WPS Resources Corporation
700 North Adams Street
P.O. Box 19002
Green Bay, WI 54307-9002

ORIGINAL

November 30, 2005

FERC Project No. 2433

Ms. Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
Mail Code: DTCA, HL 21.3
888 First Street, N.E.
Washington, DC 20426

Dear Secretary Salas:

Grand Rapids Hydroelectric Project Water Quality Monitoring Data

As per the Order Approving Water Quality Monitoring Plan, dated April 7, 1999, Wisconsin Public Service Corporation (WPSC) is pleased to submit water quality-monitoring data for the 2005 monitoring year.

In 2004, water quality monitoring was ended on August 2 due to the power canal being de-watered for maintenance purposes, which was almost two months earlier than specified in the Plan. WPSC consulted with the Michigan Department of Natural Resources (MDNR), Wisconsin Department of Natural Resources (WDNR), and the U.S. Fish and Wildlife Service (FWS) in October 2004 about the water quality monitoring data collected during the 2004 monitoring season. It was agreed upon that WPSC would monitor water quality in August and September of 2005 in an effort to collect data to supplement the time period that data could not be collected in the 2004 monitoring year.

Per the water quality-monitoring plan for the Grand Rapids Hydroelectric Project, dissolved oxygen (D.O.), temperature, and pH were monitored at two locations on the Menominee River. The first monitoring location was upstream of the Grand Rapids Dam and the second was in the powerhouse tailrace.

There are no deviations from water quality standards to note. Copies of the D.O., temperature, and pH data are included in Appendix A. Please note that the D.O. data has been corrected for any loss of calibration of greater than 0.20 mg/l between equipment maintenance events. Copies of pre- and post-deployment calibration data are included in Appendix B.

WPSC consulted with the MDNR, WDNR, and FWS in regards to the supplemental data collected in August and September 2005. No comments or suggestions were received from the Agencies. Documentation of Agency Consultation is included in Appendix C.

If you have any questions about this submittal, please do not hesitate to call Mr. Mark Metcalf at (920) 433-1833.

Sincerely,

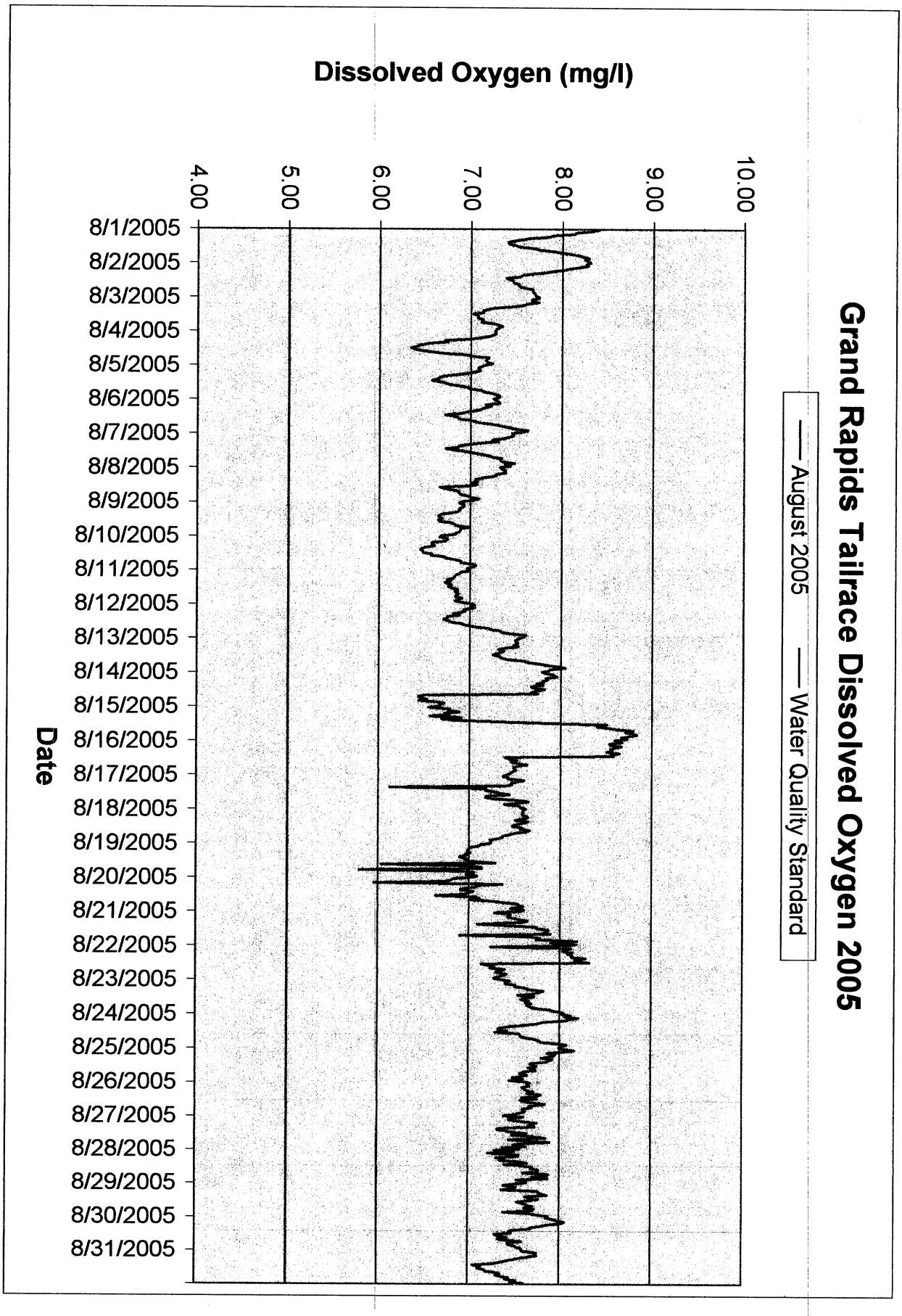
Terry P. Jensky
Assistant Vice President - Energy Supply Operations
for Wisconsin Public Service Corporation
Telephone: (715) 355-2047

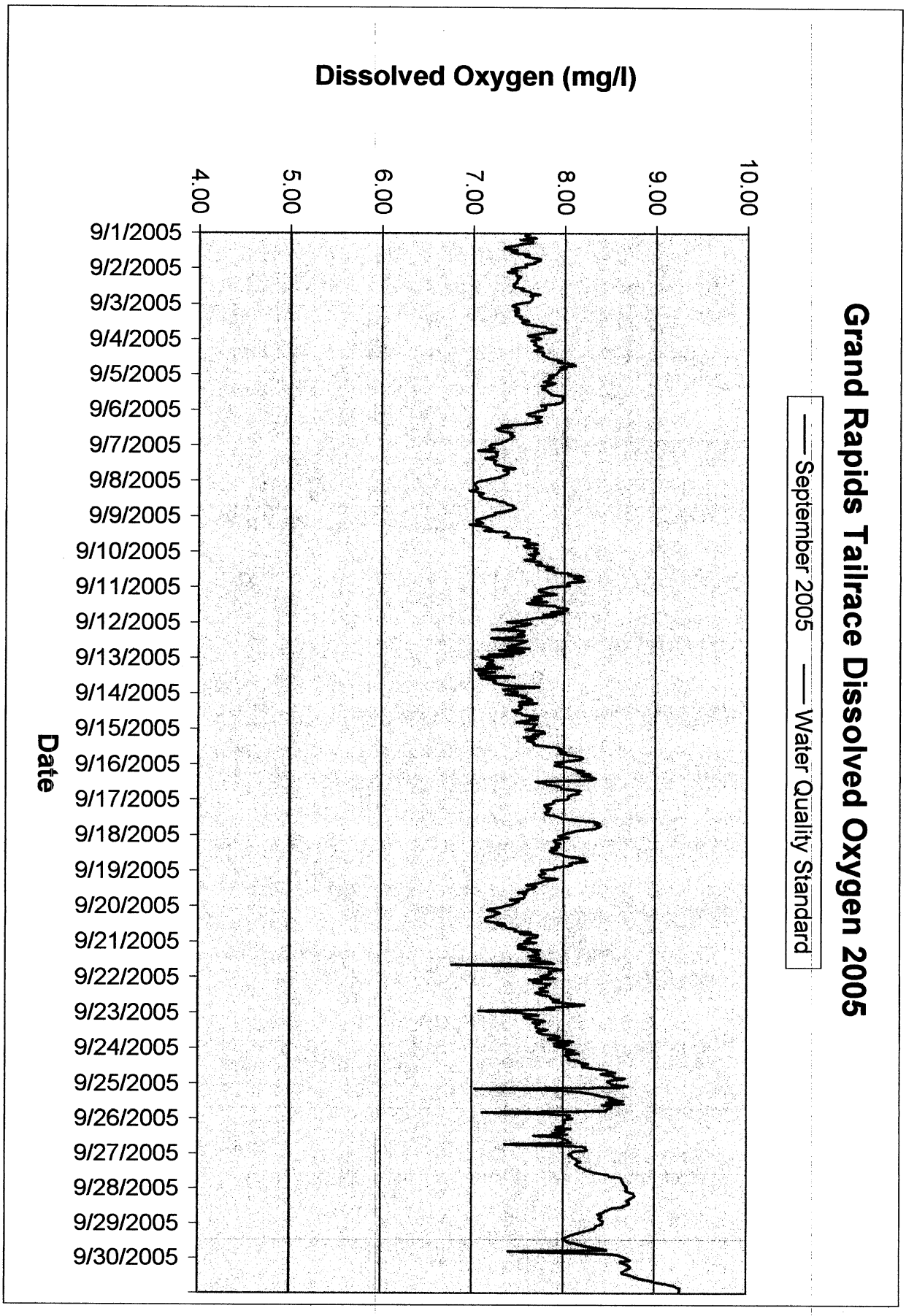
Enc.

cc:
Ms. Janet Smith, FWS
Ms. Jessica Mistak, MDNR
Mr. Mike Donofrio, WDNR
Ms. Peggy Harding, FERC - Chicago
Mr. Gil Snyder, WPSC - D2
Mr. Shawn Puzen, WPSC - D2
Ms. Joan Johanek, WPSC - D2 (file)
Mr. Bruce Crocker, WPSC - D2 (cover only)
Mr. Bill Bloczynski, WPSC - MERH (cover only)

Appendix A

Water Quality Monitoring Data





Grand Rapids Dam Tailrace Dissolved Oxygen Summary - August 2005

Time HHMMSS	08/01/05	08/02/05	08/03/05	08/04/05	08/05/05	08/06/05	08/07/05	08/08/05	08/09/05	08/10/05	08/11/05	08/12/05	08/13/05	08/14/05	08/15/05	08/16/05
0	8.40	8.25	7.74	7.26	7.11	7.26	7.47	7.33	6.87	6.66	6.98	7.05	7.52	7.83	6.54	8.67
10000	8.29	8.28	7.66	7.27	7.08	7.29	7.46	7.38	6.91	6.73	6.89	6.99	7.49	7.91	6.78	8.53
20000	8.14	8.21	7.66	7.23	7.08	7.32	7.40	7.36	6.93	6.74	6.88	7.05	7.51	7.95	6.75	8.54
30000	8.12	8.09	7.74	7.19	7.10	7.16	7.35	7.38	6.92	6.71	6.83	6.92	7.52	7.83	6.88	8.67
40000	7.88	8.02	7.61	7.10	7.04	7.22	7.23	7.27	6.87	6.57	6.82	6.95	7.47	7.86	6.71	8.58
50000	7.86	7.89	7.58	6.97	6.95	7.16	7.30	7.28	6.88	6.58	6.81	6.88	7.53	7.79	6.77	8.54
60000	7.64	7.81	7.47	6.71	6.86	7.11	7.13	7.14	6.86	6.60	6.74	6.80	7.39	7.81	6.55	8.57
70000	7.56	7.66	7.26	6.74	6.71	7.08	6.95	7.07	6.78	6.51	6.78	6.88	7.30	7.73	6.90	8.50
80000	7.45	7.55	7.19	6.54	6.65	6.95	6.86	7.04	6.67	6.46	6.71	6.75	7.37	7.80	6.68	8.64
90000	7.39	7.53	7.13	6.43	6.63	6.89	6.86	7.07	6.64	6.45	6.76	6.74	7.34	7.66	6.83	8.55
100000	7.41	7.37	7.13	6.41	6.56	6.71	6.72	7.00	6.65	6.47	6.79	6.70	7.29	7.68	7.29	8.58
110000	7.48	7.42	7.01	6.33	6.68	6.81	6.85	7.07	6.69	6.47	6.75	6.76	7.24	7.82	7.87	7.38
120000	7.53	7.46	7.06	6.38	6.72	6.86	6.94	6.98	6.63	6.57	6.78	6.78	7.32	7.75	8.50	7.45
130000	7.70	7.46	7.08	6.45	6.78	6.86	7.02	6.66	6.65	6.56	6.85	6.90	7.33	7.66	8.39	7.52
140000	7.73	7.51	7.07	6.58	6.89	6.99	7.12	6.72	6.78	6.71	6.86	6.93	7.41	7.74	8.51	7.45
150000	7.88	7.52	7.12	6.71	6.96	7.04	7.19	6.79	6.81	6.72	6.83	7.03	7.60	6.51	8.61	7.52
160000	7.99	7.52	7.13	6.94	6.98	7.11	7.22	6.87	6.84	6.85	6.86	7.19	7.61	6.43	8.79	7.63
170000	8.09	7.60	7.10	6.99	7.11	7.25	7.33	6.86	6.98	6.90	6.84	7.22	7.76	6.43	8.70	7.52
180000	8.18	7.67	7.24	7.19	7.12	7.32	7.31	6.89	6.88	6.88	6.83	7.33	7.83	6.52	8.80	7.48
190000	8.22	7.67	7.30	7.17	7.21	7.42	7.34	6.96	6.89	7.02	6.91	7.34	7.98	6.43	8.83	7.48
200000	8.29	7.67	7.34	7.16	7.28	7.49	7.48	6.99	6.88	7.06	6.87	7.44	8.04	6.63	8.73	7.51
210000	8.24	7.69	7.30	7.17	7.31	7.62	7.37	7.09	6.84	7.02	6.82	7.61	7.88	6.72	8.66	7.47
220000	8.27	7.70	7.27	7.23	7.30	7.58	7.43	7.03	6.83	6.97	6.90	7.59	7.86	6.66	8.73	7.46
230000	8.30	7.73	7.26	7.15	7.24	7.45	7.31	6.90	6.68	6.96	7.01	7.55	7.79	6.67	8.59	7.42
Daily Max	8.40	8.28	7.74	7.27	7.31	7.62	7.48	7.38	6.98	7.06	7.01	7.61	8.04	7.95	8.83	8.67
Daily Min	7.39	7.37	7.01	6.33	6.56	6.71	6.72	6.66	6.63	6.45	6.71	6.70	7.24	6.43	6.54	7.38
Average	7.92	7.72	7.31	6.89	6.97	7.16	7.19	7.05	6.81	6.72	6.84	7.06	7.56	7.33	7.77	7.99

License Minimum Dissolved Oxygen: 5.0 mg/l

Grand Rapids Dam Tailrace Dissolved Oxygen Summary - August 2005

Time HHMMSS	08/17/05	08/18/05	08/19/05	08/20/05	08/21/05	08/22/05	08/23/05	08/24/05	08/25/05	08/26/05	08/27/05	08/28/05	08/29/05	08/30/05	08/31/05
0	7.36	7.59	7.12	6.82	7.27	7.23	7.45	8.11	8.02	7.67	7.60	7.28	7.51	7.84	7.58
10000	7.42	7.58	7.11	6.80	7.44	8.12	7.40	8.05	8.15	7.64	7.46	7.51	7.38	7.93	7.75
20000	7.42	7.59	7.01	6.74	7.46	8.08	7.39	8.20	8.03	7.67	7.43	7.21	7.52	7.98	7.72
30000	7.59	7.58	7.00	5.95	7.42	8.02	7.51	8.10	7.86	7.58	7.55	7.55	7.51	8.05	7.75
40000	7.52	7.61	6.98	7.36	7.47	8.13	7.50	8.05	7.95	7.61	7.75	7.54	7.36	8.01	7.66
50000	7.45	7.64	6.97	7.07	7.55	8.07	7.61	7.81	7.92	7.64	7.70	7.30	7.75	7.86	7.56
60000	7.47	7.59	7.01	7.08	7.64	8.13	7.64	7.74	7.79	7.72	7.65	7.40	7.76	7.81	7.47
70000	7.39	7.50	6.95	6.96	7.57	8.12	7.82	7.59	7.92	7.64	7.73	7.34	7.80	7.68	7.41
80000	6.11	7.64	6.97	6.90	7.09	8.28	7.75	7.42	7.88	7.79	7.33	7.56	7.86	7.68	7.35
90000	7.18	7.58	6.88	7.04	7.43	8.15	7.70	7.35	7.85	7.75	7.31	7.65	7.62	7.47	7.27
100000	7.16	7.49	6.97	6.98	7.74	8.22	7.53	7.32	7.67	7.58	7.42	7.39	7.65	7.45	7.04
110000	7.27	7.47	6.95	6.95	7.73	8.32	7.72	7.42	7.70	7.75	7.49	7.59	7.77	7.47	7.13
120000	7.34	7.58	7.01	6.63	7.85	7.13	7.62	7.28	7.75	7.56	7.64	7.70	7.64	7.28	7.10
130000	7.43	7.55	7.28	7.07	7.87	7.20	7.57	7.53	7.65	7.61	7.47	7.67	7.53	7.33	7.17
140000	7.18	7.66	6.02	7.11	7.81	7.28	7.66	7.56	7.73	7.73	7.68	7.77	7.62	7.43	7.18
150000	7.17	7.61	7.01	7.00	7.89	7.23	7.61	7.57	7.73	7.84	7.84	7.77	7.63	7.32	7.29
160000	7.28	7.50	7.11	7.26	6.89	7.39	7.69	7.61	7.60	7.66	7.44	7.59	7.71	7.40	7.35
170000	7.53	7.44	7.14	7.38	7.68	7.35	7.63	7.71	7.56	7.69	7.64	7.87	7.61	7.59	7.30
180000	7.64	7.36	5.78	7.52	7.78	7.29	7.67	7.77	7.64	7.60	7.89	7.87	7.72	7.43	7.36
190000	7.53	7.36	6.96	7.54	7.73	7.41	7.72	7.79	7.58	7.59	7.57	7.69	7.70	7.43	7.45
200000	7.38	7.31	7.05	7.59	8.18	7.37	7.89	7.98	7.48	7.62	7.49	7.87	7.38	7.49	7.40
210000	7.55	7.22	6.96	7.45	7.89	7.31	7.93	8.07	7.60	7.55	7.63	7.52	7.67	7.52	7.52
220000	7.55	7.24	7.09	7.60	8.18	7.27	8.03	8.02	7.44	7.52	7.37	7.63	7.74	7.57	7.45
230000	7.61	7.23	7.02	7.56	8.07	7.35	8.00	7.99	7.62	7.38	7.56	7.64	7.87	7.58	7.61
Daily Max	7.64	7.66	7.28	7.60	8.18	8.32	8.03	8.20	8.15	7.84	7.89	7.87	7.87	8.05	7.75
Daily Min	6.11	7.22	5.78	5.95	6.89	7.13	7.39	7.28	7.44	7.38	7.31	7.21	7.36	7.28	7.04
Average	7.36	7.50	6.93	7.10	7.65	7.69	7.67	7.75	7.75	7.64	7.57	7.58	7.64	7.61	7.41

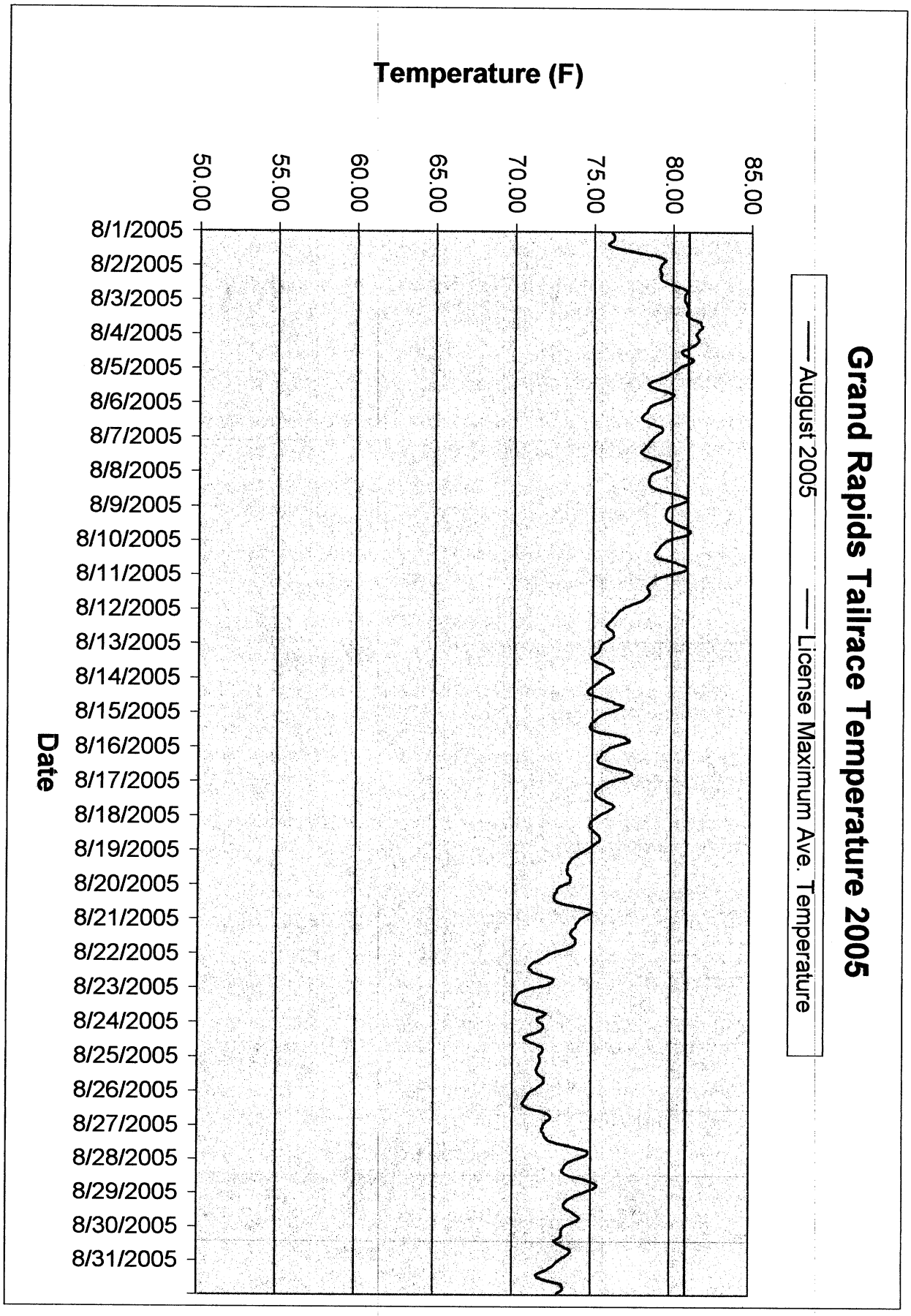
Grand Rapids Dam Tailrace Dissolved Oxygen Summary - September 2005

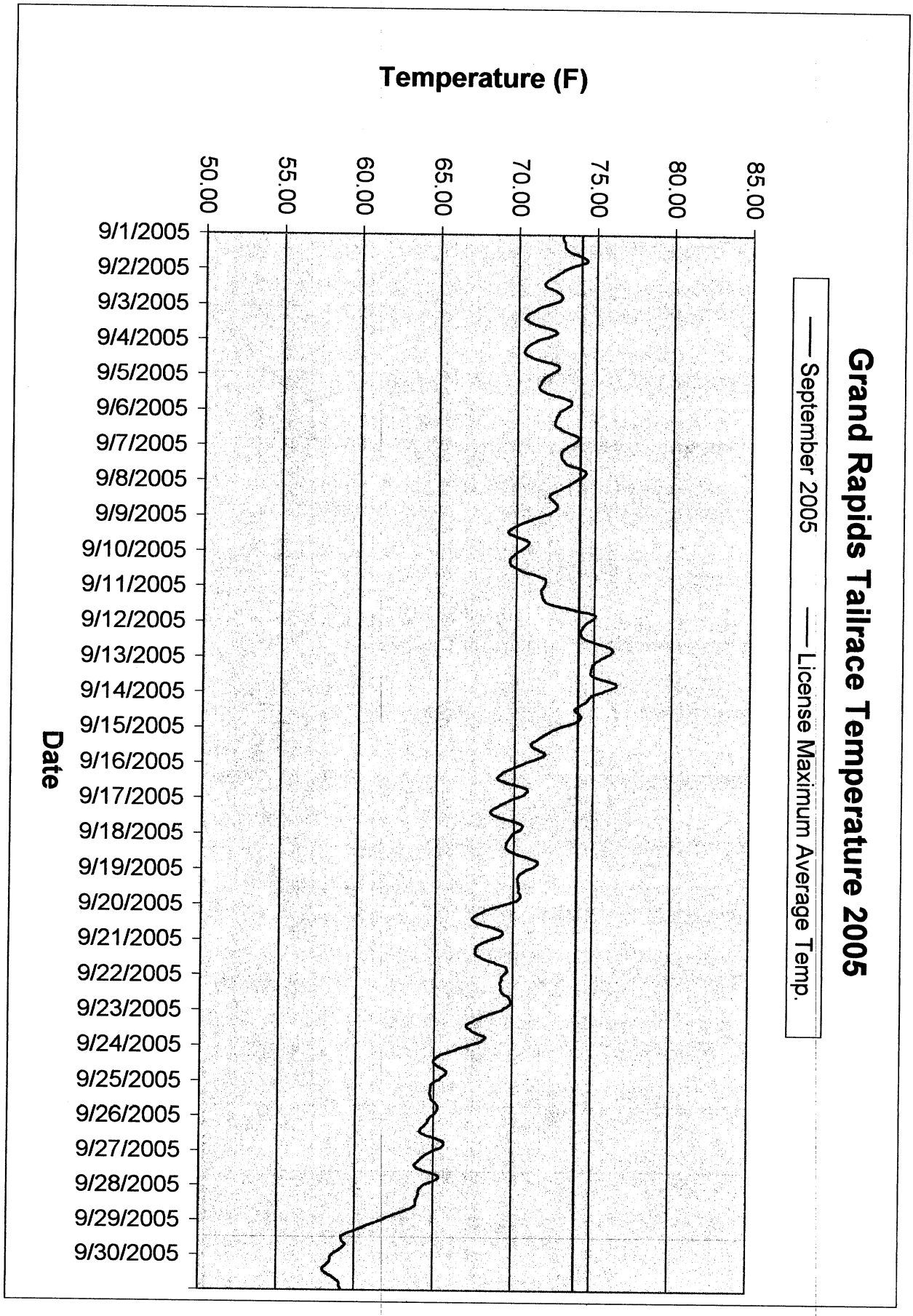
Time HHMMSS	09/01/05	09/02/05	09/03/05	09/04/05	09/05/05	09/06/05	09/07/05	09/08/05	09/09/05	09/10/05	09/11/05	09/12/05	09/13/05	09/14/05	09/15/05	09/16/05
0	7.61	7.40	7.44	7.62	7 82	7.70	7 17	7.05	7.13	7 71	7.78	7.63	7.14	7.35	7.57	7.89
10000	7.55	7.47	7 41	7.66	7.87	7.66	7.22	7 02	7.07	7.60	7.72	7.59	7.22	7.58	7 76	8.00
20000	7.57	7.36	7.47	7 68	7.81	7 58	7.19	7.00	7.02	7.68	7.72	7.44	7.20	7.52	7.78	8.07
30000	7.68	7.46	7.49	7.65	7 83	7 60	7 04	7.01	7.06	7.65	7.79	7.45	7.15	7.62	7.65	8.11
40000	7.50	7.45	7.44	7.68	7.76	7.74	7.26	7 04	7.10	7.67	7.91	7.20	7.23	7.65	7.72	8.22
50000	7.64	7.51	7 48	7.75	7.89	7.68	7.24	7.04	6.95	7.55	7.71	7.56	7.13	7.50	7.55	8.14
60000	7.64	7.47	7.45	7.70	7.85	7.69	7 26	6.95	7.08	7.73	7.66	7.55	7.32	7.70	7.69	8.29
70000	7.50	7.48	7.45	7.65	7.74	7.74	7.24	7.05	7.17	7.75	7.74	7.48	7.01	7.51	7.59	8.18
80000	7.46	7.46	7.52	7.75	7.79	7.64	7.12	7.11	7.20	7.68	7.63	7 56	7.05	7.50	7.65	8.30
90000	7.34	7.47	7.49	7.77	7.74	7.52	7.20	7.06	7.12	7.80	7.81	7.53	7.24	7.54	7.67	8.34
100000	7.33	7.42	7.52	7.74	7.80	7.30	7.24	7.07	7.34	7.87	7.58	7.19	7.05	7.52	7.66	8.30
110000	7.47	7.44	7.60	7.78	7 81	7.41	7.22	7.10	7.37	7.79	7.69	7.33	7.07	7.43	7.78	7.68
120000	7.40	7.43	7.52	7.80	7.84	7.25	7.23	7.23	7.38	7.88	7.89	7.59	7.45	7.45	7 91	7.79
130000	7.45	7.54	7.56	7.89	7.84	7.26	7.29	7.26	7.33	7.89	7.91	7.53	7.08	7.53	7 97	7.80
140000	7.60	7.51	7.67	7.96	7.97	7.35	7.36	7.35	7.55	8.07	8.04	7.48	7.19	7.53	7 93	7.91
150000	7.55	7.60	7.77	7.91	7.97	7.42	7.45	7.36	7.61	8.03	8.01	7.40	7.25	7.71	8.02	7.96
160000	7.61	7.62	7.80	8.06	7.98	7.39	7.32	7.44	7.56	8.20	7.85	7.37	7.22	7 62	7.96	7.97
170000	7.72	7.72	7.89	8.11	7.97	7.43	7.36	7.42	7.58	8.09	7.99	7.61	7.28	7.70	8.04	8 18
180000	7.72	7.61	7.88	7.94	7.96	7.42	7.38	7.46	7.70	8.17	7.76	7.28	7.40	7.55	8.17	8 13
190000	7.66	7.64	7.75	8 00	7.91	7.39	7.36	7.41	7.55	8.21	7.90	7.55	7.72	7.47	8.20	8.17
200000	7.66	7.64	7 66	7 94	7 73	7.36	7.31	7.33	7.56	8.04	7.66	7.50	7.44	7.70	8.17	8.09
210000	7.56	7.62	7 58	7.93	7.79	7.32	7.28	7.23	7.70	8.02	7 62	7.17	7.33	7.66	8.04	8.04
220000	7.57	7.61	7.69	7.91	7.79	7.29	7.18	7.24	7.69	8.05	7 50	7.43	7.47	7.67	7.90	8.05
230000	7.47	7.51	7.73	7.89	7.78	7.18	7.11	7.17	7.66	7 84	7.37	7.08	7.49	7.64	7.98	8.03
Daily Max	7.72	7.72	7.89	8.11	7.98	7.74	7.45	7.46	7.70	8.21	8.04	7.63	7.72	7.71	8.20	8 34
Daily Min	7.33	7.36	7.41	7.62	7.73	7.18	7.04	6 95	6.95	7.55	7.37	7.08	7.01	7.35	7.55	7.68
Average	7.55	7.52	7.59	7.82	7.84	7.47	7.25	7 18	7.35	7.87	7.76	7.44	7.26	7.57	7.85	8.07

License Minimum Dissolved Oxygen: 5.0 mg/l

Grand Rapids Dam Tailrace Dissolved Oxygen Summary - September 2005

Time HHMMSS	09/17/05	09/18/05	09/19/05	09/20/05	09/21/05	09/22/05	09/23/05	09/24/05	09/25/05	09/26/05	09/27/05	09/28/05	09/29/05	09/30/05
0	7 88	7 94	7.75	7.31	7.70	7.90	7.55	8.01	8.52	8.01	8.05	8.70	8 42	8.69
10000	7.89	8 05	7.80	7.22	7.52	7.62	7.72	8.12	8 71	8.01	8 09	8.67	8.36	8.73
20000	7.86	7.93	7.73	7 15	7.49	7.76	7.56	8 02	8.61	8 01	8 10	8.71	8 36	8.62
30000	7 79	7.88	7.73	7 25	7.58	7.66	7.58	8 16	7.02	8.00	8.14	8.76	8.34	8.66
40000	7 79	7 90	7.76	7.30	7.50	7.85	7.71	8.01	7.95	8.00	8.14	8 77	8.27	8.70
50000	7 85	7 96	7.93	7 24	7.74	7 80	7.79	8 03	8.12	7.91	8.18	8 78	8.21	8.72
60000	7.81	7.90	7.78	7 24	7 65	7.81	7.66	8 06	8.30	8.08	8.15	8.74	8.17	8.74
70000	7.84	7.95	7 74	7.16	7 71	7.73	7.74	8 05	8.36	7.91	8.13	8.71	8.11	8 69
80000	7.79	7.86	7.68	7.14	7.73	7.74	7.70	8.17	8.42	8.01	8.16	8.68	8.07	8 67
90000	7.79	7.92	7.59	7.13	7 61	7 83	7.69	8.16	8.54	7.88	8.18	8.71	8.02	8.64
100000	7.89	7.84	7.70	7.21	7.71	7.69	7.73	8.26	8 49	8.04	8.23	8.72	7.98	8.64
110000	7.94	7.87	7.67	7.35	7.75	7.74	7.82	8.22	8 65	7 67	8.24	8.67	8.00	8.72
120000	7.97	7.96	7.60	7.26	7.63	7.85	7.70	8.20	8 47	7 95	8 31	8 65	8.03	8.76
130000	8.13	8.00	7.60	7.37	7.85	7.85	7.73	8.32	8.66	7 98	8 38	8.52	8.09	8.81
140000	8.31	8.09	7.49	7.37	7.89	7.86	7.78	8.46	8.42	8.03	8.49	8.49	8.15	8.87
150000	8.39	8.23	7.58	7.48	6.77	7.94	7.93	8.48	8.52	8.05	8.49	8.45	8.23	8.96
160000	8.33	8.17	7.57	7.46	7 64	7 88	7.95	8 56	8.53	8.08	8.61	8.44	8.31	9.00
170000	8.41	8.25	7.57	7.64	7.79	8.04	7.83	8.40	8.46	7.35	8.64	8 37	8.41	9.10
180000	8.37	8 06	7.55	7.52	8.00	8.22	7 91	8.55	8.47	8.00	8.63	8 41	8.47	9.20
190000	8 33	8.09	7.41	7.71	7.86	8.02	8.10	8.55	7 11	8.24	8.65	8.42	7.39	9.23
200000	8 14	8.03	7.51	7.70	7.83	7.81	7.89	8.67	7.80	8 24	8.65	8.39	8.30	9.27
210000	8.09	7 90	7.47	7.60	7.86	7.89	8.06	8.52	8.07	8.26	8.66	8.39	8.59	9 26
220000	8.02	7.91	7.43	7.63	7.82	7.06	7.89	8.48	8.03	8.10	8.69	8.43	8.63	9 27
230000	7.99	7.75	7 37	7.56	7.74	7.53	8.00	8 51	8.10	8.09	8.68	8.43	8.67	9.27
Daily Max	8.41	8 25	7.93	7.71	8.00	8.22	8.10	8.67	8.71	8.26	8.69	8 78	8.67	9.27
Daily Min	7.79	7.75	7.37	7.13	6.77	7 06	7.55	8.01	7 02	7 35	8.05	8.37	7.39	8.62
Average	8.03	7.98	7.63	7.38	7.68	7.79	7.79	8.29	8 26	8 00	8.36	8.58	8.23	8.88





Grand Rapids Dam Tailrace Temperature Summary - August 2005

Time HHMMSS	08/01/05	08/02/05	08/03/05	08/04/05	08/05/05	08/06/05	08/07/05	08/08/05	08/09/05	08/10/05	08/11/05	08/12/05	08/13/05	08/14/05	08/15/05	08/16/05
0	76.05	79.18	80.76	81.48	80.20	78.76	78.71	78.73	79.74	79.52	79.38	76.68	75.52	75.54	75.70	75.99
10000	76.17	79.14	80.80	81.54	80.06	78.60	78.64	78.64	79.66	79.43	79.12	76.59	75.49	75.43	75.52	75.87
20000	76.23	79.14	80.85	81.59	79.92	78.51	78.58	78.57	79.63	79.32	78.93	76.51	75.45	75.34	75.38	75.70
30000	76.24	79.18	80.87	81.64	79.75	78.46	78.49	78.55	79.61	79.23	78.78	76.42	75.42	75.20	75.27	75.61
40000	76.24	79.20	80.92	81.63	79.57	78.42	78.42	78.53	79.59	79.18	78.66	76.35	75.38	75.11	75.20	75.56
50000	76.23	79.25	80.96	81.55	79.38	78.39	78.31	78.51	79.57	79.12	78.57	76.26	75.31	74.95	75.09	75.52
60000	76.15	79.23	80.94	81.43	79.18	78.30	78.28	78.49	79.57	79.03	78.46	76.17	75.16	74.82	74.95	75.45
70000	76.03	79.20	80.89	81.28	78.94	78.17	78.15	78.51	79.59	78.96	78.42	76.10	75.04	74.71	74.89	75.38
80000	75.87	79.18	80.83	81.12	78.67	78.06	78.04	78.53	79.65	78.91	78.44	76.01	74.93	74.64	74.86	75.34
90000	75.88	79.23	80.83	80.89	78.48	78.01	77.95	78.64	79.77	78.91	78.49	75.90	74.88	74.64	74.84	75.34
100000	76.06	79.36	80.87	80.64	78.40	78.04	78.03	78.80	79.99	78.93	78.55	75.85	74.95	74.73	74.84	75.40
110000	76.39	79.57	81.00	80.55	78.48	78.17	78.17	79.03	80.15	79.12	78.57	75.85	75.07	75.00	74.93	75.72
120000	76.84	79.88	81.16	80.55	78.69	78.39	78.40	79.36	80.35	79.50	78.58	75.94	75.27	75.31	75.18	76.05
130000	77.34	80.17	81.41	80.64	78.96	78.60	78.67	79.68	80.53	79.83	78.53	76.05	75.52	75.65	75.61	76.28
140000	77.77	80.42	81.61	80.80	79.29	78.84	78.96	80.02	80.87	80.17	78.44	76.19	75.78	75.87	76.23	76.71
150000	78.24	80.65	81.77	80.96	79.61	79.07	79.25	80.37	80.92	80.40	78.35	76.30	75.90	76.28	76.68	77.11
160000	78.82	80.78	81.75	81.16	79.83	79.25	79.52	80.64	81.14	80.73	78.17	76.30	76.12	76.32	77.00	77.34
170000	79.12	80.89	81.77	81.32	80.08	79.34	79.74	80.83	81.12	80.89	77.97	76.32	76.19	76.62	77.09	77.50
180000	79.32	80.87	81.86	81.27	80.04	79.36	79.84	80.94	81.05	80.98	77.76	76.28	76.24	76.93	77.34	77.50
190000	79.45	80.78	81.82	81.10	79.93	79.29	79.77	80.89	80.83	80.91	77.50	76.17	76.28	76.91	77.34	77.36
200000	79.48	80.76	81.68	80.87	79.77	79.14	79.63	80.67	80.49	80.69	77.29	76.05	76.08	76.69	77.07	77.16
210000	79.36	80.74	81.63	80.60	79.50	79.02	79.43	80.44	80.11	80.40	77.09	75.87	75.92	76.48	76.80	76.75
220000	79.27	80.73	81.52	80.44	79.20	78.89	79.14	80.15	79.84	80.01	76.93	75.70	75.78	76.24	76.48	76.46
230000	79.23	80.71	81.46	80.35	78.96	78.80	78.91	79.90	79.65	79.68	76.82	75.58	75.63	75.92	76.17	76.10
Daily Max	79.48	80.89	81.86	81.64	80.20	79.36	79.84	80.94	81.14	80.98	79.38	76.68	76.28	76.93	77.34	77.50
Daily Min	75.87	79.14	80.76	80.35	78.40	78.01	77.95	78.49	79.57	78.91	76.82	75.58	74.88	74.64	74.84	75.34
Average	77.41	79.93	81.25	81.06	79.37	78.66	78.79	79.48	80.14	79.74	78.24	76.14	75.55	75.64	75.85	76.22

Monthly Average Temperature: 75.78

License Maximum Monthly Average Temperature: 81

Grand Rapids Dam Tailrace Temperature Summary - August 2005

Time HHMMSS	08/17/05	08/18/05	08/19/05	08/20/05	08/21/05	08/22/05	08/23/05	08/24/05	08/25/05	08/26/05	08/27/05	08/28/05	08/29/05	08/30/05	08/31/05
0	75.88	75.24	74.39	73.00	74.19	72.19	70.99	71.83	71.71	71.11	71.94	73.85	74.26	73.20	72.84
10000	75.70	75.07	74.23	72.86	74.10	72.09	70.72	71.92	71.74	71.02	71.94	73.65	74.03	73.15	72.73
20000	75.60	74.97	74.08	72.81	74.03	71.96	70.52	71.96	71.74	70.95	71.87	73.49	73.81	73.13	72.68
30000	75.47	74.89	73.96	72.79	73.99	71.80	70.41	71.94	71.73	70.92	71.87	73.40	73.65	73.13	72.59
40000	75.34	74.86	73.83	72.79	74.01	71.64	70.30	71.87	71.69	70.86	71.92	73.31	73.51	73.11	72.45
50000	75.24	74.84	73.74	72.66	73.96	71.40	70.25	71.73	71.64	70.79	72.00	73.27	73.40	73.13	72.30
60000	75.18	74.84	73.65	72.63	73.85	71.26	70.23	71.53	71.58	70.72	72.01	73.22	73.35	73.11	72.12
70000	75.15	74.84	73.58	72.59	73.74	71.13	70.20	71.24	71.55	70.66	72.03	73.17	73.27	73.00	71.92
80000	75.18	74.91	73.53	72.59	73.67	71.04	70.12	70.97	71.51	70.61	72.09	73.15	73.27	72.86	71.74
90000	75.22	75.00	73.49	72.61	73.62	71.02	70.09	70.75	71.51	70.68	72.14	73.22	73.29	72.70	71.58
100000	75.33	75.15	73.47	72.63	73.67	71.06	70.16	70.72	71.55	70.77	72.28	73.35	73.33	72.68	71.51
110000	75.54	75.25	73.45	72.79	73.72	71.20	70.34	70.75	71.56	70.97	72.50	73.53	73.42	72.81	71.60
120000	75.74	75.36	73.42	73.04	73.85	71.22	70.61	70.93	71.67	71.28	72.79	73.83	73.60	72.97	71.85
130000	75.85	75.45	73.38	73.42	73.96	71.49	71.02	71.11	71.80	71.67	73.17	74.26	73.78	73.18	72.14
140000	76.12	75.49	73.42	73.92	73.98	71.76	71.29	71.35	72.00	71.96	73.58	74.61	73.92	73.38	72.52
150000	76.26	75.49	73.44	74.35	73.96	72.05	71.64	71.53	71.98	72.18	73.98	74.88	74.05	73.62	72.86
160000	76.39	75.47	73.47	74.73	73.96	72.37	71.92	71.78	71.98	72.32	74.35	75.15	74.17	73.71	73.17
170000	76.32	75.36	73.60	74.97	73.87	72.59	72.12	71.89	72.01	72.41	74.64	75.31	74.26	73.71	73.09
180000	76.21	75.24	73.65	75.02	73.76	72.57	72.01	71.96	71.92	72.43	74.79	75.36	74.21	73.65	73.18
190000	76.05	75.13	73.63	74.93	73.53	72.48	71.85	71.91	71.76	72.32	74.79	75.33	74.10	73.56	73.24
200000	75.87	75.00	73.62	74.73	73.26	72.34	71.60	71.87	71.65	72.16	74.73	75.20	73.85	73.40	73.20
210000	75.69	74.88	73.60	74.53	72.93	72.07	71.55	71.78	71.55	72.12	74.53	75.02	73.65	73.24	73.08
220000	75.54	74.71	73.40	74.35	72.61	71.65	71.55	71.69	71.40	72.03	74.34	74.75	73.44	73.09	72.91
230000	75.38	74.57	73.20	74.23	72.36	71.28	71.67	71.69	71.26	71.96	74.12	74.50	73.31	73.00	72.84
Daily Max	76.39	75.49	74.39	75.02	74.19	72.59	72.12	71.96	72.01	72.43	74.79	75.36	74.26	73.71	73.24
Daily Min	75.15	74.57	73.20	72.59	72.36	71.02	70.09	70.72	71.26	70.61	71.87	73.15	73.27	72.68	71.51
Average	75.68	75.08	73.63	73.54	73.69	71.74	70.97	71.53	71.69	71.45	73.10	74.12	73.71	73.19	72.51

Grand Rapids Dam Tailrace Temperature Summary - September 2005

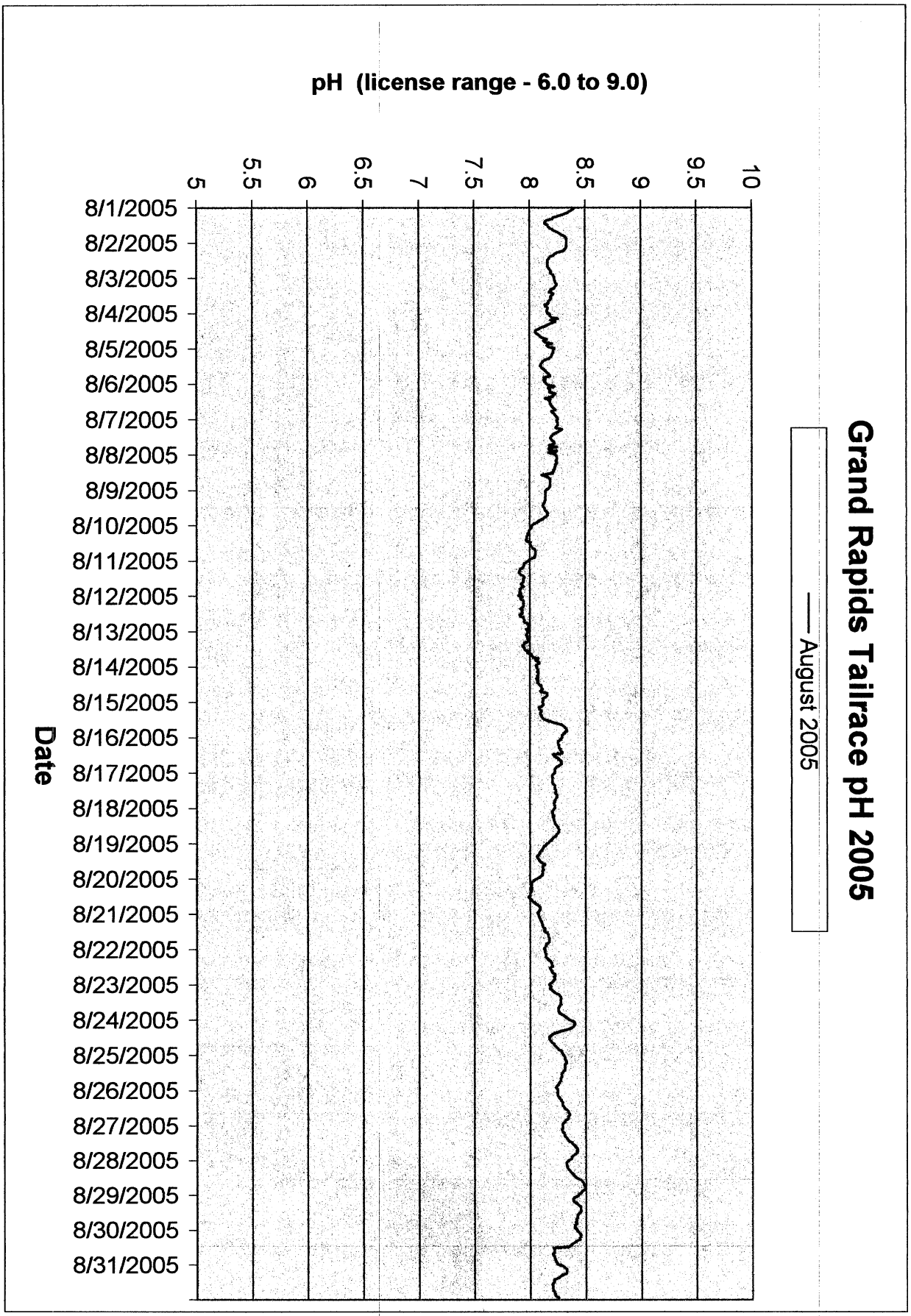
Time HHMMSS	09/01/05	09/02/05	09/03/05	09/04/05	09/05/05	09/06/05	09/07/05	09/08/05	09/09/05	09/10/05	09/11/05	09/12/05	09/13/05	09/14/05	09/15/05	09/16/05
0	72.79	72.77	71.56	71.02	71.76	72.63	73.11	73.49	71.20	69.94	71.60	74.43	75.33	74.97	72.45	70.30
10000	72.73	72.66	71.31	70.86	71.67	72.61	72.95	73.33	70.93	69.84	71.55	74.34	75.16	74.84	72.30	70.07
20000	72.77	72.52	71.13	70.68	71.55	72.54	72.86	73.17	70.66	69.73	71.56	74.23	75.06	74.73	72.07	69.85
30000	72.79	72.37	70.97	70.59	71.49	72.48	72.79	72.95	70.41	69.64	71.56	74.19	74.95	74.66	71.92	69.67
40000	72.82	72.21	70.79	70.50	71.46	72.43	72.75	72.75	70.21	69.55	71.60	74.14	74.89	74.59	71.78	69.46
50000	72.88	72.05	70.63	70.45	71.40	72.41	72.75	72.55	70.02	69.57	71.62	74.12	74.89	74.48	71.64	69.28
60000	72.90	71.89	70.50	70.38	71.35	72.39	72.77	72.39	69.84	69.53	71.64	74.12	74.84	74.32	71.51	69.15
70000	72.90	71.74	70.41	70.36	71.29	72.36	72.79	72.23	69.67	69.57	71.67	74.14	74.80	74.17	71.33	69.03
80000	72.88	71.65	70.36	70.36	71.29	72.36	72.81	72.09	69.53	69.58	71.71	74.14	74.80	74.01	71.17	68.92
90000	72.93	71.62	70.39	70.45	71.38	72.32	72.90	72.03	69.42	69.71	71.82	74.19	74.77	73.87	71.06	68.86
100000	73.04	71.62	70.52	70.61	71.58	72.43	72.99	72.05	69.39	69.87	72.03	74.34	74.75	73.76	70.99	68.90
110000	73.22	71.76	70.68	70.84	71.76	72.64	73.08	72.16	69.48	70.11	72.30	74.55	74.89	73.78	71.04	69.19
120000	73.45	71.98	70.88	71.11	72.05	72.73	73.29	72.23	69.76	70.27	72.68	74.82	75.09	73.87	71.10	69.37
130000	73.72	72.19	71.24	71.49	72.37	73.00	73.60	72.32	70.02	70.54	73.11	75.18	75.33	74.03	71.38	69.75
140000	73.92	72.39	71.58	71.85	72.75	73.20	73.94	72.43	70.30	70.93	73.53	75.52	75.69	74.10	71.53	70.11
150000	74.12	72.52	71.92	72.19	73.06	73.45	74.12	72.54	70.56	71.19	73.96	75.78	76.03	74.19	71.76	70.45
160000	74.26	72.66	72.18	72.43	73.29	73.65	74.32	72.57	70.68	71.46	74.55	75.99	76.30	74.14	71.85	70.66
170000	74.35	72.72	72.36	72.55	73.40	73.83	74.39	72.54	70.75	71.76	74.86	76.14	76.42	74.08	71.92	70.81
180000	74.25	72.77	72.45	72.59	73.40	73.90	74.32	72.46	70.72	71.83	75.06	76.19	76.44	73.96	71.73	70.83
190000	73.98	72.70	72.27	72.50	73.36	73.83	74.25	72.36	70.63	71.85	75.02	76.14	76.26	73.81	71.51	70.66
200000	73.69	72.63	72.09	72.41	73.22	73.76	74.16	72.18	70.52	71.83	74.95	76.05	76.05	73.45	71.31	70.65
210000	73.36	72.37	71.85	72.23	73.06	73.60	73.92	71.96	70.39	71.80	74.82	75.88	75.76	73.11	71.02	70.43
220000	73.09	72.10	71.53	72.05	72.91	73.42	73.76	71.73	70.27	71.74	74.68	75.72	75.54	72.86	70.77	70.12
230000	72.90	71.83	71.24	71.89	72.77	73.24	73.62	71.46	70.09	71.71	74.53	75.51	75.18	72.66	70.56	69.85
Daily Max	74.35	72.77	72.45	72.59	73.40	73.90	74.39	73.49	71.20	71.85	75.06	76.19	76.44	74.97	72.45	70.83
Daily Min	72.73	71.62	70.36	70.36	71.29	72.32	72.75	71.46	69.39	69.53	71.55	74.12	74.75	72.66	70.56	68.86
Average	73.32	72.24	71.29	71.35	72.24	72.97	73.43	72.41	70.23	70.56	73.02	74.99	75.38	74.02	71.49	69.85

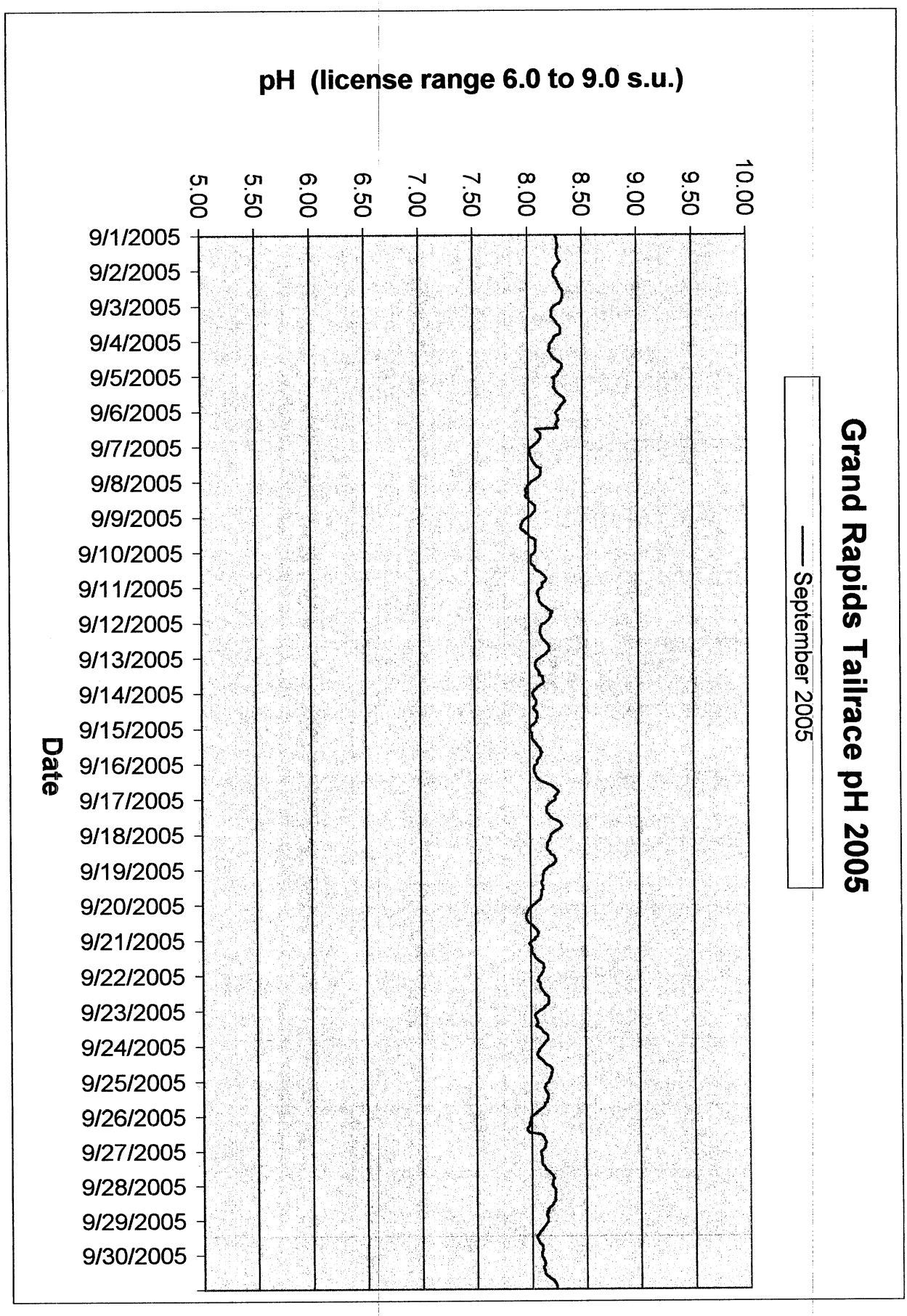
Monthly Average: 68.78

License Maximum Monthly Average Temperature. 74 F

Grand Rapids Dam Tailrace Temperature Summary - September 2005

Time HHMMSS	09/17/05	09/18/05	09/19/05	09/20/05	09/21/05	09/22/05	09/23/05	09/24/05	09/25/05	09/26/05	09/27/05	09/28/05	09/29/05	09/30/05
0	69.67	69.84	70.63	68.95	68.22	69.24	68.85	66.81	64.94	64.74	64.76	64.22	61.38	58.50
10000	69.49	69.76	70.48	68.67	68.04	69.22	68.58	66.51	64.87	64.67	64.60	64.11	61.18	58.42
20000	69.31	69.69	70.36	68.40	67.82	69.28	68.34	66.25	64.78	64.62	64.45	64.08	60.93	58.44
30000	69.12	69.60	70.30	68.16	67.68	69.22	68.11	65.98	64.81	64.58	64.33	64.04	60.71	58.42
40000	68.94	69.53	70.25	67.98	67.62	69.15	67.89	65.73	64.78	64.53	64.24	64.02	60.49	58.39
50000	68.76	69.49	70.23	67.78	67.59	69.15	67.64	65.46	64.78	64.44	64.11	64.04	60.24	58.33
60000	68.63	69.48	70.23	67.62	67.57	69.19	67.48	65.30	64.76	64.36	64.04	64.02	60.03	58.23
70000	68.52	69.44	70.23	67.48	67.57	69.21	67.32	65.12	64.74	64.24	63.93	63.97	59.77	58.08
80000	68.45	69.44	70.25	67.35	67.55	69.19	67.15	64.99	64.74	64.13	63.84	63.93	59.54	57.96
90000	68.47	69.48	70.27	67.32	67.59	69.19	67.05	64.94	64.76	64.08	63.77	63.86	59.34	57.92
100000	68.63	69.57	70.29	67.41	67.71	69.26	67.01	64.94	64.80	64.11	63.81	63.86	59.14	57.96
110000	68.83	69.75	70.32	67.55	67.89	69.30	67.12	64.94	64.80	64.22	63.90	63.88	59.13	58.01
120000	69.12	70.02	70.32	67.82	68.09	69.42	67.32	65.05	64.85	64.42	64.13	63.86	59.13	58.15
130000	69.46	70.30	70.30	68.13	68.41	69.62	67.37	65.23	64.94	64.69	64.44	63.84	59.16	58.33
140000	69.80	70.70	70.29	68.50	68.76	69.71	67.59	65.41	65.03	64.99	64.78	63.70	59.16	58.50
150000	70.18	70.92	70.32	68.83	68.90	69.76	67.86	65.59	65.16	65.28	64.99	63.52	59.32	58.60
160000	70.39	71.15	70.41	69.06	69.22	69.85	68.09	65.71	65.23	65.50	65.21	63.28	59.40	58.75
170000	70.50	71.42	70.45	69.24	69.44	69.85	68.27	65.79	65.25	65.62	65.34	63.01	59.32	58.87
180000	70.52	71.51	70.38	69.31	69.57	69.87	68.22	65.75	65.23	65.62	65.28	62.76	59.23	59.00
190000	70.43	71.49	70.32	69.31	69.58	69.80	68.09	65.68	65.21	65.62	65.16	62.49	59.09	59.04
200000	70.38	71.40	70.20	69.19	69.64	69.67	67.93	65.52	65.14	65.53	64.99	62.31	58.96	59.00
210000	70.14	71.26	69.93	68.95	69.57	69.48	67.66	65.41	65.07	65.37	64.74	62.04	58.82	59.02
220000	70.00	71.06	69.57	68.67	69.46	69.37	67.37	65.34	64.98	65.14	64.51	61.84	58.68	59.07
230000	69.87	70.81	69.26	68.41	69.33	69.12	67.10	65.10	64.83	64.96	64.35	61.63	58.57	59.13
Daily Max	70.52	71.51	70.63	69.31	69.64	69.87	68.85	66.81	65.25	65.62	65.34	64.22	61.38	59.13
Daily Min	68.45	69.44	69.26	67.32	67.55	69.12	67.01	64.94	64.74	64.08	63.77	61.63	58.57	57.92
Average	69.48	70.30	70.23	68.34	68.45	69.42	67.72	65.52	64.94	64.81	64.49	63.43	59.61	58.51





Grand Rapids Dam Tailrace pH Summary - August 2005

Time HHMMSS	08/01/05	08/02/05	08/03/05	08/04/05	08/05/05	08/06/05	08/07/05	08/08/05	08/09/05	08/10/05	08/11/05	08/12/05	08/13/05	08/14/05	08/15/05	08/16/05
0	8.40	8.33	8.22	8.17	8.21	8.15	8.24	8.23	8.14	8.01	7.98	7.93	7.98	8.06	8.11	8.28
10000	8.38	8.33	8.22	8.18	8.21	8.22	8.24	8.24	8.14	8.01	7.95	7.91	7.97	8.06	8.12	8.27
20000	8.36	8.33	8.23	8.19	8.21	8.16	8.25	8.24	8.14	8.00	7.95	7.92	7.96	8.07	8.11	8.25
30000	8.34	8.32	8.23	8.25	8.20	8.17	8.25	8.24	8.14	7.99	7.94	7.94	7.98	8.06	8.08	8.25
40000	8.31	8.31	8.24	8.18	8.20	8.18	8.24	8.23	8.14	7.99	7.94	7.94	7.97	8.07	8.08	8.25
50000	8.27	8.30	8.23	8.23	8.19	8.17	8.23	8.24	8.14	7.98	7.91	7.94	7.98	8.07	8.09	8.26
60000	8.23	8.25	8.22	8.20	8.17	8.23	8.29	8.23	8.14	7.98	7.91	7.94	7.99	8.06	8.10	8.26
70000	8.20	8.23	8.19	8.17	8.14	8.21	8.27	8.23	8.13	7.97	7.90	7.93	7.95	8.07	8.09	8.26
80000	8.16	8.21	8.19	8.13	8.12	8.20	8.25	8.22	8.13	7.97	7.90	7.91	7.95	8.05	8.09	8.27
90000	8.14	8.18	8.17	8.10	8.11	8.13	8.22	8.22	8.12	7.97	7.92	7.93	7.93	8.07	8.10	8.28
100000	8.13	8.17	8.21	8.08	8.10	8.18	8.20	8.21	8.12	7.96	7.94	7.92	7.93	8.06	8.10	8.29
110000	8.14	8.16	8.20	8.05	8.09	8.17	8.19	8.21	8.12	8.00	7.95	7.93	7.95	8.07	8.12	8.20
120000	8.16	8.16	8.18	8.05	8.10	8.18	8.18	8.20	8.13	8.00	7.93	7.90	7.95	8.09	8.15	8.21
130000	8.17	8.16	8.19	8.05	8.11	8.18	8.19	8.10	8.13	8.00	7.94	7.91	7.98	8.10	8.20	8.23
140000	8.19	8.15	8.18	8.07	8.13	8.19	8.20	8.14	8.14	8.01	7.94	7.94	7.97	8.10	8.25	8.25
150000	8.21	8.16	8.17	8.09	8.14	8.20	8.21	8.16	8.15	8.02	7.92	7.94	8.01	8.11	8.28	8.27
160000	8.24	8.16	8.17	8.12	8.15	8.21	8.22	8.18	8.16	8.04	7.92	7.95	8.01	8.09	8.30	8.28
170000	8.26	8.17	8.16	8.15	8.17	8.23	8.17	8.18	8.15	8.05	7.94	7.94	8.02	8.14	8.31	8.28
180000	8.28	8.18	8.13	8.12	8.18	8.19	8.24	8.18	8.13	8.05	7.92	7.98	8.07	8.15	8.32	8.27
190000	8.31	8.19	8.15	8.13	8.12	8.20	8.17	8.18	8.12	8.05	7.90	7.98	8.04	8.15	8.33	8.25
200000	8.32	8.18	8.16	8.20	8.14	8.22	8.17	8.18	8.09	8.04	7.91	7.99	8.07	8.14	8.31	8.23
210000	8.33	8.20	8.15	8.15	8.12	8.23	8.24	8.18	8.07	8.04	7.90	7.99	8.08	8.11	8.30	8.22
220000	8.33	8.21	8.15	8.16	8.13	8.24	8.16	8.17	8.04	8.01	7.92	7.96	8.06	8.12	8.29	8.22
230000	8.33	8.22	8.15	8.22	8.14	8.25	8.23	8.15	8.02	7.99	7.89	7.98	8.05	8.11	8.29	8.22
Daily Max	8.40	8.33	8.24	8.25	8.21	8.25	8.29	8.24	8.16	8.05	7.98	7.99	8.08	8.15	8.33	8.29
Daily Min	8.13	8.15	8.13	8.05	8.09	8.13	8.16	8.10	8.02	7.96	7.89	7.90	7.93	8.05	8.08	8.20
Average	8.26	8.22	8.19	8.14	8.15	8.20	8.22	8.20	8.12	8.01	7.93	7.94	7.99	8.09	8.19	8.25

License pH range - 6.0 to 9.0 s.u.

Grand Rapids Dam Tailrace pH Summary - August 2005

Time HHMMSS	08/17/05	08/18/05	08/19/05	08/20/05	08/21/05	08/22/05	08/23/05	08/24/05	08/25/05	08/26/05	08/27/05	08/28/05	08/29/05	08/30/05	08/31/05
0	8.21	8.21	8.14	8.04	8.07	8.13	8.17	8.37	8.30	8.24	8.29	8.33	8.42	8.41	8.28
10000	8.20	8.20	8.13	8.02	8.07	8.13	8.18	8.39	8.31	8.24	8.29	8.32	8.39	8.43	8.30
20000	8.20	8.19	8.12	8.01	8.08	8.13	8.17	8.40	8.31	8.24	8.28	8.32	8.38	8.44	8.31
30000	8.20	8.20	8.11	8.01	8.09	8.14	8.19	8.39	8.31	8.24	8.28	8.32	8.38	8.45	8.32
40000	8.20	8.20	8.10	8.01	8.09	8.14	8.20	8.38	8.32	8.26	8.29	8.33	8.38	8.45	8.32
50000	8.20	8.21	8.09	8.00	8.10	8.14	8.22	8.36	8.32	8.26	8.30	8.33	8.41	8.44	8.32
60000	8.20	8.20	8.08	8.01	8.10	8.15	8.25	8.32	8.31	8.27	8.31	8.34	8.42	8.44	8.29
70000	8.20	8.21	8.08	8.01	8.11	8.17	8.26	8.27	8.31	8.28	8.31	8.35	8.44	8.41	8.27
80000	8.22	8.21	8.06	8.01	8.11	8.18	8.27	8.23	8.31	8.29	8.32	8.36	8.45	8.39	8.26
90000	8.22	8.22	8.06	8.00	8.12	8.19	8.27	8.20	8.31	8.29	8.33	8.38	8.45	8.37	8.23
100000	8.22	8.22	8.07	8.00	8.13	8.19	8.27	8.18	8.30	8.29	8.34	8.39	8.45	8.36	8.21
110000	8.23	8.23	8.08	8.00	8.12	8.20	8.27	8.17	8.29	8.30	8.37	8.40	8.45	8.34	8.21
120000	8.23	8.24	8.09	7.98	8.14	8.17	8.27	8.17	8.28	8.31	8.37	8.42	8.43	8.20	8.20
130000	8.22	8.25	8.11	8.00	8.15	8.18	8.27	8.17	8.28	8.33	8.39	8.45	8.42	8.21	8.19
140000	8.23	8.26	8.13	8.01	8.16	8.19	8.26	8.18	8.28	8.34	8.40	8.46	8.42	8.21	8.20
150000	8.24	8.26	8.11	8.02	8.16	8.19	8.25	8.19	8.27	8.34	8.41	8.47	8.42	8.21	8.20
160000	8.24	8.25	8.11	8.04	8.17	8.21	8.25	8.21	8.27	8.35	8.42	8.48	8.41	8.20	8.20
170000	8.23	8.24	8.12	8.06	8.17	8.22	8.25	8.21	8.27	8.34	8.41	8.48	8.41	8.20	8.20
180000	8.22	8.23	8.11	8.07	8.17	8.21	8.25	8.23	8.26	8.34	8.42	8.49	8.40	8.21	8.21
190000	8.22	8.22	8.11	8.09	8.16	8.22	8.26	8.24	8.25	8.33	8.40	8.49	8.41	8.21	8.21
200000	8.21	8.20	8.11	8.09	8.14	8.21	8.28	8.26	8.24	8.31	8.38	8.48	8.40	8.22	8.22
210000	8.21	8.19	8.11	8.08	8.14	8.20	8.30	8.28	8.23	8.31	8.37	8.46	8.40	8.23	8.22
220000	8.22	8.17	8.09	8.07	8.13	8.19	8.32	8.28	8.23	8.29	8.37	8.45	8.39	8.23	8.24
230000	8.22	8.16	8.07	8.06	8.12	8.17	8.34	8.29	8.24	8.29	8.35	8.43	8.41	8.24	8.25
Daily Max	8.24	8.26	8.14	8.09	8.17	8.22	8.34	8.40	8.32	8.35	8.42	8.49	8.45	8.45	8.32
Daily Min	8.20	8.16	8.06	7.98	8.07	8.13	8.17	8.17	8.23	8.24	8.28	8.32	8.38	8.20	8.19
Average	8.22	8.22	8.10	8.03	8.13	8.18	8.25	8.27	8.28	8.30	8.35	8.41	8.41	8.31	8.24

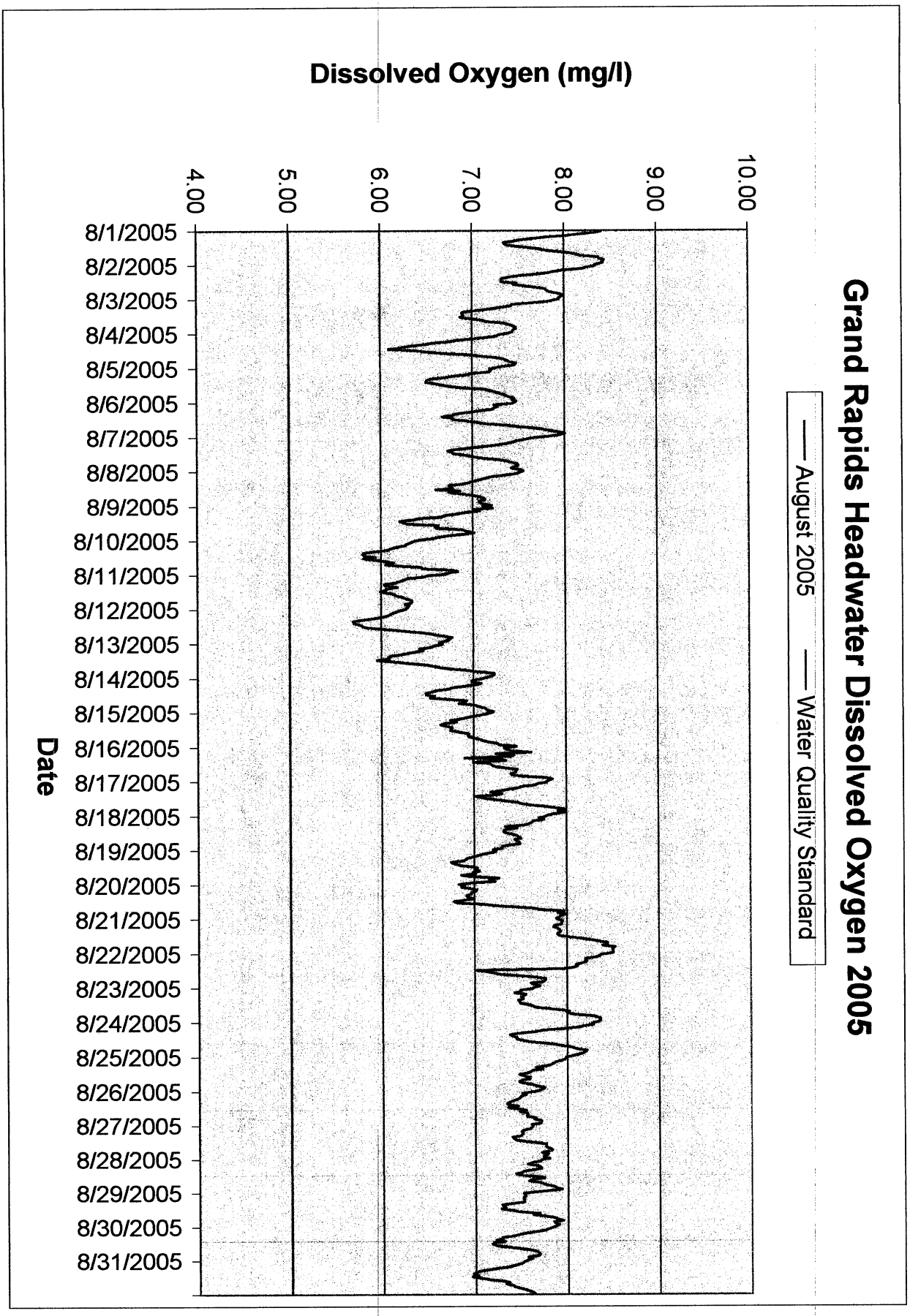
Grand Rapids Dam Tailrace pH Summary - September 2005

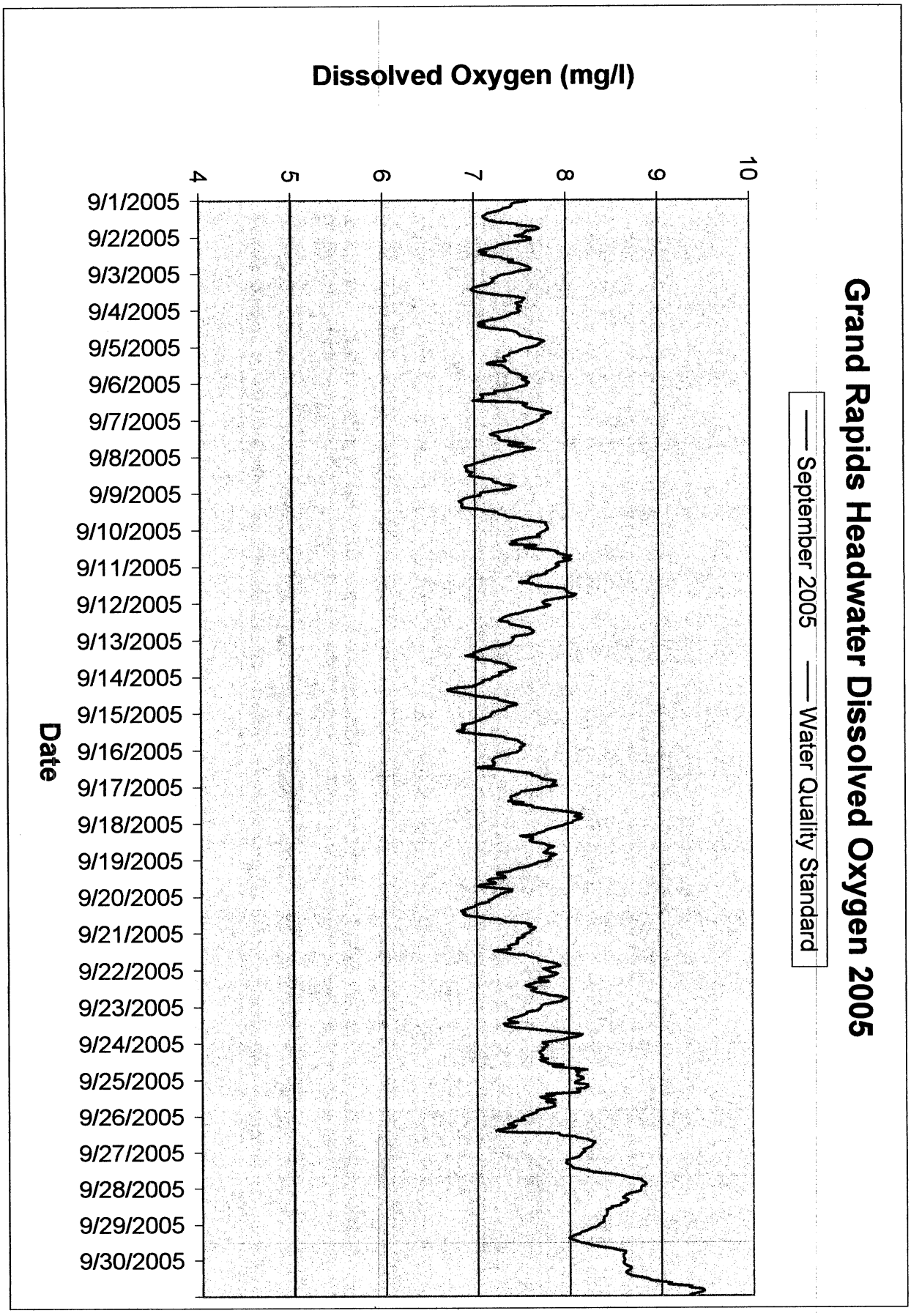
Time HHMMSS	09/01/05	09/02/05	09/03/05	09/04/05	09/05/05	09/06/05	09/07/05	09/08/05	09/09/05	09/10/05	09/11/05	09/12/05	09/13/05	09/14/05	09/15/05	09/16/05
0	8.26	8.24	8.25	8.22	8.25	8.26	8.03	8.02	7.99	8.05	8.11	8.14	8.09	8.02	8.00	8.06
10000	8.26	8.23	8.23	8.21	8.22	8.25	8.01	8.01	7.97	8.04	8.09	8.11	8.07	8.03	8.00	8.04
20000	8.27	8.24	8.22	8.20	8.24	8.26	8.01	8.00	7.95	8.02	8.08	8.11	8.06	8.03	8.01	8.04
30000	8.27	8.24	8.22	8.20	8.24	8.27	8.00	7.99	7.94	8.02	8.08	8.10	8.05	8.04	8.02	8.03
40000	8.27	8.24	8.22	8.19	8.24	8.27	8.01	7.98	7.94	8.02	8.07	8.10	8.05	8.05	8.02	8.04
50000	8.27	8.26	8.22	8.20	8.24	8.27	8.02	7.97	7.93	8.02	8.08	8.10	8.05	8.06	8.02	8.04
60000	8.28	8.26	8.22	8.19	8.24	8.28	8.02	7.97	7.93	8.02	8.08	8.10	8.05	8.06	8.02	8.04
70000	8.27	8.27	8.21	8.19	8.23	8.26	8.02	7.98	7.93	8.02	8.09	8.10	8.06	8.06	8.02	8.05
80000	8.28	8.28	8.23	8.20	8.23	8.26	8.03	7.98	7.93	8.02	8.09	8.10	8.07	8.05	8.03	8.05
90000	8.27	8.28	8.24	8.21	8.25	8.25	8.03	7.97	7.96	8.04	8.09	8.11	8.08	8.04	8.04	8.06
100000	8.27	8.29	8.25	8.22	8.25	8.26	8.04	7.97	7.96	8.05	8.10	8.11	8.09	8.03	8.05	8.07
110000	8.27	8.29	8.26	8.23	8.26	8.27	8.05	8.00	7.98	8.05	8.11	8.12	8.08	8.04	8.06	8.09
120000	8.26	8.30	8.26	8.24	8.28	8.06	8.06	8.00	8.00	8.07	8.12	8.13	8.11	8.05	8.07	8.12
130000	8.27	8.31	8.28	8.26	8.29	8.08	8.07	8.00	8.00	8.09	8.14	8.15	8.12	8.06	8.09	8.15
140000	8.27	8.32	8.29	8.28	8.31	8.09	8.10	8.03	8.03	8.11	8.16	8.16	8.12	8.07	8.10	8.18
150000	8.28	8.32	8.30	8.30	8.33	8.11	8.11	8.04	8.05	8.12	8.18	8.17	8.12	8.07	8.09	8.20
160000	8.28	8.32	8.30	8.31	8.33	8.11	8.11	8.06	8.06	8.14	8.21	8.18	8.13	8.07	8.11	8.22
170000	8.29	8.32	8.30	8.31	8.34	8.11	8.11	8.06	8.06	8.15	8.21	8.18	8.12	8.06	8.10	8.24
180000	8.30	8.32	8.30	8.31	8.32	8.11	8.11	8.06	8.06	8.16	8.19	8.18	8.10	8.06	8.10	8.25
190000	8.28	8.31	8.29	8.30	8.31	8.10	8.11	8.06	8.06	8.15	8.20	8.17	8.08	8.06	8.09	8.26
200000	8.27	8.31	8.26	8.29	8.30	8.09	8.10	8.05	8.06	8.14	8.19	8.16	8.07	8.04	8.08	8.25
210000	8.27	8.30	8.24	8.28	8.29	8.08	8.08	8.04	8.06	8.12	8.18	8.15	8.05	8.03	8.07	8.24
220000	8.25	8.29	8.24	8.28	8.29	8.06	8.06	8.03	8.06	8.12	8.17	8.13	8.04	8.01	8.06	8.22
230000	8.24	8.26	8.23	8.27	8.27	8.05	8.04	8.02	8.06	8.12	8.16	8.11	8.03	8.00	8.07	8.23
Daily Max	8.30	8.32	8.30	8.31	8.34	8.28	8.11	8.06	8.06	8.16	8.21	8.18	8.13	8.07	8.11	8.26
Daily Min	8.24	8.23	8.21	8.19	8.22	8.05	8.00	7.97	7.93	8.02	8.07	8.10	8.03	8.00	8.00	8.03
Average	8.27	8.28	8.25	8.25	8.27	8.18	8.06	8.01	8.00	8.08	8.13	8.13	8.08	8.05	8.06	8.13

License Range - 6.0 to 9.0 s.u.

Grand Rapids Dam Tailrace pH Summary - September 2005

Time HHMMSS	09/17/05	09/18/05	09/19/05	09/20/05	09/21/05	09/22/05	09/23/05	09/24/05	09/25/05	09/26/05	09/27/05	09/28/05	09/29/05	09/30/05
0	8.23	8.19	8.13	8.02	8.01	8.08	8.07	8.10	8.16	8.00	8.08	8.19	8.14	8.08
10000	8.21	8.19	8.12	8.01	8.00	8.07	8.05	8.08	8.14	7.99	8.08	8.19	8.14	8.08
20000	8.19	8.18	8.12	7.99	7.98	8.07	8.04	8.07	8.13	7.99	8.08	8.20	8.13	8.09
30000	8.17	8.18	8.11	7.98	7.99	8.06	8.03	8.07	8.13	7.99	8.08	8.21	8.12	8.10
40000	8.16	8.17	8.11	7.97	8.00	8.06	8.04	8.06	8.12	7.98	8.09	8.21	8.11	8.10
50000	8.15	8.16	8.11	7.97	8.01	8.08	8.04	8.05	8.12	7.98	8.09	8.21	8.10	8.11
60000	8.15	8.15	8.11	7.96	8.00	8.08	8.05	8.05	8.13	7.98	8.09	8.21	8.09	8.11
70000	8.15	8.16	8.11	7.96	8.01	8.08	8.05	8.06	8.13	7.97	8.09	8.21	8.08	8.11
80000	8.15	8.15	8.10	7.96	8.01	8.08	8.06	8.07	8.14	7.96	8.09	8.21	8.07	8.10
90000	8.15	8.15	8.10	7.96	8.01	8.09	8.05	8.09	8.15	7.96	8.09	8.20	8.06	8.10
100000	8.17	8.15	8.10	7.96	8.03	8.10	8.04	8.10	8.15	7.96	8.10	8.21	8.05	8.10
110000	8.17	8.16	8.11	7.97	8.03	8.11	8.07	8.11	8.15	7.97	8.11	8.20	8.04	8.11
120000	8.19	8.18	8.11	7.98	8.04	8.12	8.08	8.12	8.14	8.07	8.12	8.19	8.04	8.11
130000	8.20	8.18	8.11	8.00	8.06	8.13	8.10	8.15	8.14	8.09	8.13	8.19	8.04	8.11
140000	8.23	8.21	8.10	8.01	8.07	8.15	8.10	8.17	8.14	8.10	8.15	8.17	8.05	8.12
150000	8.26	8.22	8.10	8.03	8.09	8.16	8.12	8.18	8.12	8.11	8.16	8.16	8.06	8.14
160000	8.28	8.22	8.10	8.04	8.11	8.16	8.14	8.19	8.12	8.11	8.17	8.14	8.06	8.15
170000	8.28	8.23	8.10	8.05	8.11	8.16	8.15	8.19	8.11	8.12	8.19	8.15	8.08	8.17
180000	8.29	8.23	8.09	8.06	8.12	8.16	8.15	8.18	8.10	8.13	8.19	8.13	8.09	8.19
190000	8.28	8.22	8.09	8.07	8.11	8.16	8.15	8.18	8.08	8.12	8.20	8.14	8.09	8.20
200000	8.26	8.21	8.09	8.06	8.11	8.14	8.14	8.18	8.06	8.12	8.19	8.13	8.09	8.21
210000	8.24	8.19	8.07	8.06	8.11	8.12	8.13	8.17	8.05	8.12	8.19	8.13	8.09	8.22
220000	8.22	8.16	8.05	8.04	8.10	8.11	8.11	8.17	8.03	8.11	8.19	8.14	8.08	8.22
230000	8.20	8.15	8.04	8.04	8.09	8.09	8.11	8.16	8.01	8.10	8.18	8.14	8.08	8.22
Daily Max	8.29	8.23	8.13	8.07	8.12	8.16	8.15	8.19	8.16	8.13	8.20	8.21	8.14	8.22
Daily Min	8.15	8.15	8.04	7.96	7.98	8.06	8.03	8.05	8.01	7.96	8.08	8.13	8.04	8.08
Average	8.21	8.18	8.10	8.01	8.05	8.11	8.09	8.12	8.11	8.04	8.13	8.18	8.08	8.14





Grand Rapids Dam Headwater Dissolved Oxygen Summary - August 2005

Time HHMMSS	08/01/05	08/02/05	08/03/05	08/04/05	08/05/05	08/06/05	08/07/05	08/08/05	08/09/05	08/10/05	08/11/05	08/12/05	08/13/05	08/14/05	08/15/05	08/16/05
0	8.40	8.33	7.88	7.29	7.18	7.41	7.63	7.50	7.10	6.35	6.51	6.22	6.66	7.08	7.16	7.32
10000	8.31	8.24	7.81	7.26	7.20	7.22	7.57	7.46	7.21	6.32	6.45	6.16	6.57	6.98	7.07	7.36
20000	8.15	8.19	7.64	7.15	7.18	7.27	7.48	7.34	6.99	6.27	6.28	6.12	6.54	6.97	6.98	7.39
30000	8.02	7.98	7.43	7.00	7.00	7.23	7.43	7.20	7.07	6.26	6.25	6.09	6.40	7.08	6.90	7.62
40000	7.81	7.89	7.42	6.83	6.93	7.21	7.36	7.14	6.92	6.17	6.18	6.04	6.45	7.00	6.83	7.23
50000	7.68	7.81	7.33	6.75	6.78	7.08	7.27	7.08	6.83	6.09	6.14	5.98	6.37	6.88	6.74	7.43
60000	7.52	7.69	7.21	6.56	6.69	6.98	7.13	7.01	6.68	6.06	6.02	5.87	6.28	6.76	6.81	7.39
70000	7.44	7.50	7.11	6.47	6.54	6.84	6.94	6.95	6.65	5.92	6.06	5.75	6.20	6.72	6.68	6.89
80000	7.34	7.40	6.95	6.31	6.50	6.78	6.80	6.88	6.41	5.81	6.17	5.68	6.09	6.59	6.63	7.30
90000	7.35	7.32	6.88	6.21	6.49	6.66	6.72	6.73	6.34	5.79	6.05	5.70	6.08	6.54	6.70	7.34
100000	7.40	7.32	6.89	6.08	6.59	6.78	6.77	6.76	6.19	5.81	6.05	5.75	6.08	6.48	6.76	6.98
110000	7.53	7.31	6.90	6.37	6.66	6.78	6.79	6.78	6.24	5.93	5.98	5.78	5.94	6.48	6.76	7.16
120000	7.71	7.48	6.86	6.50	6.75	6.92	6.92	6.59	6.29	5.80	6.05	5.81	6.11	6.57	6.74	7.19
130000	7.77	7.44	6.98	6.67	6.88	7.03	6.99	6.86	6.62	5.92	6.13	5.96	6.26	6.52	6.85	7.23
140000	7.90	7.56	7.10	6.95	7.12	7.13	7.07	6.73	6.59	6.03	6.14	6.13	6.49	6.73	6.93	7.35
150000	8.05	7.68	7.15	7.07	7.18	7.34	7.24	6.86	6.59	6.13	6.22	6.33	6.56	6.92	6.94	7.47
160000	8.13	7.78	7.33	7.24	7.24	7.47	7.35	6.98	6.87	6.04	6.27	6.50	6.64	6.90	6.93	7.45
170000	8.18	7.80	7.39	7.33	7.30	7.63	7.41	7.06	6.93	6.19	6.32	6.57	6.76	6.83	7.00	7.45
180000	8.37	7.82	7.43	7.37	7.34	7.76	7.47	7.12	7.01	6.43	6.33	6.66	6.94	6.99	7.05	7.40
190000	8.37	7.90	7.46	7.39	7.37	7.86	7.49	7.13	6.89	6.44	6.32	6.77	7.04	7.04	7.10	7.40
200000	8.43	7.96	7.47	7.47	7.45	7.97	7.45	7.06	6.73	6.75	6.25	6.71	7.21	7.10	7.16	7.54
210000	8.42	7.98	7.44	7.45	7.42	8.00	7.41	7.07	6.62	6.83	6.30	6.73	7.22	7.13	7.25	7.78
220000	8.42	7.94	7.43	7.33	7.47	7.91	7.51	7.11	6.56	6.73	6.28	6.67	7.19	7.14	7.26	7.85
230000	8.34	7.94	7.39	7.25	7.46	7.81	7.55	7.20	6.41	6.68	6.27	6.62	7.14	7.21	7.46	7.80
Daily Max	8.43	8.33	7.88	7.47	7.47	8.00	7.63	7.50	7.21	6.83	6.51	6.77	7.22	7.21	7.46	7.85
Daily Min	7.34	7.31	6.86	6.08	6.49	6.66	6.72	6.59	6.19	5.79	5.98	5.68	5.94	6.48	6.63	6.89
Average	7.96	7.76	7.29	6.93	7.03	7.29	7.24	7.03	6.70	6.20	6.21	6.19	6.55	6.86	6.95	7.39

License Minimum Dissolved Oxygen: 5.0 mg/l

Grand Rapids Dam Headwater Dissolved Oxygen Summary - August 2005

Time HHMMSS	08/17/05	08/18/05	08/19/05	08/20/05	08/21/05	08/22/05	08/23/05	08/24/05	08/25/05	08/26/05	08/27/05	08/28/05	08/29/05	08/30/05	08/31/05
0	7.78	7.75	7.23	6.89	7.92	8.37	7.62	8.26	7.98	7.63	7.62	7.71	7.51	7.83	7.53
10000	7.68	7.69	7.18	6.85	7.95	8.36	7.49	8.28	7.98	7.50	7.61	7.70	7.52	7.77	7.50
20000	7.66	7.75	7.09	6.93	7.94	8.31	7.49	8.18	7.94	7.55	7.59	7.62	7.54	7.73	7.45
30000	7.50	7.64	7.04	7.02	7.94	8.20	7.42	8.12	7.88	7.50	7.52	7.56	7.51	7.63	7.40
40000	7.47	7.62	6.99	7.01	7.87	8.19	7.55	7.97	7.85	7.48	7.49	7.66	7.51	7.53	7.34
50000	7.36	7.59	6.92	6.96	7.85	8.21	7.53	7.74	7.82	7.45	7.51	7.69	7.52	7.46	7.22
60000	7.29	7.53	6.90	6.96	7.89	8.17	7.49	7.63	7.75	7.41	7.50	7.71	7.52	7.40	7.12
70000	7.17	7.33	6.87	6.91	7.91	8.09	7.52	7.47	7.65	7.37	7.48	7.63	7.40	7.28	7.03
80000	7.30	7.46	6.74	6.91	7.93	8.11	7.46	7.37	7.73	7.34	7.39	7.51	7.28	7.29	6.99
90000	7.23	7.34	6.78	6.99	7.90	8.07	7.48	7.40	7.62	7.35	7.41	7.50	7.29	7.21	6.96
100000	7.01	7.31	6.84	6.89	7.89	7.96	7.48	7.45	7.60	7.46	7.43	7.43	7.32	7.31	7.02
110000	7.11	7.33	6.98	6.77	7.91	7.00	7.56	7.44	7.55	7.35	7.51	7.47	7.27	7.19	6.95
120000	7.22	7.40	7.03	6.80	8.03	7.13	7.62	7.50	7.47	7.46	7.66	7.63	7.39	7.17	7.07
130000	7.34	7.45	6.99	7.08	8.15	7.21	7.64	7.58	7.53	7.55	7.76	7.74	7.46	7.23	7.15
140000	7.46	7.47	7.05	7.21	8.26	7.28	7.78	7.72	7.59	7.47	7.76	7.63	7.69	7.37	7.30
150000	7.51	7.50	6.97	7.44	8.34	7.47	7.92	7.86	7.59	7.56	7.76	7.57	7.62	7.48	7.36
160000	7.62	7.43	7.01	7.65	8.44	7.65	8.02	7.94	7.50	7.57	7.81	7.68	7.75	7.60	7.32
170000	7.77	7.45	6.85	7.70	8.44	7.76	7.99	8.04	7.47	7.55	7.83	7.73	7.85	7.66	7.39
180000	7.88	7.48	7.01	7.97	8.38	7.76	8.09	8.10	7.55	7.65	7.78	7.77	7.87	7.67	7.41
190000	7.98	7.49	7.26	7.89	8.52	7.74	8.28	8.21	7.63	7.63	7.71	7.85	7.94	7.69	7.47
200000	7.90	7.37	7.15	7.99	8.49	7.60	8.33	8.19	7.67	7.71	7.78	7.86	7.84	7.67	7.53
210000	7.98	7.30	7.22	7.93	8.49	7.65	8.36	8.17	7.75	7.71	7.75	7.93	7.86	7.56	7.57
220000	7.88	7.30	6.97	7.91	8.50	7.70	8.36	8.11	7.72	7.70	7.73	7.80	7.90	7.61	7.61
230000	7.79	7.19	6.82	7.88	8.49	7.64	8.34	8.05	7.70	7.60	7.80	7.64	7.87	7.56	7.63
Daily Max	7.98	7.75	7.26	7.99	8.52	8.37	8.36	8.28	7.98	7.71	7.83	7.93	7.94	7.83	7.63
Daily Min	7.01	7.19	6.74	6.77	7.85	7.00	7.42	7.37	7.47	7.34	7.39	7.43	7.27	7.17	6.95
Average	7.54	7.47	7.00	7.27	8.14	7.82	7.78	7.87	7.69	7.52	7.63	7.67	7.59	7.50	7.31

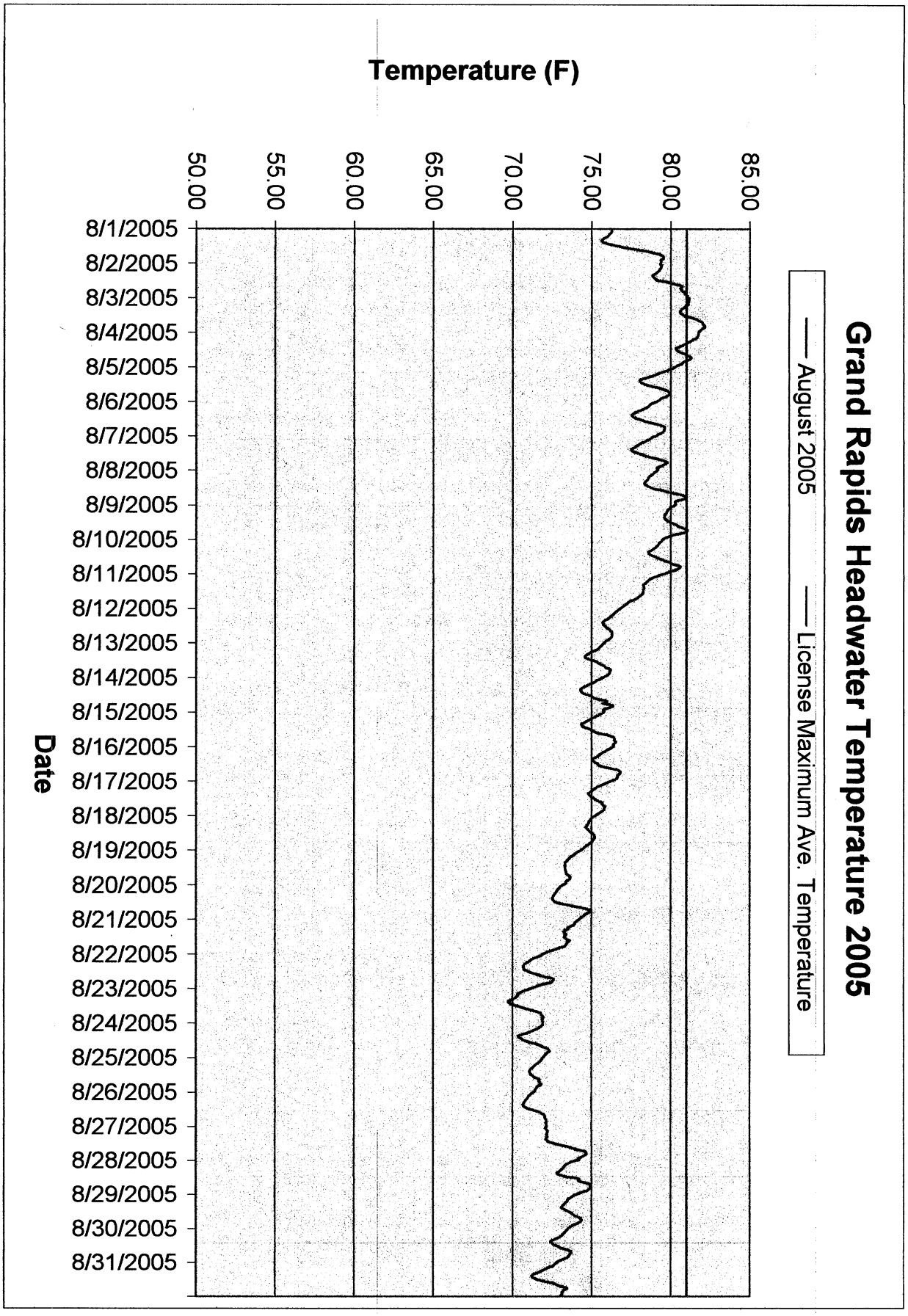
Grand Rapids Dam Headwater Dissolved Oxygen Summary - September 2005

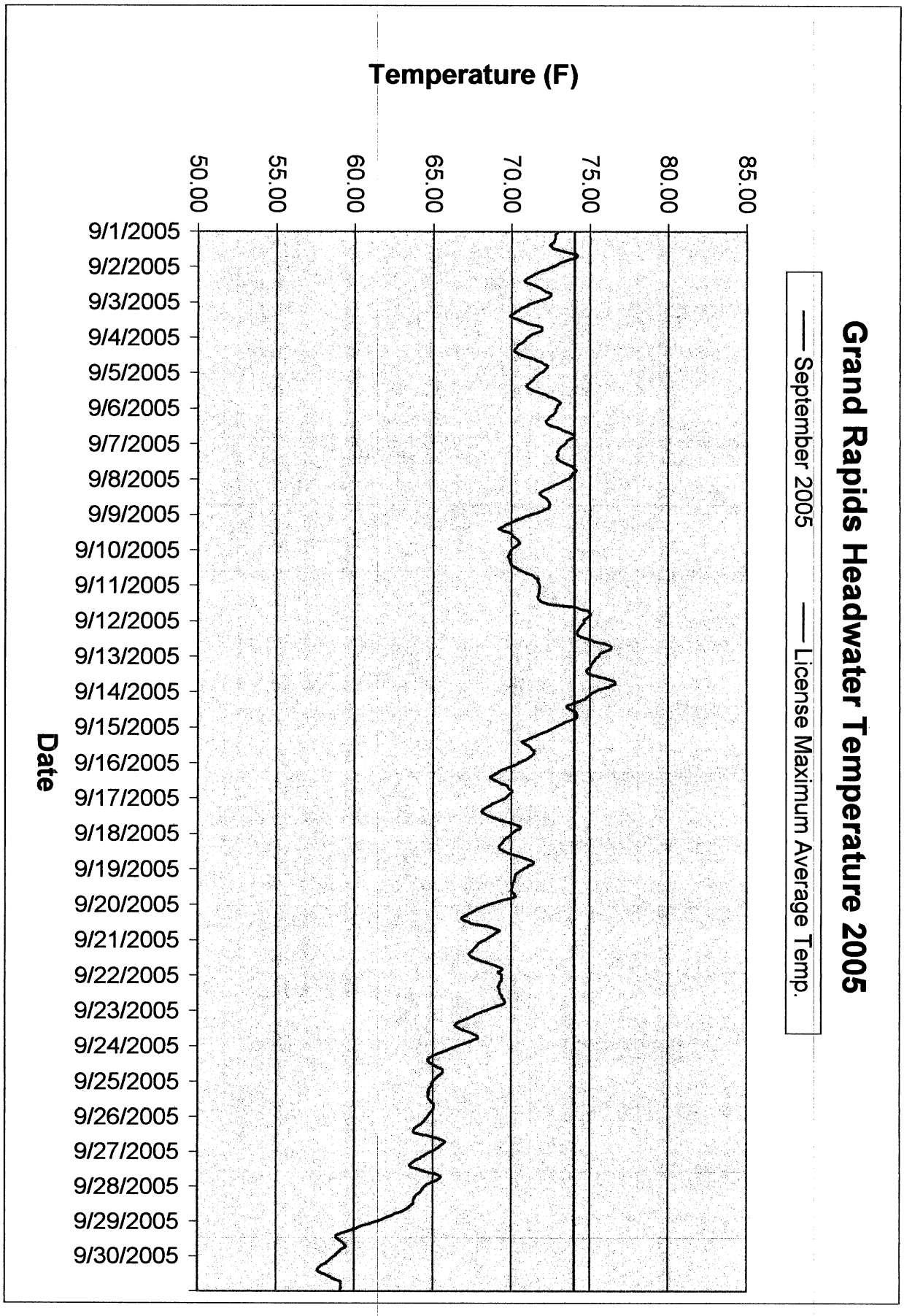
Time HHMMSS	09/01/05	09/02/05	09/03/05	09/04/05	09/05/05	09/06/05	09/07/05	09/08/05	09/09/05	09/10/05	09/11/05	09/12/05	09/13/05	09/14/05	09/15/05	09/16/05
0	7 58	7.60	7 35	7.50	7.61	7.56	7 69	7.23	7.05	7 76	7.88	7.74	7.40	7.18	7.16	7.47
10000	7 47	7 62	7 27	7.48	7.52	7.56	7.64	7.15	7.06	7.72	7.84	7 81	7.38	7.16	7.16	7 44
20000	7.41	7.55	7.25	7.40	7.49	7 47	7.61	7.11	6.93	7.71	7 81	7.74	7.35	7.07	7.12	7.36
30000	7.41	7.43	7.19	7.37	7.46	7.43	7.55	7.06	6 88	7.67	7.77	7.66	7.28	7.08	7.07	7.30
40000	7.39	7.35	7.21	7.32	7.38	7.35	7.53	7.00	6 86	7.70	7.78	7 62	7 15	7.04	7.04	7.22
50000	7.32	7.26	7.20	7.27	7.38	7 21	7.43	6 95	6.82	7.55	7.72	7.53	7.14	7 00	6.99	7.19
60000	7.30	7.25	7 17	7.18	7.32	7 23	7.39	6 88	6.85	7.48	7.63	7.48	7.08	6 95	6.94	7.18
70000	7.23	7 18	7.11	7.09	7.31	7.06	7.28	6.90	6.86	7 39	7.59	7.38	7.02	6.77	6.84	7 17
80000	7.15	7 08	7.04	7.04	7.33	7.08	7.20	6.91	6.85	7 45	7.58	7.34	6.97	6.68	6.88	7.20
90000	7.13	7.05	6.99	7.11	7.34	7.09	7.16	6.90	6.85	7.37	7 58	7.30	6.97	6.72	6.84	7.18
100000	7.10	7.13	6.96	7.04	7.16	7.07	7.23	6.97	7 05	7.66	7.47	7 28	6.88	6.81	6.87	7.19
110000	7.10	7.07	6.98	7.13	7.13	6.97	7.27	6.94	7 12	7.53	7.62	7.25	7 02	6.90	6.79	7 00
120000	7.13	7.17	7.07	7.25	7.31	7.48	7 26	6.93	7 23	7.64	7.65	7.36	7 00	6.98	6.85	7.24
130000	7.16	7.29	7.19	7.40	7.33	7.57	7 27	7.02	7.25	7.82	7.81	7.36	7.15	7.10	7.02	7.35
140000	7.27	7.31	7.32	7.46	7.35	7.52	7.42	7.13	7.32	7.90	7 96	7.43	7.21	7.23	7.18	7.48
150000	7.47	7.42	7.47	7.48	7.37	7.55	7.53	7.19	7.34	7.88	7 97	7.51	7.30	7.25	7.29	7.61
160000	7.47	7.37	7.55	7 49	7.38	7 59	7.36	7.19	7.47	7.97	7.99	7.59	7.33	7.33	7.31	7.59
170000	7.67	7.49	7.53	7 55	7.43	7 70	7 45	7 27	7.53	8.04	8.02	7.60	7.35	7.41	7.43	7.67
180000	7.71	7.53	7.52	7.64	7.49	7.77	7.65	7 29	7.65	7.95	8.09	7.63	7 43	7.44	7.46	7.69
190000	7.66	7.58	7 45	7.71	7.51	7.83	7.57	7.45	7.77	8.04	8.05	7.62	7.36	7.35	7.48	7.75
200000	7.56	7.61	7 47	7.76	7.57	7.76	7.51	7.40	7.76	8.00	7.93	7.56	7.33	7.33	7.53	7 86
210000	7.56	7.61	7.51	7.72	7.51	7.72	7.42	7.34	7.78	7.91	7.84	7.45	7.25	7.32	7.51	7 85
220000	7.53	7.49	7.48	7.70	7.55	7.75	7.38	7.21	7 78	7.87	7.76	7.39	7.27	7.23	7.47	7.82
230000	7.44	7.42	7.46	7 68	7.59	7 72	7.31	7.06	7 79	7.91	7.73	7.41	7.23	7.18	7.49	7.87
Daily Max	7.71	7.62	7.55	7.76	7 61	7.83	7.69	7.45	7.79	8.04	8.09	7.81	7.43	7.44	7.53	7.87
Daily Min	7.10	7.05	6 96	7.04	7.13	6.97	7.16	6.88	6.82	7.37	7.47	7.25	6.88	6.68	6.79	7.00
Average	7.38	7.37	7.28	7.41	7.41	7.46	7.42	7.10	7.24	7.75	7.79	7.50	7.20	7.10	7.16	7 45

License Minimum Dissolved Oxygen: 5.0 mg/l

Grand Rapids Dam Headwater Dissolved Oxygen Summary - September 2005

Time HHMMSS	09/17/05	09/18/05	09/19/05	09/20/05	09/21/05	09/22/05	09/23/05	09/24/05	09/25/05	09/26/05	09/27/05	09/28/05	09/29/05	09/30/05
0	7.73	7.97	7.76	7.19	7.53	7.79	7.69	7.71	8 09	7.50	8.13	8.77	8.31	8.59
10000	7.70	7.94	7.67	7.17	7 49	7.78	7 68	7.76	8.06	7.47	8.12	8.77	8.29	8.58
20000	7.56	7.86	7.64	7 12	7.51	7 87	7.65	7.74	8.05	7.51	8.10	8.75	8.23	8.58
30000	7.48	7.80	7.60	7 13	7.43	7.85	7.54	7.70	8.19	7 39	8 07	8.67	8.21	8.60
40000	7.47	7.75	7.54	7.07	7.45	7.78	7.54	7 72	8 20	7.38	8.01	8.62	8 17	8.64
50000	7.41	7.74	7 45	6.98	7.42	7.67	7.49	7 68	8.17	7.32	7.96	8.60	8.11	8.66
60000	7 37	7.66	7 40	6.98	7.44	7 66	7.44	7.67	8.07	7 41	7.97	8.57	8.10	8 65
70000	7 37	7 64	7.35	6.92	7.39	7 77	7.38	7.69	8.11	7.38	7.95	8.62	8.04	8 62
80000	7.38	7.47	7.23	6.87	7.33	7 62	7 33	7.71	8.09	7.25	7.99	8.63	8.00	8.60
90000	7.34	7.61	7.21	6.82	7.34	7.58	7 35	7.68	7.74	7.19	8.00	8.61	7.98	8.62
100000	7.51	7.61	7.28	6.87	7.36	7.52	7.44	7.76	7.83	7.32	8.02	8.55	8.02	8.66
110000	7.39	7.57	7.31	6 84	7.17	7.60	7.28	7.68	7 68	7.88	8.10	8.55	8 07	8.75
120000	7 61	7 60	7.16	6.87	7.27	7.64	7.30	7.72	7 72	7.88	8.19	8.45	8 12	8.83
130000	7 60	7 73	7.11	7 02	7.36	7 58	7.37	7.78	7.84	8.05	8.26	8.45	8.20	8.88
140000	7 72	7 76	7.17	7.09	7.53	7.64	7.54	7.93	7.74	8.09	8.43	8.39	8.24	8.97
150000	7.82	7.84	7.20	7.25	7.56	7.73	7.67	7.81	7.83	8.18	8.52	8.40	8.33	9.10
160000	7.99	7.79	7.05	7.29	7.64	7.76	7.86	7.97	7.82	8.23	8.59	8.40	8.46	9.06
170000	8.07	7.77	7.00	7.51	7.66	7.90	7.98	8.19	7 84	8.27	8.66	8.40	8 51	9.32
180000	8.14	7.76	7.21	7.59	7.74	7.98	8.14	8.06	7.78	8.26	8.77	8.39	8.60	9.29
190000	8.06	7 72	7 38	7.55	7.82	7.93	8.09	8.10	7.70	8.24	8.78	8.36	8.60	9.42
200000	8 15	7 86	7 38	7.63	7.87	7 92	8.01	8.08	7.63	8 23	8.81	8.37	8.58	9.46
210000	8 11	7 81	7.31	7.62	7.90	7 84	7.94	8.07	7.64	8 18	8.83	8.36	8.58	9.43
220000	8.06	7.78	7.25	7.58	7.81	7.72	7.87	8.13	7 59	8.14	8.81	8.37	8.58	9.36
230000	8.04	7.80	7.24	7.57	7 71	7.70	7.71	8.15	7 54	8.16	8.77	8.32	8.59	9.30
Daily Max	8.15	7.97	7.76	7.63	7.90	7.98	8.14	8.19	8.20	8.27	8.83	8.77	8.60	9.46
Daily Min	7.34	7 47	7 00	6.82	7.17	7.52	7.28	7.67	7.54	7.19	7.95	8.32	7.98	8.58
Average	7.71	7 74	7.33	7.19	7.53	7.74	7 64	7.85	7.87	7 79	8.33	8.52	8.29	8.92





Grand Rapids Dam Headwater Temperature Summary - August 2005

Time HHMMSS	08/01/05	08/02/05	08/03/05	08/04/05	08/05/05	08/06/05	08/07/05	08/08/05	08/09/05	08/10/05	08/11/05	08/12/05	08/13/05	08/14/05	08/15/05	08/16/05
0	76.24	79.29	81.16	81.75	80.13	78.89	78.85	79.05	80.11	79.41	79.30	76.69	75.70	75.58	75.67	76.21
10000	76.26	79.41	81.14	81.73	79.92	78.69	78.73	78.94	79.99	79.34	79.07	76.59	75.63	75.34	75.43	76.03
20000	76.21	79.39	81.12	81.70	79.68	78.64	78.55	78.84	79.90	79.23	78.80	76.48	75.52	75.18	75.24	75.87
30000	76.12	79.32	81.07	81.63	79.41	78.55	78.39	78.69	79.83	79.20	78.64	76.37	75.43	74.97	75.06	75.70
40000	76.05	79.25	81.10	81.46	79.21	78.35	78.19	78.60	79.74	79.11	78.55	76.26	75.25	74.77	74.91	75.58
50000	75.97	79.20	80.98	81.30	79.00	78.15	78.04	78.55	79.72	78.96	78.46	76.17	75.04	74.61	74.73	75.45
60000	75.79	79.09	80.83	81.12	78.71	77.94	77.90	78.49	79.63	78.85	78.35	76.05	74.88	74.44	74.59	75.33
70000	75.67	78.91	80.71	80.94	78.42	77.74	77.72	78.39	79.57	78.67	78.26	75.88	74.71	74.30	74.43	75.16
80000	75.56	78.82	80.64	80.78	78.10	77.56	77.54	78.31	79.56	78.58	78.28	75.78	74.61	74.26	74.34	75.00
90000	75.69	78.84	80.56	80.55	77.97	77.50	77.45	78.35	79.61	78.57	78.30	75.70	74.53	74.34	74.35	75.06
100000	75.96	78.93	80.58	80.33	78.06	77.59	77.58	78.49	79.70	78.71	78.24	75.69	74.64	74.39	74.61	75.13
110000	76.39	79.05	80.71	80.31	78.28	77.79	77.79	78.69	79.90	78.98	78.26	75.74	74.91	74.70	74.82	75.38
120000	76.87	79.61	80.85	80.40	78.53	78.12	78.10	78.89	80.06	79.09	78.24	75.85	75.24	74.95	75.00	75.40
130000	77.32	79.97	81.28	80.60	78.89	78.35	78.35	79.43	80.33	79.34	78.21	75.97	75.34	75.07	75.18	75.72
140000	77.90	80.31	81.59	80.80	79.30	78.69	78.64	79.66	80.38	79.54	78.10	76.12	75.61	75.33	75.54	76.10
150000	78.48	80.69	81.68	80.96	79.56	79.09	79.02	80.10	80.67	79.86	77.97	76.21	75.78	75.92	76.01	76.55
160000	78.85	80.71	81.95	81.16	79.79	79.39	79.34	80.51	80.96	80.08	77.83	76.30	75.83	75.96	76.26	76.69
170000	79.20	80.58	81.99	81.28	79.86	79.57	79.65	80.85	81.03	80.42	77.63	76.28	76.08	75.67	76.41	76.82
180000	79.36	80.67	82.04	81.23	79.95	79.63	79.75	80.98	80.91	80.60	77.43	76.28	76.21	76.21	76.44	76.78
190000	79.52	80.71	82.15	80.94	79.84	79.59	79.59	80.83	80.55	80.53	77.31	76.24	76.12	76.33	76.41	76.64
200000	79.52	80.85	82.15	80.80	79.59	79.54	79.38	80.38	80.10	80.38	77.18	76.15	76.14	76.12	76.53	76.60
210000	79.36	80.91	81.99	80.67	79.34	79.41	79.14	80.28	79.86	80.06	77.05	76.05	76.06	75.83	76.42	76.62
220000	79.38	81.03	81.82	80.44	79.29	79.21	79.07	80.26	79.63	79.79	76.93	75.90	75.87	75.69	76.33	76.50
230000	79.34	81.03	81.77	80.29	79.11	79.07	79.18	80.29	79.50	79.61	76.82	75.81	75.70	75.79	76.37	76.24
Daily Max	79.52	81.03	82.15	81.75	80.13	79.63	79.75	80.98	81.03	80.60	79.30	76.69	76.21	76.33	76.53	76.82
Daily Min	75.56	78.82	80.56	80.29	77.97	77.50	77.45	78.31	79.50	78.57	76.82	75.69	74.53	74.26	74.34	75.00
Average	77.38	79.86	81.33	80.97	79.16	78.63	78.58	79.41	80.05	79.45	78.05	76.11	75.45	75.24	75.46	75.94

Monthly Average Temperature: 75.62

License Maximum Monthly Average Temperature: 81

Grand Rapids Dam Headwater Temperature Summary - August 2005

Time HHMMSS	08/17/05	08/18/05	08/19/05	08/20/05	08/21/05	08/22/05	08/23/05	08/24/05	08/25/05	08/26/05	08/27/05	08/28/05	08/29/05	08/30/05	08/31/05
0	75.99	75.07	74.16	73.04	74.10	71.83	70.88	71.91	71.87	71.26	72.10	73.85	73.92	73.45	72.73
10000	75.79	74.98	74.03	72.95	73.99	71.60	70.66	71.85	71.82	71.13	72.03	73.62	73.80	73.36	72.64
20000	75.58	74.89	73.90	72.90	73.92	71.35	70.50	71.73	71.74	71.06	72.12	73.42	73.60	73.29	72.50
30000	75.36	74.84	73.78	72.81	73.87	71.17	70.32	71.58	71.65	70.97	72.21	73.31	73.47	73.22	72.25
40000	75.24	74.80	73.67	72.75	73.67	71.11	70.34	71.38	71.47	70.90	72.18	73.22	73.44	73.13	72.07
50000	75.11	74.73	73.58	72.72	73.49	70.95	70.27	71.17	71.37	70.83	72.12	73.17	73.36	73.00	71.89
60000	75.00	74.70	73.49	72.63	73.51	70.81	70.12	70.90	71.29	70.75	72.16	73.08	73.29	72.82	71.71
70000	74.88	74.62	73.38	72.57	73.27	70.70	69.93	70.59	71.17	70.68	72.18	72.95	73.20	72.64	71.47
80000	74.75	74.62	73.31	72.54	73.20	70.63	69.73	70.34	71.08	70.63	72.09	72.79	73.09	72.45	71.28
90000	74.82	74.71	73.31	72.52	73.33	70.68	69.73	70.34	71.04	70.66	72.09	72.84	73.06	72.37	71.20
100000	74.88	74.82	73.29	72.54	73.36	70.74	69.87	70.52	71.08	70.77	72.18	73.04	73.18	72.45	71.20
110000	75.09	74.97	73.31	72.63	73.24	70.92	70.14	70.63	71.11	70.99	72.43	73.22	73.36	72.57	71.37
120000	75.20	75.06	73.33	72.93	73.29	71.13	70.47	70.90	71.22	71.28	72.75	74.01	73.56	72.77	71.71
130000	75.38	75.15	73.33	73.40	73.36	71.42	70.74	71.19	71.33	71.55	73.11	74.19	73.72	72.99	72.10
140000	75.65	75.18	73.35	73.78	73.60	71.73	71.06	71.51	71.55	71.74	73.49	74.10	73.81	73.33	72.55
150000	75.61	75.15	73.36	74.28	73.47	71.94	71.37	71.74	71.71	71.92	73.83	74.52	74.03	73.56	72.72
160000	75.70	75.07	73.36	74.70	73.44	72.41	71.65	71.89	71.65	72.03	74.16	74.86	74.21	73.69	72.91
170000	75.83	75.04	73.53	74.88	73.38	72.61	71.80	72.16	71.71	72.01	74.57	74.86	74.34	73.63	73.26
180000	75.78	74.97	73.65	74.93	73.27	72.55	71.82	72.27	71.82	72.05	74.62	74.93	74.35	73.58	73.42
190000	75.78	74.84	73.65	74.77	72.93	72.43	71.94	72.32	71.58	72.12	74.64	74.93	74.25	73.56	73.26
200000	75.67	74.71	73.51	74.57	72.63	71.92	71.89	72.18	71.53	72.12	74.53	74.84	74.08	73.42	73.17
210000	75.54	74.61	73.35	74.46	72.34	71.62	71.85	72.07	71.47	72.10	74.39	74.68	73.83	73.22	73.09
220000	75.40	74.46	73.38	74.34	72.12	71.42	71.89	72.00	71.40	72.12	74.12	74.43	73.69	73.02	73.13
230000	75.22	74.34	73.18	74.23	71.92	71.20	71.92	71.96	71.40	72.16	74.19	74.14	73.56	72.86	73.02
Daily Max	75.99	75.18	74.16	74.93	74.10	72.61	71.94	72.32	71.87	72.16	74.64	74.93	74.35	73.69	73.42
Daily Min	74.75	74.34	73.18	72.52	71.92	70.63	69.73	70.34	71.04	70.63	72.03	72.79	73.06	72.37	71.20
Average	75.39	74.85	73.51	73.49	73.28	71.45	70.87	71.46	71.46	71.41	73.10	73.87	73.68	73.10	72.36

Grand Rapids Dam Headwater Temperature Summary - September 2005

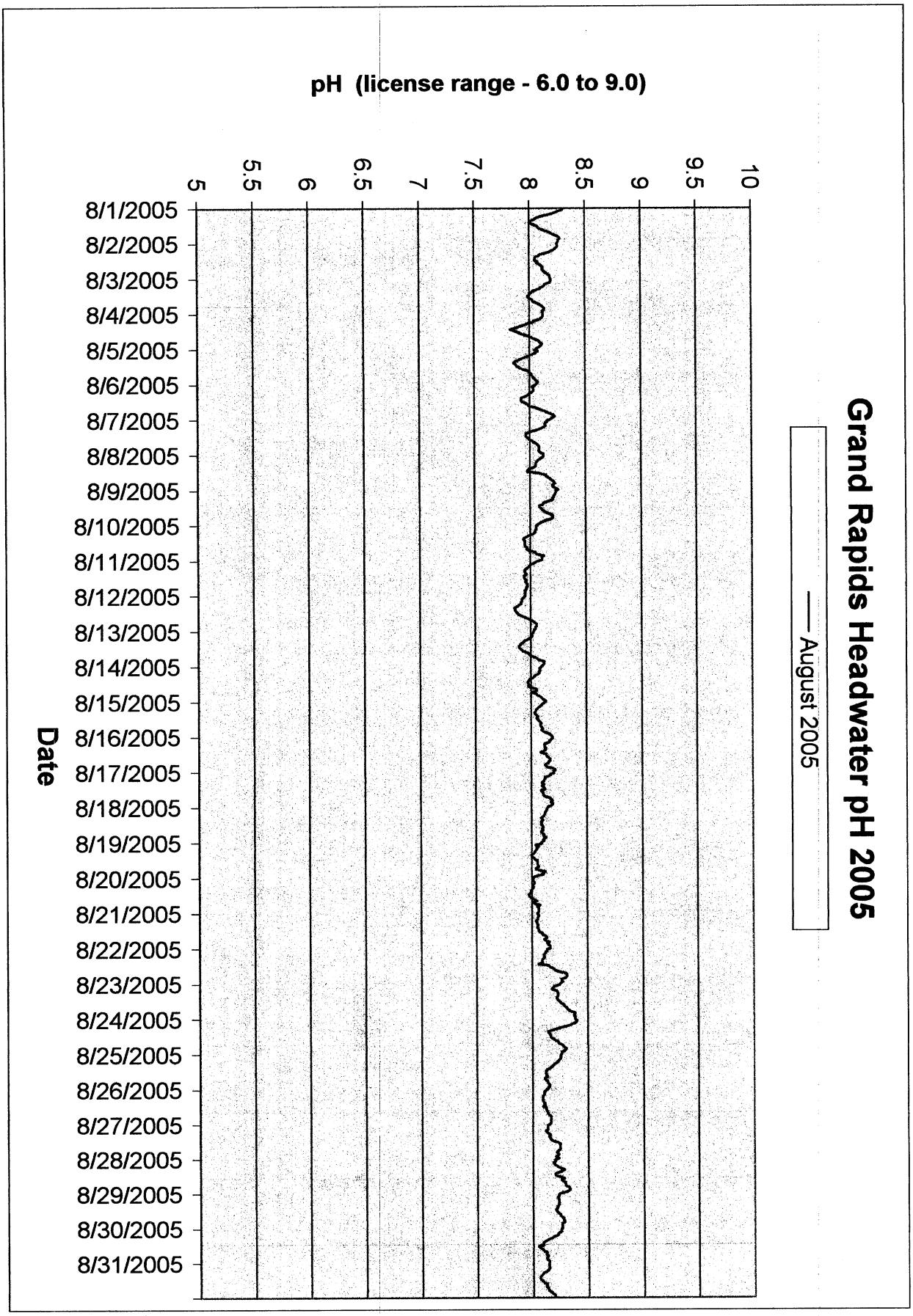
Time HHMMSS	09/01/05	09/02/05	09/03/05	09/04/05	09/05/05	09/06/05	09/07/05	09/08/05	09/09/05	09/10/05	09/11/05	09/12/05	09/13/05	09/14/05	09/15/05	09/16/05
0	72.90	72.45	71.37	70.90	71.74	72.81	73.33	73.36	71.04	69.91	71.78	74.61	75.43	75.13	72.63	70.36
10000	72.81	72.27	71.13	70.84	71.64	72.81	73.18	73.18	70.81	69.93	71.74	74.59	75.34	75.04	72.45	70.16
20000	72.77	72.01	70.92	70.75	71.51	72.75	73.09	73.00	70.54	69.85	71.74	74.46	75.29	74.93	72.21	69.89
30000	72.77	71.76	70.72	70.65	71.42	72.68	73.00	72.79	70.30	69.82	71.73	74.37	75.18	74.82	71.96	69.67
40000	72.75	71.53	70.56	70.50	71.37	72.57	72.97	72.57	70.09	69.73	71.74	74.32	75.16	74.68	71.76	69.42
50000	72.73	71.37	70.41	70.36	71.24	72.45	72.90	72.39	69.89	69.78	71.69	74.26	75.07	74.43	71.60	69.26
60000	72.70	71.20	70.23	70.29	71.15	72.34	72.95	72.19	69.67	69.87	71.69	74.21	75.04	74.23	71.35	69.12
70000	72.63	71.01	70.11	70.20	71.02	72.27	72.91	72.00	69.48	69.87	71.65	74.17	74.98	73.99	71.08	68.95
80000	72.50	70.88	69.93	70.14	70.92	72.18	72.86	71.83	69.30	69.89	71.67	74.16	74.88	73.69	70.88	68.79
90000	72.39	70.75	69.84	70.12	70.95	72.18	72.84	71.76	69.12	69.93	71.71	74.19	74.77	73.51	70.63	68.63
100000	72.52	70.86	70.05	70.30	71.08	72.23	72.90	71.80	69.31	70.00	71.85	74.41	74.77	73.49	70.70	68.63
110000	72.59	71.13	70.30	70.56	71.22	72.41	73.06	71.94	69.60	70.18	72.07	74.62	74.88	73.65	70.86	68.85
120000	72.97	71.37	70.54	70.79	71.47	72.70	73.24	72.10	69.89	70.32	72.36	74.93	75.11	73.83	71.02	69.03
130000	73.24	71.56	70.75	71.08	71.74	73.09	73.44	72.21	70.00	70.48	73.17	75.18	75.52	74.05	71.22	69.21
140000	73.62	71.80	71.06	71.38	72.07	73.17	73.71	72.28	70.05	70.70	74.05	75.58	75.87	74.12	71.26	69.51
150000	74.01	71.91	71.42	71.53	72.23	73.45	73.89	72.37	70.16	70.84	74.30	75.97	76.17	74.16	71.46	69.71
160000	74.16	72.07	71.74	71.80	72.54	73.65	73.89	72.41	70.30	71.17	74.77	76.21	76.46	74.16	71.42	69.75
170000	74.12	72.32	71.89	71.98	72.73	73.83	74.10	72.39	70.38	71.38	74.91	76.33	76.59	74.12	71.42	69.82
180000	73.81	72.50	71.89	72.21	72.84	73.96	74.07	72.37	70.47	71.42	74.98	76.35	76.60	73.92	71.35	70.02
190000	73.54	72.46	71.85	72.25	73.00	73.96	73.90	72.32	70.48	71.69	75.04	76.14	76.35	73.62	71.22	70.03
200000	73.26	72.34	71.56	72.21	73.09	73.72	73.83	72.03	70.34	71.67	74.95	75.94	76.23	73.35	71.08	69.96
210000	73.02	72.14	71.33	72.12	72.91	73.54	73.80	71.89	70.27	71.64	74.79	75.72	75.85	73.22	70.95	69.82
220000	72.84	71.89	71.15	72.05	72.90	73.49	73.72	71.60	70.03	71.71	74.68	75.56	75.49	72.99	70.70	69.73
230000	72.68	71.62	71.08	71.91	72.88	73.45	73.58	71.33	70.02	71.74	74.59	75.61	75.29	72.81	70.52	69.62
Daily Max	74.16	72.50	71.89	72.25	73.09	73.96	74.10	73.36	71.04	71.74	75.04	76.35	76.60	75.13	72.63	70.36
Daily Min	72.39	70.75	69.84	70.12	70.92	72.18	72.84	71.33	69.12	69.73	71.65	74.16	74.77	72.81	70.52	68.63
Average	73.06	71.72	70.91	71.12	71.90	72.99	73.38	72.26	70.06	70.56	73.07	75.08	75.51	74.00	71.32	69.50

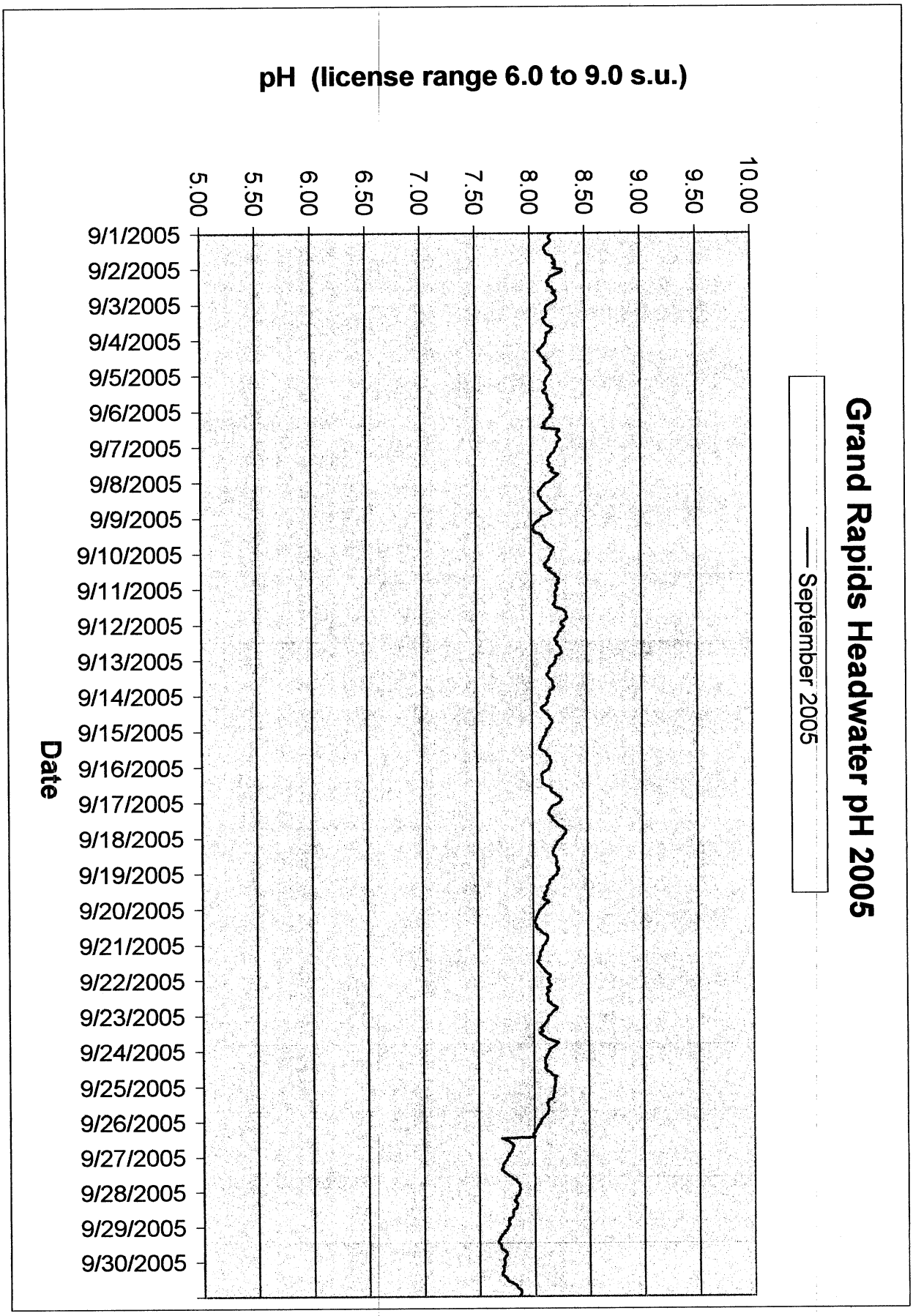
Monthly Average: 68.64

License Maximum Monthly Average Temperature: 74 F

Grand Rapids Dam Headwater Temperature Summary - September 2005

Time HHMMSS	09/17/05	09/18/05	09/19/05	09/20/05	09/21/05	09/22/05	09/23/05	09/24/05	09/25/05	09/26/05	09/27/05	09/28/05	09/29/05	09/30/05
0	69.46	69.98	70.65	68.38	68.16	69.35	68.09	66.38	64.98	64.58	64.78	64.42	61.21	58.66
10000	69.26	69.87	70.48	68.14	67.98	69.30	67.87	66.15	64.90	64.53	64.60	64.31	60.94	58.51
20000	69.03	69.71	70.32	67.93	67.84	69.37	67.69	65.89	64.89	64.45	64.45	64.26	60.62	58.41
30000	68.81	69.58	70.27	67.71	67.78	69.37	67.53	65.66	64.85	64.38	64.29	64.24	60.37	58.30
40000	68.65	69.48	70.23	67.53	67.73	69.26	67.32	65.41	64.78	64.26	64.13	64.11	60.15	58.21
50000	68.47	69.42	70.20	67.35	67.62	69.24	67.08	65.19	64.72	64.09	63.93	63.99	59.88	58.03
60000	68.36	69.35	70.20	67.21	67.53	69.21	66.87	64.99	64.71	63.97	63.82	63.86	59.59	57.88
70000	68.22	69.28	70.16	67.05	67.46	69.13	66.65	64.83	64.67	63.88	63.68	63.82	59.34	57.76
80000	68.13	69.19	70.11	66.87	67.32	69.15	66.49	64.67	64.72	63.79	63.54	63.79	59.07	57.67
90000	68.09	69.19	70.05	66.76	67.24	69.22	66.36	64.63	64.69	63.72	63.46	63.77	58.82	57.63
100000	68.27	69.24	70.07	66.92	67.33	69.24	66.43	64.71	64.67	63.75	63.55	63.75	58.84	57.63
110000	68.47	69.42	70.05	67.19	67.46	69.24	66.60	64.78	64.71	64.06	63.84	63.75	58.80	57.81
120000	68.63	69.64	70.03	67.33	67.66	69.26	66.76	64.94	64.76	64.49	64.18	63.63	58.96	58.06
130000	68.92	69.89	69.98	67.73	67.91	69.39	67.03	65.12	64.87	64.83	64.47	63.54	59.04	58.30
140000	69.17	70.25	69.94	68.38	68.25	69.35	67.32	65.35	64.96	65.14	64.83	63.43	59.20	58.48
150000	69.49	70.54	70.02	68.74	68.50	69.40	67.55	65.53	65.03	65.48	65.23	63.32	59.31	58.60
160000	69.93	70.75	70.07	69.01	68.76	69.51	67.71	65.61	65.05	65.70	65.37	63.16	59.38	58.89
170000	70.14	71.08	70.21	69.24	69.04	69.57	67.86	65.61	65.05	65.77	65.48	62.87	59.47	59.11
180000	70.41	71.33	70.27	69.06	69.31	69.58	67.87	65.53	65.01	65.68	65.39	62.60	59.29	59.14
190000	70.59	71.38	69.96	68.94	69.42	69.46	67.60	65.39	64.96	65.52	65.25	62.44	59.09	59.13
200000	70.52	71.37	69.58	68.83	69.35	69.19	67.37	65.30	64.90	65.39	65.03	62.20	59.04	59.14
210000	70.29	71.08	69.21	68.61	69.15	68.90	67.10	65.21	64.80	65.28	64.83	61.95	58.93	59.13
220000	70.16	71.04	68.92	68.50	69.17	68.61	66.87	65.14	64.72	65.12	64.63	61.72	58.84	59.11
230000	70.07	70.79	68.59	68.38	69.37	68.32	66.60	65.01	64.65	64.96	64.53	61.48	58.77	59.11
Daily Max	70.59	71.38	70.65	69.24	69.42	69.58	68.09	66.38	65.05	65.77	65.48	64.42	61.21	59.14
Daily Min	68.09	69.19	68.59	66.76	67.24	68.32	66.36	64.63	64.65	63.72	63.46	61.48	58.77	57.63
Average	69.23	70.12	69.98	67.99	68.22	69.23	67.19	65.29	64.84	64.70	64.47	63.35	59.46	58.45





Grand Rapids Dam Headwater pH Summary - August 2005

Time HHMMSS	08/01/05	08/02/05	08/03/05	08/04/05	08/05/05	08/06/05	08/07/05	08/08/05	08/09/05	08/10/05	08/11/05	08/12/05	08/13/05	08/14/05	08/15/05	08/16/05
0	8.30	8.24	8.19	8.12	8.04	8.05	8.15	8.12	8.23	8.05	8.06	7.94	8.02	8.09	8.12	8.19
10000	8.28	8.25	8.19	8.12	8.07	8.01	8.15	8.11	8.23	8.05	8.03	7.93	8.01	8.07	8.10	8.18
20000	8.24	8.25	8.18	8.11	8.05	8.03	8.13	8.09	8.22	8.05	8.00	7.92	8.00	8.08	8.09	8.16
30000	8.21	8.23	8.14	8.09	8.02	8.03	8.14	8.07	8.21	8.04	7.99	7.92	8.01	8.07	8.07	8.16
40000	8.16	8.21	8.13	8.05	7.99	8.03	8.13	8.06	8.21	8.04	7.98	7.91	8.00	8.07	8.06	8.12
50000	8.11	8.18	8.12	8.03	7.95	8.01	8.10	8.05	8.20	8.03	7.96	7.91	7.98	8.05	8.04	8.12
60000	8.07	8.15	8.09	7.99	7.92	7.99	8.07	8.05	8.20	7.99	7.95	7.89	7.95	8.03	8.04	8.12
70000	8.04	8.10	8.06	7.95	7.89	7.97	8.03	8.05	8.16	7.97	7.95	7.87	7.93	8.02	8.03	8.12
80000	8.01	8.08	8.03	7.90	7.86	7.94	7.99	8.03	8.12	7.94	7.95	7.85	7.91	7.99	8.03	8.13
90000	8.01	8.05	8.01	7.87	7.85	7.92	7.96	7.99	8.11	7.93	7.96	7.85	7.90	7.98	8.05	8.11
100000	8.01	8.05	8.00	7.82	7.87	7.92	7.96	7.98	8.08	7.94	7.94	7.86	7.89	7.97	8.06	8.08
110000	8.04	8.04	7.99	7.86	7.88	7.92	7.96	7.97	8.08	7.95	7.94	7.87	7.89	7.97	8.04	8.13
120000	8.07	8.07	7.98	7.89	7.90	7.95	7.98	8.07	8.09	7.94	7.94	7.88	7.91	7.98	8.06	8.13
130000	8.08	8.06	8.00	7.91	7.93	7.97	7.99	8.14	8.11	7.95	7.96	7.91	7.92	7.97	8.07	8.14
140000	8.11	8.09	8.02	7.96	7.97	7.99	8.01	8.14	8.12	7.95	7.95	7.94	7.96	8.00	8.09	8.15
150000	8.15	8.10	8.03	8.00	7.99	8.04	8.03	8.16	8.14	7.97	7.96	7.97	7.98	8.05	8.08	8.17
160000	8.18	8.12	8.06	8.02	8.00	8.07	8.05	8.18	8.19	7.96	7.97	7.99	7.99	8.04	8.08	8.16
170000	8.20	8.11	8.08	8.06	8.01	8.11	8.07	8.19	8.20	8.00	7.97	8.01	8.02	8.00	8.09	8.15
180000	8.23	8.12	8.10	8.08	8.02	8.14	8.08	8.21	8.20	8.04	7.96	8.04	8.05	8.04	8.10	8.13
190000	8.26	8.13	8.12	8.09	8.03	8.17	8.08	8.22	8.19	8.05	7.96	8.05	8.06	8.05	8.09	8.12
200000	8.27	8.15	8.13	8.11	8.04	8.20	8.08	8.20	8.14	8.12	7.95	8.05	8.12	8.08	8.11	8.13
210000	8.26	8.17	8.12	8.10	8.05	8.22	8.07	8.20	8.11	8.10	7.95	8.04	8.12	8.09	8.15	8.19
220000	8.26	8.18	8.11	8.08	8.07	8.20	8.09	8.22	8.08	8.10	7.95	8.04	8.11	8.10	8.16	8.21
230000	8.25	8.18	8.12	8.06	8.06	8.18	8.12	8.25	8.06	8.10	7.95	8.03	8.10	8.13	8.18	8.20
Daily Max	8.30	8.25	8.19	8.12	8.07	8.22	8.15	8.25	8.23	8.12	8.06	8.05	8.12	8.13	8.18	8.21
Daily Min	8.01	8.04	7.98	7.82	7.85	7.92	7.96	7.97	8.06	7.93	7.94	7.85	7.89	7.97	8.03	8.08
Average	8.16	8.14	8.08	8.01	7.98	8.04	8.06	8.11	8.15	8.01	7.97	7.94	7.99	8.04	8.08	8.15

License pH range - 6.0 to 9.0 s.u.

Grand Rapids Dam Headwater pH Summary - August 2005

Time HHMMSS	08/17/05	08/18/05	08/19/05	08/20/05	08/21/05	08/22/05	08/23/05	08/24/05	08/25/05	08/26/05	08/27/05	08/28/05	08/29/05	08/30/05	08/31/05
0	8.20	8.14	8.09	8.01	8.04	8.13	8.24	8.38	8.25	8.12	8.13	8.20	8.23	8.25	8.14
10000	8.17	8.13	8.03	8.00	8.06	8.13	8.20	8.40	8.25	8.10	8.13	8.20	8.23	8.25	8.13
20000	8.16	8.13	8.06	8.01	8.05	8.12	8.18	8.38	8.25	8.10	8.13	8.18	8.22	8.24	8.14
30000	8.12	8.12	8.04	8.02	8.05	8.11	8.17	8.35	8.24	8.10	8.13	8.18	8.22	8.22	8.14
40000	8.12	8.12	8.04	8.01	8.04	8.10	8.21	8.31	8.23	8.09	8.11	8.20	8.23	8.22	8.13
50000	8.11	8.11	8.03	8.00	8.03	8.11	8.22	8.26	8.22	8.09	8.12	8.22	8.23	8.19	8.12
60000	8.10	8.10	8.02	8.01	8.04	8.10	8.23	8.22	8.20	8.09	8.14	8.25	8.23	8.17	8.09
70000	8.09	8.08	8.01	8.00	8.04	8.09	8.23	8.17	8.18	8.09	8.15	8.28	8.23	8.14	8.08
80000	8.11	8.10	7.99	7.99	8.05	8.09	8.22	8.14	8.17	8.09	8.14	8.26	8.22	8.11	8.07
90000	8.09	8.08	8.00	7.99	8.04	8.09	8.21	8.14	8.15	8.10	8.15	8.21	8.21	8.09	8.06
100000	8.11	8.09	8.01	7.98	8.05	8.05	8.22	8.15	8.13	8.11	8.15	8.20	8.21	8.09	8.06
110000	8.12	8.08	8.03	7.97	8.06	8.14	8.23	8.16	8.12	8.09	8.17	8.20	8.20	8.09	8.06
120000	8.08	8.09	8.05	7.97	8.06	8.16	8.24	8.16	8.12	8.12	8.21	8.25	8.21	8.04	8.08
130000	8.09	8.10	8.05	7.99	8.09	8.19	8.26	8.18	8.12	8.12	8.24	8.28	8.22	8.05	8.09
140000	8.10	8.09	8.05	8.01	8.09	8.20	8.28	8.20	8.12	8.12	8.24	8.25	8.24	8.08	8.12
150000	8.10	8.10	8.05	8.04	8.12	8.23	8.29	8.23	8.13	8.13	8.24	8.26	8.24	8.09	8.12
160000	8.11	8.08	8.06	8.00	8.13	8.29	8.31	8.23	8.10	8.13	8.24	8.29	8.26	8.12	8.11
170000	8.15	8.09	8.03	8.02	8.10	8.31	8.31	8.26	8.11	8.14	8.24	8.29	8.27	8.11	8.13
180000	8.17	8.11	8.06	8.07	8.12	8.31	8.33	8.27	8.13	8.16	8.22	8.29	8.27	8.12	8.13
190000	8.18	8.10	8.12	8.04	8.15	8.30	8.37	8.29	8.13	8.16	8.21	8.32	8.28	8.13	8.14
200000	8.17	8.13	8.09	8.06	8.14	8.26	8.38	8.30	8.14	8.16	8.23	8.32	8.26	8.12	8.16
210000	8.19	8.10	8.10	8.06	8.14	8.26	8.37	8.29	8.15	8.16	8.22	8.33	8.26	8.12	8.17
220000	8.18	8.11	8.04	8.06	8.16	8.27	8.38	8.26	8.14	8.16	8.20	8.30	8.26	8.14	8.19
230000	8.15	8.09	8.01	8.05	8.16	8.25	8.38	8.26	8.14	8.15	8.23	8.25	8.26	8.14	8.19
Daily Max	8.20	8.14	8.12	8.07	8.16	8.31	8.38	8.40	8.25	8.16	8.24	8.33	8.28	8.25	8.19
Daily Min	8.08	8.08	7.99	7.97	8.03	8.05	8.17	8.14	8.10	8.09	8.11	8.18	8.20	8.04	8.06
Average	8.13	8.10	8.04	8.02	8.08	8.18	8.27	8.25	8.16	8.12	8.18	8.25	8.24	8.14	8.12

Grand Rapids Dam Headwater pH Summary - September 2005

Time HHMMSS	09/01/05	09/02/05	09/03/05	09/04/05	09/05/05	09/06/05	09/07/05	09/08/05	09/09/05	09/10/05	09/11/05	09/12/05	09/13/05	09/14/05	09/15/05	09/16/05
0	8.19	8.29	8.17	8.14	8.16	8.19	8.23	8.14	8.09	8.18	8.23	8.27	8.21	8.15	8.13	8.15
10000	8.18	8.29	8.15	8.14	8.15	8.20	8.22	8.12	8.08	8.17	8.22	8.29	8.21	8.15	8.12	8.15
20000	8.17	8.28	8.14	8.13	8.14	8.18	8.22	8.12	8.05	8.16	8.21	8.28	8.20	8.13	8.12	8.13
30000	8.17	8.25	8.14	8.12	8.14	8.18	8.21	8.10	8.04	8.16	8.21	8.26	8.19	8.14	8.11	8.11
40000	8.18	8.21	8.14	8.11	8.13	8.17	8.20	8.09	8.03	8.16	8.22	8.26	8.17	8.14	8.10	8.09
50000	8.19	8.18	8.14	8.10	8.13	8.15	8.18	8.08	8.02	8.14	8.21	8.24	8.16	8.13	8.10	8.08
60000	8.17	8.18	8.15	8.08	8.13	8.15	8.18	8.07	8.02	8.13	8.22	8.24	8.16	8.12	8.09	8.08
70000	8.16	8.17	8.14	8.07	8.14	8.12	8.16	8.07	8.02	8.11	8.22	8.23	8.16	8.10	8.08	8.09
80000	8.14	8.16	8.14	8.07	8.14	8.11	8.16	8.07	8.02	8.13	8.21	8.23	8.15	8.08	8.08	8.09
90000	8.13	8.15	8.11	8.09	8.13	8.13	8.15	8.07	8.02	8.12	8.21	8.21	8.14	8.08	8.07	8.09
100000	8.13	8.17	8.12	8.09	8.11	8.12	8.16	8.09	8.06	8.17	8.19	8.21	8.13	8.10	8.07	8.09
110000	8.13	8.16	8.12	8.11	8.11	8.10	8.17	8.08	8.08	8.15	8.21	8.21	8.15	8.11	8.06	8.09
120000	8.14	8.19	8.13	8.12	8.14	8.26	8.16	8.09	8.10	8.17	8.21	8.23	8.15	8.12	8.07	8.11
130000	8.14	8.20	8.14	8.13	8.15	8.26	8.16	8.10	8.10	8.19	8.26	8.22	8.17	8.14	8.10	8.14
140000	8.16	8.20	8.16	8.14	8.15	8.24	8.19	8.12	8.11	8.22	8.29	8.24	8.18	8.16	8.12	8.16
150000	8.20	8.23	8.19	8.12	8.15	8.24	8.20	8.13	8.11	8.21	8.30	8.25	8.19	8.15	8.13	8.17
160000	8.20	8.20	8.20	8.14	8.16	8.23	8.18	8.14	8.13	8.23	8.31	8.26	8.19	8.17	8.13	8.16
170000	8.21	8.22	8.19	8.15	8.16	8.25	8.20	8.15	8.14	8.25	8.31	8.26	8.19	8.18	8.16	8.18
180000	8.22	8.23	8.17	8.17	8.17	8.26	8.25	8.16	8.17	8.23	8.31	8.27	8.20	8.18	8.16	8.20
190000	8.23	8.24	8.14	8.18	8.18	8.27	8.24	8.19	8.19	8.25	8.32	8.27	8.19	8.17	8.16	8.22
200000	8.20	8.24	8.15	8.19	8.20	8.25	8.22	8.18	8.20	8.24	8.30	8.25	8.17	8.16	8.17	8.25
210000	8.23	8.23	8.15	8.19	8.18	8.24	8.20	8.16	8.20	8.22	8.29	8.22	8.16	8.16	8.17	8.25
220000	8.23	8.21	8.14	8.18	8.17	8.24	8.18	8.13	8.19	8.22	8.27	8.21	8.16	8.14	8.16	8.26
230000	8.21	8.18	8.14	8.17	8.20	8.24	8.17	8.09	8.18	8.23	8.26	8.22	8.16	8.13	8.16	8.25
Daily Max	8.23	8.29	8.20	8.19	8.20	8.27	8.25	8.19	8.20	8.25	8.32	8.29	8.21	8.18	8.17	8.26
Daily Min	8.13	8.15	8.11	8.07	8.11	8.10	8.15	8.07	8.02	8.11	8.19	8.21	8.13	8.08	8.06	8.08
Average	8.18	8.21	8.15	8.13	8.15	8.20	8.19	8.11	8.10	8.19	8.25	8.24	8.17	8.14	8.12	8.15

License Range - 6.0 to 9.0 s.u.

Grand Rapids Dam Headwater pH Summary - September 2005

Time HHMMSS	09/17/05	09/18/05	09/19/05	09/20/05	09/21/05	09/22/05	09/23/05	09/24/05	09/25/05	09/26/05	09/27/05	09/28/05	09/29/05	09/30/05
0	8.24	8.27	8.22	8.06	8.09	8.14	8.13	8.14	8.18	8.05	7.75	7.86	7.75	7.72
10000	8.22	8.25	8.20	8.05	8.08	8.13	8.13	8.13	8.18	8.05	7.75	7.85	7.75	7.72
20000	8.18	8.23	8.18	8.05	8.08	8.14	8.13	8.12	8.18	8.03	7.74	7.85	7.74	7.72
30000	8.17	8.22	8.18	8.04	8.08	8.16	8.12	8.11	8.18	8.03	7.73	7.83	7.72	7.70
40000	8.16	8.22	8.15	8.03	8.07	8.15	8.11	8.11	8.18	8.02	7.72	7.83	7.72	7.71
50000	8.15	8.20	8.15	8.03	8.06	8.12	8.10	8.10	8.17	8.01	7.71	7.82	7.70	7.71
60000	8.15	8.20	8.15	8.02	8.06	8.12	8.09	8.10	8.17	8.01	7.71	7.81	7.70	7.71
70000	8.14	8.19	8.14	8.02	8.06	8.14	8.08	8.10	8.17	8.00	7.71	7.82	7.68	7.70
80000	8.14	8.19	8.13	8.01	8.05	8.13	8.06	8.10	8.16	7.99	7.70	7.84	7.68	7.70
90000	8.16	8.18	8.12	8.01	8.05	8.11	8.07	8.10	8.12	7.99	7.70	7.84	7.67	7.70
100000	8.18	8.18	8.13	8.02	8.05	8.12	8.08	8.11	8.13	8.00	7.72	7.83	7.66	7.72
110000	8.17	8.18	8.12	8.03	8.03	8.13	8.05	8.10	8.11	7.70	7.73	7.83	7.67	7.73
120000	8.19	8.19	8.12	8.02	8.04	8.13	8.05	8.10	8.12	7.73	7.75	7.80	7.68	7.74
130000	8.20	8.21	8.10	8.03	8.05	8.13	8.07	8.11	8.12	7.76	7.77	7.80	7.69	7.75
140000	8.22	8.21	8.10	8.06	8.07	8.12	8.09	8.14	8.13	7.77	7.79	7.80	7.69	7.78
150000	8.23	8.21	8.11	8.07	8.07	8.15	8.11	8.15	8.13	7.79	7.80	7.80	7.69	7.80
160000	8.26	8.22	8.09	8.08	8.09	8.15	8.15	8.16	8.13	7.81	7.83	7.80	7.71	7.82
170000	8.27	8.21	8.09	8.11	8.09	8.18	8.18	8.20	8.12	7.80	7.83	7.79	7.73	7.83
180000	8.29	8.21	8.13	8.13	8.11	8.21	8.22	8.18	8.12	7.80	7.85	7.76	7.74	7.84
190000	8.30	8.21	8.14	8.13	8.12	8.21	8.21	8.19	8.10	7.79	7.86	7.77	7.74	7.86
200000	8.30	8.23	8.12	8.13	8.15	8.19	8.19	8.19	8.09	7.79	7.86	7.76	7.73	7.87
210000	8.29	8.22	8.10	8.12	8.15	8.17	8.17	8.19	8.08	7.78	7.86	7.76	7.72	7.87
220000	8.28	8.23	8.09	8.11	8.14	8.16	8.15	8.19	8.08	7.76	7.87	7.77	7.71	7.87
230000	8.27	8.22	8.08	8.11	8.12	8.15	8.13	8.19	8.06	7.77	7.86	7.76	7.71	7.85
Daily Max	8.30	8.27	8.22	8.13	8.15	8.21	8.22	8.20	8.18	8.05	7.87	7.86	7.75	7.87
Daily Min	8.14	8.18	8.08	8.01	8.03	8.11	8.05	8.10	8.06	7.70	7.70	7.76	7.66	7.70
Average	8.22	8.21	8.13	8.06	8.08	8.15	8.12	8.14	8.13	7.88	7.78	7.81	7.71	7.77

Appendix B

Equipment Calibration Data

Field Notes for Datasonde Deployment

Date/Time: July 29, 2005 11:45 Analyst: HR

Location: Grand Rapids Headwater Datasonde Serial #: 40870R

Calibration Information Datasonde Battery [volts]: 12.0

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	6.59	7.00
10.00 Std	9.91	10.00

Conductivity (mS/cm)	Before Cal.	After Cal.	Zero Conductivity Calibration
0.287 Std	0.292	0.287	Before 0.000 After 0.000

Barometric Pressure (mm Hg) 746.7 mm Hg

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	123.4%	100.0%
mg/L D.O.	8.54 mg/L	8.23 mg/L
Temp - °C	24.20°C	24.19°C

YSI calibration (See field notes for YSI Model 95 MEA calibration information)

	Before Calibration	After Calibration
% Saturation	90.3%	95.2%
mg/L D.O.	7.34 mg/L	7.76 mg/L
Temp °C	25.9°C	25.9°C

New cap memb. on 7/20/05
Cal. elev. @ 13

Test Program Readings

	Datasonde	YSI Meter	(Must be within 0.5 mg/L D.O.)
% Saturation	94.8%	95.4%	S: 12:10
mg/L D.O.	7.96 mg/L	8.13 mg/L	
Temp - °C	23.16°C	23.2°C	E: 12:25

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI
% Saturation				
mg/L D.O.	Deploy			
Temp - °C				

Setup through 8/8/05 17:00

YSI Reading at Tube

Time	13:00
% Saturation	97.0%
mg/L D.O.	8.28 mg/L
Temp - °C	23.3°C

Check Status
Battery Life @ Start: 96%
Battery Life @ End: 79%

Notes: partly cloudy, variable winds, 73°F
Test program named GHT729.txt
Circulator works good.

Field Notes for Datasonde Deployment

Date/Time: 8/8/05 10:30 Analyst: MLM

Location: Grand Rapids - Upstream Datasonde Serial #: 42172

Calibration Information Datasonde Battery (volts): 9.9

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	7.06	7.00
10.00 Std	9.96	10.00

Conductivity (mS/cm)	Before Cal.	After Cal.	Zero Conductivity Calibration
0.284 Std	0.284	0.284	Before .0000 After .0000

Barometric Pressure (mm Hg) 741.2

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	115.0	100.1
mg/L D.O.	8.95	8.02
Temp – °C	26.01	25.24

YSI calibration (See field notes for YSI Model information) 55 calibration

	Before Calibration	After Calibration
% Saturation		97.7
mg/L D.O.		7.75
Temp – °C		27.2

Test Program Readings

	Datasonde	YSI Meter	(Must be within 0.5 mg/L D.O.) Last #'s
% Saturation	~~[illegible]~~ 75.4%	78.7	
mg/L D.O.	5.91	6.34	
Temp – °C	26.27	26.2	circulator not working

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI
% Saturation				
mg/L D.O.				
Temp – °C				

YSI Reading at Tube

Time

% Saturation

mg/L D.O.

Temp – °C

Check Status

Battery Life @ Start: Says "Used up"

Battery Life @ End: but Pat said 9.9 was ok to start.

*said used up for test but ok

Notes: End 8/16/05 - ok

Grandtes.txt - ok - first 3 reading in different spot. Then moved to better spot.

*No rope - all right by shore.

I don't like it - restart with other one.

Field Notes for Datasonde Deployment

Date/Time: 8/8/05 11:10 Analyst: MLM

Location: Grand Rapids Upstream Datasonde Serial #: 42175

Calibration Information Datasonde Battery (volts): 10.1

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	7.37	7.00
10.00 Std	9.93	10.00

Conductivity (mS/cm)	Before Cal.	After Cal.	Zero Conductivity Calibration
0.284 Std	0.299	0.284	Before ___ After ___

Barometric Pressure (mm Hg) 740.7

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	137.9	100.0
mg/L D.O.	10.27	7.69
Temp - °C	27.41	27.54

YSI calibration information) (See field notes for YSI Model 55 calibration

	Before Calibration	After Calibration
% Saturation	97.3	97.4
mg/L D.O.	7.46	7.47
Temp - °C	29.2	29.2

cal'd at 7

Test Program Readings (Must be within 0.5 mg/L D.O.)

	Datasonde	YSI Meter
% Saturation	83.0	83.2
mg/L D.O.	6.56	6.68
Temp - °C	26.02	26.1

End #'s
83.2
6.63
25.94

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI
% Saturation				
mg/L D.O.				
Temp - °C				

YSI Reading at Tube

Time	
% Saturation	
mg/L D.O.	
Temp - °C	

Check Status

Battery Life @ Start:

Battery Life @ End:

Notes: GRT808.txt (test): ok

Field Notes for Datasonde Deployment

Date/Time: 8/16/05 9:10 CST Analyst: MWM

Location: Grand Rapids - upstream Datasonde Serial #: 40858

Calibration Information Datasonde Battery (volts): 11.1

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	6.94	7.01 @ 22.77°
10.00 Std	10.10	10.02 @ 22.48°

Conductivity (mS/cm)	Before Cal.	After Cal.	Zero Conductivity Calibration
0.288 Std	0.285		Before .0007 After .0000

Barometric Pressure (mm Hg) 743.0

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	107.5	100.0
mg/L D.O.	9.23	8.62
Temp - °C	21.53	21.50

YSI calibration (See field notes for YSI Model 95 calibration information)

	Before Calibration	After Calibration
% Saturation	99.4	97.4
mg/L D.O.	8.71	8.52
Temp - °C	21.9	21.9

Test Program Readings

	Datasonde	YSI Meter	**(Must be within 0.5 mg/L D.O.)**
% Saturation	86.1	86.3	
mg/L D.O.	7.09	7.25	OK - Deploy
Temp - °C	23.95	24.0	

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI
% Saturation				
mg/L D.O.				
Temp - °C				

YSI Reading at Tube

Time	
% Saturation	
mg/L D.O.	
Temp - °C	

Check Status

Battery Life @ Start:

Battery Life @ End:

Notes: Circ. works OK

Grp Test. Txt OK -

Field Notes for Datasonde Deployment

Date/Time: 8/22/05 9:50 Analyst: MLM

Location: Grand Rapids - Headwaters Datasonde Serial #: 40870

Calibration Information Datasonde Battery (volts): 11.4

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	6.92	7.01
10.00 Std	10.07	10.03

Conductivity (mS/cm)	Before Cal.	After Cal.	Zero Conductivity Calibration
0.288 Std	0.325	0.288	Before .0000 After .0000

Barometric Pressure (mm Hg) 744.8

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	105.6	100.0
mg/L D.O.	9.05	8.63
Temp -- °C	21.60	21.56

YSI calibration (See field notes for YSI Model 95 calibration information)

Cal'd at 700'

	Before Calibration	After Calibration
% Saturation	102.9	97.4
mg/L D.O.	9.16	8.74
Temp - °C	20.7	20.7

Test Program Readings

	Datasonde	YSI Meter (Must be within 0.5 mg/L D.O.)
% Saturation	81.7	84.3
mg/L D.O.	7.05	7.39
Temp - °C	21.58	21.6

Datasonde reading + YSI readings by tube.

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI
% Saturation				
mg/L D.O.	OK - Deployed			
Temp - °C				

End #'s
82.1
7.08
21.52
- OK

YSI Reading at Tube

Time	
% Saturation	
mg/L D.O.	
Temp - °C	

Check Status
Battery Life @ Start: 84.0
Battery Life @ End: 76.0

Notes: GT82205.txt = OK (test file)
Partly sunny + 68° Winds 5-10 MPH

End Date: 8/30/05 Time: 170000

Field Notes for Datasonde Deployment

Date/Time: 8/30/05 10:50 Analyst: MWM

Location: Grand Rapids headwater Datasonde Serial #: 36467

Calibration Information Datasonde Battery [volts]: 5.1

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	7.13	7.00 @ 24.2°
10.00 Std	10.07	10.00 @ 24.90°

Conductivity (mS/cm)	Before Cal.	After Cal.	Zero Conductivity Calibration
0.292 Std	0.275	0.292	Before .0000 After .0000

Barometric Pressure (mm Hg) 737

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	114.3	100.0
mg/L D.O.	9.19	8.11
Temp - °C	23.81	23.79

YSI calibration (See field notes for YSI Model information) 95 calibration

	Before Calibration	After Calibration
% Saturation	102.8	97.2
mg/L D.O.	8.62	8.15
Temp °C	24.3	24.3

Test Program Readings

	Datasonde	YSI Meter	(Must be within 0.5 mg/L D.O.)
% Saturation	97.0	97.2	
mg/L D.O.	7.28	7.51	ok - Deploy
Temp - °C	22.62	22.7	

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI
% Saturation				
mg/L D.O.				
Temp - °C				

YSI Reading at Tube

Time
% Saturation
mg/L D.O.
Temp - °C

Check Status

Battery Life @ Start:
Battery Life @ End:

Notes: GRUP Test.TXT - OK

Field Notes for Datasonde Deployment

Date/Time: 9/6/05 10:45 A.M Analyst: MWM

Location: Grand Rapids Headwater Datasonde Serial #: 42172

Calibration Information Datasonde Battery (volts): 11.4

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	6.94	7.00 @25.03°
10.00 Std	10.01	10.00 @24.74°

Conductivity (mS/cm)	Before Cal.	After Cal.	Zero Conductivity Calibration
0.298 Std	0.304	0.298	Before .0000 After .0000

Barometric Pressure (mm Hg) 745

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	113.8	100.1
mg/L D.O.	9.22	8.12
Temp - °C	24.82	24.83

YSI calibration information) (See field notes for YSI Model 95 ___ ___ calibration

	Before Calibration	After Calibration
% Saturation	105.0	97.4
mg/L D.O.	8.65	8.03
Temp - °C	25.1	25.2

Test Program Readings

	Datasonde	YSI Meter	(Must be within 0.5 mg/L D.O.)
% Saturation	87.0	92.0	
mg/L D.O.	7.35	7.93	- Recalibrate
Temp - °C	22.66	22.8	

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI	
% Saturation	94.2	100.2	90.1	91.9	
mg/L D.O.	7.80	8.23	7.60	7.91	ok-Deploy
Temp - °C	24.24	24.26	22.78	22.8	

YSI Reading at Tube

Time	
% Saturation	
mg/L D.O.	
Temp - °C	

Check Status

Battery Life @ Start:

Battery Life @ End:

Notes: GR UP Test. Txt - ok

GR Test 2. Txt - OK

Field Notes for Datasonde Deployment

Date/Time: 9/16/05 9:05 Analyst: MWM

Location: Grand Rapids Headwater Datasonde Serial #: 36467

Calibration Information Datasonde Battery (volts): 5.8

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	6.98	7.02 @ 20.80°
10.00 Std	10.08	10.04 @ 21.15°

Conductivity (mS/cm)		Before Cal.	After Cal.	Zero Conductivity Calibration
0.298	Std	0.311	0.298 ~~0.311~~	Before .0000 After .0000

Barometric Pressure (mm Hg) 745

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	106.4	100.0
mg/L D.O.	9.44	8.89
Temp – °C	20.15	20.05

YSI calibration (See field notes for YSI Model 95 calibration information)

	Before Calibration	After Calibration
% Saturation	~~10.~~ 111.2	97.4
mg/L D.O.	10.45	9.13
Temp – °C	18.8	18.8

Test Program Readings

	Datasonde	YSI Meter	**(Must be within 0.5 mg/L D.O.)**
% Saturation	81.5	85.6	
mg/L D.O.	7.21	7.71	- within, but Recal
Temp · °C	20.37	20.5	

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI	
% Saturation	96.8	100.0	~~82.7~~	83.1	
mg/L D.O.	8.80	9.09	7.30	7.49	- OK Deploy
Temp – °C	19.02	19.00	20.39	20.5	

YSI Reading at Tube

Time
% Saturation
mg/L D.O.
Temp · °C

Check Status

Battery Life @ Start:
Battery Life @ End:

Notes: gruptst.Txt - OK

gutest2.Txt - OK

Field Notes for Datasonde Deployment

Date/Time: 10:25 10:40 9/26/05 Analyst: MWH

Location: Grand Rapids Headwaters Datasonde Serial #: 42484

Calibration Information Datasonde Battery [volts]: 12.5

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	7.26	7.01 @ 21.34°
10.00 Std	9.89	10.04 @ 21.30°

Conductivity (mS/cm)	Before Cal.	After Cal.	Zero Conductivity Calibration
0.303 Std	0.304	0.303	Before .0000 After .0000

Barometric Pressure (mm Hg) 739.5

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	156.5	100.1
mg/L D.O.	14.94	9.55
Temp - °C	15.99	15.96

YSI calibration (See field notes for YSI Model 95 calibration information)

	Before Calibration	After Calibration
% Saturation	95.9	97.4
mg/L D.O.	8.45	8.60
Temp - °C	21.6	21.5

Test Program Readings

	Datasonde	YSI Meter	(Must be within 0.5 mg/L D.O.)
% Saturation	85.9	83.7	
mg/L D.O.	7.89	7.93	-OK
Temp °C	17.8	17.9	

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI
% Saturation				
mg/L D.O.				
Temp - °C				

YSI Reading at Tube

Time
% Saturation
mg/L D.O.
Temp - °C

Check Status

Battery Life @ Start:
Battery Life @ End:

Notes: Gwptest.TXT -ok - only 1 reading - Accidentally set up for 3 hr intervals.

Field Notes for Datasonde Deployment

Date/Time: July 29, 2005 12:15 Analyst: HR

Location: Grand Rapids Tailrace Datasonde Serial #: 40858R

Calibration Information Datasonde Battery (volts): 11.5 v

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	7.02	7.00
10.00 Std	9.91	10.00

Conductivity (mS/cm)	Before Cal.	After Cal.	Zero Conductivity Calibration
0.287 Std	0.284	0.287	Before 0.000 After 0.000

In Air

Barometric Pressure (mm Hg) 746.7 mm Hg

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	117.3%	100.0%
mg/L D.O.	9.27 mg/L	8.13 mg/L
Temp - °C	24.84°C	24.85°C

YSI calibration (See field notes for YSI Model 95 MEA calibration information)

	Before Calibration	After Calibration
% Saturation	90.3%	95.2%
mg/L D.O.	7.34 mg/L	7.76 mg/L
Temp - °C	25.9°C	25.9°C

New cap memb. on 7/20/05
Cal. elev. @ 13

Test Program Readings

	Datasonde	YSI Meter	(Must be within 0.5 mg/L D.O.)
% Saturation	92.6%	95.4%	Test ran off bridge
mg/L D.O.	7.75 mg/L	8.13 mg/L	at headwater tube
Temp - °C	23.28°C	23.2°C	

S: 12:34
F: 12:49

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI
% Saturation				
mg/L D.O.				
Temp - °C				

~~Deploy~~

YSI Reading at Tube

Time	13:30
% Saturation	93.4%
mg/L D.O.	7.95 mg/L
Temp - °C	23.3°C

Check Status
Battery Life @ Start: 86%
Battery Life @ End: 68%

Setup Through
8/8/05
17:00

Notes: Partly cloudy, variable winds, 73°F
Test program named GTT0729.EXE
Circulator works well.

Field Notes for Datasonde Deployment

Date/Time: 8/8/05 12:05 Analyst: MLM

Location: Grand Rapids - Tail Datasonde Serial #: 42169

Calibration Information Datasonde Battery [volts]: 12.4

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	7.20	7.00
10.00 Std	9.89	10.00

Conductivity (mS/cm)	Before Cal.	After Cal.	Zero Conductivity Calibration
0.284 Std	0.293	0.284	Before .0000 After .0000

Barometric Pressure (mm Hg) 740.6 (?) - Bounces all over 740.0 - 740.6 741.2 - next time on

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	117.3	100.0
mg/L D.O.	8.83	7.61
Temp - °C	28.03	28.10

YSI calibration information) (See field notes for YSI Model 55 calibration

	Before Calibration	After Calibration
% Saturation	92.8	97.9
mg/L D.O.	7.01	7.38
Temp - °C	30.0	30.0

cal'd at 6

Test Program Readings (Must be within 0.5 mg/L D.O.) End #'s

	Datasonde	YSI Meter
% Saturation	83.1	87.1
mg/L D.O.	6.51	6.96
Temp - °C	26.43	26.5

92.2
6.51
26.31

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI
% Saturation				
mg/L D.O.				
Temp °C				

YSI Reading at Tube

Time	
% Saturation	
mg/L D.O.	
Temp - °C	

Check Status

Battery Life @ Start:
Battery Life @ End:

Notes: GRT808.txt = GRT808.txt = ok

Field Notes for Datasonde Deployment

Date/Time: 8/16/05 9:20 Analyst: MWM

Location: Grand Rapids Tailrace Datasonde Serial #: 37681

Calibration Information Datasonde Battery (volts): 12.7

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	6.98	7.01 @ 22.44°
10.00 Std	10.02	10.03 @ 22.29°

Conductivity (mS/cm)	Before Cal.	After Cal.	Zero Conductivity Calibration
0.288 Std			Before .0000 After .0000

Barometric Pressure (mm Hg) 743.0

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	96.9	100.0
mg/L D.O.	8.30	8.59
Temp · °C	21.67	21.68

YSI calibration information) (See field notes for YSI Model 95 calibration

	Before Calibration	After Calibration
% Saturation	99.4	97.4
mg/L D.O.	8.71	8.52
Temp - °C	21.9	21.7

Test Program Readings

	Datasonde	YSI Meter	(Must be within 0.5 mg/L D.O.)
% Saturation	83.2	85.16	
mg/L D.O.	6.84	7.20	OK - Deploy
Temp °C	24.01	24.1	

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI
% Saturation				
mg/L D.O.				
Temp °C				

YSI Reading at Tube

Time
% Saturation
mg/L D.O.
Temp - °C

Check Status

Battery Life @ Start:
Battery Life @ End:

Notes: Circ Works OK

GRT Test.TXT - OK

Field Notes for Datasonde Deployment

Date/Time: 8/22/05 10:55 Analyst: MLR

Location: Grand Rap: Ds: Tailwater Datasonde Serial #: 37619

Calibration Information Datasonde Battery (volts): 11.4

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	6.85	7.02
10.00 Std	10.10	10.04

Conductivity (mS/cm)	Before Cal.	After Cal.	Zero Conductivity Calibration
0.288 Std	0.293	0.288	Before .0000 After .0000

Barometric Pressure (mm Hg) 744.9

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	118.0	100.0
mg/L D.O.	10.24	8.73
Temp - °C	21.00	20.98

YSI calibration (See field notes for YSI Model 95 calibration information)

	Before Calibration	After Calibration
% Saturation	102.0	97.4
mg/L D.O.	9.16	8.74
Temp - °C	20.7	20.7

Test Program Readings

	Datasonde	YSI Meter	(Must be within 0.5 mg/L D.O.) End #'s
% Saturation	83.6	85.3	83.6 %
mg/L D.O.	7.19	7.51	7.17
Temp - °C	21.75	21.8	21.78

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI
% Saturation				
mg/L D.O.	OK - Dep.			
Temp °C				

YSI Reading at Tube

Time	
% Saturation	
mg/L D.O.	
Temp - °C	

Check Status

Battery Life @ Start: 89 %

Battery Life @ End: 86 %

Notes: GTT82205.txt: OK (test file)

End Date = 083005 Time = 170000

Field Notes for Datasonde Deployment

Date/Time: 8/30/05 11:00 Analyst: MWM

Location: Grand Rapids Tailrace Datasonde Serial #: 37681

Calibration Information Datasonde Battery (volts): 12.2

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	6.96	7.00 @ 24.07°
10.00 Std	10.05	10.00 @ 24.76°

Conductivity (mS/cm)	Before Cal.	After Cal.	Zero Conductivity Calibration
0.292 Std	0.289	0.292	Before .0000 After .0000

Barometric Pressure (mm Hg) 737

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	98.7	100.1
mg/L D.O.	8.11	8.15
Temp - °C	24.10	24.09

YSI calibration (See field notes for YSI Model 95 calibration information)

	Before Calibration	After Calibration
% Saturation	~~24.3~~ 102.8	97.2
mg/L D.O.	8.62	8.15
Temp °C	24.3	24.3

Test Program Readings

	Datasonde	YSI Meter	(Must be within 0.5 mg/L D.O.)
% Saturation	87.6	86.0	
mg/L D.O.	7.33	7.43	-ok- Deploy
Temp - °C	22.68	22.7	

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI
% Saturation				
mg/L D.O.				
Temp - °C				

YSI Reading at Tube

Time		
% Saturation		
mg/L D.O.		
Temp - °C		

Check Status

Battery Life @ Start:

Battery Life @ End:

Notes: GRTL Test.TXT - OK

Field Notes for Datasonde Deployment

Date/Time: 9/6/05 11:00 Analyst: MWM

Location: Grand Rapids Tailrace Datasonde Serial #: 37679

Calibration Information Datasonde Battery (volts): 11.4

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	7.42	7.00 @ 24.74°
10.00 Std	9.90	10.00 @ 24.74°

Conductivity (mS/cm)	Before Cal.	After Cal.	Zero Conductivity Calibration
0.298 Std	0.294	0.298	Before .0000 After .0000

Barometric Pressure (mm Hg) 745

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	97.8	100.0
mg/L D.O.	7.86	8.13
Temp - °C	24.76	24.77

YSI calibration (See field notes for YSI Model 95 calibration information)

	Before Calibration	After Calibration
% Saturation	105.0	97.4
mg/L D.O.	8.65	8.03
Temp - °C	25.1	25.2

Test Program Readings

	Datasonde	YSI Meter	(Must be within 0.5 mg/L D.O.)
% Saturation	91.3	92.2	
mg/L D.O.	7.72	7.96	OK - Deploy
Temp - °C	22.65	22.7	

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI
% Saturation				
mg/L D.O.				
Temp °C				

YSI Reading at Tube

Time

% Saturation

mg/L D.O.

Temp - °C

Check Status

Battery Life @ Start:

Battery Life @ End:

Notes: GR Tailrs TxT - OK

Circulator - OK

Field Notes for Datasonde Deployment

Date/Time: 9/16/05 9:30 Analyst: MWM

Location: Grand Rapids Tailrace Datasonde Serial #: 37681

Calibration Information Datasonde Battery (volts): 11.9

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	7.09	7.02 @20.52
10.00 Std	10.01	10.04 @20.88°

Conductivity (mS/cm)		Before Cal.	After Cal.	Zero Conductivity Calibration
0.298	Std	0.300	0.298	Before .0000 After .0000

Barometric Pressure (mm Hg) 745

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	101.0	100.0
mg/L D.O.	8.93	8.85
Temp - °C	20.30	20.27

YSI calibration (See field notes for YSI Model information) 95 calibration

	Before Calibration	After Calibration
% Saturation		
mg/L D.O.		
Temp - °C	18.8	18.8

Test Program Readings

	Datasonde	YSI Meter	(Must be within 0.5 mg/L D.O.)
% Saturation	78.7	84.2	
mg/L D.O.	6.94	7.58	- Recal
Temp - °C	20.46	20.5	

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI	
% Saturation	94.8	100.0	82.2	80.9	
mg/L D.O.	8.57	9.05	7.25	7.30	OK - Deploy
Temp °C	19.27	19.24	20.48	20.5	

YSI Reading at Tube

Time
% Saturation
mg/L D.O.
Temp - °C

Check Status

Battery Life @ Start:
Battery Life @ End:

Notes: gttest.TXT - OK

gttest2.TXT - OK

Field Notes for Datasonde Deployment

Date/Time: 9/20/05 10:10 CST Analyst: MWM

Location: Bond Rapids tailrace Datasonde Serial #: 42483

Calibration Information Datasonde Battery (volts): 12.0

pH (s.u.)	Before Cal.	After Cal.
7.00 Std	6.86	7.01 @ 21.67°
10.00 Std	10.08	10.04 @ 21.42°

Conductivity (mS/cm)		Before Cal.	After Cal.	Zero Conductivity Calibration	
0.303	Std	0.298	0.303	Before .0000	After .0000

Barometric Pressure (mm Hg) 739.5

Dissolved Oxygen	Before Calibration	After Calibration
% Saturation	100.3	99.9
mg/L D.O.	9.18	9.13
Temp - °C	18.10	18.06

YSI calibration (See field notes for YSI Model 95 calibration information)

	Before Calibration	After Calibration
% Saturation	95.9	97.4
mg/L D.O.	8.45	8.60
Temp - °C	21.6	21.5

Test Program Readings

	Datasonde	YSI Meter	(Must be within 0.5 mg/L D.O.)
% Saturation	85.9	84.4	
mg/L D.O.	7.89	8.00	- OK - Deploy
Temp - °C	17.83	17.9	

Re-calibration required if outside 0.5 mg/l limit

	Before Cal.	After Cal.	Datasonde	YSI
% Saturation				
mg/L D.O.				
Temp - °C				

YSI Reading at Tube

Time
% Saturation
mg/L D.O.
Temp °C

Check Status

Battery Life @ Start:
Battery Life @ End:

Notes: GRT Test.DxT

Field Notes for Datasonde Post Calibration

Date/Time: 8/8/05 11:30 Analyst: MLM

Location: Grand Rapids - Upstream Datasonde Serial #: 40870

Ending Datasonde Battery (volts): 11.3

Calibration Information

pH (s.u.)	Reads
7.00 Std	6.82
10.00 Std	9.88

Conductivity (mS/cm) 0.284 Std 0.304 Reads 0.0000 Zero Reads

Barometric Pressure (mm Hg) 740.0 - why different every time I turn it on?

Dissolved Oxygen	before cal	after cal
% Saturation	91.0	100.0
mg/L D.O.	7.70	7.85
Temp - °C	26.19	26.27

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	
mg/L D.O.	
Temp - °C	

Notes:

GRUP808.txt = ok

Field Notes for Datasonde Post Calibration

Date/Time: 8/16/05 9:45 Analyst: MWM

Location: Grand Rapids Headwater Datasonde Serial #: 42175

Ending Datasonde Battery [volts]: 8.7 - change

Calibration Information

pH (s.u.)	Reads
7.00 Std	7.10 @ 22.23°
10.00 Std	10.07 @ 22.21°

Conductivity (mS/cm) 0.288 Std 0.278 Reads _____ Zero Reads

Barometric Pressure (mm Hg) 743

Dissolved Oxygen	before cal	after cal
% Saturation	98.5	100.0
mg/L D.O.	8.47	8.63
Temp - °C	21.47	21.48

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	_____
mg/L D.O.	_____
Temp - °C	_____

Notes:

GRAP0816.TXT - OK low# 8/12/05 8:00

End #'s 7.18 mg/L 5.6 mg/L

87.5% 68.8%

23.42°C 24.32°

Field Notes for Datasonde Post Calibration

Date/Time: 8/22/05 10:30 Analyst: MLM

Location: Grand Rapids - Headwater Datasonde Serial #: 40858

Ending Datasonde Battery [volts]: 10.5

Calibration Information

pH (s.u.)	Reads
7.00 Std	7.04
10.00 Std	10.08

Conductivity (mS/cm) 0.288 Std 0.321 Reads .0000 Zero Reads

Barometric Pressure (mm Hg) 744.9

Dissolved Oxygen	before cal	after cal
% Saturation	99.0	100.0
mg/L D.O.	7.99	8.85
Temp - °C	20.42	20.36

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	
mg/L D.O.	
Temp - °C	

Notes:

GH82205.txt = ok

Very Little Fouling.

Field Notes for Datasonde Post Calibration

Date/Time: 8/30/05 11:35 Analyst: MWM

Location: brad Headwater Datasonde Serial #: R40870

Ending Datasonde Battery [volts]: 11.1

Calibration Information

pH (s.u.)	Reads
7.00 Std	7.05 @ 24.01°
10.00 Std	10.01 @ 24.36°

Conductivity (mS/cm) 0.292 Std 0.265 Reads Zero Reads

Barometric Pressure (mm Hg) 737

Dissolved Oxygen	before cal	after cal
% Saturation	96.5	100.1
mg/L D.O.	8.14	8.35
Temp - °C	22.73	22.72

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	
mg/L D.O.	
Temp - °C	

Notes:

GRAP0830.TXT - OK

End #'s = lowest reading

6.98 mg/L D.O.

82.4 %

22.54 °C

Field Notes for Datasonde Post Calibration

Date/Time: 9/6/05 11:30 Analyst: MWM

Location: Grand Rapids Headwaters Datasonde Serial #: 30467

Ending Datasonde Battery [volts]: 5.7

Calibration Information

pH (s.u.)	Reads	
7.00 Std		Bouncing btwn 6.71 + 7.18 - Replace Frit
10.00 Std		" " 9.90 + 10.14

Conductivity (mS/cm) 0.298 Std 0.326 Reads — Zero Reads

Barometric Pressure (mm Hg) 745

Dissolved Oxygen	before cal	after cal	
% Saturation	100.6	100.0	- No Post Cal
mg/L D.O.	8.11	8.14	
Temp - °C	24.61	24.63	Correction.

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	
mg/L D.O.	
Temp - °C	

Notes:

GRGP0906.TXT - OK All D.O. above 6.4 mg/L

End #'S - 6.97 mg/L

83.0%

22.45°

Field Notes for Datasonde Post Calibration

Date/Time: 9/16/05 10:05 Analyst: MWM

Location: Grand Rapids upstream Datasonde Serial #: 42172

Ending Datasonde Battery [volts]: 10.9

Calibration Information

pH (s.u.)	Reads
7.00 Std	7.15 @ 19.9°
10.00 Std	10.08 @ 19.7°

Conductivity (mS/cm) 0.298 Std 0.295 Reads ~ Zero Reads

Barometric Pressure (mm Hg) 745

Dissolved Oxygen	before cal	after cal
% Saturation	98.3	99.8
mg/L D.O.	8.71	8.87
Temp - °C	20.18	20.18

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	
mg/L D.O.	
Temp - °C	

Notes:

grand. TxT - ok All D.O. over 6.0 mg/L

Encl #'s 7.03 mg/L

79.5%

20.35° C

Field Notes for Datasonde Post Calibration

Date/Time: 9/26/05 11:00 Analyst: MWM

Location: Grand Headwaters Datasonde Serial #: 36467

Ending Datasonde Battery [volts]: 5.3

Calibration Information

pH (s.u.)	Reads
7.00 Std	7.10 @ 20.18°
10.00 Std	10.01 @ 20.16°

Conductivity (mS/cm) 0.303 Std 0.314 Reads — Zero Reads

Barometric Pressure (mm Hg) 739.0

Dissolved Oxygen	before cal	after cal
% Saturation	97.6	99.9
mg/L D.O.	8.99	9.12
Temp - °C	18.4	18.30

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	
mg/L D.O.	
Temp - °C	

Notes:

Grup.Txt - OK All D.O over 6.5

Sensors are pretty clean

End #'s 7.19

77.0

17.64°

Circulator OK

Field Notes for Datasonde Post Calibration

Date/Time: 10/3/05 11:00 Analyst: MLM

Location: Grand Rapids - Upstream Datasonde Serial #: 42484

Ending Datasonde Battery [volts]: 10.9

Calibration Information

pH (s.u.)	Reads
7.00 Std	7.08
10.00 Std	10.07

Conductivity (mS/cm) 0.298 Std 0.334 Reads .0000 Zero Reads

Barometric Pressure (mm Hg) 738.6

Dissolved Oxygen	before cal	after cal
% Saturation	101.4	100.0
mg/L D.O.	8.24	8.14
Temp - °C	24.08	23.98

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	
mg/L D.O.	
Temp - °C	

Notes:

GRU1003.txt = ok

No Circulator

Overcast +75° - Winds 10 MPH

Post-cal'd at High Falls

Field Notes for Datasonde Post Calibration

Date/Time: 8/8/05 Analyst: MLM

Location: Grand Rapids - Tail Datasonde Serial #: 40858

Ending Datasonde Battery [volts]: 11.0

Calibration Information

pH (s.u.)	Reads
7.00 Std	6.94
10.00 Std	9.93

pH jumping a little

Conductivity (mS/cm) 0.284 Std 0.408 Reads .0010 Zero Reads

Barometric Pressure (mm Hg) 740.6

Dissolved Oxygen	before cal	after cal
% Saturation	92.9	100.0
mg/L D.O.	7.20	7.67
Temp - °C	27.56	27.66

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	
mg/L D.O.	
Temp - °C	

Notes:

GRDN808.txt: OK

pH jumping a little

Field Notes for Datasonde Post Calibration

Date/Time: 8/16/05 10:25 CST Analyst: MWH

Location: Grand Rapids Tailrace Datasonde Serial #: 42169

Ending Datasonde Battery [volts]: 11.6 - OK

Calibration Information

pH (s.u.)	Reads
7.00 Std	7.34 @ 23.89°
10.00 Std	10.22 @ 24.01°

Conductivity (mS/cm) 0.288 Std 0.280 Reads ____ Zero Reads

Barometric Pressure (mm Hg) 745

Dissolved Oxygen	before cal	after cal
% Saturation	82.9	100.2
mg/L D.O.	6.88	8.34
Temp – °C	23.40	23.45

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	
mg/L D.O.	
Temp – °C	

Notes:

Cortail.txt - OK low reading - 5.27 on 8/14 @ 19:00

End #'s 7.12 mg/L

87.1%

24.11°

Field Notes for Datasonde Post Calibration

Date/Time: 8/22/05 11:35 Analyst: MLM

Location: Grand Rapids - Tailwater Datasonde Serial #: 37681

Ending Datasonde Battery [volts]: 12.1

Calibration Information

pH (s.u.)	Reads
7.00 Std	7.12
10.00 Std	10.10

Conductivity (mS/cm) 0.288 Std 0.294 Reads .0000 Zero Reads

Barometric Pressure (mm Hg) 744.9

Dissolved Oxygen	before cal	after cal
% Saturation	87.1	100.0
mg/L D.O.	7.69	8.84
Temp - °C	20.37	20.37

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	
mg/L D.O.	
Temp - °C	

Notes:

GT82205.txt = ok

Very Lt. Fouling.

Field Notes for Datasonde Post Calibration

Date/Time: 8/30/05 12:00 Analyst: MWM

Location: Grand Tailrace Datasonde Serial #: 37679

Ending Datasonde Battery [volts]: 11.4

Calibration Information

pH (s.u.)	Reads
7.00 Std	7.37 @ 24.2°C
10.00 Std	10.27 @ 24.6°C

Conductivity (mS/cm) 0.292 Std 0.279 Reads ___ ___ Zero Reads

Barometric Pressure (mm Hg) 737

Dissolved Oxygen	before cal	after cal
% Saturation	93.8	100.1
mg/L D.O.	7.80	8.24
Temp - °C	23.54°	23.55°

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	
mg/L D.O.	
Temp - °C	

Notes:

GRTail.TXT - OK All readings over 6.9mg/L D.O

End #'s: 7.08mg/L

83.8% sat

22.68°

Circulator works good!

Field Notes for Datasonde Post Calibration

Date/Time: 9/6/05 12:00 Analyst: MWM

Location: GRand Rapids Tailrace Datasonde Serial #: 37681

Ending Datasonde Battery [volts]: 11.9

Calibration Information

pH (s.u.)	Reads
7.00 Std	7.15 @ 25.88°
10.00 Std	10.05 @ 25.95°

Conductivity (mS/cm) 0.298 Std 0.305 Reads — — Zero Reads

Barometric Pressure (mm Hg) 745

Dissolved Oxygen	before cal	after cal
% Saturation	95.3	100.0
mg/L D.O.	7.58	8.03
Temp °C	25.43	25.44

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	
mg/L D.O.	
Temp - °C	

Notes:

GRTail.TxT - OK All readings over 6.8 mg/L

End #'s 6.96 mg/L

83.1%

12.58°

Circulation OK

Field Notes for Datasonde Post Calibration

Date/Time: 9/16/05 1035 Analyst: MWM

Location: Grand Rapids Tailrace Datasonde Serial #: 37679

Ending Datasonde Battery [volts]: 11.2

Calibration Information

pH (s.u.)	Reads
7.00 Std	7.24 @ 19.89°
10.00 Std	10.16 @ 19.93°

Conductivity (mS/cm) 0.298 Std 0.300 Reads — Zero Reads

Barometric Pressure (mm Hg) 745

Dissolved Oxygen	before cal	after cal
% Saturation	84.4	100.0
mg/L D.O.	7.54	8.93
Temp - °C	19.87°	19.87

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	
mg/L D.O.	
Temp - °C	

Notes:

GRTail.TXT - OK All D.O over 6.0 mg/L

End #'s 6.91 mg/L

78.3% sat

20.5°

D.O membrane has a dirty film on it.

Circ. OK

Field Notes for Datasonde Post Calibration

Date/Time: 11:40 CST Analyst: MWM

Location: Grand Trail race Datasonde Serial #: 3760

Ending Datasonde Battery [volts]: 11.6

Calibration Information

pH (s.u.)	Reads
7.00 Std	6.92 @ 14.4°
10.00 Std	~~10.00~~ 10.02 @ 14.2°

Conductivity (mS/cm) 0.303 Std 0.306 Reads — Zero Reads

Barometric Pressure (mm Hg) 739.0

Dissolved Oxygen	before cal	after cal
% Saturation	92.0	100.0
mg/L D.O.	8.38	9.05
Temp - °C	18.85	18.83

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	
mg/L D.O.	
Temp - °C	

Notes:

grtrail TxT - OK All D.O over 6.4 mg/L

End # 7.00 mg/L

75.4% sat

17.4°

Field Notes for Datasonde Post Calibration

Date/Time: 10/3/05 11:15 Analyst: MLM

Location: Grand Rapids Tailrace Datasonde Serial #: 42483

Ending Datasonde Battery [volts]: 10.8

Calibration Information

pH (s.u.)	Reads
7.00 Std	6.98
10.00 Std	9.99

Conductivity (mS/cm) 0.298 Std 0.318 Reads .0000 Zero Reads

Barometric Pressure (mm Hg) 737.0

Dissolved Oxygen	before cal	after cal
% Saturation	101.4	100.0
mg/L D.O.	8.18	8.02
Temp - °C	24.52	24.59

YSI calibration (See field notes for _____ for calibration info.)

% Saturation	
mg/L D.O.	
Temp - °C	

Notes:

GRT1003.txt = ok

No Circulator

Overcast + 75° - Winds - S at 10 MPH

Post-cal'd at High Falls

Appendix C

Documentation of Agency Consultation

From: Mark Metcalf
To: Mistak, Jessica
Date: 10/20/2005 3:17:00 PM
Subject: Grand Rapids Water quality monitoring

Jessica,

Attached is the water quality monitoring data from the Grand Rapids Hydro for your review. Feel free to contact me if you have any questions.

Thanks,

Mark

Mark Metcalf
Environmental Consultant\Chemist
Wisconsin Public Service Corp.
920-433-1833
mmetcal@wpsr.com

Wisconsin Public Service Corporation
(a subsidiary of WPS Resources Corporation)
700 North Adams Street
P.O. Box 19002
Green Bay, WI 54307-9002

October 20, 2005

FERC Project No. 2433

Ms. Jessica Mistak
Michigan Department of Natural Resources
Marquette State Fish Hatchery and Station
488 Cherry Creek Road
Marquette, MI 49855

Dear Ms. Mistak:

Grand Rapids Hydroelectric Project - Water Quality Monitoring Data

Per the water quality monitoring plan for the Grand Rapids Hydroelectric Project, dissolved oxygen (D.O.), temperature, and pH are to be monitored above and below the Grand Rapids Powerhouse from June 1st to September 30th of the monitoring season. 2004 was a normally scheduled year for water quality monitoring, however, the monitoring season was ended on August 2, 2004, due to the power canal being de-watered for maintenance purposes.

Per consultation with the resource agencies, Wisconsin Public Service Corporation (WPSC) conducted water quality monitoring during the months of August and September 2005 to supplement the abbreviated monitoring season of 2004. WPSC is pleased to submit water quality monitoring data for the 2005 monitoring year for your review and comment.

Water quality was monitored at two locations on the Menominee River. The first monitoring location was upstream of the Grand Rapids Dam and the second was in the powerhouse tailrace. The D.O., temperature, and pH data is enclosed for your review. All D.O. data has been corrected for a loss of calibration of more than 0.10 mg/l.

There are no deviations from water quality standards to note. For consultation purposes, this information is also being provided to Mr. Mike Donofrio of the Wisconsin Department of Natural Resources (WDNR) and Ms. Janet Smith of the U.S. Fish and Wildlife Service (FWS).

Please review the enclosed data and make any comments you may have as soon as possible, but within 30 days of this letter. Should you have any questions or concerns, please do not hesitate to call me at (920) 433-1833. Thank you for your time and consideration.

Sincerely,

Mark Metcalf

Mark W. Metcalf
Environmental Consultant
Telephone: (920) 433-1833

Enc.

cc: Mr. Shawn Puzen, WPSC - D2
Ms. Joan Johanek, WPSC – D2

State of Michigan
DEPARTMENT OF NATURAL RESOURCES
Lansing

JENNIFER M. GRANHOLM
governor

REBECCA A. HUMPHRIES
director

Refer to: 4202.2.41

November 3, 2005

Mr. Mark Metcalf
Wisconsin Public Service Corporation
P.O. Box 19002
Green Bay, WI 54307-9002

Dear Mr. Metcalf:

Subject: Grand Rapids Hydroelectric Project (FERC No. 2433) Water Quality Monitoring

The Michigan Department of Natural Resources (DNR) has reviewed your October 20, 2005 submittal of water quality monitoring data for the Grand Rapids Hydroelectric Project. This information includes data from August and September 2005 to fulfill data gaps from the 2004 monitoring season.

Water quality parameters for temperature, DO, and pH are established in Article 407 of the FERC license. According to our review, no water quality deviations occurred in either 2004 or 2005. The next monitoring event will take place in five years, or June 1 through September 30, 2009.

If you have any questions about this matter, please contact me at 906-249-1611 ext 308 or mistakjl@michigan.gov. If you wish to contact me in writing, my address is:

MARQUETTE FISHERIES STATION
MICHIGAN DEPARTMENT OF NATURAL RESOURCES
484 CHERRY CREEK RD
MARQUETTE, MI 49855

Sincerely,

Jessica Mistak

Jessica Mistak, Senior Fisheries Biologist

cc: Mike Donofrio, WDNR
Janet Smith, FWS
Mike Herman, DNR
Chris Freiburger, DNR

From: Mark Metcalf
To: Donofrio, Michael
Date: 10/20/2005 3:18:09 PM
Subject: Grand Rapids Hydro Water quality monitoring

Mike,

Attached is the water quality monitoring data from the Grand Rapids Hydro for your review. Feel free to contact me if you have any questions.

Thanks,

Mark

Mark Metcalf
Environmental Consultant\Chemist
Wisconsin Public Service Corp.
920-433-1833
mmetcal@wpsr.com

Wisconsin Public Service Corporation
(a subsidiary of WPS Resources Corporation)
700 North Adams Street
P.O. Box 19002
Green Bay, WI 54307-9002

October 20, 2005

FERC Project No. 2433

Mr. Mike Donofrio
Wisconsin Department of Natural Resources
101 N. Ogden Rd.
Peshtigo, WI 54157

Dear Mr. Donofrio:

Grand Rapids Hydroelectric Project - Water Quality Monitoring Data

Per the water quality monitoring plan for the Grand Rapids Hydroelectric Project, dissolved oxygen (D.O.), temperature, and pH are to be monitored above and below the Grand Rapids Powerhouse from June 1st to September 30th of the monitoring season. 2004 was a normally scheduled year for water quality monitoring, however, the monitoring season was ended on August 2, 2004, due to the power canal being de-watered for maintenance purposes.

Per consultation with the resource agencies, Wisconsin Public Service Corporation (WPSC) conducted water quality monitoring during the months of August and September 2005 to supplement the abbreviated monitoring season of 2004. WPSC is pleased to submit water quality monitoring data for the 2005 monitoring year for your review and comment.

Water quality was monitored at two locations on the Menominee River. The first monitoring location was upstream of the Grand Rapids Dam and the second was in the powerhouse tailrace. The D.O., temperature, and pH data is enclosed for your review. All D.O. data has been corrected for a loss of calibration of more than 0.10 mg/l.

There are no deviations from water quality standards. Copies of pre- and post-deployment calibration data are also attached. For consultation purposes, this information is also being provided to Ms. Jessica Mistak of the Michigan Department of Natural Resources (MDNR) and Ms. Janet Smith of the U.S. Fish and Wildlife Service (FWS).

Please review the enclosed data and make any comments you may have as soon as possible, but within 30 days of this letter. Should you have any questions or concerns, please do not hesitate to call me at (920) 433-1833. Thank you for your time and consideration.

Sincerely,

Mark Metcalf

Mark W. Metcalf
Environmental Consultant
Telephone: (920) 433-1833

Enc.

cc: Mr. Shawn Puzen, WPSC - D2
Ms. Joan Johanek, WPSC D2

From: Mark Metcalf
To: Smith, Janet
Date: 10/20/2005 3:19:10 PM
Subject: Grand Rapids Hydro water quality monitoring data

Janet,

Attached is the water quality monitoring data from the Grand Rapids Hydro for your review. Feel free to contact me if you have any questions.

Thanks,

Mark

Mark Metcalf
Environmental Consultant\Chemist
Wisconsin Public Service Corp.
920-433-1833
mmetcal@wpsr.com

Wisconsin Public Service Corporation
(a subsidiary of WPS Resources Corporation)
700 North Adams Street
P.O. Box 19002
Green Bay, WI 54307-9002

October 20, 2005

FERC Project No. 2433

Ms. Janet Smith
U.S. Fish and Wildlife Service
2661 Scott Tower Drive
New Franken, WI 54229

Dear Ms. Smith:

Grand Rapids Hydroelectric Project - Water Quality Monitoring Data

Per the water quality monitoring plan for the Grand Rapids Hydroelectric Project, dissolved oxygen (D.O.), temperature, and pH are to be monitored above and below the Grand Rapids Powerhouse from June 1st to September 30th of the monitoring season. 2004 was a normally scheduled year for water quality monitoring, however, the monitoring season was ended on August 2, 2004, due to the power canal being de-watered for maintenance purposes.

Per consultation with the resource agencies, Wisconsin Public Service Corporation (WPSC) conducted water quality monitoring during the months of August and September 2005 to supplement the abbreviated monitoring season of 2004. WPSC is pleased to submit water quality monitoring data for the 2005 monitoring year for your review and comment.

Water quality was monitored at two locations on the Menominee River. The first monitoring location was upstream of the Grand Rapids Dam and the second was in the powerhouse tailrace. The D.O., temperature, and pH data is enclosed for your review. All D.O. data has been corrected for a loss of calibration of more than 0.10 mg/l.

There are no deviations from water quality standards to note. For consultation purposes, this information is also being provided to Ms. Jessica Mistak of the Michigan Department of Natural Resources (MDNR) and Mr. Mike Donofrio of the Wisconsin Department of Natural Resources (WDNR).

Please review the enclosed data and make any comments you may have as soon as possible, but within 30 days of this letter. Should you have any questions or concerns, please do not hesitate to call me at (920) 433-1833. Thank you for your time and consideration.

Sincerely,

Mark Metcalf

Mark W. Metcalf
Environmental Consultant - Chemist
Telephone: (920) 433-1833

Enc.

cc: Mr. Shawn Puzen, WPSC - D2
Ms. Joan Johanek, WPSC – D2