PRELIMINARY REPORT
LIMNOCORRAL STUDY
OF
CHERRY CREEK RESERVOIR

Prepared for
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Englewood, Colorado

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INTRODUCTION

This is a preliminary report on the results of a study utilizing limnocorrals to conduct specific scientific tests on the response of Cherry Creek Reservoir to the addition of alum and phosphorus. The work was conducted by Advanced Aquatic Technology Associates, Inc. (AATA), and involved several phases. First, limnocorrals were constructed of special plastic sheeting material by Dr. Frank Vertucci. All limnocorrals were 2 meters in diameter. Three were constructed to be installed at a depth of 20 feet, and three were constructed to be installed at a depth of 30 feet.

CONSTRUCTION AND INSTALLATION

The limnocorrals were constructed of polyethylene plastic sewn into a cylinder 2 meters in diameter. Three limnocorrals were 20 feet long, while another set was constructed in a 30 foot length. These occupied the shallow and deep sample sites in Cherry Creek Reservoir respectively. The limnocorrals were designed with a pocket at the top edge of the corral which contained empty 1-gallon milk containers and served both as a float and as a small obstruction to waves overtopping into the corral. Three additional smaller pockets were sewn into the sides of the limnocorrals to provide a containment for a semi-rigid length of PVC pipe. These pipe hoops served to maintain the circular shape of the limnocorral.

The limnocorrals were installed near the outlet structure in Cherry Creek Reservoir using diver assistance on July 15, 1991. Initial lake conditions were recorded and treatments were administered after equilibration on July 16, 1991.

The limnocorrals were anchored in water just shallower than their overall length. Divers were used to anchor the bottom of the corral in the reservoir sediment. A good seal between the

corral and the sediment was required for isolation of the treated water from the rest of the reservoir. The limnocorrals were further secured in a radial manner to anchors located 15 to 20 feet from the corrals.

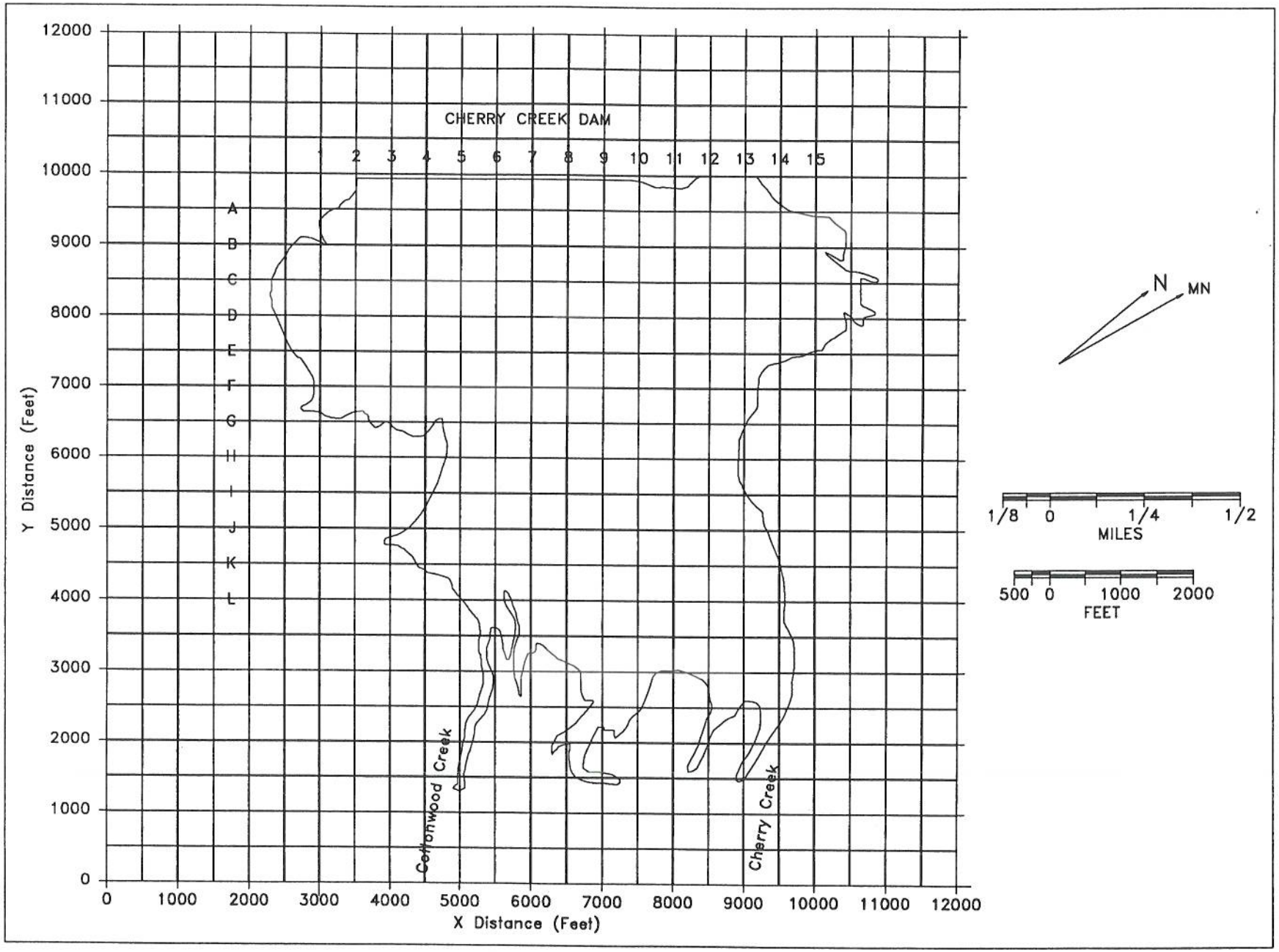
Sample sites were selected to be representative of the entire reservoir. A site corresponding to a water depth of about 18 feet was located near the C-14 grid point (Map 1). A second site was located near the B-13 grid point in approximately 25 feet of water. These sites were outside of the heavily used ski boat lanes, and were further marked with hazard buoys to prevent possible conflict with the boating activity.

In the limnocorral used to test the effect of phosphorus addition, the phosphorous concentration was elevated by 613 9µg-P/L, the same level as used in the 3.3X concentration of the limited nutrient study. This augmented phosphorous concentration was approximately 100 times the average annual measured phosphorous concentration.

The limnocorral used to test phosphorous removal contained an aluminum concentration of 20 mg/l. Aluminum sulfate and Sodium aluminate were added in a 1:1.6 ratio as suggested by Dominie (1980). The inclusion of the Sodium aluminate tends to buffer the pH of the system, preventing the significant drop in pH often seen with pure precipitation of phosphorous using only Aluminum sulfate.

Sampling and Field Measurements

Field measurements were made of dissolved oxygen and temperature profiles, pH, alkalinity, conductivity, and Secchi disc visibility on Day 3, 7, 14, and 21. Some limited information was generated for the 30 foot limnocorrals at Day 28. A strong thunderstorm disturbed the 20 foot limnocorrals on Day 19, as waves of approximately 4 feet ripped them from their moorings. Data collected beyond Day 19 are not deemed to be representative for the 20 foot limnocorrals. Comparison with data in the 30 foot sets confirms that a nearly total evacuation of the test water occurred due to the storm. Water samples from the surface, mid-depth, and bottom were collected with an inert Beta bottle, cooled, and returned to the AATA lab where they were prepared for analysis of nutrients, chlorophyll, and other water chemistry. Samples


CHERRY CREEK DAM
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H I J K L
Y Distance (Feet)
X Distance (Feet)
0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 11000 12000
Cottonwood Creek
Cherry Creek
N
MN
1/8 0 1/4 1/2
MILES
500 0 1000 2000
FEET

Map 1

were shipped using overnight express to Inter-Mountain Labs (IML), Sheridan, Wyoming for analysis.

ANALYSIS

Analysis of the water samples was conducted according to standard EPA protocols (see attached lab sheets for listings). Method comparisons were conducted, along with normal quality assurance/quality control procedures. Excellent results were obtained for calculated spiked samples.

RESULTS

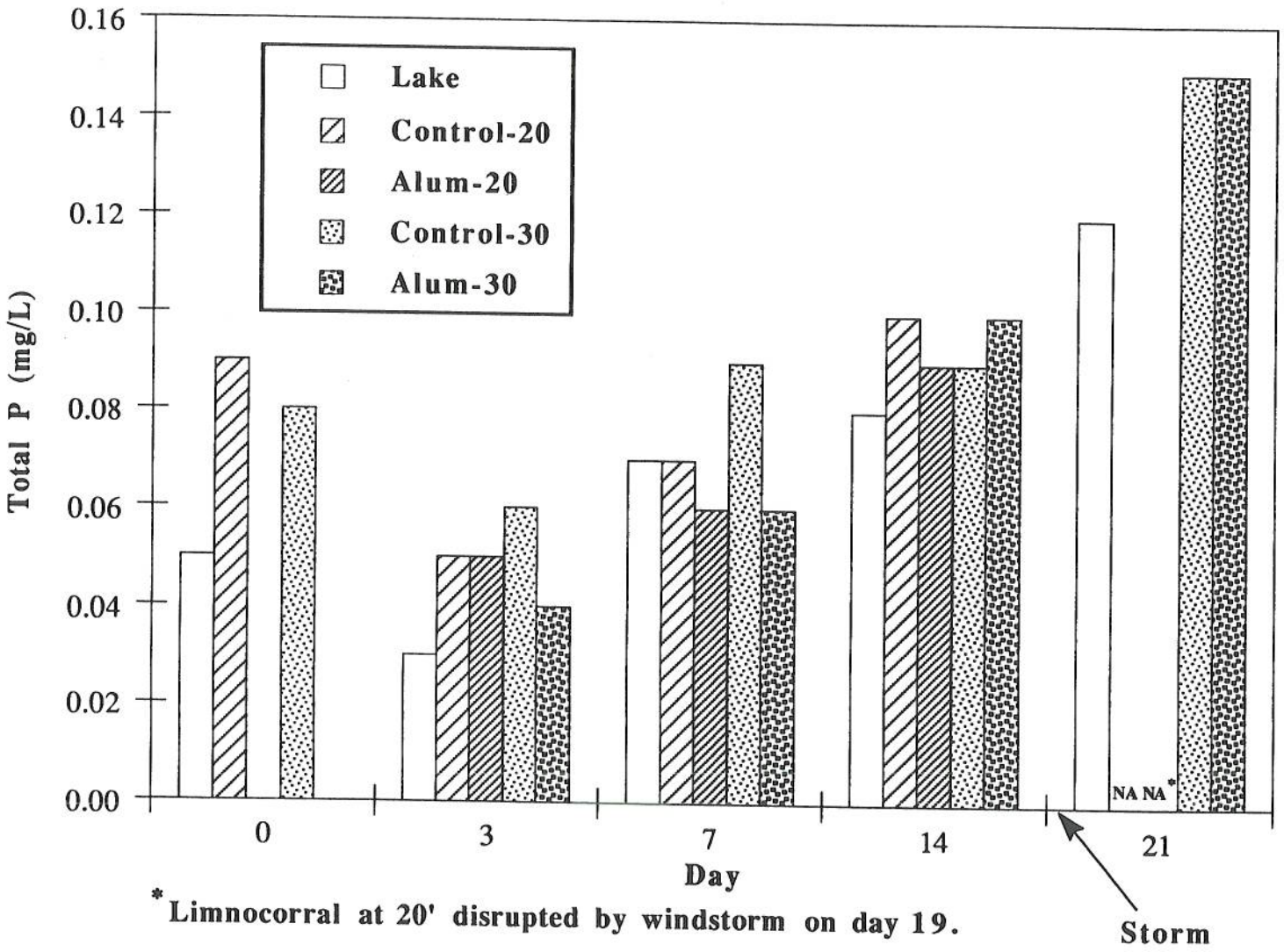
Results of water quality analysis from IML are provided in Appendix A. Results of field measurements are provided in Appendix B. Plots of the results of the total phosphorus analysis are provided in Figure 1. Plots of the results of total and dissolved reactive phosphorus analysis are provided in Figure 2.

DISCUSSION AND CONCLUSTIONS

Alum/Sodium aluminate Treatment - There was very little difference between the control limnocorrals and the alum test limnocorrals (see Figure 1). A small decrease in total phosphorus between control and treatment was seen in the 3-day and 7-day 30 foot limnocorrals, and in the 7-day and 14-day 20 foot limnocorrals. However, total phosphorus was increasing over this period, including in the lake. By day 21, the 30 foot limnocorrals showed no difference between control and test, and were higher than the total phosphorus in the lake. No significant phosphorus complexation and precipitation occurred versus controls past day 7.

Phosphorus Addition - The results of phosphorus addition to the limnocorrals was very interesting. An amount of dissolved orthophosphorus was added that had been calculated to

Cherry Creek Reservoir
LIMNOCORRAL STUDY
Summary of Total Phosphorus Data



*Limnocorral at 20' disrupted by windstorm on day 19.

Figure 1

Cherry Creek Reservoir - Limnological Study
Summary of Total & Dissolved Reactive Phosphorus
in spiked (PHOS) Limnocorrals

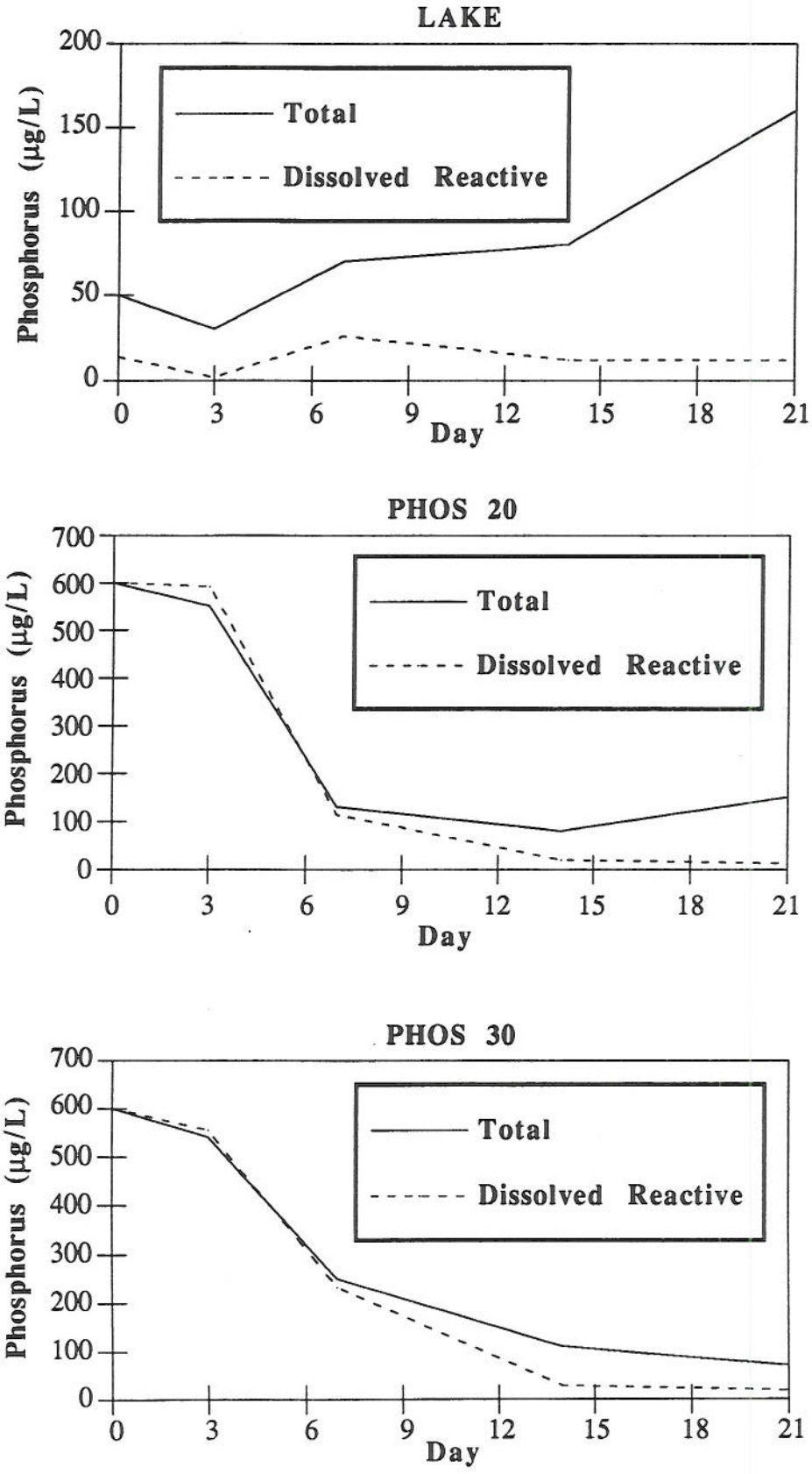


Figure 2

raise the lake water to an estimated 600 ug/L. This was achieved in both the 30-foot limnocorrals (580 ug/L total reactive phosphorus) and 20-foot limnocorrals (597 ug/L total reactive phosphorus). Figure 2 illustrates what happened to the total and dissolved reactive phosphorus over the test. Total phosphorus increased in the lake, with dissolved reactive phosphorus remaining about the same. However, in both the limnocorrals, total and dissolved reactive phosphorus declined in the water column. Thus, dissolved phosphorus was apparently complexed and settled out throughout the test. Recall that the 20-foot limnocorrals were disrupted at Day 19, so an increase in total phosphorus was seen toward the end of the test versus the 30-foot results which indicated sustained sedimentation and removal. The total and dissolved reactive phosphorus were virtually the same as in the lake by day 21 in the 30-foot limnocorrals. It is also interesting to note that the dissolved reactive phosphorus was about the same in the limnocorrals receiving phosphorus addition as compared to the alum treatment at day 14 and beyond.

The concepts that 1) there is a relatively constant pool of dissolved reactive phosphorus in the lake, and 2) significant changes in total phosphorus can occur due to resuspension of bottom sediments are supported by the study. Doubling of total phosphorus concentrations is achievable, even when water is isolated in plastic enclosures. Results of this limnocorral study need to be linked to the results of the limiting nutrient study to further examine the phosphorus situation. It is doubtful that phosphorus was the limiting nutrient to algal growth during the summer growing season of 1991.

The general surface water conditions of the reservoir were acceptable this year according to numerous interviews at the reservoir of various users. Perceptions of those interviewed tended to be highly biased toward the visual characteristics of the surface. However, significant oxygen depletions were measured (Appendix B). These will be discussed in more detail in the Limiting Nutrient Study.

REFERENCES

Dominie, D.R. 1980. Hypolimnetic Aluminum Treatment of Softwater Annabessacook Lake. in *Restoration of Lakes and Inland Waters*. EPA - 440/5-81-010. pp. 417 - 423.

APPENDIX B

FIELD MEASUREMENTS

Cherry Creek Reservoir
30 Foot Limnocorrals

Date	Control					Alum				Phosphorous			
7/16/91	Air Temperature 95° F Saturation DO mg/L Alkalinity* 173.91 179.52 mg/L Secchi Depth 37" inches					90° F mg/L mg/L 44" inches							
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	6.70	23.8		916								
	1m	6.00	23.0		925								
	2m	5.30	22.0		912								
	3m	4.20	22.0		891								
	Middle 4m	3.20	22.0		880								
	5m				870								
	6m				870								
	7m				870								
	Bottom 7.5m	2.20	22.0		870								
7/19/91	Air Temperature 80° F Saturation DO mg/L Alkalinity* 163 mg/L Secchi Depth 44" inches					88° F mg/L 174 mg/L 44" inches				84° F mg/L 174 mg/L 46" inches			
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	5.60	23.1		892	5.70	22.8		929	5.20	23.1		913
	1m	5.20	23.0	8.30	894	5.60	22.8	8.0	939	4.70	23.0	8.17	915
	2m	4.95	22.9		896	4.75	22.5		945	4.50	22.9		917
	3m	4.80	22.9		896	4.30	22.5		935	4.10	22.8		919
	Middle 4m	3.95	22.8	8.06	887	3.70	22.0	7.90	944	3.60	22.5	8.06	924
	5m	3.40	22.5		893	2.85	21.5		954	2.60	22.1		932
	6m	2.30	21.8		873	2.25	21.2		938	2.20	21.8		916
	7m	2.30	21.8	7.94	884	1.90	21.1	7.9	918	2.15	21.8	7.96	927
	Bottom 7.5m												

*Composite sample - top, middle and bottom depth.

Cherry Creek Reservoir
30 Foot Limnocorrals (continued)

Date	Control					Alum				Phosphorous			
7/23/91	Air Temperature 65° F Saturation DO 7.65 mg/L Alkalinity* 163 mg/L Secchi Depth 47" inches					65° F 7.65 mg/L 168 mg/L 39" inches				65° F 7.65 mg/L 168 mg/L 41" inches			
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	4.55	22.0	8.12	870	3.80	21.8	8.02	905	3.95	22.0	7.97	870
	1m	4.45	22.0	7.80	870	3.70	21.8	7.84	905	3.80	22.0	8.03	870
	2m	4.00	22.0		870	3.40	21.8		905	3.70	22.0		870
	3m	3.85	22.0		870	3.20	21.8		905	3.45	21.9		872
	Middle 4m	3.75	22.0	7.96	880	3.10	21.8	7.94	916	3.30	21.9	7.96	882
	5m	3.80	22.0		870	2.95	21.8		916	3.20	21.9		893
	6m	2.30	21.9		903	2.85	21.8		916	2.80	21.9		903
	7m	1.85	21.8	7.90	884	3.40	21.7	7.99	918	2.30	21.9	7.91	903
	Bottom 7.5m					3.45	21.5		922				
7/30/91	Air Temperature 85° F Saturation DO 8.4 mg/L Alkalinity* 163 mg/L Secchi Depth 32" inches					89° F 8.4 mg/L 163 mg/L 33.5" inches				85° F 8.4 mg/L 168 mg/L 36" inches			
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	7.20	22.8	8.39	887	7.20	22.8	8.38	887	6.55	23.0	8.36	894
	1m	6.90	22.8	8.34	887	6.80	22.5	8.24	893	6.40	22.9	8.33	886
	2m	6.80	22.6		891	6.15	22.2		898	6.10	22.9		896
	3m	6.35	22.2		898	4.85	21.5		879	5.45	22.7		889
	Middle 4m	4.65	21.4	8.04	881	4.40	20.9	8.12	890	4.45	21.6	8.02	877
	5m	4.30	21.0		888	4.15	20.8		892	4.35	21.2		884
	6m	3.80	20.9		890	3.60	20.4		888	3.60	21.0		877
	7m	3.30	20.5	7.93	897	3.35	20.2	8.09	892	3.35	20.9	7.95	879
	Bottom 7.5m	3.20	20.5		886	3.35	20.2		892	3.10	20.8		881

*Composite sample - top, middle and bottom depth.

Cherry Creek Reservoir
30 Foot Limnocorrals (continued)

Date	Control					Alum				Phosphorous			
8/6/91	Air Temperature 80° F Saturation DO 6.8 mg/L Alkalinity* 168 mg/L Secchi Depth 34.5" inches					88° F 6.8 mg/L 168 mg/L 39" inches				85° F 6.8 mg/L 168 mg/L 31" inches			
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	6.90	21.9	8.32	872	7.35	22.0	8.27	880	6.30	21.8	8.33	873
	1m	6.35	21.7	8.17	875	6.50	21.5	8.28	889	6.10	21.8	8.24	873
	2m	5.60	21.2		884	5.90	21.1		886	5.40	21.2		884
	3m	5.35	21.1		886	5.50	21.1		875	5.05	21.2		884
	Middle 4m	5.30	21.1	7.97	886	5.10	21.0	8.08	877	4.70	21.1	8.02	886
	5m	5.10	21.1		886	4.85	20.9		879	4.05	21.1		875
	6m	4.90	21.1		886	4.55	20.9		879	4.10	21.0		877
	7m	4.20	21.0	7.96	877	4.30	20.8	8.09	870	3.95	20.9	8.03	879
	Bottom 7.5m	4.20	21.0		877	4.85	20.8		870	3.95	20.8		881
8/13/91	Air Temperature 59° F Saturation DO 7.33 mg/L Alkalinity* 163 mg/L Secchi Depth 46.5" inches					70° F 7.33 mg/L 163 163 mg/L 49" inches				70° F 7.33 mg/L 168 mg/L 41" inches			
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	4.60	21.0	8.10	888	5.25	21.0	8.10	888	4.70	21.0	8.08	888
	1m	4.60	21.0	8.15	888	4.90	21.0	8.12	888	4.60	21.0	8.08	888
	2m	4.55	21.0		888	4.80	21.0		888	4.55	21.0		888
	3m	4.55	21.0		888	4.80	21.0		888	4.45	21.0		888
	Middle 4m	4.60	21.0	8.11	888	4.70	21.0	8.12	888	4.40	21.0	8.05	888
	5m	4.50	21.0		888	4.65	21.0		888	3.80	21.0		888
	6m	4.10	21.0		888	4.45	20.9		890	3.80	21.0		888
	7m	4.30	21.0	8.12	888	4.45	20.9	8.10	890	3.95	20.9	8.05	890
	Bottom 7.5m	3.45	20.9		890	4.50	20.9	8.08	890	3.20	20.9		911

*Composite sample - top, middle and bottom depth.

Cherry Creek Reservoir
20 Foot Limnocorrals

Date	Control					Alum				Phosphorous			
7/16/91	Air Temperature	90°		F									
	Saturation DO			mg/L									
	Alkalinity*	168	174	mg/L									
	Secchi Depth	39.5"		inches									
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	7.55	23.2		922								
	1m	7.20	22.8		908								
	2m	6.10	21.8		916								
	3m	3.95	21.5		900								
	4m												
	5m												
	5.5m												
	Bottom 6m	3.15	22.2		887								
7/19/91	Air Temperature	90°	F			90°	F			88°	F		
	Saturation DO		mg/L				mg/L				mg/L		
	Alkalinity*	168	mg/L			154	mg/L			168	mg/L		
	Secchi Depth	60"	inches			61"	inches			55"	inches		
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	6.90	23.0	8.25	894	6.65	23.2	8.10	932	7.10	22.9		896
	1m	6.60	22.6	8.30	890	6.60	23.1	8.10	924	7.05	22.8	8.45	898
	2m	6.40	22.2		898	6.30	22.5		935	6.75	22.3		896
	3m	6.05	22.2	8.18	898	5.90	22.2	7.93	951	6.20	22.2	8.33	898
	4m	6.43	22.0		902	5.20	22.1		942	4.40	22.0		912
	5m	2.15	21.7	7.86	907	3.60	21.8	7.93	937	2.25	21.7	7.95	907
	5.5m	2.10	21.5		911	1.65	21.3		947	2.15	21.6		920
	Bottom 6m												

*Composite sample - top, middle and bottom depth.

Cherry Creek Reservoir
20 Foot Limnocorrals (continued)

Date	Control					Alum				Phosphorous			
7/23/91	Air Temperature 60° F Saturation DO 7.65 mg/L Alkalinity* 168 mg/L Secchi Depth 38" inches					60° F 7.65 mg/L 163 mg/L 39" inches				60° F 7.65 mg/L 163 mg/L 37" inches			
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	4.70	21.8	8.16	895	4.85	21.8	8.10	916	4.45	22.0	8.17	870
	1m	4.50	21.8	8.07	895	4.45	21.8	8.05	916	4.40	21.9	8.05	861
	2m	4.40	21.8		905	4.30	21.8		916	4.30	21.9		872
	3m	4.30	21.8	8.06	905	4.35	21.8	8.02	916	4.20	21.9	8.12	872
	4m	3.85	21.8		905	3.95	21.8		916	3.95	21.9		872
	5m	3.60	21.7	8.0	907	3.90	21.6	7.94	920	3.75	21.8	8.06	873
	Bottom 5.5m	3.55	21.6		909	3.50	21.5		922	3.70			
7/30/91	Air Temperature 75° F Saturation DO 8.40 mg/L Alkalinity* 129 mg/L Secchi Depth 35.5" inches					79° F 8.4 mg/L 168 mg/L 34.5" inches				80° F 9.4 mg/L 168 mg/L 35" inches			
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	7.40	22.6	8.50	891	7.50	23.0	8.41	915	7.55	22.6	8.47	901
	1m	6.90	22.2	8.42	887	6.95	22.2	8.30	930	7.20	22.2	8.37	898
	2m	6.70	22.0		870	6.10	22.0		933	6.55	22.0		902
	3m	6.10	21.8	8.32	873	5.10	21.8	7.89	927	5.85	21.8	8.18	895
	4m	5.10	21.2		884	3.75	21.0		942	4.30	21.0		888
	5m	3.30	20.3	8.04	890	3.25	20.5	8.03	941	3.40	20.5	7.94	897
	Bottom 5.5m	2.15	20.2		892	2.95	20.3		945	3.15	20.4		899

*Composite sample - top, middle and bottom depth.

Cherry Creek Reservoir
20 Foot Limnocorrals (continued)

Date	Control					Alum				Phosphorous			
8/6/91	Air Temperature 88° F Saturation DO 6.8 mg/L Alkalinity* 163 mg/L Secchi Depth 36" inches					90° F 6.8 mg/L 163 mg/L 39.5" inches				90° F 6.8 mg/L 185 mg/L 37.5" inches			
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	7.05	22.2	8.36	866	7.70	22.3	8.42	875	7.85	22.3	8.26	865
	1m	6.80	21.8	8.35	863	7.20	21.8	8.36	863	6.75	21.6	8.41	877
	2m	5.95	21.1		875	5.85	21.0		877	5.70	21.0		888
	3m	5.45	20.9	8.15	868	5.50	20.8	8.44	870	5.35	20.8	8.21	881
	4m	5.35	20.8		870	5.30	20.7		872	5.30	20.8		881
	5m	5.30	20.8	8.14	870	5.25	20.6	8.12	873	5.30	20.6	8.17	884
	Bottom 5.5m	5.20	20.6		873	5.35	20.5		875	5.30	20.6		873
8/13//91	Air Temperature 78° F Saturation DO 7.33 mg/L Alkalinity* 163 mg/L Secchi Depth 49" inches					80° F 7.33 mg/L 168 mg/L 47.5" inches				75° F 7.33 mg/L 168 mg/L 49.5" inches			
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	5.87	21.2	8.17	884	6.00	21.5	8.22	879	6.50	21.5	8.29	879
	1m	5.40	21.2	8.15	884	5.75	21.2	8.30	884	6.00	21.5	8.27	879
	2m	4.95	21.0		888	5.30	21.1		886	5.40	21.2		884
	3m	4.80	21.0	8.11	888	5.05	21.0	8.20	888	5.10	21.1	8.28	886
	4m	4.70	20.9		890	4.90	21.0		888	4.85	21.0		888
	5m	4.60	20.9	8.04	890	4.90	20.9	8.15	890	4.85	21.0	8.16	888
	Bottom 5.5m	4.65	20.8		892	4.80	20.9		890	4.80	21.0		888

*Composite sample - top, middle and bottom depth.

Cherry Creek Reservoir
20 Foot Limnocorrals (continued)

Date	Control					Alum				Phosphorous			
8/20/91	Air Temperature 70° F Saturation DO 8.9 mg/L Alkalinity* 163 mg/L Secchi Depth 38.5" inches					70° F 8.9 mg/L 168 mg/L 38" inches				70° F 8.9 mg/L 157 mg/L 39" inches			
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	5.95	21.2	8.19	884	6.15	21.3	8.16	882	5.70	21.2	8.18	884
	1m	5.80	21.3	8.18	882	5.95	21.4	8.19	881	5.60	21.3	8.19	882
	2m	5.85	21.4		881	5.85	21.3		882	5.70	21.3		882
	3m	5.70	21.3	8.20	882	5.80	21.3	8.23	882	5.65	21.2	8.17	884
	4m	5.55	21.3		882	5.60	21.3		882	5.45	21.2		884
	5m	3.30	21.2	8.01	884	5.45	21.2	8.23	884	5.55	21.2	8.23	884
	Bottom 5.5m	2.90	21.1		886	4.30	21.1		886	4.05	21.0		888

*Composite sample - top, middle and bottom depth.

Cherry Creek Reservoir
Lake Outside Limnocorrals

Date

7/15/91

Air Temperature	95°	F
Saturation DO		mg/L
Alkalinity*		mg/L
Secchi Depth		inches

Depth	DO	Temperature Degrees C	pH	Corrected Conductivity
Surface	7.45	23.5		906
1m	7.55	22.5		893
2m	6.80	22.0		891
3m	6.65	21.5		879
4m	2.80	20.8		892
5m				
6m				
7m				
8m				
9m	2.65	20.8		892

7/23/91

Air Temperature	63°	F
Saturation DO	7.65	mg/L
Alkalinity*		mg/L
Secchi Depth	32"	inches

Depth	DO	Temperature Degrees C	pH	Corrected Conductivity
Surface	3.30	21.8	8.07	905
1m	4.30	21.8		895
2m	3.90	21.8		895
3m	3.60	21.8		905
4m	3.35	21.8		905
5m	3.25	21.8		905
6m	3.30	21.8		905
7m	3.35	21.8		905
Bottom 7.5m	3.35	21.7		907

*Composite sample - top, middle and bottom depth.

Cherry Creek Reservoir
Lake Outside Limnocorrals (continued)

Date					
7/30/91	Air Temperature	88°	F		
	Saturation DO	8.4	mg/L		
	Alkalinity*		mg/L		
	Secchi Depth		inches		
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	7.70	22.8	8.40	866
	1m	7.10	22.6	7.38	859
	2m	7.05	22.5		872
	3m	6.90	22.4		873
	4m	4.55	21.2		884
	5m	4.20	21.0		877
	6m	4.00	20.8		881
	7m	3.45	20.5		886
	Bottom 7.5m	3.40	20.5		886
8/6/91	Air Temperature	88°	F		
	Saturation DO	6.8	mg/L		
	Alkalinity*		mg/L		
	Secchi Depth	40"	inches		
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	6.30	21.9	8.32	872
	1m	6.35	21.8		873
	2m	6.25	21.5		879
	3m	6.20	21.4		881
	4m	6.15	21.4		881
	5m	5.90	21.2		884
	6m	5.70	21.1		886
	7m	5.50	21.0		888
	Bottom 7.5m	5.60	20.9		890

*Composite sample - top, middle and bottom depth.

Cherry Creek Reservoir
Lake Outside Limnocorrals (continued)

Date					
8/13/91	Air Temperature	70°	F		
	Saturation DO	7.33	mg/L		
	Alkalinity*	157	mg/L		
	Secchi Depth	45"	inches		
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	5.90	21.1	8.25	886
	1m	5.75	21.1	8.23	886
	2m	5.75	21.1		886
	3m	5.70	21.1		886
	4m	5.70	21.1		886
	5m	5.35	21.0		888
	6m	5.10	21.0		888
	7m	4.95	20.9		890
	Bottom 7.5m	1.20	20.9		890
8/13/91	Air Temperature	82°	F		
	Saturation DO	7.33	mg/L		
	Alkalinity*		mg/L		
	Secchi Depth		inches		
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	6.45	21.2	8.31	895
	1m	5.60	21.1		897
	2m	5.25	20.9		890
	3m	5.15	20.9		890
	4m	5.05	20.9		890
	5m	5.05	20.9		890
	Bottom 5.5m	4.85	20.8		892

*Composite sample - top, middle and bottom depth.

Cherry Creek Reservoir
Lake Outside Limnocorrals (continued)

Date					
8/20/91	Air Temperature	70°	F		
	Saturation DO	8.9	mg/L		
	Alkalinity*	157	mg/L		
	Secchi Depth	39"	inches		
	Depth	DO	Temperature Degrees C	pH	Corrected Conductivity
	Surface	6.45	21.2	8.18	873
	1m	8.50	21.2	7.78	873
	2m	6.30	21.2		884
	3m	6.35	21.2		884
	4m	6.10	21.2		884
	5m	5.00	21.1		886
	Bottom 5.5m	3.10	21.1		886

*Composite sample - top, middle and bottom depth.

APPENDIX A

ANALYTICAL LABORATORY RESULTS

CHERRY CREEK LIMNOCORRALS
SUMMARY OF TURBIDITY

DAY		NTU	ALUMEFFECT NOTES
Initial - Day 0	LAKE	3.9	
	CRTL 20	7.1	Stirred up by installation
	CRTL 30	11.0	Stirred up by installation
Day 3	LAKE	4.6	
	CRTL 20	6.6	
	ALUM 20	3.8	Slight reduction
	PHOS 20	4.6	
	CRTL 30	6.9	
	ALUM 30	6.4	Slight reduction
	PHOS 30	5.2	
Day 7	LAKE	6.6	
	CRTL 20	12.0	
	ALUM 20	6.4	Decrease - same as lake
	PHOS 20	6.7	Same as lake
	CTRL 30	5.6	Same as lake
	ALUM 30	10.1	Increase
	PHOS 30	6.2	Same as lake
Day 14	LAKE	4.8	
	CRTL 20	10.0	
	ALUM 20	7.7	Decrease
	PHOS 20	7.6	
	CTRL 30	9.6	
	ALUM 30	12.0	Increase
	PHOS 30	12.0	
Day 21	LAKE	5.6	
	CTRL 20	6.7	Disrupted on Day 19
	ALUM 20	5.5	Disrupted on Day 19
	PHOS 20	5.8	Disrupted on Day 19
	CTRL 30	7.6	
	ALUM 30	9.7	Increase
	PHOS 30	8.0	

NOTE: Phosphorus addition similar to alum treatment and/or lake under most conditions.

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ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
August 29, 1991

Project: CCBA
Location: Cherry Creek Reservoir

TOTAL PHOSPHORUS: Method comparison

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHORUS Total, (1) MG/L	PHOSPHORUS Total, (2) MG/L
14319	Phos-20, Day 3	7/19/91 @ AM	0.55	0.53
14320	Phos-30, Day 3	7/19/91 @ AM	0.54	0.44
14321	Alum-20, Day 3	7/19/91 @ AM	0.05	<0.05
14322	Alum-30, Day 3	7/19/91 @ AM	0.04	<0.05
14323	NP 0.3X, Day 3	7/19/91 @ AM	0.09	<0.05
14324	NP 1.0X, Day 3	7/19/91 @ AM	0.18	0.06
14325	NP 3.3X, Day 3	7/19/91 @ AM	0.54	0.44
14326	N 0.3X, Day 3	7/19/91 @ AM	0.03	<0.05
14327	N 1.0X, Day 3	7/19/91 @ AM	0.03	<0.05
14328	N 3.3X, Day 3	7/19/91 @ AM	0.04	<0.05
14329	P 0.3X, Day 3	7/19/91 @ AM	0.08	<0.05
14330	P 1.0X, Day 3	7/19/91 @ AM	0.21	0.15
14331	P 3.3X, Day 3	7/19/91 @ AM	0.58	0.57

(1) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed. (Ammonium Persulfate digestion followed by colorimetric procedure)
(2) Total Phosphorus (non-filtered, preserved), ICP on TKN digest.

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ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
August 29, 1991

Project: CCBA
Location: Cherry Creek Reservoir

TOTAL PHOSPHORUS: Method comparison

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHORUS Total, (1) MG/L	PHOSPHORUS Total, (2) MG/L
14332	Ctrl-20, Day 3	7/19/91 @ AM	0.05	<0.05
14333	Ctrl 30, Day 3	7/19/91 @ AM	0.07	<0.05
14334	Ct Lk 1.0M, D 3	7/19/91 @ AM	0.03	<0.05
14335	Ctrl A, Day 3	7/19/91 @ AM	0.07	<0.05
14336	Ctrl B, Day 3	7/19/91 @ AM	0.05	<0.05
14337	Ctrl C, Day 3	7/19/91 @ AM	0.06	<0.05
14338	NP 1.0X D.3(Dup)	7/19/91 @ AM	0.17	<0.05
14339	P 3.3X D.3 (Dup)	7/19/91 @ AM	0.56	0.47

(1) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed. (Ammonium Persulfate digestion followed by colorimetric procedure)
(2) Total Phosphorus (non-filtered, preserved), ICP on TKN digest.

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August 29, 1991

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Location: Cherry Creek Reservoir

TOTAL PHOSPHORUS: Method comparison

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHORUS Total, (1) MG/L	PHOSPHORUS Total, (2) MG/L
14332	Ctrl-20, Day 3	7/19/91 @ AM	0.05	<0.05
14333	Ctrl 30, Day 3	7/19/91 @ AM	0.07	<0.05
14334	Ct Lk 1.0M, D 3	7/19/91 @ AM	0.03	<0.05
14335	Ctrl A, Day 3	7/19/91 @ AM	0.07	<0.05
14336	Ctrl B, Day 3	7/19/91 @ AM	0.05	<0.05
14337	Ctrl C, Day 3	7/19/91 @ AM	0.06	<0.05
14338	NP 1.0X D.3(Dup)	7/19/91 @ AM	0.17	<0.05
14339	P 3.3X D.3 (Dup)	7/19/91 @ AM	0.56	0.47

(1) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed. (Ammonium Persulfate digestion followed by colorimetric procedure)

(2) Total Phosphorus (non-filtered, preserved), ICP on TKN digest.

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ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
August 29, 1991

QUALITY ASSURANCE

Project: CCBA
Location: Cherry Creek Reservoir

DUPLICATE ANALYSIS (Laboratory splits)

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHATE DR (1) MG/L	PHOSPHATE TR (2) MG/L	PHOSPHORUS T (3) MG/L	NITROGEN TKN (4) MG/L	NITROGEN NO3 (5) MG/L	NITROGEN NO3-F (6) MG/L	TSS (7) MG/L	TURBIDITY (8) NTU
14324	NP 1.0X, Day 3	7/19/91 @ AM	0.093	0.093	0.18	1.5	3.28	3.10	11	5.1
14338	NP 1.0X, Day 3	7/19/91 @ AM	0.098	0.091	0.17	1.1	3.25	3.44	14	5.1
14331	P 3.3X, Day 3	7/19/91 @ AM	0.602	0.603	0.58	0.8	0.017	0.013	7	3.9
14339	P 3.3X, Day 3	7/19/91 @ AM	0.602	0.600	0.56	0.3	0.021	0.018	6	3.8

REFERENCE SAMPLES

PARAMETER	IDENTIFICATION	Observe Value	True Value	95% Confidence Interval
(1) Ortho-phosphate, mg/L	EPA WP1188	0.100	0.098	0.077 - 0.1189
(3) Total Phosphorus (SM), mg/L	EPA WP1188	0.676	0.75	0.669 - 0.831
(9) Total Phosphorus (ICP), mg/L	EPA WP1188	1.32	1.50	1.30 - 1.76
(4) Total Kjeldahl Nitrogen, mg/L	EPA WP1188	4.86	5.00	4.07 - 5.83
(5) Nitrate nitrogen, mg/L	EPA WP1188	0.51	0.50	0.41 - 0.59
(7) Total Suspended Solids, mg/L	EPA PE WP026-2	19.4	23.9	14.8 - 26.5
(8) Turbidity, NTU	EPA PE WS028	5.65	5.60	5.23 - 6.27

ABBREVIATIONS:
(1) Dissolved Reactive Phosphorus (filtered), Method 4500-P E, SM 17th Ed.
(2) Total Reactive Phosphorus (non-filtered), Method 4500-P E, SM 17th Ed.
(3) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
(4) Total Kjeldahl Nitrogen, Method 351.2 (modified), EPA-600/4-79-020, March 1983.
(5) Nitrate Nitrogen (non-filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(6) Nitrate Nitrogen (filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(7) Total Suspended Solids, Method 160.2, EPA/600-4-79-020, March 1983.
(8) Turbidity, Method 180.1, EPA 600/4-79-020, March 1983.
(9) Total Phosphorus (non-filtered, preserved), ICP on TKN digest.

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ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
August 29, 1991

QUALITY ASSURANCE

Project: CCBA
Location: Cherry Creek Reservoir

DUPLICATE ANALYSIS (Laboratory splits)

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHATE DR (1) MG/L	PHOSPHATE TR (2) MG/L	PHOSPHORUS T (3) MG/L	NITROGEN TKN (4) MG/L	NITROGEN NO3 (5) MG/L	NITROGEN NO3-F (6) MG/L	TSS (7) MG/L	TURBIDITY (8) NTU
14324	NP 1.0X, Day 3	7/19/91 @ AM	0.093	0.093	0.18	1.5	3.28	3.10	11	5.1
14338	NP 1.0X, Day 3	7/19/91 @ AM	0.098	0.091	0.17	1.1	3.25	3.44	14	5.1
14331	P 3.3X, Day 3	7/19/91 @ AM	0.602	0.603	0.58	0.8	0.017	0.013	7	3.9
14339	P 3.3X, Day 3	7/19/91 @ AM	0.602	0.600	0.56	0.3	0.021	0.018	6	3.8

REFERENCE SAMPLES

PARAMETER	IDENTIFICATION	Observe Value	True Value	95% Confidence Interval
(1) Ortho-phosphate, mg/L	EPA WP1188	0.100	0.098	0.077 - 0.1189
(3) Total Phosphorus (SM), mg/L	EPA WP1188	0.676	0.75	0.669 - 0.831
(9) Total Phosphorus (ICP), mg/L	EPA WP1188	1.32	1.50	1.30 - 1.76
(4) Total Kjeldahl Nitrogen, mg/L	EPA WP1188	4.86	5.00	4.07 - 5.83
(5) Nitrate nitrogen, mg/L	EPA WP1188	0.51	0.50	0.41 - 0.59
(7) Total Suspended Solids, mg/L	EPA PE WP026-2	19.4	23.9	14.8 - 26.5
(8) Turbidity, NTU	EPA PE WS028	5.65	5.60	5.23 - 6.27

ABBREVIATIONS:
(1) Dissolved Reactive Phosphorus (filtered), Method 4500-P E, SM 17th Ed.
(2) Total Reactive Phosphorus (non-filtered), Method 4500-P E, SM 17th Ed.
(3) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
(4) Total Kjeldahl Nitrogen, Method 351.2 (modified), EPA-600/4-79-020, March 1983.
(5) Nitrate Nitrogen (non-filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(6) Nitrate Nitrogen (filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(7) Total Suspended Solids, Method 160.2, EPA/600-4-79-020, March 1983.
(8) Turbidity, Method 180.1, EPA 600/4-79-020, March 1983.
(9) Total Phosphorus (non-filtered, preserved), ICP on TKN digest.

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III

ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
August 30, 1991

Project: CCBA
Location: Cherry Creek Reservoir

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHATE DR (1) MG/L	PHOSPHATE TR (2) MG/L	PHOSPHORUS T (3) MG/L	NITROGEN TKN (4) MG/L	NITROGEN NO3 (5) MG/L	NITROGEN NO3-F (6) MG/L	TSS (7) MG/L	TURBIDITY (8) NTU
14376	Alum-20	7/23/91	0.029	0.031	0.06	0.4	<0.005	<0.005	10	6.4
14377	Alum-30	7/23/91	0.035	0.148	0.06	0.4	<0.005	<0.005	14	10.1
14378	Phos-20	7/23/91	0.114	0.117	0.13	0.8	<0.005	<0.005	9	6.7
14379	Phos-30	7/23/91	0.233	0.240	0.25	0.6	<0.005	<0.005	10	6.2
14380	Mid-Dam	7/23/91	0.026	0.032	0.07	0.9	<0.005	<0.005	7	6.6
14381	N 0.3X	7/23/91	0.014	0.010	0.03	0.8	1.01	0.971	16	5.2
14382	N 1.0X	7/23/91	0.014	0.011	0.04	0.8	3.64	3.55	16	5.7
14383	N 3.3X	7/23/91	0.008	0.008	0.03	0.8	11.1	11.7	16	6.0
14384	P 0.3X	7/23/91	0.018	0.019	0.11	0.7	<0.005	<0.005	12	8.7
14385	P 1.0X	7/23/91	0.124	0.125	0.20	1.3	<0.005	<0.005	11	8.6
14386	P 3.3X	7/23/91	0.555	0.555	0.57	0.9	<0.005	<0.005	10	7.6
14387	NP 0.3X	7/23/91	0.014	0.016	0.06	1.0	0.514	0.576	22	7.6
14388	NP 1.0X	7/23/91	0.018	0.031	0.11	1.9	2.39	2.30	20	13
14389	NP 3.3X	7/23/91	0.101	0.163	0.43	2.2	11.6	10.9	38	14

ABBREVIATIONS:

(1) Dissolved Reactive Phosphorus (filtered), Method 4500-P E, SM 17th Ed.
(2) Total Reactive Phosphorus (non-filtered), Method 4500-P E, SM 17th Ed.
(3) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
(4) Total Kjeldahl Nitrogen, Method 351.2 (modified), EPA-600/4-79-020, March 1983.
(5) Nitrate Nitrogen (non-filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(6) Nitrate Nitrogen (filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(7) Total Suspended Solids, Method 160.2, EPA/600-4-79-020, March 1983.
(8) Turbidity, Method 180.1, EPA 600/4-79-020, March 1983.

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ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
August 30, 1991

Project: CCBA
Location: Cherry Creek Reservoir

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHATE DR (1) MG/L	PHOSPHATE TR (2) MG/L	PHOSPHORUS T (3) MG/L	NITROGEN TKN (4) MG/L	NITROGEN NO3 (5) MG/L	NITROGEN NO3-F (6) MG/L	TSS (7) MG/L	TURBIDITY (8) NTU
14376	Alum-20	7/23/91	0.029	0.031	0.06	0.4	<0.005	<0.005	10	6.4
14377	Alum-30	7/23/91	0.035	0.148	0.06	0.4	<0.005	<0.005	14	10.1
14378	Phos-20	7/23/91	0.114	0.117	0.13	0.8	<0.005	<0.005	9	6.7
14379	Phos-30	7/23/91	0.233	0.240	0.25	0.6	<0.005	<0.005	10	6.2
14380	Mid-Dam	7/23/91	0.026	0.032	0.07	0.9	<0.005	<0.005	7	6.6
14381	N 0.3X	7/23/91	0.014	0.010	0.03	0.8	1.01	0.971	16	5.2
14382	N 1.0X	7/23/91	0.014	0.011	0.04	0.8	3.64	3.55	16	5.7
14383	N 3.3X	7/23/91	0.008	0.008	0.03	0.8	11.1	11.7	16	6.0
14384	P 0.3X	7/23/91	0.018	0.019	0.11	0.7	<0.005	<0.005	12	8.7
14385	P 1.0X	7/23/91	0.124	0.125	0.20	1.3	<0.005	<0.005	11	8.6
14386	P 3.3X	7/23/91	0.555	0.555	0.57	0.9	<0.005	<0.005	10	7.6
14387	NP 0.3X	7/23/91	0.014	0.016	0.06	1.0	0.514	0.576	22	7.6
14388	NP 1.0X	7/23/91	0.018	0.031	0.11	1.9	2.39	2.30	20	13
14389	NP 3.3X	7/23/91	0.101	0.163	0.43	2.2	11.6	10.9	38	14

ABBREVIATIONS:

(1) Dissolved Reactive Phosphorus (filtered), Method 4500-P E, SM 17th Ed.
(2) Total Reactive Phosphorus (non-filtered), Method 4500-P E, SM 17th Ed.
(3) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
(4) Total Kjeldahl Nitrogen, Method 351.2 (modified), EPA-600/4-79-020, March 1983.
(5) Nitrate Nitrogen (non-filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(6) Nitrate Nitrogen (filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(7) Total Suspended Solids, Method 160.2, EPA/600-4-79-020, March 1983.
(8) Turbidity, Method 180.1, EPA 600/4-79-020, March 1983.

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August 30, 1991

Project: CCBA
Location: Cherry Creek Reservoir

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHATE DR (1) MG/L	PHOSPHATE TR (2) MG/L	PHOSPHORUS T (3) MG/L	NITROGEN TKN (4) MG/L	NITROGEN NO3 (5) MG/L	NITROGEN NO3-F (6) MG/L	TSS (7) MG/L	TURBIDITY (8) NTU
14390	Control-1	7/23/91	0.014	0.011	0.05	0.5	<0.005	<0.005	12	5.3
14391	Control-2	7/23/91	0.014	0.014	0.05	1.0	<0.005	<0.005	10	7.1
14392	Control-3	7/23/91	0.014	0.016	0.05	0.7	<0.005	<0.005	11	6.4
14393	Control-20	7/23/91	0.035	0.043	0.07	0.9	<0.005	<0.005	12	12.0
14394	Control-30	7/23/91	0.066	0.063	0.09	0.5	0.008	<0.005	8	5.6
14397	AATA-1	7/23/91	0.005					0.007		

ABBREVIATIONS:
(1) Dissolved Reactive Phosphorus (filtered), Method 4500-P E, SM 17th Ed.
(2) Total Reactive Phosphorus (non-filtered), Method 4500-P E, SM 17th Ed.
(3) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
(4) Total Kjeldahl Nitrogen, Method 351.2 (modified), EPA-600/4-79-020, March 1983.
(5) Nitrate Nitrogen (non-filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(6) Nitrate Nitrogen (filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(7) Total Suspended Solids, Method 160.2, EPA/600-4-79-020, March 1983.
(8) Turbidity, Method 180.1, EPA 600/4-79-020, March 1983.

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IIIa

ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
August 30, 1991

Project: CCBA
Location: Cherry Creek Reservoir

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHATE DR (1) MG/L	PHOSPHATE TR (2) MG/L	PHOSPHORUS T (3) MG/L	NITROGEN TKN (4) MG/L	NITROGEN NO3 (5) MG/L	NITROGEN NO3-F (6) MG/L	TSS (7) MG/L	TURBIDITY (8) NTU
14390	Control-1	7/23/91	0.014	0.011	0.05	0.5	<0.005	<0.005	12	5.3
14391	Control-2	7/23/91	0.014	0.014	0.05	1.0	<0.005	<0.005	10	7.1
14392	Control-3	7/23/91	0.014	0.016	0.05	0.7	<0.005	<0.005	11	6.4
14393	Control-20	7/23/91	0.035	0.043	0.07	0.9	<0.005	<0.005	12	12.0
14394	Control-30	7/23/91	0.066	0.063	0.09	0.5	0.008	<0.005	8	5.6
14397	AATA-1	7/23/91	0.005					0.007		

ABBREVIATIONS:
(1) Dissolved Reactive Phosphorus (filtered), Method 4500-P E, SM 17th Ed.
(2) Total Reactive Phosphorus (non-filtered), Method 4500-P E, SM 17th Ed.
(3) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
(4) Total Kjeldahl Nitrogen, Method 351.2 (modified), EPA-600/4-79-020, March 1983.
(5) Nitrate Nitrogen (non-filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(6) Nitrate Nitrogen (filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(7) Total Suspended Solids, Method 160.2, EPA/600-4-79-020, March 1983.
(8) Turbidity, Method 180.1, EPA 600/4-79-020, March 1983.

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III

ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
August 30, 1991

Project: CCBA
Location: Cherry Creek Reservoir

TOTAL PHOSPHORUS: Method comparison

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHORUS Total, (1) MG/L	PHOSPHORUS Total, (2) MG/L
14376	Alum-20	7/23/91	0.06	0.08
14377	Alum-30	7/23/91	0.06	0.12
14378	Phos-20	7/23/91	0.13	0.32
14379	Phos-30	7/23/91	0.25	0.36
14380	Mid-Dam	7/23/91	0.07	0.18
14381	N 0.3X	7/23/91	0.03	<0.05
14382	N 1.0X	7/23/91	0.04	0.08
14383	N 3.3X	7/23/91	0.03	0.14
14384	P 0.3X	7/23/91	0.11	0.16
14385	P 1.0X	7/23/91	0.20	0.30
14386	P 3.3X	7/23/91	0.57	0.84
14387	NP 0.3X	7/23/91	0.06	0.14
14388	NP 1.0X	7/23/91	0.11	0.18
14389	NP 3.3X	7/23/91	0.43	0.60

(1) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed. (Ammonium Persulfate digestion followed by colorimetric procedure)
(2) Total Phosphorus (non-filtered, preserved), ICP on TKN digest.

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III

ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
August 30, 1991

Project: CCBA
Location: Cherry Creek Reservoir

TOTAL PHOSPHORUS: Method comparison

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHORUS Total, (1) MG/L	PHOSPHORUS Total, (2) MG/L
14376	Alum-20	7/23/91	0.06	0.08
14377	Alum-30	7/23/91	0.06	0.12
14378	Phos-20	7/23/91	0.13	0.32
14379	Phos-30	7/23/91	0.25	0.36
14380	Mid-Dam	7/23/91	0.07	0.18
14381	N 0.3X	7/23/91	0.03	<0.05
14382	N 1.0X	7/23/91	0.04	0.08
14383	N 3.3X	7/23/91	0.03	0.14
14384	P 0.3X	7/23/91	0.11	0.16
14385	P 1.0X	7/23/91	0.20	0.30
14386	P 3.3X	7/23/91	0.57	0.84
14387	NP 0.3X	7/23/91	0.06	0.14
14388	NP 1.0X	7/23/91	0.11	0.18
14389	NP 3.3X	7/23/91	0.43	0.60

(1) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
(Ammonium Persulfate digestion followed by colorimetric procedure)

(2) Total Phosphorus (non-filtered, preserved), ICP on TKN digest.

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IIIa

ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
August 30, 1991

Project: CCBA
Location: Cherry Creek Reservoir

TOTAL PHOSPHORUS: Method comparison

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHORUS Total, (1) MG/L	PHOSPHORUS Total, (2) MG/L
14390	Control-1	7/23/91	0.05	0.13
14391	Control-2	7/23/91	0.05	0.13
14392	Control-3	7/23/91	0.05	0.20
14393	Control-20	7/23/91	0.07	0.13
14394	Control-30	7/23/91	0.09	0.16

(1) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed. (Ammonium Persulfate digestion followed by colorimetric procedure)
(2) Total Phosphorus (non-filtered, preserved), ICP on TKN digest.

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ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
August 30, 1991

QUALITY ASSURANCE

Project: CCBA
Location: Cherry Creek Reservoir

DUPLICATE ANALYSIS (Laboratory splits)

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHATE DR (1) MG/L	PHOSPHATE TR (2) MG/L	PHOSPHORUS T (3) MG/L	NITROGEN TKN (4) MG/L	NITROGEN NO3 (5) MG/L	NITROGEN NO3-F (6) MG/L	TSS (7) MG/L	TURBIDITY (8) NTU
14379	Phos-30	7/23/91	0.233	0.240	0.25	0.6	<0.005	<0.005	10	6.2
14395	Phos-30 (Dup)	7/23/91	0.230	0.238	0.26	0.8	<0.005	<0.005	7	5.9
14388	NP 1.0X	7/23/91	0.018	0.031	0.11	1.9	2.39	2.30	20	13
14396	NP 1.0X (Dup)	7/23/91	0.018	0.022	0.12	1.6	2.66	2.49	24	13

REFERENCE SAMPLES

PARAMETER	IDENTIFICATION	Observed Value	True Value	95% Confidence Interval
(1) Ortho-phosphate, mg/L	EPA WP1188	0.104	0.098	0.077 - 0.1189
(3) Total Phosphorus (SM), mg/L	EPA WP1188	0.71	0.75	0.669 - 0.831
(9) Total Phosphorus (ICP), mg/L	EPA WP1188	1.46	1.50	1.30 - 1.76
(4) Total Kjeldahl Nitrogen, mg/L	EPA WP1188	5.09	5.00	4.07 - 5.83
(5) Nitrate nitrogen, mg/L	EPA WP1188	0.55	0.50	0.41 - 0.59
(7) Total Suspended Solids, mg/L	EPA PE WP026-2	19.4	23.9	14.8 - 26.5
(8) Turbidity, NTU	EPA PE WS028	5.65	5.60	5.23 - 6.27

ABBREVIATIONS:
(1) Dissolved Reactive Phosphorus (filtered), Method 4500-P E, SM 17th Ed.
(2) Total Reactive Phosphorus (non-filtered), Method 4500-P E, SM 17th Ed.
(3) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
(4) Total Kjeldahl Nitrogen, Method 351.2 (modified), EPA-600/4-79-020, March 1983.
(5) Nitrate Nitrogen (non-filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(6) Nitrate Nitrogen (filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(7) Total Suspended Solids, Method 160.2, EPA/600-4-79-020, March 1983.
(8) Turbidity, Method 180.1, EPA 600/4-79-020, March 1983.
(9) Total Phosphorus (non-filtered, preserved), ICP on TKN digest.

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IV

ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
September 9, 1991

Project: CCBA
Location: Cherry Creek Reservoir

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHATE DR (1) MG/L	PHOSPHATE TR (2) MG/L	PHOSPHORUS T (3) MG/L	NITRGEN TKN () MG/L	NITROGEN NO3 (5) MG/L	NITROGEN NO3-F (6) MG/L	TSS (7) MG/L	TURBIDITY (8) NTU
14669	N 0.3X Day 14	7/30/91 @ AM	0.016	0.008	0.08	1.4	0.98	0.931	6	2.4
14670	N 1.0X Day 14	7/30/91 @ AM	0.009	0.012	0.04	1.4	3.54	3.42	10	2.2
14671	N 3.3X Day 14	7/30/91 @ AM	0.009	0.005	0.07	1.6	12.1	12.2	14	3.2
14672	P 0.3X Day 14	7/30/91 @ AM	0.009	0.008	0.13	2.0	<0.005	<0.005	14	5.0
14673	P 1.0X Day 14	7/30/91 @ AM	0.021	0.017	0.17	2.6	<0.005	<0.005	28	18
14674	P 3.3X Day 14	7/30/91 @ AM	0.384	0.406	0.50	2.6	<0.005	<0.005	22	5.5
14675	NP 0.3X Day 14	7/30/91 @ AM	0.012	0.010	0.07	1.8	0.266	0.232	16	4.2
14676	NP 1.0X Day 14	7/30/91 @ AM	0.016	0.027	0.15	3.2	1.67	1.58	42	7.9
14677	NP 3.3X Day 14	7/30/91 @ AM	0.037	0.192	0.43	4.2	9.17	9.33	66	23
14678	CONTROL 1 D 14	7/30/91 @ AM	0.009	0.005	0.06	1.5	<0.005	<0.005	10	1.7
14679	CONTROL 2 D 14	7/30/91 @ AM	0.009	0.007	0.08	1.4	<0.005	<0.005	6	2.7
14680	CONTROL 3 D 14	7/30/91 @ AM	0.009	0.007	0.05	1.4	<0.005	<0.005	9	2.2

ABBREVIATIONS:
(1) Dissolved Reactive Phosphorus (filtered), Method 4500-P E, SM 17th Ed.
(2) Total Reactive Phosphorus (non-filtered), Method 4500-P E, SM 17th Ed.
(3) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
(4) Total Kjeldahl Nitrogen, Method 351.2 (modified), EPA-600/4-79-020, March 1983.
(5) Nitrate Nitrogen (non-filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(6) Nitrate Nitrogen (filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(7) Total Suspended Solids, Method 160.2, EPA/600-4-79-020, March 1983.
(8) Turbidity, Method 180.1, EPA 600/4-79-020, March 1983.

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IVa

ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
September 9, 1991

Project: CCBA
Location: Cherry Creek Reservoir

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHATE DR (1) MG/L	PHOSPHATE TR (2) MG/L	PHOSPHORUS T (3) MG/L	NITROGEN TKN (4) MG/L	NITROGEN NO3 (5) MG/L	NITROGEN NO3-F (6) MG/L	TSS (7) MG/L	TURBIDITY (8) NTU
14681	30' LIMNO CTRL	7/30/91 @ AM	0.021	0.018	0.09		<0.005	0.006	16	9.6
14682	30' LIMNO PHOS	7/30/91 @ AM	0.029	0.030	0.11		<0.005	<0.005	16	12.0
14683	30' LIMNO ALUM	7/30/91 @ AM	0.021	0.020	0.10		<0.005	<0.005	20	12.0
14684	20' LIMNO CTRL	7/30/91 @ AM	0.019	0.017	0.10		<0.005	<0.005	14	10.0
14685	20' LIMNO PHOS	7/30/91 @ AM	0.021	0.017	0.08		<0.005	<0.005	14	7.6
14686	20' LIMNO ALUM	7/30/91 @ AM	0.027	0.018	0.09		<0.005	<0.005	16	7.7
14687	LIMNO LAKE/ CORRAL CTRL 1.0M	7/30/91 @ AM	0.012	0.015	0.08		<0.005	<0.005	9	0.7
14688	MID-DAM 1.0 D 14	7/30/91 @ AM	0.016	0.013	0.07	1.1	<0.005	<0.005	8	4.8

ABBREVIATIONS:

(1) Dissolved Reactive Phosphorus (filtered), Method 4500-P E, SM 17th Ed.
(2) Total Reactive Phosphorus (non-filtered), Method 4500-P E, SM 17th Ed.
(3) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
(4) Total Kjeldahl Nitrogen, Method 351.2 (modified), EPA-600/4-79-020, March 1983.
(5) Nitrate Nitrogen (non-filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(6) Nitrate Nitrogen (filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(7) Total Suspended Solids, Method 160.2, EPA/600-4-79-020, March 1983.
(8) Turbidity, Method 180.1, EPA 600/4-79-020, March 1983.

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IV

ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
September 9, 1991

QUALITY ASSURANCE

Project: CCBA
Location: Cherry Creek Reservoir

DUPLICATE ANALYSIS (Laboratory splits)

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHATE DR (1) MG/L	PHOSPHATE TR (2) MG/L	PHOSPHORUS T (3) MG/L	NITROGEN TKN (4) MG/L	NITROGEN NO3 (5) MG/L	NITROGEN NO3-F (6) MG/L	TSS (7) MG/L	TURBIDITY (8) NTU
14669	N 0.3X Day 14	7/30/91	0.016	0.008	0.07	1.4	0.977	0.931	6	2.4
14689	N 0.3X (DUP)	7/30/91	0.016	0.007	0.07	1.6	0.870	0.956	6	2.5
14679	CONTROL 2 D 14	7/30/91	0.009	0.007	0.08	1.4	<0.005	<0.005	6	2.7
14690	CNTRL 2 (DUP)	7/30/91	0.011	0.007	0.08	1.0	<0.005	<0.005	8	2.8

REFERENCE SAMPLES

PARAMETER	IDENTIFICATION	Observed Value	True Value	95% Confidence Interval
(1) Ortho-phosphate, mg/L	EPA WP1188	0.097	0.098	0.077 - 0.1189
(3) Total Phosphorus (SM), mg/L	EPA WP1188	1.32	1.50	1.30 - 1.76
(9) Total Phosphorus (ICP), mg/L	EPA WP1188	1.56	1.50	1.30 - 1.76
(4) Total Kjeldahl Nitrogen, mg/L	EPA WP1188	5.16	5.00	4.07 - 5.83
(5) Nitrate nitrogen, mg/L	EPA WP1188	0.48	0.50	0.41 - 0.59
(7) Total Suspended Solids, mg/L	EPA PE WP026-2	19.1	23.9	14.8 - 26.5
(8) Turbidity, NTU	EPA PE WS028	5.50	5.60	5.23 - 6.27

ABBREVIATIONS:
(1) Dissolved Reactive Phosphorus (filtered), Method 4500-P E, SM 17th Ed.
(2) Total Reactive Phosphorus (non-filtered), Method 4500-P E, SM 17th Ed.
(3) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
(4) Total Kjeldahl Nitrogen, Method 351.2 (modified), EPA-600/4-79-020, March 1983.
(5) Nitrate Nitrogen (non-filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(6) Nitrate Nitrogen (filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(7) Total Suspended Solids, Method 160.2, EPA/600-4-79-020, March 1983.
(8) Turbidity, Method 180.1, EPA 600/4-79-020, March 1983.
(9) Total Phosphorus (non-filtered, preserved), ICP on TKN digest.

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IV

ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
September 9, 1991

Project: CCBA
Location: Cherry Creek Reservoir

TOTAL PHOSPHORUS: Method comparison

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHORUS Total, (1) MG/L	PHOSPHORUS Total, (2) MG/L
14669	N 0.3X Day 14	7/30/91 @ AM	0.08	0.05
14670	N 1.0X Day 14	7/30/91 @ AM	0.04	0.09
14671	N 3.3X Day 14	7/30/91 @ AM	0.07	0.21
14672	P 0.3X Day 14	7/30/91 @ AM	0.13	0.16
14673	P 1.0X Day 14	7/30/91 @ AM	0.17	0.77
14674	P 3.3X Day 14	7/30/91 @ AM	0.50	0.52
14675	NP 0.3X Day 14	7/30/91 @ AM	0.07	0.07
14676	NP 1.0X Day 14	7/30/91 @ AM	0.15	0.16
14677	NP 3.3X Day 14	7/30/91 @ AM	0.43	0.41
14678	CONTROL 1 D 14	7/30/91 @ AM	0.06	0.16
14679	CONTROL 2 D 14	7/30/91 @ AM	0.08	<0.05
14680	CONTROL 3 D 14	7/30/91 @ AM	0.05	<0.05
14688	Mid-Dam 1.0 D 14	7/30/91 @ AM	0.07	<0.05
14689	N 0.3X Day 14	7/30/91 @ AM	0.07	0.11
14690	CONTROL 2 D 14	7/30/91 @ AM	0.08	<0.05

(1) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
(Ammonium Persulfate digestion followed by colorimetric procedure)

(2) Total Phosphorus (non-filtered, preserved), ICP on TKN digest.

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V

ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
September 10, 1991

Project: CCBA
Location: Cherry Creek Reservoir

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHATE DR (1) MG/L	PHOSPHATE TR (2) MG/L	PHOSPHORUS T (3) MG/L	NITRGEN TKN () MG/L	NITROGEN NO3 (5) MG/L	NITROGEN NO3-F (6) MG/L	TSS (7) MG/L	TURBIDITY (8) NTU
14775	N 0.3X Day 21	8/6/91 @ AM	0.007	0.009	0.07	1.4	0.860	0.882	10	2.3
14776	N 1.0X Day 21	8/6/91 @ AM	0.007	0.010	0.06	1.6	3.31	3.37	10	3.4
14777	N 3.3X Day 21	8/6/91 @ AM	0.009	0.010	0.07	2.0	12.2	12.2	15	4.2
14778	P 0.3X Day 21	8/6/91 @ AM	<0.002	0.015	0.06	2.2	<0.005	0.009	10	4.2
14779	P 1.0X Day 21	8/6/91 @ AM	0.007	0.015	0.24	4.1	<0.005	0.006	34	23
14780	P 3.3X Day 21	8/6/91 @ AM	0.062	0.257	0.77	4.2	<0.005	0.007	34	17
14781	NP 0.3X Day 21	8/6/91 @ AM	0.013	0.014	0.08	2.0	0.096	0.102	12	2.6
14782	NP 1.0X Day 21	8/6/91 @ AM	0.014	0.025	0.09	4.1	0.889	0.91	57	24
14783	NP 3.3X Day 21	8/6/91 @ AM	0.047	0.167	0.90	4.7	10.2	9.12	26	21
14784	CONTROL 1 D 21	8/6/91 @ AM	0.007	0.010	0.07	1.4	<0.005	<0.005	7	3.0
14785	CONTROL 2 D 21	8/6/91 @ AM	<0.002	<0.002	0.07	1.3	<0.005	<0.005	6	2.6
14786	CONTROL 3 D 21	8/6/91 @ AM	<0.002	<0.002	0.06	1.2	<0.005	<0.005	5	1.8
14793	Mid-Dam 1.0 D 21	8/6/91 @ AM	0.011	0.014	0.12	1.6	<0.005	0.006	8	5.3

ABBREVIATIONS:
(1) Dissolved Reactive Phosphorus (filtered), Method 4500-P E, SM 17th Ed.
(2) Total Reactive Phosphorus (non-filtered), Method 4500-P E, SM 17th Ed.
(3) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
(4) Total Kjeldahl Nitrogen, Method 351.2 (modified), EPA-600/4-79-020, March 1983.
(5) Nitrate Nitrogen (non-filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(6) Nitrate Nitrogen (filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(7) Total Suspended Solids, Method 160.2, EPA/600-4-79-020, March 1983.
(8) Turbidity, Method 180.1, EPA 600/4-79-020, March 1983.

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Va

ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
September 10, 1991

Project: CCBA
Location: Cherry Creek Reservoir

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHATE DR (1) MG/L	PHOSPHATE TR (2) MG/L	PHOSPHORUS T (3) MG/L	NITROGEN TKN (4) MG/L	NITROGEN NO3 (5) MG/L	NITROGEN NO3-F (6) MG/L	TSS (7) MG/L	TURBIDITY (8) NTU
14787	30' LIMNO CTRL	8/6/91 @ AM	0.018	0.025	0.15	1.2	<0.005	0.006	12	7.6
14788	30' LIMNO PHOS	8/6/91 @ AM	0.019	0.018	0.07	1.5	<0.005	<0.005	13	8.0
14789	30' LIMNO ALUM	8/6/91 @ AM	0.013	0.007	0.15	1.7	0.009	<0.005	18	9.7
14790	20' LIMNO CTRL	8/6/91 @ AM	0.014	0.021	0.07	1.3	<0.005	<0.005	9	6.7
14791	20' LIMNO PHOS	8/6/91 @ AM	0.013	0.017	0.15	1.7	<0.005	<0.005	9	5.8
14792	20' LIMNO ALUM	8/6/91 @ AM	0.012	0.017	0.12	1.3	<0.005	<0.005	7	5.5
14794	LK LIMNO 1.0M	8/6/91 @ AM	0.012	0.014	0.16	1.4	0.096	0.102	9	5.6

ABBREVIATIONS:

(1) Dissolved Reactive Phosphorus (filtered), Method 4500-P E, SM 17th Ed.
(2) Total Reactive Phosphorus (non-filtered), Method 4500-P E, SM 17th Ed.
(3) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
(4) Total Kjeldahl Nitrogen, Method 351.2 (modified), EPA-600/4-79-020, March 1983.
(5) Nitrate Nitrogen (non-filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(6) Nitrate Nitroge 'filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(7) Total Suspended Solids, Method 160.2, EPA/600-4-79-020, March 1983.
(8) Turbidity, Method 180.1, EPA 600/4-79-020, March 1983.

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V

ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
September 10, 1991

QUALITY ASSURANCE

Project: CCBA
Location: Cherry Creek Reservoir

DUPLICATE ANALYSIS (Laboratory splits)

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHATE DR (1) MG/L	PHOSPHATE TR (2) MG/L	PHOSPHORUS T (3) MG/L	NITROGEN TKN (4) MG/L	NITROGEN NO3 (5) MG/L	NITROGEN NO3-F (6) MG/L	TSS (7) MG/L	TURBIDITY (8) NTU
14778	P 0.3X Day 21	8/6/91 @ AM	<0.002	0.015	0.06	2.2	<0.005	0.009	10	4.2
14795	P 0.3X (DUP)	8/6/91 @ AM	<0.002	0.013	0.06	1.6	<0.005	<0.005	11	4.4
14788	30 LIM PHS 21	8/6/91 @ AM	0.019	0.018	0.07	1.5	<0.005	<0.005	13	8.0
14796	30 LIM PHS (DUP)	8/6/91 @ AM	0.016	0.017	0.07	1.0	<0.005	<0.005	11	11

REFERENCE SAMPLES

PARAMETER	IDENTIFICATION	Observed Value	True Value	95% Confidence Interval
(1) Ortho-phosphate, mg/L	EPA WP1188	0.099	0.098	0.077 - 0.1189
(3) Total Phosphorus (SM), mg/L	EPA WP1188	1.35	1.50	1.32 - 1.76
(4) Total Kjeldahl Nitrogen, mg/L	EPA WP1188	5.16	5.00	4.07 - 5.83
(5) Nitrate nitrogen, mg/L	EPA WP1188	0.48	0.50	0.41 - 0.59
(7) Total Suspended Solids, mg/L	EPA PE WP026-2	19.1	23.9	14.8 - 26.5
(8) Turbidity, NTU	EPA PE WS028	5.80	5.60	5.23 - 6.27

ABBREVIATIONS:

(1) Dissolved Reactive Phosphorus (filtered), Method 4500-P E, SM 17th Ed.
(2) Total Reactive Phosphorus (non-filtered), Method 4500-P E, SM 17th Ed.
(3) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
(4) Total Kjeldahl Nitrogen, Method 351.2 (modified), EPA-600/4-79-020, March 1983.
(5) Nitrate Nitrogen (non-filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(6) Nitrate Nitrogen (filtered, preserved), Method 353.2 EPA-600/4-79-020, March 1983.
(7) Total Suspended Solids, Method 160.2, EPA/600-4-79-020, March 1983.
(8) Turbidity, Method 180.1, EPA 600/4-79-020, March 1983.
(9) Total Phosphorus (non-filtered, preserved), ICP on TKN digest.

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VI

ADVANCED AQUATIC TECHNOLOGY ASSOCIATES, INC.
September 11, 1991

QUALITY ASSURANCE

Project: CCBA
Location: Cherry Creek Reservoir

DUPLICATE ANALYSIS (Laboratory splits)

LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHATE DR (1) MG/L	PHOSPHATE TR (2) MG/L	PHOSPHORUS T (3) MG/L	NITROGEN TKN (4) MG/L	NITROGEN NO3 (5) MG/L	NITROGEN NO3-F (6) MG/L	TSS (7) MG/L	TURBIDITY (8) NTU
14871	20' LIMNO CTRL	8/13/91 @ AM	0.015	0.028	0.06	0.5	<0.005	<0.005	6	4.4
14876	20' LIMNO CTRL	8/13/91 @ AM	0.016	0.026	0.07	1.6	0.870	0.956	6	2.5

REFERENCE SAMPLES

PARAMETER	IDENTIFICATION	Observed Value	True Value	95% Confidence Interval
(1) Ortho-phosphate, mg/L	EPA WP1188	0.101	0.098	0.077 - 0.1189
(3) Total Phosphorus (SM), mg/L	EPA WP1188	1.32	1.50	1.32 - 1.76
(4) Total Kjeldahl Nitrogen, mg/L	EPA WP1188	5.16	5.00	4.07 - 5.83
(5) Nitrate nitrogen, mg/L	EPA WP1188	0.48	0.50	0.41 - 0.59
(7) Total Suspended Solids, mg/L	EPA PE WP026-2	19.1	23.9	14.8 - 26.5
(8) Turbidity, NTU	EPA PE WS028	5.50	5.60	5.23 - 6.27

ABBREVIATIONS:

(1) Dissolved Reactive Phosphorus (filtered), Method 4500-P E, SM 17th Ed.
(2) Total Reactive Phosphorus (non-filtered), Method 4500-P E, SM 17th Ed.
(3) Total Phosphorus (non-filtered, preserved), Method 4500-P B 5, followed by 4500-P E SM 17th Ed.
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(9) Total Phosphorus (non-filtered, preserved), ICP on TKN digest.

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LAB NO.	SAMPLE ID.	DATE/TIME COLLECTED	PHOSPHATE DR (1) MG/L	PHOSPHATE TR (2) MG/L	PHOSPHORUS T (3) MG/L	NITROGEN TKN (4) MG/L	NITROGEN NO3 (5) MG/L	NITROGEN NO3-F (6) MG/L	TSS (7) MG/L	TURBIDITY (8) NTU
14871	20' LIMNO CTRL	8/13/91 @ AM	0.015	0.028	0.06	0.5	<0.005	<0.005	6	4.4
14870	20' LIMNO ALUM	8/13/91 @ AM	0.014	0.023	0.05	0.7	<0.005	<0.005	3	4.5
14869	20' LIMNO PHOS	8/13/91 @ AM	0.013	0.019	0.04	0.4	<0.005	<0.005	7	4.5
14872	30' LIMNO CTRL	8/13/91 @ AM	0.017	0.028	0.07	0.6	<0.005	<0.005	8	6.5
14873	30' LIMNO ALUM	8/13/91 @ AM	0.016	0.028	0.08	0.8	<0.005	<0.005	8	5.0
14868	30' LIMNO PHOS	8/13/91 @ AM	0.016	0.029	0.08	0.8	<0.005	<0.005	6	5.2
14867	30'LIMNO LK 1.0M	8/13/91 @ AM	0.016	0.025	0.07	0.3	<0.005	<0.005	5	4.8
14874	30' LIMNO ALUM 7.5" MD BOTTOM	8/13/91 @ AM	0.012	0.050	0.10	0.8	<0.005	<0.005	25	12
14875	NP 3.3X	8/13/91 @ AM	0.014	0.196				10.7	96	43

ABBREVIATIONS:

(1) Dissolved Reactive Phosphorus (filtered), Method 4500-P E, SM 17th Ed.
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