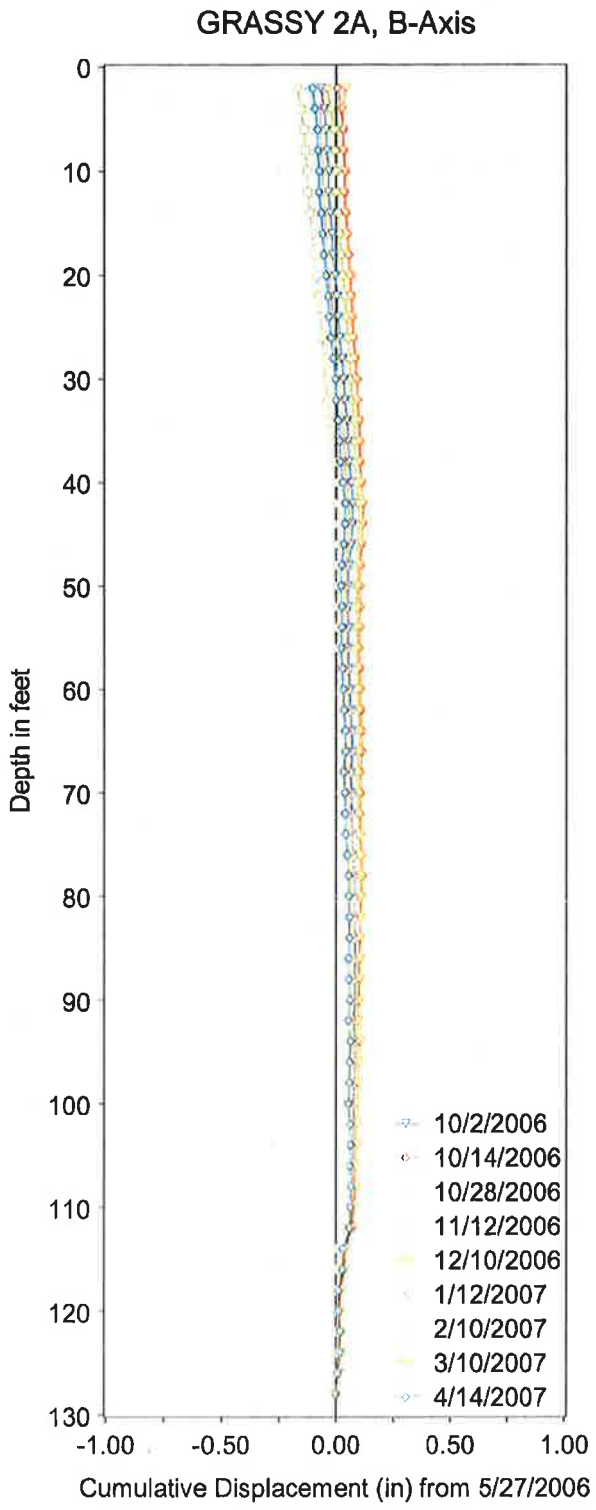
-1.00
-0.50
0.00
0.50
1.00
Cumulative Displacement (in) from 5/27/2006
10/2/2006
10/14/2006
10/28/2006
11/12/2006
12/10/2006
1/12/2007
2/10/2007
3/10/2007
4/14/2007


GRASSY 2A, B-Axis
Depth in feet
0
10
20
30
40
50
60
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120
130
-1.00
-0.50
0.00
0.50
1.00
Cumulative Displacement (in) from 5/27/2006
10/2/2006
10/14/2006
10/28/2006
11/12/2006
12/10/2006
1/12/2007
2/10/2007
3/10/2007
4/14/2007

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Grassy Trail Dam, Seismic Summary for April 14, 2007.

For the period between March 10 and April 14, 2007 no MIS (Mining Induced Seismicity) earthquakes were recorded within the area near panel #7 (nearest the Dam) by the UUSS. No MIS events were recorded on the Dam or Hillside instruments during the past month.

Since March 10, 2007 there have been about 54 micro earthquakes (Eq mag 0.9 to 1.8) reported by the UUSS which have taken place about 3-4 miles west to northwest of the dam. This area is near Panel 9 where mining began after Panel 7 was completed at the end of September 2006. It should be noted that during February 10 to March 10 only 2 earthquakes were reported form these same area. One of he reasons for the significant increase in earthquakes may be an increase in the thickness of overburden above the mined area. None of these MIS earthquakes were recorded on the Dam or Hillside seismic instruments.

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 slight but gradual movement during the past few months.

Reservoir levels have risen with the spring runoff. With the exception of P-12 no unexpected changes in piezometer or seepage readings were observed during the past month. P-12 shows a drop of about 1 foot during the past week and may be a recording error. This reading will be compared with the next readings. Seepage from the Toe Drain was clear and may be from spring thaw. Other than a few freeze-thaw and desiccation cracks, no significant 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 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)
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 Cloy trace snow	45
9/22/06	MNH	7588.9		wet, no flow	Clear	15.0	Clear	0.42	Clear	P Cloy 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		

Looking West
04/14/2007

Looking West
04/14/2007

Looking West
04/14/2007

Looking East
04/14/2007

Looking East
04/14/2007

Looking East
04/14/2007

West Abutment
04/14/2007

Down stream face
04/14/2007

East Abutment
04/14/2007