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December 28, 2001

David Boergers  
Secretary  
Federal Energy Regulatory Commission  
888 First Street NE  
Washington, DC 20426

ORIGINAL

Subject: Article 403  
Order Approving Water Quality Monitoring Plan (Issued August 24, 2000)  
Little Chute Hydroelectric Project; FERC No. 2588  
Kaukauna, WI

Dear Mr. Boergers:

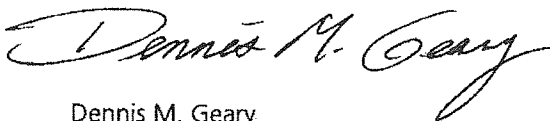
On behalf of the City of Kaukauna Electric & Water Department, we are hereby filing an original and eight (8) copies of the Water Quality Report for 2001 in compliance with Article 403 and the Order Approving Water Quality Monitoring Plan issued on August 24, 2000.

We have also submitted a copy of the report to the Wisconsin Department of Natural Resources as required by the Order Approving Water Quality Monitoring Plan.

Thank you for your time and attention to this matter. If you have any questions, please contact me.

Sincerely,

MEAD & HUNT, Inc.



Dennis M. Geary  
Senior Project Scientist

Enclosures

cc: Mr. Peter D. Prast, Kaukauna Electric and Water Department

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**Water Quality Report  
Little Chute Hydroelectric Project  
FERC Project No. 2588**

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*Prepared for:*

**Kaukauna Electric & Water Department  
Kaukauna, Wisconsin**

*Prepared by:*

**MEAD  
& HUNT**

ENGINEERS  
ARCHITECTS  
SCIENTISTS  
PLANNERS

*December 2001*

# Table of Contents

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	Page
1. Project Information .....	1
2. Data .....	1
3. Quality Assurance .....	2
4. Complications in Monitoring During Study Period .....	2
A. Upstream Data .....	2
B. Downstream Data .....	2

## Appendix

- A. Graphs of Upstream and Downstream Hourly Temperature and Dissolved Oxygen Readings
- B. Raw Data
- C. Daily Means for Dissolved Oxygen and Temperature
- D. Calibration Summaries

**Water Quality Report  
Little Chute Hydroelectric Project  
FERC Project No. 2588**

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## 1. Project Information

Article 403 of the City of Kaukauna's current license for the Little Chute Project (FERC No. 2588) requires the City to file a water quality plan. The City filed the plan on August 14, 2000, and FERC issued an Order Approving Water Quality Plan on August 24, 2000. The order calls for the licensee to monitor dissolved oxygen (DO) and temperature upstream and downstream of the project for the period from June 15 through September 30 for the first year (2001) and then once every five years for the duration of the license. The order further states that the water quality probes (Hydrolab Datasondes) will not be deployed unless flows in the Fox River are below 4,000 cubic feet per second (cfs).

In 2001, flows in the Fox River at the Little Chute Project exceeded 4,000 cfs throughout the month of June and into the first week of July. Consequently the downstream probe was not installed until July 3. A lack of access to the proposed upstream monitoring location delayed installation of the upstream probe until July 24.

What follows in this report is a presentation of monitoring data, statistics, water quality compliance information, quality assurance data, and a description of any problems or malfunctions as required by the Order Approving Water Quality Plan.

## 2. Data

Graphs comparing the hourly upstream and downstream dissolved oxygen and temperature readings are provided in Appendix A and the corresponding raw data is provided on disk in Excel format in Appendix B.

For both upstream and downstream temperature and dissolved oxygen data, the daily means were calculated and compared. The mean and standard deviation of the difference between the daily means for the upstream and downstream readings were calculated. For the temperature comparison, the mean of difference in the daily averages was  $-0.30^{\circ}\text{F}$  (the negative sign denotes that the downstream temperature was lower than the upstream temperature) with a standard deviation of  $\pm 0.43^{\circ}\text{F}$ . The mean of the difference in the average daily dissolved oxygen concentration was  $-0.40\text{ mg/l}$  (the negative sign denotes that the downstream dissolved oxygen concentration was lower than the upstream dissolved oxygen concentration) and the standard deviation was  $\pm 0.95\text{ mg/l}$ . A comparison of the daily means for temperature and dissolved oxygen concentration are provided in Appendix C.

The dissolved oxygen daily averages of the upstream and downstream data were compared, when both data sets were available, and at no time did they vary by greater than  $2\text{ mg/l}$  for five or more consecutive days. The difference between daily means for dissolved oxygen only exceeded  $2\text{ mg/l}$  on August 6<sup>th</sup> and this daily mean was based only on 8 hours of data rather than 24 hours of data due to data loss. The daily means for both dissolved oxygen and temperature are shown in Appendix C.

### 3. Quality Assurance

The upstream and downstream monitors were calibrated every two weeks at which time the data was also checked. The pre-calibration and post-calibration dissolved oxygen values were compared and never differed by greater than 0.8 mg/l. Calibration summaries for the upstream and downstream monitors are provided in Appendix D.

### 4. Complications in Monitoring During Study Period

#### A. Upstream Data

Data was lost on three occasions which are detailed below:

- |                    |  |
|--------------------|--|
| 7/3/01 to 7/13/01  | We were unable to access an appropriate deployment site on July 3 <sup>rd</sup> , 2001, when we deployed the downstream monitor. We were able to gain access on July 13 <sup>th</sup> , 2001, when we calibrated the downstream monitor.   |
| 9/11/01 to 9/12/01 | When the meters were calibrated on August 27 <sup>th</sup> , 2001, the sample time was accidentally set for every ten minutes instead of every hour. This caused the monitor's voltage to decrease faster than normal and by September 11 <sup>th</sup> , 2001, the battery voltage was too low for the monitor to sample. |
| 9/25/01 to 9/30/01 | The monitor's memory was full, therefore no additional data could be stored.   |

#### B. Downstream Data

Data was lost on three occasions which are detailed below:

- |                    |  |
|--------------------|--|
| 7/14/01 to 7/24/01 | When we arrived to calibrate the monitor on July 24 <sup>th</sup> , 2001, the monitor was found along the shore with the probes exposed to the air. Given the weight of the casing that holds the monitor, the monitor had to be physically moved by someone. In reviewing the data, the monitor appears to have been removed from its deployment location on the morning of July 14 <sup>th</sup> , 2001.   |
| 7/24/01 to 8/6/01  | The monitor's battery pack malfunctioned, and therefore, data was lost until the next calibration on August 6 <sup>th</sup> , 2001.  |
| 9/12/01 to 9/30/01 | The monitor's memory was full, therefore no additional data could be stored. We were unable to obtain communication between the monitor and the computer during the September 12 <sup>th</sup> , 2001 calibration. The spare meter had already been deployed that day at the upstream location, therefore there was no spare meter to use at the downstream location. Thus, the downstream meter was re-deployed without calibration or checking the data. |

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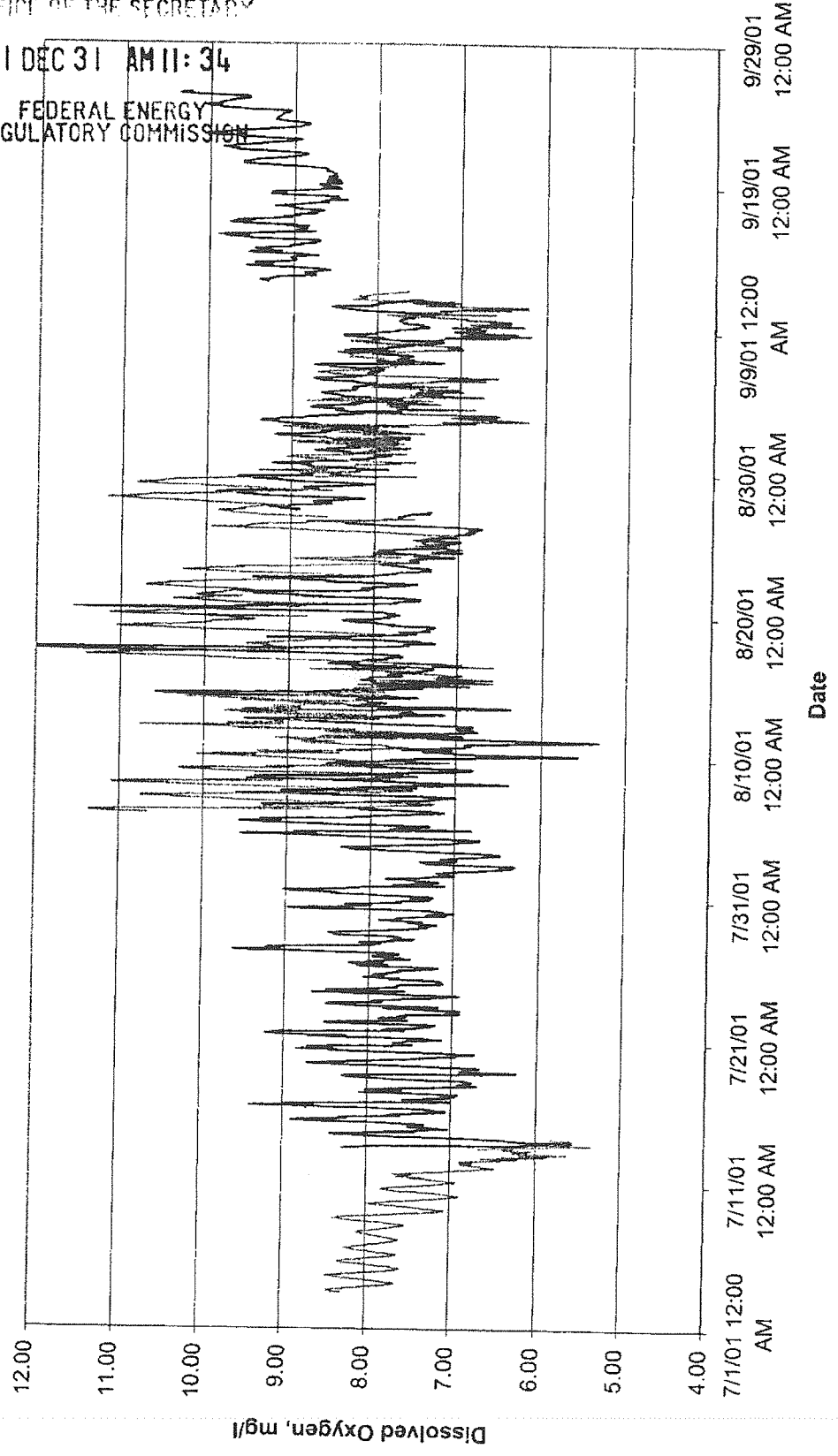
**Appendix A. Graphs of Upstream and Downstream  
Hourly Temperature and Dissolved  
Oxygen Readings**

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### Comparison of Dissolved Oxygen Levels Upstream and Downstream of the Little Chute Hydro

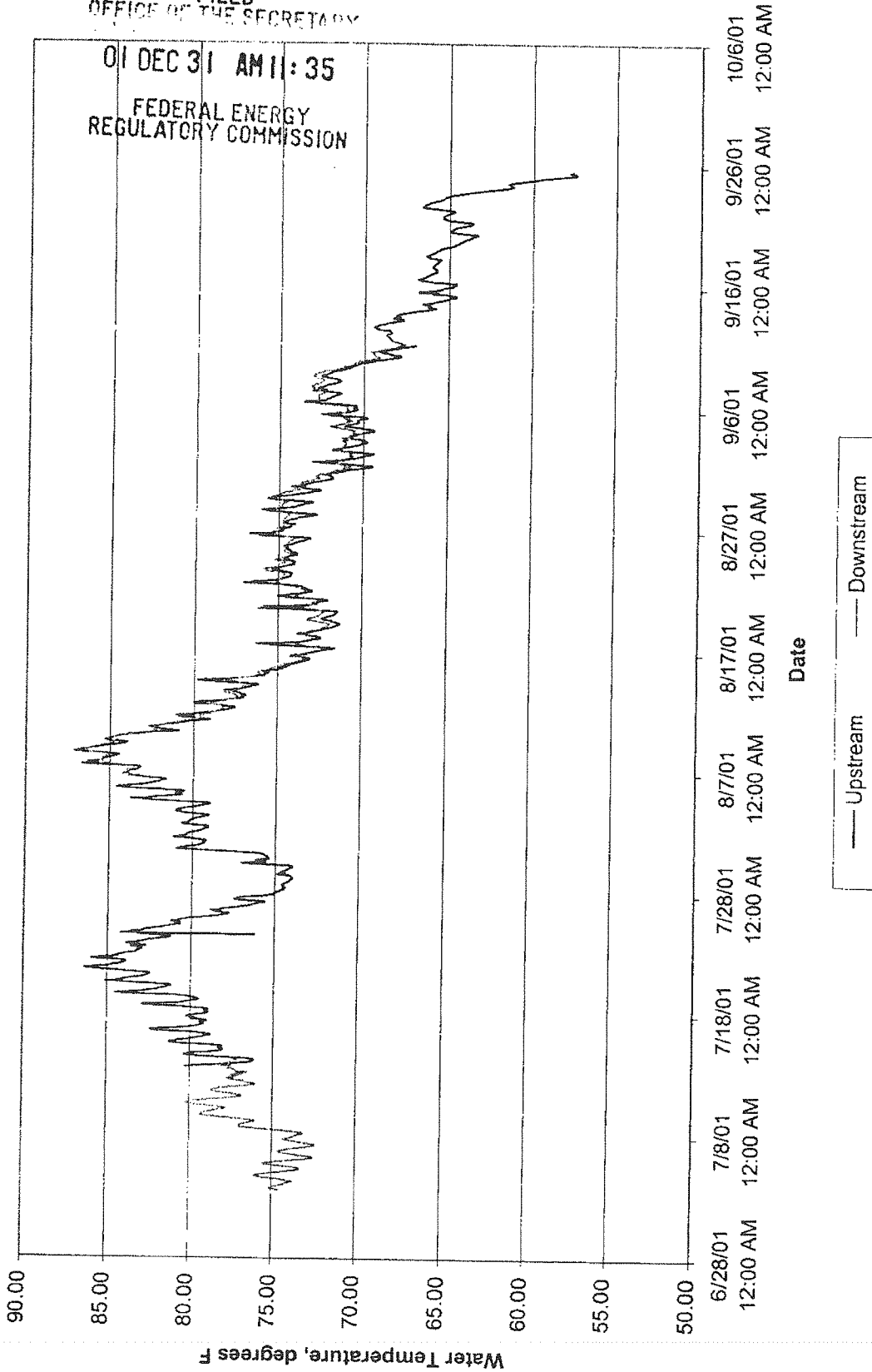


— Upstream      - - - Downstream

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### Comparison of Water Temperature Upstream and Downstream of the Little Chute Hydro





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**Appendix B. Raw Data**

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**Appendix C. Daily Means for Dissolved Oxygen and  
Temperature**

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**Daily Means of the Upstream and Downstream Temperature and Dissolved Oxygen Data**

Date	Upstream Data Daily Means		Downstream Data Daily Means		Difference in Daily Means	
	Temperature °F	DO mg/l	Temperature °F	DO mg/l	Temperature °F	DO mg/l
03-Jul-01			74.84	8.29		
04-Jul-01			74.88	8.03		
05-Jul-01			74.32	7.94		
06-Jul-01			73.62	7.93		
07-Jul-01			73.38	7.85		
08-Jul-01			75.08	7.91		
09-Jul-01			77.80	7.49		
10-Jul-01			78.99	7.35		
11-Jul-01			77.86	7.28		
12-Jul-01			76.99	6.62		
13-Jul-01	78.42	6.90	77.43	6.00	0.99	0.90
14-Jul-01			76.98	6.75		
15-Jul-01			77.33	8.37		
16-Jul-01			77.23	8.05		
17-Jul-01			75.86	8.38		
18-Jul-01			76.01	8.46		
19-Jul-01			79.53	7.88		
20-Jul-01			79.73	8.21		
21-Jul-01			83.01	7.89		
22-Jul-01			83.73	7.80		
23-Jul-01			81.77	7.57		
24-Jul-01			79.51	7.86		
25-Jul-01	80.84	7.59				
26-Jul-01	78.04	7.71				
27-Jul-01	76.26	8.41				
28-Jul-01	74.56	7.92				
29-Jul-01	74.26	7.44				
30-Jul-01	75.27	7.83				
31-Jul-01	78.25	8.03				
01-Aug-01	80.00	7.35				
02-Aug-01	79.79	6.85				
03-Aug-01	80.10	7.35				
04-Aug-01	80.96	7.75				
05-Aug-01	82.38	8.39				
06-Aug-01	82.95	8.05	83.87	10.51	-0.92	-2.46
07-Aug-01	84.75	8.08	84.63	9.06	0.12	-0.97
08-Aug-01	85.64	8.06	85.80	9.14	-0.16	-1.08
09-Aug-01	84.66	7.71	84.89	8.70	-0.23	-0.99
10-Aug-01	82.01	6.92	82.34	8.70	-0.33	-1.78
11-Aug-01	79.89	6.81	79.78	8.27	0.11	-1.46
12-Aug-01	78.56	7.92	78.51	8.89	0.05	-0.97
13-Aug-01	77.35	7.66	77.58	8.76	-0.24	-1.10
14-Aug-01	77.43	8.55	77.24	8.96	0.19	-0.41
15-Aug-01	75.17	7.85	75.60	7.76	-0.44	0.09
16-Aug-01	73.54	7.81	73.72	7.52	-0.18	0.30
17-Aug-01	73.43	9.05	73.09	9.30	0.34	-0.25
18-Aug-01	72.81	7.89	73.02	8.96	-0.21	-1.07
19-Aug-01	71.80	7.79	72.54	9.45	-0.74	-1.66
20-Aug-01	73.13	8.70	72.85	10.04	0.28	-1.35

**Daily Means of the Upstream and Downstream Temperature and Dissolved Oxygen Data**

Date	Upstream Data Daily Means		Downstream Data Daily Means		Difference in Daily Means	
	Temperature °F	DO mg/l	Temperature °F	DO mg/l	Temperature °F	DO mg/l
21-Aug-01	73.38	8.36	73.24	9.65	0.13	-1.29
22-Aug-01	74.62	8.27	74.47	10.04	0.16	-1.77
23-Aug-01	74.65	7.62	75.15	9.11	-0.51	-1.49
24-Aug-01	74.27	7.53	74.76	8.18	-0.49	-0.65
25-Aug-01	74.28	7.15	74.49	7.25	-0.21	-0.10
26-Aug-01	74.62	7.61	74.69	8.40	-0.07	-0.79
27-Aug-01	74.43	8.37	74.82	8.90	-0.39	-0.53
28-Aug-01	74.27	9.00	74.86	10.13	-0.60	-1.13
29-Aug-01	74.24	8.86	74.99	9.87	-0.75	-1.02
30-Aug-01	73.23	8.54	74.05	8.78	-0.82	-0.25
31-Aug-01	71.87	8.21	72.49	8.32	-0.62	-0.11
01-Sep-01	70.87	8.52	71.28	8.06	-0.41	0.46
02-Sep-01	70.54	8.81	70.99	8.03	-0.44	0.77
03-Sep-01	70.29	8.41	70.98	7.09	-0.69	1.32
04-Sep-01	70.20	8.24	71.08	7.75	-0.89	0.49
05-Sep-01	70.83	8.29	71.13	7.52	-0.30	0.77
06-Sep-01	71.65	8.10	72.06	7.86	-0.42	0.24
07-Sep-01	72.12	7.92	72.73	7.87	-0.61	0.05
08-Sep-01	71.91	7.82	72.68	7.55	-0.77	0.28
09-Sep-01	70.60	7.61	71.11	6.75	-0.51	0.86
10-Sep-01	68.46	7.96	69.25	7.08	-0.79	0.87
11-Sep-01	67.44	7.71	68.17	7.46	-0.73	0.26
12-Sep-01	69.12	9.09	68.56	7.81	0.55	1.28
13-Sep-01	68.00	9.03				
14-Sep-01	66.16	9.12				
15-Sep-01	65.43	9.18				
16-Sep-01	65.75	9.23				
17-Sep-01	65.90	8.86				
18-Sep-01	65.91	8.78				
19-Sep-01	64.84	8.56				
20-Sep-01	64.22	9.11				
21-Sep-01	64.61	9.34				
22-Sep-01	65.69	9.48				
23-Sep-01	64.92	9.06				
24-Sep-01	61.34	9.58				
25-Sep-01	58.11	9.85				
			Mean:		-0.30	-0.40
			Standard Deviation:		0.43	0.95

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**Appendix D. Calibration Summaries**

Summary of Calibration for Upstream DataSonde3

Date	Pre-Calibration		Post-Calibration		Bar. Pres. mmHg	Notes
	% saturation	Dissolved Oxygen mg/l	% saturation	Dissolved Oxygen mg/l		
07/13/01	NA	NA	NA	NA		
07/24/01	109.8	7.95	99.9	7.23	760.0	
08/06/01	98.3	6.77	100.0	6.97	765.6	
08/27/01	NA	NA	NA	NA	760.5	Original u/s DataSonde was swapped out with spare DataSonde because I was unable to detach the original DataSonde from the Battery Pack which is necessary in order to calibrate the meter. When I went to calibrate the original meter in the lab, I found a bubble under the DO membrane so I did not perform a final calibration.
09/07/01	89.6	7.77	99.9	8.54	754.6	DO Membrane was replaced and allowed to soak for several days, then the meter was calibrated.
08/27/01	---	---	100.0	6.97	760.5	Spare DataSonde
09/12/01	103.0	8.73	100.0	8.60	764.8	Spare DataSonde was replaced with original DataSonde
09/12/01	---	---	99.9	9.41	764.8	Spare DataSonde was replaced with original DataSonde

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Summary of Calibration for Downstream DataSonde3

Date	Pre-Calibration		Post-Calibration		Bar. Pres. mmHg	Notes
	% saturation	Dissolved Oxygen mg/l	% saturation	Dissolved Oxygen mg/l		
07/03/01	NA	NA	NA	NA		
07/13/01	NA	NA	NA	NA		
07/24/01	101.9	7.05	100.0	6.89	760.0	Note that DataSonde was found at the edge of the water with the probes exposed to the air.
08/06/01	101.1	6.69	100.0	6.63	765.6	
08/27/01	100.0	8.65	100.1	8.30	760.5	
09/12/01	NA	NA	NA	NA	764.8	Unable to communicate between either the d/s DataSonde or the spare, therefore the d/s DataSonde was re-deployed for without calibration

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