



January 18, 2006

Ms. Magalie R. Salas, Secretary
 Federal Energy Regulatory Commission
 888 First Street, N.E.
 Washington, D.C. 20426

RE: Peavy Falls Hydroelectric Project - FERC No. 11830-000
 Article 407 -Year 2005 - Water Quality Monitoring Report

Wisconsin Electric (WE) doing business as We-Energies, is hereby filing one original and eight additional copies of the results of water quality monitoring and low dissolved oxygen problem testing for the above identified Project performed during 2005 in fulfillment of the monitoring plan approved and incorporated in the article identified above by FERC for this project.

The Commission issued a new license for the above Project on January 12, 2001 and by Order issued March 9, 2001 clarified certain Water Quality Monitoring requirements. The approved monitoring plan assures that the discharges from the above Project meet the state's water quality standards for temperature and dissolved oxygen (DO). The applicable mean temperature standards for the months during which continuous monitoring is to take place are shown in the table below:

Month	June	July	August	September
°F	80	83	81	74
°C	26.7	28.3	27.2	23.3

The applicable D.O. standard is 5.0 mg/l at all times.

The Plan as approved by FERC order dated January 12, 2001 was subsequently modified by WE, with approval of consulted state agencies. The modified plan was filed with FERC in correspondence dated May 20, 2003. The modified plan now requires continuous monitoring of temperature and dissolved oxygen for the next three years at only those projects where problems in meeting the water quality standards were encountered during the 2001-2002 period. The Peavy Falls Project was one among three projects where problems were encountered.

In addition, the modified plan also requires the collection of vertical profile measurements in the flowage upstream of any project when continuous monitoring is being conducted in the tailrace waters.

The results of our 2005 monitoring program for the Peavy Falls Project are as follows:

I. Continuous water quality monitoring

Appendix A contains summary tables for the continuous monitoring data. In 2005, continuous monitoring at Peavy Falls was conducted in three locations: in the Plant's tailrace; in the outlet of the spillway section; at a station situated ~700 ft downstream of the tailrace monitoring location. The monitoring locations (Figure C-1) were selected to ascertain the intensity and duration of low DO conditions in the near-plant area of the river segment that connects Peavy discharge with Michigamme Falls flowage (stations located in the tailrace). In 2005, a station was situated near the point where the spillway section empties into the river segment connecting the Peavy Falls discharge with the Michigamme Falls flowage. The data collected at this Station was used to ascertain the DO levels contributed by spillage to the river segment receiving the Plant's discharge.

Temperature and DO were monitored continuously from mid-June through mid- September. As in previous years, the immediate Project tailrace area failed to meet the dissolved oxygen standard for portions of specific days when the units were offline (e.g., low DO levels were primarily detected in the leakage flow). At no time were DO levels less than 5.0 mg/l during an entire day in 2005. In the tailrace location closest to the plant, approximately 10.3% of all (2381) hourly DO measurements were less than 5.0 mg/l during the entire monitoring period, and 1.9% (48 of 2381) of the hourly readings were less than 4.0 mg/l (Table A-1). Two readings were less than 3.0 mg/l.

DO levels at the more downstream tailrace location (Station P-1), which should have received spillage, approximately 9.8% (232 out of 2376) of the hourly readings were less than 5.0 mg/l while 3.4% were less than 4.0 mg/l. None were less than 3.0 mg/l.

Table A-2 contains these monitoring summaries as well as data recovery statistics, by location for each of the multi-function data sondes.

II. Flowage measurements

Appendix B contains the results of the vertical profile measurements made in 2005 for the project. Patterns observed in Peavy Falls flowage were very similar to measurements made during the two previous years.

III. 2005 tests of Corrective Measures

The work conducted in 2005, as detailed in Appendix C, represent WE's latest efforts to understand the extent of the low DO problem as well as the results of our initial tests involving low quantities of spillage to limit low DO conditions in the tailrace. The low DO problems encountered at Peavy Falls during 2005, as well as during previous years, have been explained in previous reports. In general, the low DO problem at this project stems from the way Peavy Falls Project is operated during periods of lower flow during the summer and the location of the intake relative to the position of the summer thermocline within the flowage water column.

Our analysis indicates that the Plant's intake structure opening is situated near or below the hypolimnion, which is largely devoid of oxygen during the warmest part of summer. When the plant is operating, water is pulled from a portion of the hypolimnion, which is lower in dissolved oxygen, as well as from the upper portions of the water column in the flowage, which is well oxygenated. However, when the plant is offline, leakage flow through the plant's wicket gates, which originate in the hypolimnion, dominate the flow released to the tailrace area. The 2005 monitoring data showed that nearly 90 % of the low DO measurements in the tailrace occurred while the plant was off-line.

WE is proceeding with discussions involving the state regulatory agencies as to what further studies / mitigation strategies may be justified for the Peavy Fall Project. In 2005, the Company agreed to monitor the discharge at Peavy as it had in the past. In addition, the Company agreed to commence evaluation of mitigation alternatives. To this end, the Company is evaluating the use of an air bubbler system at its Way Dam Project (FERC No. 1759-036) to correct low DO conditions in the leakage flow from that unit. If air bubbling proves to be a feasible alternative for correcting low DO conditions at Way Dam tests involving bubbler systems will be evaluated for use at Peavy in 2007.

In 2006, the company will continue evaluating the use of limited spilling to correct low DO problems at Peavy Falls. The company began an evaluation of costs associated with spilling at Peavy Project during 2005. While spilling has clearly helped correct much of the low DO problem at Way Dam, the cost of such an alternative for use at Peavy will be much higher than is the case at Way Dam. Limited spillage during August, 2005 yielded mixed results (Appendix C). We will assess the likely cost for spilling more water at Peavy during 2006 as well as the effectiveness of this additional spillage for correcting low DO conditions in the immediate and more downstream tailrace areas.

As part of this filing, a diskette containing all the raw data and accompanying explanatory sheets are being submitted to the agencies for their use.

Enclosed is a proof of service to the agencies listed on the copy list.

Please call me at (906) 779-2547, if you have questions on this matter.

Sincerely,



William Rauscher



Manager, Hydroelectric Operations

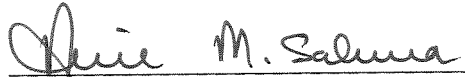
Enclosures

cc: Mr. Michael Donofrio, WDNR
Ms. Jessica Mistak, MDNR
Mr. John Supnick, MDEQ

Certificate of Service

I hereby certify that I have this day served the foregoing document upon all entities specified in the order to issue license to be consulted on matters related to the Commission filing. Service was done pursuant to Rule 2010 of FERC's Rules of Practice and Procedure 18 CFR, Section 385.2010

Dated this day Tuesday, January 17, 2006



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We Energies

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APPENDIX A

Water Quality Monitoring Conducted at Peavy Falls Project During 2005

Monitoring Results

Table A-1 provides a frequency of occurrence analysis of the continuous recording data base for 2005 monitoring work. By hour of the day, the number of hours during which DO was less than 5.0, 4.0, or 3.0 mg /l during the entire study period (mid-June through mid-September) has been tallied. As can be seen, in the immediate area of the tailrace, DO was less than 5.0 mg / l for approximately 245 hours or 10.3% of the time during this period.

Our analysis of plant operating data revealed that approximately 90% of the DO measurements that were less than 5.0 mg/l were associated with the times the plant was off-line (Table A-1). Only 46 out of 2381 (1.9%) hourly measurements were less than 4.0 mg/l.

Table A-2 provides the summary statistics for temperature and DO. No violations of the state's temperature standard were observed at any location. Data recovery from the continuous monitoring equipment was 99% or greater for each of the three monitoring locations

Table A-1
 Peavy Plant Water Quality Monitoring Data
 Data from June 14 through September 22, 2005

Hour of Reading	Station Peavy Tailrace			Number of < 5 readings when unit is off line
	<5	<4	<3	
0	12	1	0	6
100	15	2	0	12
200	17	2	0	17
300	16	3	0	16
400	18	1	0	18
500	18	2	0	18
600	18	3	0	18
700	17	3	0	17
800	13	2	0	13
900	12	5	0	12
1000	13	5	0	13
1100	16	5	0	15
1200	11	3	0	11
1300	7	2	0	6
1400	7	1	1	7
1500	5	3	1	4
1600	3	1	0	3
1700	3	2	0	2
1800	3	0	0	2
1900	3	0	0	1
2000	3	0	0	0
2100	3	0	0	1
2200	3	0	0	3
2300	9	0	0	4
totals	245	46	2	219
	% of readings while plant off line			89.4%
Total Observations				2381
% of total observations below 5 mg/l				10.3%
% of total observations below 4 mg/l				1.9%

Hour of Reading	Station P1			Number of < 5 readings when unit is off line
	<5	<4	<3	
0	10	5	0	8
100	12	6	0	10
200	13	5	0	2
300	16	7	0	16
400	14	7	0	14
500	16	6	0	16
600	13	7	0	13
700	11	7	0	11
800	12	6	0	11
900	11	5	0	11
1000	10	4	0	9
1100	10	3	0	10
1200	7	2	0	7
1300	8	1	0	4
1400	6	1	0	4
1500	4	0	0	1
1600	2	0	0	1
1700	4	1	0	1
1800	7	0	0	3
1900	7	0	0	1
2000	8	1	0	3
2100	11	0	0	5
2200	10	3	0	6
2300	10	3	0	7
totals	232	80	0	174
	% of readings while plant off line			75.0%
Total Observations				2376
% of total observations below 5 mg/l				9.8%
% of total observations below 4 mg/l				3.4%

Hour of Reading	Station P5			Number of < 5 readings when unit is off line
	<5	<4	<3	
0	1	0	0	0
100	1	0	0	1
200	1	0	0	1
300	1	0	0	1
400	0	0	0	0
500	1	0	0	1
600	1	0	0	1
700	0	0	0	0
800	0	0	0	0
900	1	0	0	1
1000	3	0	0	3
1100	3	0	0	3
1200	4	0	0	4
1300	3	1	0	2
1400	3	1	0	3
1500	3	0	0	3
1600	1	0	0	1
1700	0	0	0	0
1800	0	0	0	0
1900	0	0	0	0
2000	0	0	0	0
2100	2	0	0	0
2200	1	0	0	0
2300	1	0	0	0
totals	31	2	0	25
	% of readings while plant off line			80.6%
Total Observations				2401
% of total observations below 5 mg/l				1.3%
% of total observations below 4 mg/l				0.1%

Table A-2
 Peavy Plant Water Quality Monitoring Data
 Data from June 14 through September 22, 2005

Dissolved Oxygen Limit 5.0 mg/l

Monthly Average		Degree F	Degree C
Temperature limits	June	80	26.7
	July	83	28.3
	August	81	27.2
	September	74	23.3

Tailrace

Month	# of observation	Temperature F			DO % Saturation			Dissolved Oxygen (mg/l)		
		Mean	Max	Min	Mean	Max	Min	Mean	Max	Min
June	394	19.6	22.5	15.8	70.2	90.8	41.9	6.3	8.0	3.7
July	743	21.8	27.8	19.3	70.8	98.6	31.0	6.0	7.7	2.8
August	725	21.7	26.4	19.7	67.3	90.0	33.3	5.8	7.9	2.9
September	519	20.2	21.7	19.2	72.1	88.7	52.6	6.5	8.0	4.7
total	2381									
data recovery	99.2%									

P1

Month	# of observation	Temperature F			DO % Saturation			Dissolved Oxygen (mg/l)		
		Mean	Max	Min	Mean	Max	Min	Mean	Max	Min
June	394	19.7	22.7	17.2	76.1	92.7	58.1	6.8	8.0	5.1
July	720	22.0	30.1	19.4	67.6	99.0	35.7	5.8	7.7	3.1
August	743	22.1	27.2	19.9	72.0	101.2	51.4	6.2	8.4	4.4
September	519	20.4	22.5	19.1	79.9	94.6	67.8	7.1	8.5	6.0
total	2376									
data recovery	99.0%									

P5

Month	# of observation	Temperature F			DO % Saturation			Dissolved Oxygen (mg/l)		
		Mean	Max	Min	Mean	Max	Min	Mean	Max	Min
June	394	19.7	22.5	17.2	76.8	96.3	64.1	6.8	8.5	5.6
July	744	21.9	29.6	19.0	76.0	107.3	51.9	6.5	8.4	4.5
August	744	21.7	27.0	19.2	77.8	97.7	41.2	6.7	8.4	3.6
September	519	20.4	22.6	19.0	78.2	94.0	54.7	7.0	8.3	5.0
total	2401									
data recovery	100.0%									

APPENDIX B

Vertical Profile Results

Tables B-1 through B-8 provide the results of vertical profile measurement made in Peavy Flowage as well as in the tailrace area near sonde deployments during 2005. For each measurement, the Table contains the corresponding tailrace measurement for temperature and DO taken by the continuous recording data sondes during the same hour on the same day when the vertical profile measurements were taken in the flowage. This comparison allows one to observe how operating conditions result in the discharge being in compliance with the DO standard in spite of intense thermal and DO stratification conditions that exist in the flowage during the warmest time of the summer months.

15-Jun-05					
Approximate air temp: 12.7 C					
Secchi Depth: 6.5 ft. water depth 64 to 67'			Time: 1200		
Winds 21-28 NNE			overcast		
Taken in flowage					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	21.5	7.9	91.5	97	7.1
0.5	21.5	7.8	90.8	97	7.1
1.0	21.5	7.8	89.9	97	7.1
1.5	21.5	7.8	90.4	98	7.1
2.0	21.4	7.8	90.4	98	7.1
2.5	21.4	7.0	89.3	97	7.1
3.0	21.4	7.7	90.0	98	7.1
3.5	21.4	8.0	92.5	98	7.1
4.0	21.4	8.0	92.6	98	7.1
4.5	21.4	8.0	92.7	97	7.1
5.0	21.4	8.0	92.0	98	7.1
5.5	21.4	8.0	92.7	98	7.1
6.0	21.4	8.0	92.7	97	7.1
6.5	21.4	8.0	92.5	98	7.1
7.0	21.4	8.0	92.4	98	7.1
7.5	21.3	7.9	92.1	98	7.1
8.0	19.1	7.4	80.3	97	7.1
8.5	15.7	7.1	72.7	96	7.2
9.0	15.3	7.0	72.7	96	7.2
9.5	14.6	6.6	72.4	98	7.1
10.0	14.1	6.7	66.8	94	7.2
10.5	12.3	6.8	65.2	92	7.3
11.0	11.9	6.8	65.4	92	7.2
11.5	11.6	6.9	64.6	93	7.3
12.0	11.3	6.7	63.7	91	7.2
12.5	10.9	6.7	63.2	93	7.2
13.0	10.7	6.8	62.2	94	7.2
13.5	10.5	6.7	61.0	95	7.2
14.0	10.3	6.5	58.7	94	7.0
14.5	10.2	6.4	57.7	93	7.0
15.0	9.9	6.2	56.8	94	7.0
15.5	9.9	6.3	56.5	94	7.0
16.0	9.9	6.3	56.8	94	7.0
16.5	9.8	5.9	53.9	94	7.1
17.0	9.8	6.0	54.0	92	7.1
17.5	9.8	5.8	52.9	92	7.2
18.0	9.6	5.3	48.8	92	7.2
18.5	9.5	5.0	45.8	94	7.2
19.0	9.4	4.7	42.9	96	7.2
19.5	9.4	4.7	42.2	96	7.2

14-Jun-05					
Approximate air temperature : 28C					
Secchi Depth: 6.5 in 10' of water			Time: 1330		
Winds light and variable			overcast, threat of thunderstorms		
Peavy Tailrace					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	18.7	7.6	83.2	96	6.9
0.5	18.7	7.5	82.6	97	6.9
1.0	18.7	7.5	82.5	97	6.9
1.5	18.7	7.5	82.5	97	6.9

14-Jun-05					
Approximate air temperature : 28C					
Secchi Depth: 6.5 in 10' of water			Time: 1400		
Winds light and variable			overcast, drizzly		
Peavy Tailrace Downstream - Station P1					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	18.7	7.5	82.5	97	7.0
0.5	18.7	7.5	82.5	97	7.0
1.0	18.7	7.5	82.4	96	7.1
1.5	18.7	7.5	82.3	96	7.1
2.0	18.7	7.5	82.4	96	7.0
2.5	18.7	7.5	85.5	96	7.0
3.0	18.7	7.5	82.6	96	7.0

14-Jun-05					
Approximate air temperature : 28C					
Secchi Depth: 6.5 in 10' of water			Time: 1330		
Winds light and variable			overcast, threat of thunderstorms		
Spillway - Station P5					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	18.5	7.8	85.1	97	6.8
0.5	18.5	7.5	85.2	97	6.7
1.0	18.5	7.8	85.1	97	6.7
1.5	18.8	7.6	84.1	97	6.8
2.0	18.7	7.6	84.0	97	6.8
2.5	18.7	7.6	83.6	97	6.8
2.8	18.7	7.6	83.7	96	6.8

Tailrace data for same time period as the the flowage vertical profile on 6/15/05					
time	Temp C	DO (mg/l)	DO (% Sat)	Cond	
1100	20.5	7.6	86.4	92	
1200	20.6	7.8	88.6	93	
1300	20.9	7.8	90.1	93	

Highlighted Depth: Opening of the intake forebay (2 to 10 m)

1-Jul-05					
Approximate air temp:16 C					
Secci Depth:5.5 ft. water depth 64 to 67' Time: 1130					
Winds 24-30 NNE gusts to 35 overcast- rain on and off					
Taken in flowage					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	21.8	8.1	94.4	110	7.0
0.5	21.9	8.0	94.4	109	7.1
1.0	22.0	8.0	94.2	110	7.0
1.5	22.0	8.0	93.9	110	7.0
2.0	22.0	8.0	93.8	110	7.1
2.5	22.0	8.0	93.5	110	7.1
3.0	21.9	8.0	93.8	110	7.1
3.5	21.9	8.0	93.6	111	7.1
4.0	21.9	8.8	93.7	110	7.1
4.5	21.9	8.0	93.6	111	7.1
5.0	21.9	8.0	93.4	111	7.1
5.5	21.9	8.0	93.2	110	7.1
6.0	21.9	7.9	92.6	110	7.1
6.5	21.8	7.9	92.3	110	7.1
7.0	21.7	7.9	92.3	111	7.1
7.5	21.7	7.9	92.1	111	7.1
8.0	21.6	7.9	92.1	111	7.2
8.5	21.6	7.9	92.1	110	7.2
9.0	21.5	7.9	92.3	111	7.2
9.5	21.2	7.6	80.6	110	7.1
10.0	17.5	6.0	58.7	106	7.2
10.5	17.4	4.9	52.1	106	7.2
11.0	14.7	4.7	47.9	98	7.2
11.5	14.1	4.7	47.7	98	7.2
12.0	12.7	4.7	45.4	95	7.3
12.5	12.3	4.7	44.6	93	7.3
13.0	11.6	4.7	44.1	93	7.3
13.5	11.4	4.6	43.5	92	6.9
14.0	11.1	4.6	42.7	94	6.9
14.5	11.0	4.8	43.6	93	6.9
15.0	10.5	5.1	45.6	95	6.9
15.5	10.6	4.7	42.8	95	6.8
16.0	10.3	5.2	45.0	92	6.8
16.5	10.2	4.2	38.7	93	6.9
17.0	10.1	4.0	36.6	94	6.9
17.5	9.8	4.3	38.0	94	7.0
18.0	9.8	3.7	33.5	96	7.1
18.5	9.6	3.4	30.6	96	7.1
19.0	9.6	3.4	30.4	94	7.2

30-Jun-05					
Approximate air temp:26.6 C					
Secci Depth: not taken Time: 1215					
strong SSW 20-30 mph 10 % clouds					
Peavy Tailrace					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	20.0	6.5	73.0	107	7.2
0.5	20.0	6.4	72.6	107	7.2
1.0	20.0	6.4	72.6	107	7.2
1.5	20.0	6.4	72.4	107	7.2

30-Jun-05					
Approximate air temp:26.6 C					
Secci Depth: not taken Time: 1220					
strong SSW 20-30 mph Sunny and beautiful					
Peavy Tailrace Downstream - Station P1					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	20.1	6.5	73.8	107	7.2
0.5	20.1	6.5	73.7	107	7.2
1.0	20.1	6.5	73.5	107	7.2
1.5	20.1	6.5	73.5	107	7.2
2.0	20.1	6.5	73.5	107	7.2

30-Jun-05					
Approximate air temp:26.6 C					
Secci Depth:6.5 ft. Time: 1205					
strong SSW 20-30 mph 10 % clouds					
Peavy Spillway- Station P5					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	21.0	7.1	81.3	108	7.2
0.5	20.8	7.0	80.1	107	7.2
1.0	20.6	6.5	74.7	107	7.3
1.5	20.6	6.6	73.9	107	7.3
2.0	20.5	6.6	74.1	107	7.2
2.5	20.5	6.5	73.7	107	7.2
3.0	20.5	6.8	76.8	107	7.2

Tailrace data for same time period as the the flowage vertical profile on 7/1/05					
time	Temp C	DO (mg/l)	DO (% Sat)	Cond	
1100	21.5	7.6	89.3	105	
1200	21.5	7.7	90.3	106	
1300	21.6	7.7	90.7	107	

Highlighted Depth: Opening of the intake forebay (2 to 10 m)

14-Jul-05					
Approximate air temp:25.5 C					
Secchi Depth:8.5 ft. water depth 60 to 66'			Time: 1310		
Northerly 8-12 mph			blue sky beautiful day		
Taken in flowage					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	28.4	8.4	111.1	112	7.9
0.5	28.4	8.4	110.7	112	7.9
1.0	28.1	8.4	110.3	112	7.9
1.5	27.4	8.4	109.3	112	8.0
2.0	27.3	8.4	108.7	112	8.0
2.5	27.2	8.4	108.3	111	8.0
3.0	26.8	8.3	105.5	112	8.1
3.5	23.2	8.2	97.8	112	8.1
4.0	22.1	7.0	82.3	112	8.1
4.5	21.5	6.6	77.1	112	8.0
5.0	21.1	6.0	69.3	112	8.0
5.5	20.9	5.8	66.5	111	8.0
6.0	20.7	5.6	63.3	111	7.9
6.5	20.5	5.3	60.2	110	7.9
7.0	20.2	4.8	54.5	109	7.8
7.5	19.7	4.3	48.3	108	7.8
8.0	19.2	3.9	42.9	109	7.7
8.5	18.7	3.5	38.1	107	7.7
9.0	18.0	3.3	35.5	107	7.8
9.5	16.9	3.0	31.4	106	7.8
10.0	15.4	2.8	28.8	101	7.8
10.5	14.3	2.9	29.1	100	7.9
11.0	13.2	3.1	30.5	97	8.0
11.5	12.5	6.2	31.3	95	8.0
12.0	12.2	3.3	31.4	97	8.0
12.5	11.8	3.4	32.4	95	8.0
13.0	11.4	3.3	31.0	95	7.9
13.5	11.1	3.3	30.2	96	7.9
14.0	10.9	3.3	30.2	97	7.9
14.5	10.7	3.2	29.8	95	7.8
15.0	10.6	3.3	30.6	94	7.8
15.5	10.4	3.3	29.4	96	7.6
16.0	10.2	2.9	26.1	94	7.3
16.5	10.1	2.6	23.9	94	7.3
17.0	10.0	2.3	21.2	96	7.4
17.5	9.9	2.1	19.0	96	7.4
18.0	9.8	1.8	16.1	98	7.5
18.5	9.6	1.3	11.7	99	7.5
19.0	9.6	1.3	11.1	99	7.6
19.2	bottom				

Highlighted Depth: Opening of the intake forebay (2 to 10 m)

14-Jul-05					
Approximate air temp:29.4 C					
Secchi Depth:not taken			Time: 1540		
Northerly 8-12 mph			no clouds		
Peavy Tailrace					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	26.4	6.6	85.1	110	7.5
0.5	24.3	7.1	86.4	112	7.6
1.0	21.4	4.8	54.6	108	7.8
1.5	19.2	4.5	50.2	108	7.9
2.0	19.2	4.5	50.3	108	7.9
2.5	19.0	4.4	49.0	108	7.8
3.0	19.0	4.4	48.9	108	7.8
3.5	19.1	4.4	49.2	108	7.7
4.0	19.0	4.4	48.9	108	7.7
4.4	19.0	4.4	48.9	108	7.7

14-Jul-05					
Approximate air temp:29.4 C					
Secchi Depth:not taken			Time: 1545		
Northerly 8-12 mph			no clouds		
Peavy Tailrace Downstream - Station P1					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	28.3	7.5	98.5	27.7	7.2
0.5	27.7	7.2	93.4	112	7.5
1.0	24.6	6.7	82.6	111	7.5
1.5	22.7	7.2	85.3	111	7.6
2.0	21.0	6.3	72.1	108	7.7
2.4	21.0	6.2	71.8	108	7.6

14-Jul-05					
Approximate air temp:29.4 C					
Secchi Depth:not taken			Time: 1525		
Northerly 8-12 mph			10 % clouds		
Peavy Spillway - Station P5					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	26.7	7.2	92.1	112	7.7
0.5	24.0	7.3	89.2	112	7.9
1.0	20.0	5.1	57.5	109	8.2
1.5	19.6	4.9	54.8	107	8.2
2.0	19.3	4.8	53.4	107	8.2
2.5	19.3	4.7	52.6	107	8.0
3.0	19.3	4.7	52.7	108	8.0

Tailrace data for same time period as the the flowage vertical profile on 7/14/05

time	Temp C	DO (mg/l)	DO (% Sat)	Cond
1200	23.3	6.1	74.7	106
1300	23.4	6.2	76.1	106
1400	23.6	6.3	77.3	107

27-Jul-05					
Approximate air temp:15.0C					
Secci Depth:6.5 ft. water depth 60 to 66' Time: 0830					
Northerly 8-12 mph					
Taken in flowage					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	22.2	7.6	89.9	114	7.1
0.5	22.2	7.6	89.1	114	7.2
1.0	22.2	7.5	86.1	114	7.2
1.5	22.1	7.2	83.6	114	7.2
2.0	22.1	7.3	87.5	114	7.2
2.5	22.1	7.6	89.1	114	7.2
3.0	22.1	7.5	88.3	114	7.3
3.5	22.1	7.5	88.2	111	7.3
4.0	22.1	7.5	88.7	114	7.3
4.5	22.2	7.6	89.4	113	7.3
5.0	22.2	7.6	88.4	114	7.3
5.5	22.2	7.5	88.9	114	7.3
6.0	22.1	7.6	90.1	114	7.3
6.5	22.1	7.6	89.1	118	7.3
7.0	22.1	7.5	88.1	114	7.4
7.5	20.3	2.5	27.3	114	7.2
8.0	19.5	1.7	19.3	114	7.2
8.5	19.1	1.7	18.7	114	7.1
9.0	18.3	1.6	17.3	112	7.1
9.5	17.5	1.5	15.7	109	7.2
10.0	16.4	1.4	14.6	106	7.1
10.5	15.7	1.4	14.0	104	7.1
11.0	14.7	1.3	13.4	103	7.1
11.5	13.5	1.4	15.3	99	7.2
12.0	12.8	1.6	16.5	97	7.2
12.5	12.2	1.8	17.4	97	7.2
13.0	11.6	2.1	19.3	95	7.5
13.5	11.3	1.9	18.1	98	7.4
14.0	11.0	1.8	17.1	98	7.3
14.5	10.8	1.9	17.3	96	7.3
15.0	10.6	1.8	17.0	95	7.3
15.5	10.4	1.8	15.9	97	7.3
16.0	10.2	1.5	12.5	98	7.3
16.5	10.1	1.2	10.5	97	7.3
17.0	10.0	1.0	8.9	98	7.3
17.5	9.9	1.0	8.7	100	7.2
18.0	9.8	0.9	8.1	101	7.2
18.3	bottom				

28-Jul-05					
Approximate air temp:21.1C					
Secci Depth: not taken Time: 0950					
Winds light and variable					
Peavy Tailrace					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	21.2	6.4	74.8	113	7.1
0.5	20.7	6.1	70.7	112	7.2
1.0	20.0	4.2	45.2	112	7.2
1.5	19.8	3.8	44.7	112	7.2
2.0	19.6	3.4	38.4	112	7.2
2.5	19.6	3.3	37.2	112	7.1
3.0	19.5	3.2	36.3	111	7.1
3.5	19.5	3.2	36.2	112	7.1
4.0	19.5	3.2	36.0	111	7.1

28-Jul-05					
Approximate air temp:21.1C					
Secci Depth: not taken Time: 1015					
Winds picking up 8-12 mph					
Peavy Tailrace downstream- Station P1					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	22.3	7.3	86.8	113	7.2
0.5	22.1	7.3	85.5	113	7.2
1.0	21.3	6.5	74.9	113	7.3
1.5	21.2	6.4	73.9	112	7.3
2.0	21.1	6.2	72.4	112	7.2
2.5	21.0	5.9	68.3	113	7.3

28-Jul-05					
Approximate air temp:21.1C					
Secci Depth: not taken Time: 0950					
Winds light and variable					
Peavy Spillway- Station P5					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	20.9	6.8	78.0	111	7.3
0.5	20.7	6.3	72.4	113	7.3
1.0	20.3	7.3	83.1	115	7.4
1.5	19.9	3.8	43.0	112	7.3
2.0	19.7	3.5	39.7	111	7.2
2.5	19.6	3.5	39.8	111	7.1

Tailrace data for same time period as the the flowage vertical profile on 7/27/05					
time	Temp C	DO (mg/l)	DO (% Sat)	Cond	
800	20.9	5.8	66.0	109	
900	21.0	6.1	69.6	108	
1000	20.9	5.8	65.5	108	

Highlighted Depth: Opening of the intake forebay (2 to 10 m)

11-Aug-05					
Approximate air temp:20.0C					
Secci Depth:7.5 ft. water depth 64 to 67'			Time: 1225		
SSW winds 8-12 mph			100 % clouds		
Taken in flowage			Threat of rain		
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	24.6	7.9	97.2	114	8.0
0.5	24.6	7.9	96.9	114	8.0
1.0	24.6	7.9	96.9	114	8.0
1.5	24.6	7.9	96.3	114	8.0
2.0	24.5	7.7	94.4	114	8.0
2.5	24.4	7.5	91.9	114	8.0
3.0	24.3	7.3	89.6	114	8.0
3.5	24.0	7.0	84.2	114	8.0
4.0	23.9	6.7	81.2	114	7.9
4.5	23.6	5.7	68.7	114	7.8
5.0	22.9	4.9	57.5	114	7.7
5.5	22.3	3.9	46.0	113	7.6
6.0	21.9	3.4	39.1	113	7.6
6.5	21.6	2.9	not taken	114	7.5
7.0	21.2	2.3	26.9	114	7.5
7.5	20.8	1.6	18.7	114	7.4
8.0	20.5	1.3	14.6	114	7.4
8.5	20.0	0.8	8.9	114	7.4
9.0	19.4	0.5	5.1	113	7.4
9.5	18.7	0.2	2.3	111	7.4
10.0	17.1	0.1	1.5	109	7.4
10.5	15.9	0.1	1.2	106	7.0
11.0	14.4	0.3	2.8	100	7.1
11.5	13.7	0.4	3.6	99	7.2
12.0	12.9	0.5	4.4	98	7.2
12.5	12.5	0.5	4.5	98	7.3
13.0	13.0	0.5	4.5	97	7.3
13.5	11.7	0.4	4.2	96	7.3
14.0	11.5	0.5	4.4	98	7.4
14.5	11.3	0.4	4.4	99	7.3
15.0	11.2	0.4	3.2	98	7.5
15.5	10.9	0.2	2.9	97	7.6
16.0	10.7	0.2	1.8	98	7.6
16.5	10.6	0.2	1.6	100	7.7
17.0	10.4	0.2	1.3	98	7.7
17.5	10.4	0.1	1.5	99	7.7
18.0	10.1	0.1	1.2	101	7.8
18.5	9.7	0.1	1.2	107	7.8
19.0	9.7	0.1	1.3	109	7.9
19.5	9.6	0.2	1.6	114	8.0

Highlighted Depth: Opening of intake forebay 2-10 m

11-Aug-05					
Approximate air temp:20.0C					
Secci Depth: not taken			Time: 1505		
SSW winds 8-12 mph			100 % clouds		
Peavy Tailrace			Threat of rain		
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	22.7	5.1	60.0	114	7.5
0.5	22.7	5.1	59.7	114	7.4
1.0	22.7	5.0	59.7	113	7.5
1.5	22.7	5.0	59.7	113	7.4
2.0	22.7	5.0	59.8	114	7.4
2.5	22.7	5.0	59.7	114	7.4
3.0	22.7	5.0	59.7	114	7.4

11-Aug-05					
Approximate air temp:20.0C					
Secci Depth: not taken			Time: 1515		
SSW winds 8-12 mph			100 % clouds		
Peavy Tailrace Downstream - Station P1			Threat of rain		
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	22.7	5.1	60.4	113	7.4
0.5	22.7	5.1	60.5	113	7.4
1.0	22.7	5.1	60.2	113	7.4
1.5	22.7	5.1	60.3	114	7.4
2.0	22.7	5.1	60.1	113	7.4

11-Aug-05					
Approximate air temp:20.0C					
Secci Depth: not taken			Time: 1455		
SSW winds 8-12 mph			100 % clouds		
Peavy Spillway- Station P5			Threat of rain		
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	22.7	5.7	67.0	114	7.7
0.5	22.7	5.7	67.0	114	7.8
1.0	22.7	5.7	68.0	114	7.7
1.5	22.7	5.7	68.0	114	7.7
2.0	22.7	5.8	68.3	114	7.7
2.5	22.7	5.7	67.7	114	7.6
3.0	22.6	5.6	65.6	113	7.6

Tailrace data for same time period as the the flowage vertical profile on 8/11/05 is not available
Downstream data is shown below

time	Temp C	DO (mg/l)	DO (% Sat)	Cond
1100	23.0	5.0	59.3	109
1200	23.0	5.0	59.6	109
1300	23.0	4.9	58.1	109

25-Aug-05					
Approximate air temp:23.8 C					
Secci Depth:8.0ft. water depth 60 to 66'			Time: 1230		
Southern winds 8-12 mph			80 % clouds		
Taken in flowage					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	21.8	7.7	89.3	115	7.7
0.5	21.8	7.6	88.6	115	7.7
1.0	20.9	7.6	87.0	115	7.7
1.5	20.7	7.6	86.6	115	7.7
2.0	20.7	7.6	86.4	115	7.7
2.5	20.7	7.6	86.6	115	7.7
3.0	20.6	7.6	86.4	115	7.7
3.5	20.6	7.6	85.6	115	7.7
4.0	20.6	7.5	84.8	115	7.7
4.5	20.6	7.4	84.4	115	7.7
5.0	20.6	7.4	83.9	115	7.7
5.5	20.6	7.4	84.2	115	7.7
6.0	20.5	7.3	82.4	115	7.7
6.5	20.5	7.3	83.1	115	7.7
7.0	20.5	7.4	84.3	114	7.7
7.5	20.5	6.9	78.6	115	7.6
8.0	20.4	6.9	77.8	115	7.6
8.5	20.4	6.8	77.6	115	7.5
9.0	20.4	6.5	73.6	115	7.6
9.5	19.8	4.9	54.6	113	7.5
10.0	17.8	0.6	7.1	112	7.5
10.5	15.3	0.3	2.6	107	7.6
11.0	14.4	0.2	2.2	104	7.6
11.5	13.7	0.2	2.4	103	7.6
12.0	13.1	0.2	2.0	102	7.5
12.5	12.5	0.2	1.8	100	7.6
13.0	12.1	0.2	1.7	102	7.6
13.5	11.8	0.2	1.7	100	7.6
14.0	11.4	0.2	1.6	100	7.6
14.5	11.2	0.2	1.4	99	7.6
15.0	10.9	0.2	1.4	99	7.5
15.5	10.6	0.1	1.4	101	7.6
16.0	10.4	0.2	1.3	103	7.5
16.5	10.2	0.2	1.3	105	7.5
17.0	10.1	0.1	1.3	105	7.5
17.5	10.0	0.2	1.2	109	7.5
18.0	9.8	0.1	1.2	111	7.5
18.5	9.6	0.1	1.2	117	7.4
19.0	9.5	0.2	1.2	126	4.4
19.5	9.5	0.1	1.2	129	7.4

Highlighted Depth: Opening of intake forebay 2-10 m

25-Aug-05					
Approximate air temp:23.8 C					
Secci Depth: not taken			Time: 1435		
Southern winds 8-12 mph			100 % clouds		
Peavy Tailrace					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	20.5	7.2	81.5	114	7.8
0.5	20.5	7.2	81.3	115	7.8
1.0	20.5	7.2	81.1	114	7.7
1.5	20.5	7.1	81.0	114	7.7
2.0	20.5	7.1	80.9	114	7.7
2.5	20.5	7.1	80.9	114	7.7

25-Aug-05					
Approximate air temp:23.8 C					
Secci Depth: not taken			Time: 1445		
Southern winds 8-12 mph			100 % clouds		
Peavy Tailrace Downstream - Station P1					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	20.6	7.2	82.0	114	7.8
0.5	20.6	7.2	81.3	114	7.7
1.0	20.6	7.2	81.5	114	7.7
1.5	20.6	7.2	81.4	114	7.7
2.0	20.6	7.2	81.6	115	7.7

25-Aug-05					
Approximate air temp:23.8 C					
Secci Depth: not taken			Time: 1430		
Southern winds 8-12 mph			100 % clouds		
Peavy Spillway - Station P5					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	21.5	8.6	99.0	115	7.8
0.5	21.3	8.6	99.0	115	7.8
1.0	20.9	8.4	95.3	114	7.8
1.5	20.7	8.6	98.0	114	7.8
2.0	20.3	8.3	93.5	115	7.5
2.5	19.9	8.4	94.9	114	7.9
3.0	19.6	8.5	100.2	116	7.8

Tailrace data for same time period as the the flowage vertical profile on 8/25/05

time	Temp C	DO (mg/l)	DO (% Sat)	Cond
1200	20.2	6.8	76.6	113
1300	20.3	7.2	81.0	113
1400	20.5	6.5	73.1	113

8-Sep-05					
Approximate air temp:21.1 C					
Secchi Depth:9.0ft. water depth 60 to 66'			Time: 1250		
Southern winds 4-7 mph			30 % clouds		
Taken in flowage					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	21.2	8.2	94.7	118	7.4
0.5	20.9	8.3	94.8	118	7.5
1.0	20.6	8.3	94.5	119	7.5
1.5	20.5	8.2	93.5	119	7.6
2.0	20.4	8.1	91.5	118	7.6
2.5	20.3	8.0	90.5	118	7.6
3.0	20.3	8.0	91.4	118	7.6
3.5	20.3	7.9	89.4	118	7.5
4.0	20.3	7.9	89.2	118	7.6
4.5	20.3	7.9	89.1	118	7.6
5.0	20.3	7.9	88.7	117	7.6
5.5	20.2	7.8	87.5	118	7.5
6.0	20.2	7.7	86.1	118	7.6
6.5	20.1	7.5	84.2	118	7.5
7.0	20.0	7.0	78.3	118	7.5
7.5	20.0	6.9	77.0	118	7.5
8.0	19.9	6.9	77.1	118	7.5
8.5	19.8	6.8	75.8	118	7.5
9.0	19.7	6.5	72.6	116	7.5
9.5	19.6	6.2	69.1	118	7.5
10.0	19.4	5.8	64.4	117	7.4
10.5	18.4	3.4	36.8	116	7.4
11.0	17.1	0.3	3.5	114	7.4
11.5	14.9	0.2	2.1	112	7.4
12.0	13.7	0.2	1.9	110	7.4
12.5	13.0	0.2	1.6	104	7.4
13.0	12.4	0.2	1.5	103	7.4
13.5	11.9	0.2	1.4	105	7.4
14.0	11.7	0.2	1.4	104	7.4
14.5	11.4	0.1	1.4	105	7.4
15.0	11.2	0.1	1.3	104	7.4
15.5	10.8	0.1	1.3	108	7.4
16.0	10.5	0.1	1.2	111	7.4
16.5	10.3	0.1	1.3	113	7.4
17.0	10.2	0.1	1.2	116	7.4
17.5	10.1	0.1	1.3	117	7.4
18.0	9.8	0.1	1.1	121	7.5
18.5	9.6	0.1	1.2	126	7.3
19.0	9.5	0.1	1.2	136	7.3
19.5	9.4	0.1	1.1	141	7.3

Highlighted Depth: Opening of intake forebay 2-10 m

8-Sep-05					
Approximate air temp:21.1 C					
Secchi Depth:not taken			Time: 1535		
Light variable winds with southern			Clear Sky		
Peavy Tailrace					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	20.5	8.2	91.9	118	7.7
0.5	20.5	8.1	91.5	118	7.7
1.0	20.3	8.1	91.0	118	7.7
1.5	20.3	8.1	91.1	118	7.7
2.0	20.3	8.1	91.2	118	7.7
2.5	20.2	8.1	91.5	118	7.7

8-Sep-05					
Approximate air temp:21.1 C					
Secchi Depth:not taken			Time: 1545		
Light variable winds with southern			Clear Sky		
Peavy Tailrace Downstream -Station P1					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	20.3	7.8	88.2	118	7.7
0.5	20.3	7.8	88.1	118	7.7
1.0	20.3	7.8	88.0	118	7.7
1.5	20.3	7.8	88.0	118	7.7
2.0	20.3	7.8	88.0	118	7.7

8-Sep-05					
Approximate air temp:21.1 C					
Secchi Depth:not taken			Time: 1540		
Light variable winds with southern			Clear Sky		
Peavy Spillway- Station P5					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	20.3	7.9	89.2	118	7.7
0.5	20.3	7.9	89.0	118	7.8
1.0	20.3	7.9	88.9	118	7.7
1.5	20.3	7.9	88.9	118	7.7
2.0	20.3	7.9	88.9	118	7.7
2.5	20.3	7.8	88.7	118	7.7

Tailrace data for same time period as the the flowage vertical profile on 9/8/05				
time	Temp C	DO (mg/l)	DO (% Sat)	Cond
1200	19.8	6.9	76.1	112
1300	19.8	7.0	77.6	112
1400	20.3	7.2	80.1	113

22-Sep-05					
Approximate air temp:21.1 C					
Secchi Depth:8.5 ft. water depth 60 to 66'			Time: 1140		
Strong NNE winds 12-18 mph			100 % clouds		
Taken in flowage					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	19.8	7.8	87.2	118	7.4
0.5	19.9	7.8	87.0	119	7.4
1.0	19.9	7.7	86.9	119	7.4
1.5	19.9	7.7	86.7	119	7.9
2.0	19.9	7.7	87.0	119	7.4
2.5	19.9	7.7	87.0	119	7.4
3.0	19.9	7.8	87.3	119	7.4
3.5	19.9	7.8	87.7	119	7.4
4.0	19.9	7.8	87.8	119	7.4
4.5	19.9	7.8	87.8	119	7.4
5.0	19.9	7.6	85.2	119	7.5
5.5	19.9	7.6	85.3	119	7.5
6.0	19.9	7.6	85.0	119	7.6
6.5	19.9	7.6	85.0	119	7.5
7.0	19.9	7.6	85.2	119	7.6
7.5	19.8	7.6	84.5	119	7.5
8.0	19.9	7.6	85.0	119	7.5
8.5	19.8	7.5	84.2	118	7.5
9.0	19.7	7.1	79.5	119	7.5
9.5	19.6	6.9	76.9	119	7.4
10.0	19.6	6.9	77.0	119	7.4
10.5	19.6	6.8	75.6	119	7.4
11.0	19.6	6.6	74.1	118	7.4
11.5	19.5	6.5	72.0	118	7.4
12.0	19.1	5.2	58.7	118	7.4
12.5	18.0	1.5	15.8	116	7.3
13.0	16.8	0.4	4.5	115	7.3
13.5	14.2	0.3	2.5	112	7.4
14.0	12.8	0.4	3.2	110	7.4
14.5	12.8	0.2	2.0	109	7.2
15.0	12.2	0.3	2.2	108	7.2
15.5	11.8	0.3	3.0	109	7.3
16.0	11.2	0.1	1.3	111	7.3
16.5	10.7	0.2	1.4	118	7.3
17.0	10.4	0.2	1.5	120	7.4
17.5	10.2	0.2	1.5	124	7.4
18.0	10.0	0.2	1.7	126	7.4
18.5	9.8	0.2	1.7	130	7.4
19.0	9.7	0.2	2.2	138	7.4

Highlighted Depth: Opening of intake forebay 2-10 m

22-Sep-05					
Approximate air temp:22.7 C					
Secchi Depth:not taken			Time: 1500		
Strong NNE Winds 12-18 mph			100 % overcast		
Peavy Tailrace					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	20.0	7.5	84.6	119	7.5
0.5	20.0	7.5	84.4	119	7.5
1.0	19.9	7.5	84.3	119	7.5
1.5	19.9	7.5	84.3	119	7.5
2.0	19.8	7.5	84.1	119	7.5
2.5	19.8	7.5	83.4	119	7.5
3.0	19.7	7.4	82.8	119	7.5
3.5	19.6	7.6	84.6	119	7.5

22-Sep-05					
Approximate air temp:22.7 C					
Secchi Depth:not taken			Time: 1515		
Strong NNE Winds 12-18 mph			100 % overcast		
Peavy Tailrace Downstream - Station P1					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	20.0	7.7	86.0	119	7.6
0.5	20.0	7.6	85.1	119	7.6
1.0	19.9	7.4	83.2	119	7.6
1.5	19.8	7.3	82.3	119	7.5
2.0	19.8	7.3	82.1	119	7.5
2.5	19.7	7.4	82.8	118	7.5

22-Sep-05					
Approximate air temp:22.7 C					
Secchi Depth:not taken			Time: 1445		
Strong NNE Winds 12-18 mph			100 % overcast		
Peavy Spillway- Station P5					
Depth (m)	Temp. (C)	D.O. (mg/l)	D.O. % Saturation	Cond. (uS/cm)	pH (S.U.)
0.0	20.1	7.7	87.0	119	7.4
0.5	20.1	7.7	86.4	119	7.4
1.0	19.8	7.6	85.1	119	7.4
1.5	19.6	8.5	94.6	119	7.5
2.0	19.5	8.6	95.9	119	7.5
2.5	19.3	8.2	90.9	119	7.5

Tailrace data for same time period as the the flowage vertical profile on 9/22/05					
time	Temp C	DO (mg/l)	DO (% Sat)	Cond	
1100	19.6	5.4	59.6	113	
1200	19.7	5.6	62.2	113	
1300	19.9	5.9	65.3	113	

APPENDIX C

Results of low DO Corrective Measures Studied in 2005

Similar to Way Dam, there is an obstruction separating the spillway discharge from the tailrace area at the Peavy Falls Project. In the case of Way Dam, the two areas are separated by an 800 ft long narrow land mass. In the case of Peavy Falls, the two areas are partially separated by a wing wall (Figure C-1). We believe that this obstruction may prevent efficient mixing of spilled water with the turbine outflow. None the less, an evaluation of low volume spillage to elevate DO levels in the tailrace under leakage flow conditions was initiated in 2005.

Prior to actual spillage experimentation, the amount of spillage necessary to correct low DO conditions in the tailrace was calculated. In addition, the value of spillage that would be lost to Peavy Project for generation was also estimated.

Controlled spillage experiments were conducted during two periods in August. Before, during, and after DO levels were monitored at three locations downstream of the project: in the traditional tailrace location, one meter deep, (Station -PVT); near the outflow of the spillway at a depth of approximately one meter (Station P5); and at a location, one meter deep, situated ~700 ft downstream of Station PVT (Station P 1).

Determination of Spillage Necessary

For this calculation, two assumptions were made: 1) [DO] in the upper portion of the flowage water column would be 8.0 mg/l during the spillage experiments, and 2) leakage flow through the project's two turbines is 80 cfs (estimate).

For the leakage flow to contain 5.0 mg/l, the following calculation was made to establish the amount of oxygen per minute would be required to maintain 5.0 mg/l:

$$80 \text{ cfs (ft}^3 \text{ / sec)} \times (4.488 \times 10^2 \text{ gal./min-cfs)} \times (0.26 \text{ l/gal.)} \times 5.0 \text{ mg/l} = 4.6676 \times 10^4 \text{ mg/min}$$

If the [DO] in the tailrace is 4.0 mg/l, the DO transport rate in the river turns out to be 3.73×10^4 mg/min. This indicates a DO deficit of 9.376×10^3 mg/min relative to DO conditions of 5.0 mg/l

The spillage (in cfs) needed to supply this deficit (assuming again that the upper level of the flowage contains 8.0 mg/l) can be calculated by using the first equation:

$$X = (4.488 \times 10^2 \text{ gal./min-cfs}) \times (0.26 \text{ l/gal}) \times (8.0 \text{ mg/l}) = 9.376 \times 10^3 \text{ mg/l}$$
$$X \approx 10 \text{ cfs}$$

If the [DO] in the tailrace is 3.0 mg/l, the deficit is now 1.8676×10^4 mg/l

Using the same approach as above, the spillage now needed to overcome the DO deficit is ~ 20 cfs

Given that DO readings as low as 3.0 mg/l have been encountered in the tailrace on occasion, the spillage target was set at 20 cfs.

Cost per CFS for spillage

Hydro Operations has developed relationships between usable flowage storage (in acre-ft) and generation value for each of the Company's Hydroelectric Plants. The following values for lost generation per day per spill flow assumed an annual cost / Kwh of \$0.025. During the summer, the value of energy would likely be higher. Therefore, the following values should be considered low end:

- 10 cfs spill = \$37.13 per day
- 50 cfs spill = \$185.63 per day
- 100 cfs spill = \$371.25 per day

Assuming that low DO conditions could occur under leakage flow conditions for at least 6-weeks per year, the following annual costs for spilling may be realized (wasted water only):

- 10 cfs spill: ~\$1,560 per year
- 50 cfs spill: ~\$7,800 per year
- 100 cfs spill: ~\$15,600 per year

Results of spillage experiments

Low DO levels in the tailrace were observed in late July. The initial spill experiment took place August 1st-August 5th. Hydro Operations estimates that the actual spill achieved during this 5-day period was approximately 12 cfs. Figure C-2 illustrates the response of the tailrace monitoring location during this period while Table C-1 provides prior, during spillage, and after spillage DO data for all three monitors.

The data in Table C-1 represent averaged values across the various generation modes (**no flow** or leakage through the units; **unit in** or period of power generation). During each day, the DO response was positive at all monitoring locations; meaning that mean [DO] were elevated above 5.0 mg/l at all three monitoring locations.

Conditions between the first and second experiment (August 7 through the 14th) are illustrated in Figure C-3. [DO] in the tailrace often dropped below 5.0 mg/l while the plant was off-line but would rise above 5.0 mg/l when the plant was generating.

The second spillage experiment commenced August 15 and was terminated on August 26th. The results are depicted in Figure C-4 and Table C-2. As can be seen, the response of [DO] at all three monitoring locations was significantly different relative to the first experiment. In essence, no beneficial impact of spilling on [DO] was observed. A dramatic change in [DO] was observed in the tailrace following August 20th. However, this cannot be attributed to spilling. Rather, it reflects changes in thermocline conditions in the flowage (compare DO profile measurements in Tables B-5 and B-6, which occurred two weeks apart).

Conclusions and Recommendations

The company believes that the cause for periodic low DO conditions in Peavy Plant discharge is due to leakage flow being extracted from below the thermocline. Of course water temperature can also impact DO in that warmer water cannot retain as much oxygen as cooler water. The continuous water quality monitoring instruments measure temperature as well as oxygen. Figures C-5 through C-7 provide a continuous record of temperature as well as DO during the period when low DO was detected in the tailrace (July 28- August 27th). It can be seen that [DO] actually increases as temperature increases. This is due to the fact that temperature is tracking surface water layer extraction by the plant during periods of generation (surface layer temperatures are always higher than temperatures at the thermocline).

The initial results of these experiments suggest that spilling may alleviate low DO levels in the tailrace under leakage flow conditions (when generation ceases). However, spillage will have to be increased slightly since the 20 cfs that was calculated as sufficient to offset low DO conditions in the tailrace was not achieved. In addition, [DO] in the upper layers of the flowage were likely closer to 7.5 mg/l rather than the assumed 8.0 mg/l during the second experiment. The difference between the assumed 8.0 mg/l and the actual 7.5 mg/l translates into a spillage need of 23 cfs, assuming tailrace [DO] of 4.0 mg/l.

This experimental protocol will be repeated during summer, 2006, when low DO conditions in the tailrace materialize. Continuous as well as in-river vertical profile measurements will be conducted to more closely ascertain the response of the tailrace to spillage.

Figure C-1. Location of continuous monitoring stations



Table C-1

D.O. Monitoring results, prior to, during and after spillage,
July 28 to August 6, 2005

BY STATION

Date	Tailrace			Downstream (station P-1)			SpillwaY (Station P-5)		
	No flow	12 cfs	Unit In	No flow	12 cfs	Unit In	No flow	12 cfs	Unit In
7/28/2005	5.0	n/a	5.8	5.0	n/a	6.6	5.8	n/a	6.3
7/29/2005	5.6	n/a	6.2	6.4	n/a	6.4	6.1	n/a	6.2
7/30/2005	5.4	n/a	5.5	6.5	n/a	5.9	6.4	n/a	6.5
7/31/2005	5.3	n/a	6.1	6.0	n/a	6.4	6.2	n/a	6.6
8/1/2005	5.6	6.1	6.4	6.7	6.9	6.8	6.3	6.6	7.2
8/2/2005	n/a	6.0	6.3	n/a	7.0	6.6	n/a	6.4	7.5
8/3/2005	n/a	6.1	5.9	n/a	6.8	6.2	n/a	7.1	7.0
8/4/2005	n/a	5.8	6.6	n/a	6.9	7.0	n/a	6.5	6.9
8/5/2005	5.6	6.2	5.8	6.5	6.6	6.4	5.9	7.1	6.3
8/6/2005	5.2	n/a	5.3	5.9	n/a	5.7	6.1	n/a	6.2

BY FLOW

Date	No Generation			~ 12 CFS (spillage)			Generation plus spillage flows		
	No flow	No flow	No flow	12 cfs	12 cfs	12 cfs	Unit In	Unit In	Unit In
7/28/2005	5.0	5.0	5.8	n/a	n/a	n/a	5.8	6.6	6.3
7/29/2005	5.6	6.4	6.1	n/a	n/a	n/a	6.2	6.4	6.2
7/30/2005	5.4	6.5	6.4	n/a	n/a	n/a	5.5	5.9	6.5
7/31/2005	5.3	6.0	6.2	n/a	n/a	n/a	6.1	6.4	6.6
8/1/2005	5.6	6.7	6.3	6.1	6.9	6.6	6.4	6.8	7.2
8/2/2005	n/a	n/a	n/a	6.0	7.0	6.4	6.3	6.6	7.5
8/3/2005	n/a	n/a	n/a	6.1	6.8	7.1	5.9	6.2	7.0
8/4/2005	n/a	n/a	n/a	5.8	6.9	6.5	6.6	7.0	6.9
8/5/2005	5.6	6.5	5.9	5.9	6.5	6.5	5.8	6.4	6.3
8/6/2005	5.2	5.9	6.1	n/a	n/a	n/a	5.3	5.7	6.2

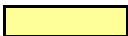
 Wasted water through tainter gate at times during the 8/1-8/5 period.

Table C-2

D.O. Monitoring results, prior to, during and after spillage
August 14 through August 28, 2005

BY STATION

Date	Tailrace			Downstream (station P-1)			Spillway (station P-5)		
	No flow	12 cfs	Unit In	No flow	12 cfs	Unit In	No flow	12 cfs	Unit In
8/14/2005	4.36	n/a	6.04	5.81	n/a	5.71	6.19	n/a	5.98
8/15/2005	4.36	n/a	5.44	5.55	n/a	5.07	5.97	n/a	6.98
8/16/2005	4.90	4.73	6.11	4.95	4.80	5.73	7.57	7.57	7.34
8/17/2005	5.36	5.36	5.11	5.52	5.52	5.10	7.65	7.65	6.94
8/18/2005	4.76	4.76	5.40	4.80	4.80	4.93	7.49	7.49	7.22
8/19/2005	5.77	5.77	6.32	5.31	5.31	5.91	7.51	7.51	7.55
8/20/2005	5.88	5.88	6.28	5.55	5.54	5.85	6.54	6.59	6.76
8/21/2005	5.58	5.60	6.80	5.96	6.03	6.67	7.21	7.09	6.70
8/22/2005	6.96	6.93	7.28	6.60	6.58	6.83	7.80	7.76	7.59
8/23/2005	6.96	6.94	6.47	6.47	6.46	6.60	7.40	7.39	7.33
8/24/2005	6.60	6.57	6.47	6.18	6.19	6.38	7.37	7.38	7.72
8/25/2005	6.80	6.72	6.85	6.27	6.16	7.42	7.46	7.49	7.99
8/26/2005	6.40	n/a	6.63	6.80	n/a	6.98	6.86	n/a	7.09

BY FLOW

Date	No Generation Flow			~ 12 CFS- spillage			Generation plus spillage flows		
	No flow	No flow	No flow	12 cfs	12 cfs	12 cfs	Unit In	Unit In	Unit In
8/14/2005	4.36	5.81	6.19	n/a	n/a	n/a	6.04	5.71	5.98
8/15/2005	4.36	5.55	5.97	n/a	n/a	n/a	5.44	5.07	6.98
8/16/2005	4.90	4.95	7.57	4.73	4.80	7.57	6.11	5.73	7.34
8/17/2005	5.36	5.52	7.65	5.36	5.52	7.65	5.11	5.10	6.94
8/18/2005	4.76	4.80	7.49	4.76	4.80	7.49	5.40	4.93	7.22
8/19/2005	5.77	5.31	7.51	5.77	5.31	7.51	6.32	5.91	7.55
8/20/2005	5.88	5.55	6.54	5.88	5.54	6.59	6.28	5.85	6.76
8/21/2005	5.58	5.96	7.21	5.60	6.03	7.09	6.80	6.67	6.70
8/22/2005	6.96	6.60	7.80	6.93	6.58	7.76	7.28	6.83	7.59
8/23/2005	6.96	6.47	7.40	6.94	6.46	7.39	6.47	6.60	7.33
8/24/2005	6.60	6.18	7.37	6.57	6.19	7.38	6.47	6.38	7.72
8/25/2005	6.80	6.27	7.46	6.72	6.16	7.49	6.85	7.42	7.99
8/26/2005	6.40	6.80	6.86	n/a	n/a	n/a	6.63	6.98	7.09

Wasted water through tainter gate at times during the 8/14-8/16 period.

Figure C-2
Response of D.O. in the tailrace to 12 cfs spillage,
July 28- August 6, 2005

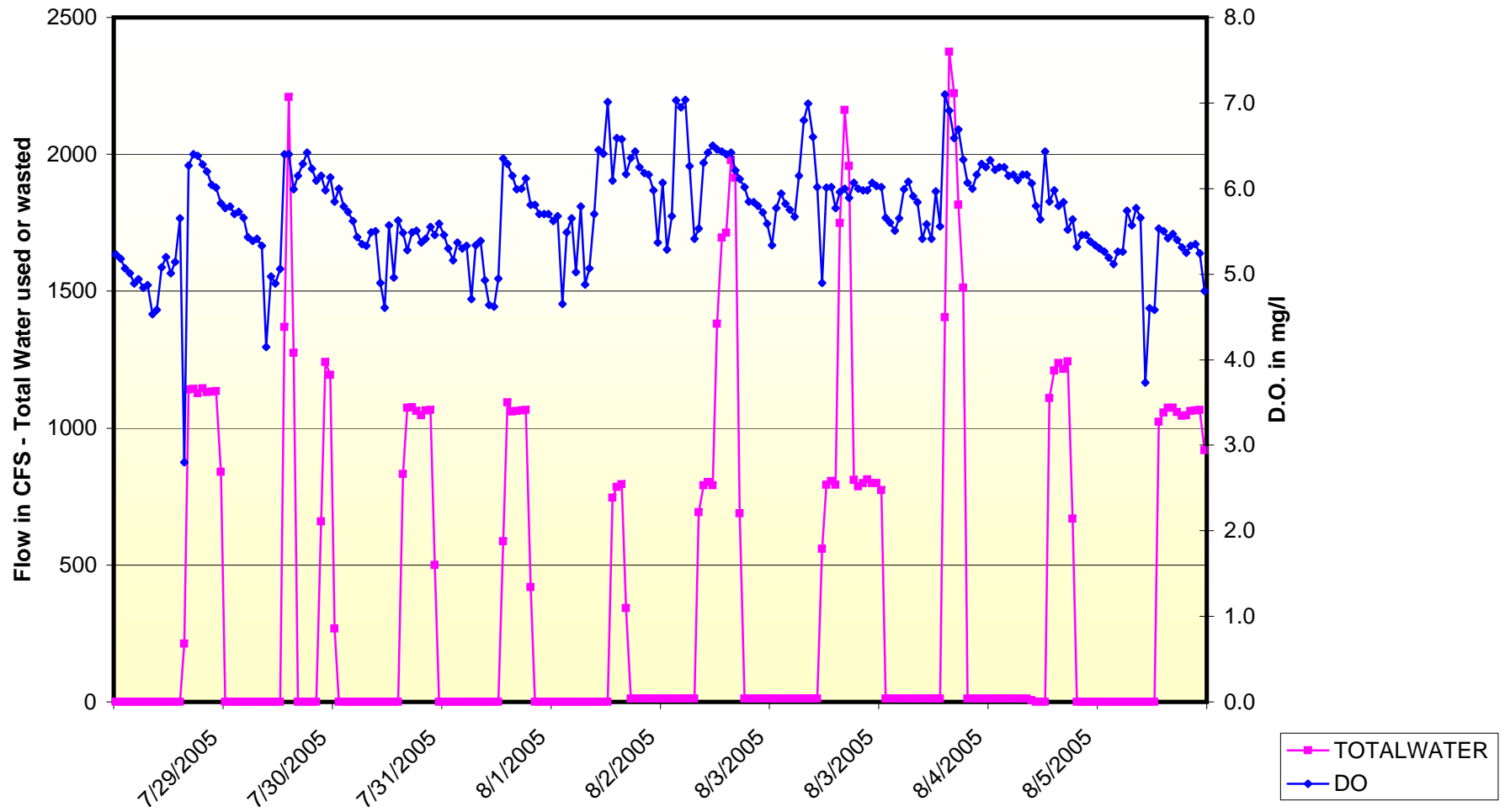


Figure C-3
Peavy Falls D.O. levels in the Tailrace, no spillage,
August 7-13, 2005

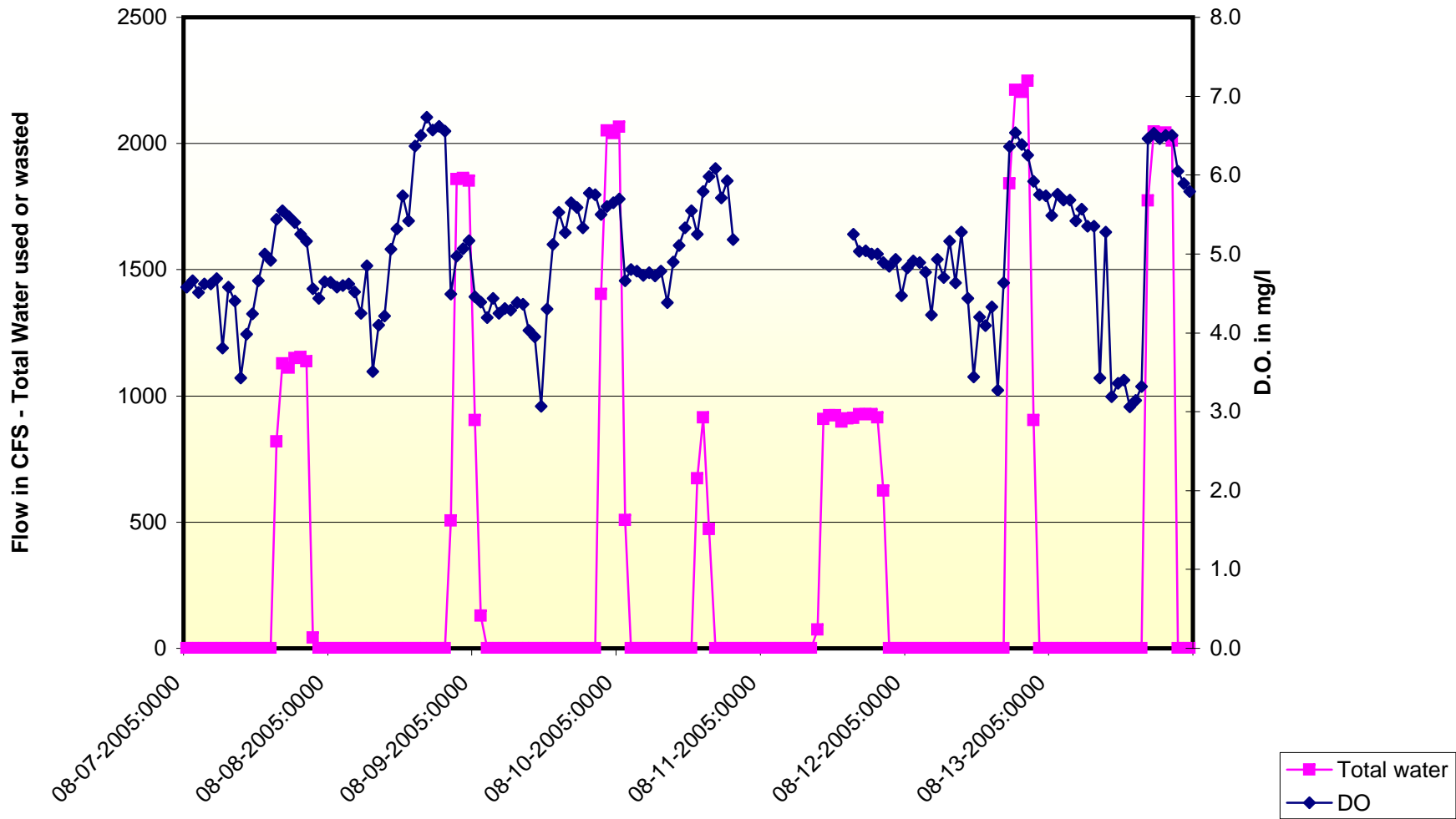


Figure C-4
Response of D.O. in the tailrace to 12 cfs spillage,
August 14-25, 2005

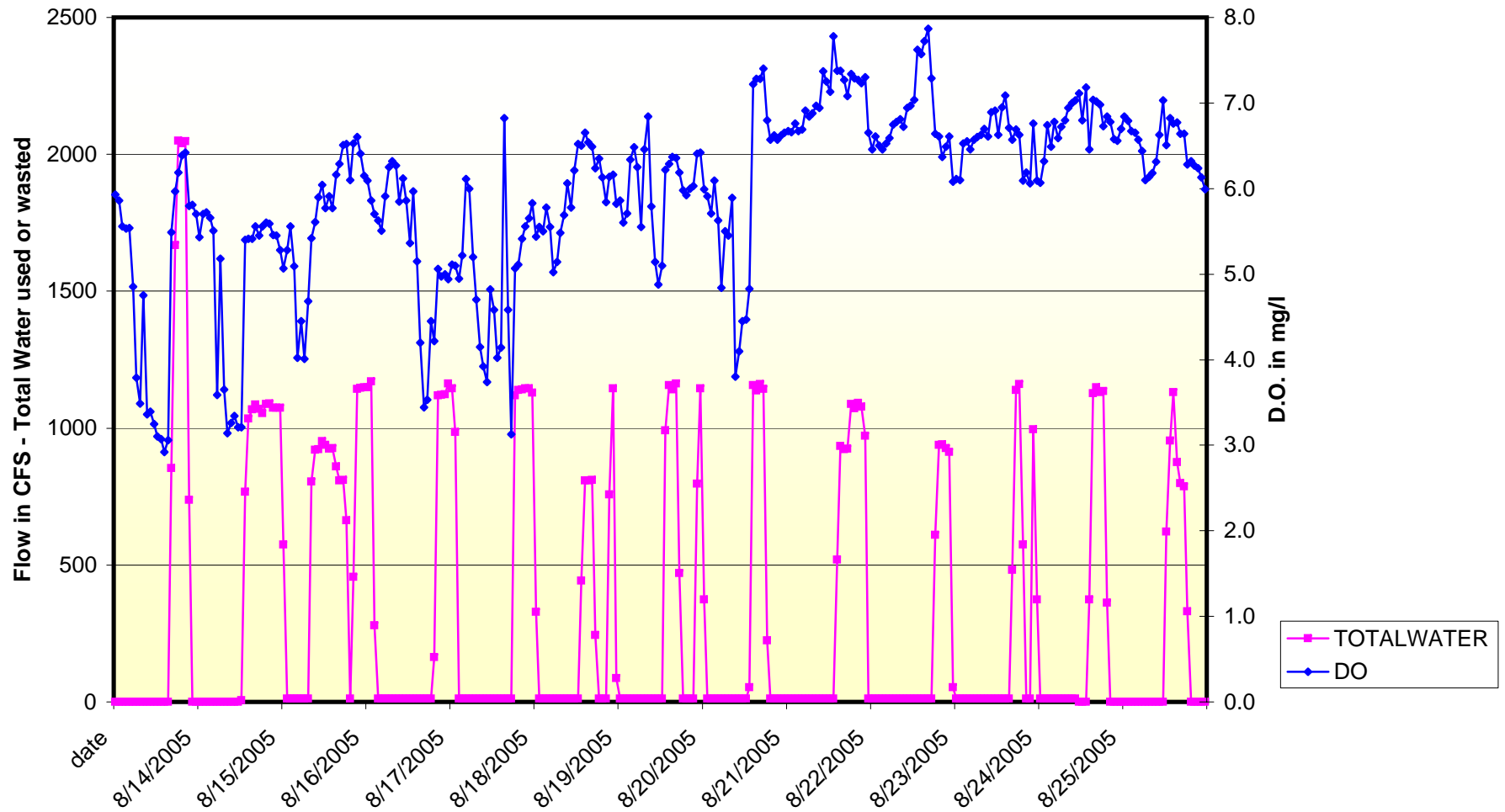


Figure C-5
Peavy Falls Tailrace Temperature and D.O. Data,
July 28- August 6, 2005

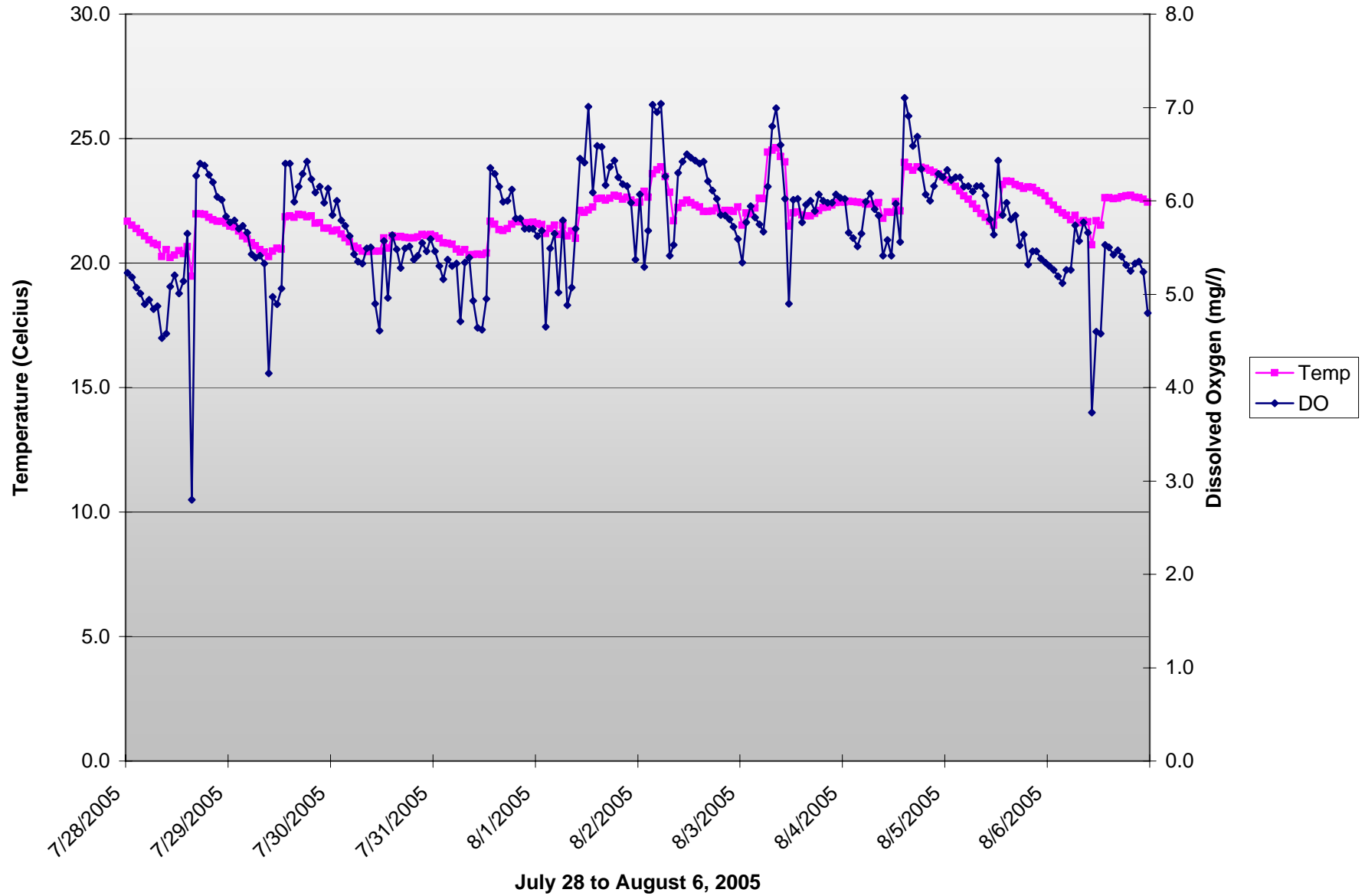


Figure C-6
Peavy Falls Temperature and D.O. Data,
August 7-13, 2005

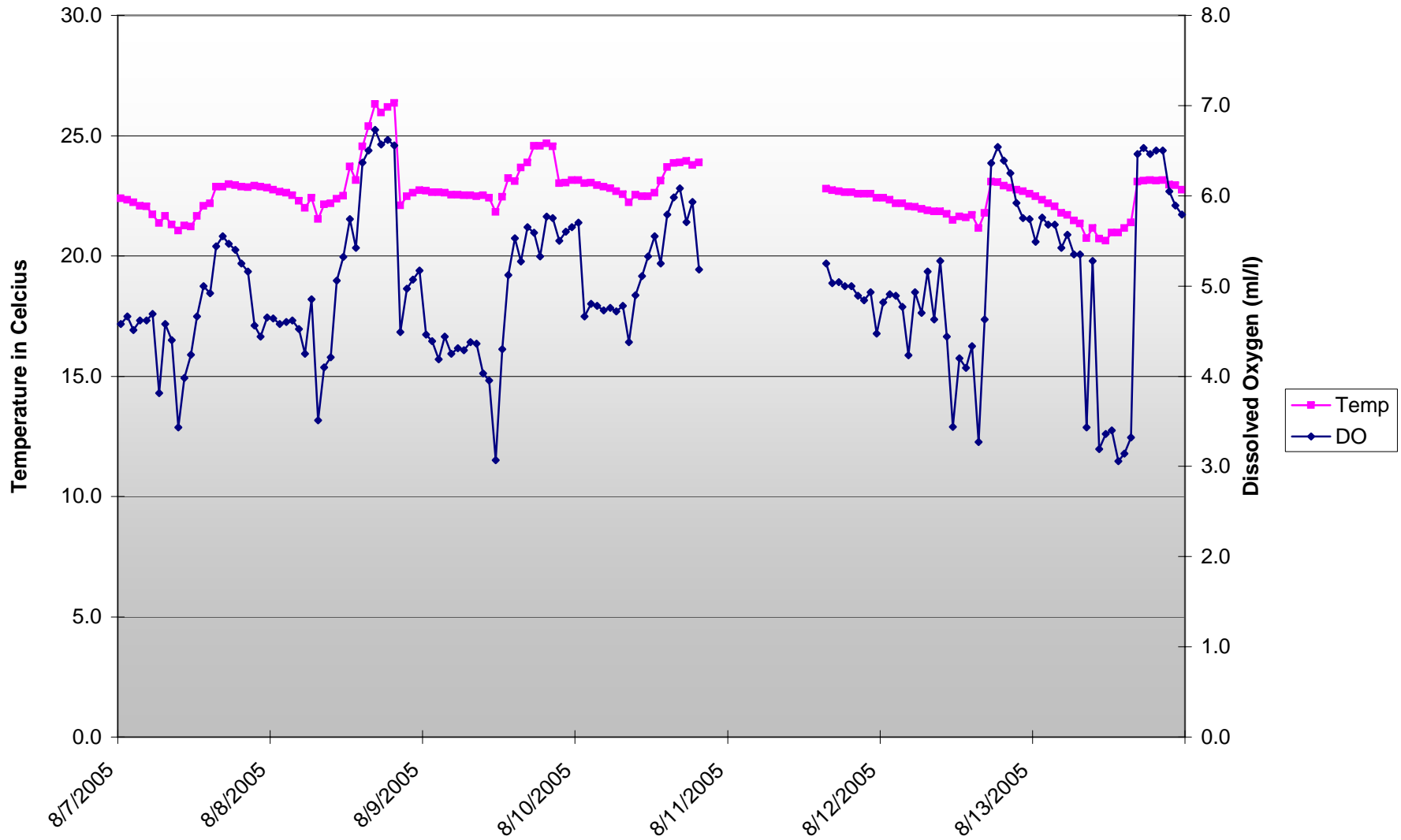


Figure C-7
Peavy Falls Tailrace Temperature and D.O. data,
August 14-26, 2005

