Clear Creek Watershed Management Agreement

2003 Annual Report

Black Hawk/Central City Sanitation District
Central Clear Creek Sanitation District
Church Ditch Company
City of Arvada
City of Central
City of Golden
City of Idaho Springs
City of Northglenn
City of Thornton
City of Westminster
Clear Creek County
Clear Creek Ski Corporation
Colorado Dept of Transportation
Cyprus/Amax
Farmers= High Line Canal Company
Farmers= Reservoir & Irrigation Company
Georgetown
Gilpin County
Jefferson Center Metropolitan District
Jefferson County
St. Mary=s Glacier W&S District
City of Black Hawk

April 2004

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EXECUTIVE SUMMARY

Introduction

Standley Lake is an agricultural and municipal water supply reservoir located in Jefferson County Colorado that is supplied with water primarily from Clear Creek. The reservoir supplies water for agricultural use by the Farmers Reservoir and Irrigation Company (FRICO) and for municipal supply for the cities of Northglenn, Thornton, and Westminster (Standley Lake Cities). In response to a request by the Standley Lake Cities for a Rulemaking Hearing to establish water quality standards and resulting control regulations for Standley Lake, 23 entities developed and agreed to the Clear Creek Watershed Management Agreement (Agreement). This Agreement, adopted in December 1993, sought to address certain water quality issues and concerns within the Clear Creek Basin of Colorado. Specifically, issues that may affect Standley Lake (i.e. Reservoir) water quality. The parties to this Agreement are governmental agencies and private corporations having land use, water supply, and/or wastewater treatment responsibilities within the Clear Creek Basin.

For purposes of the Agreement, the Clear Creek Basin was divided into three (3) segments: the Upper Clear Creek Basin (Upper Basin), consisting of Clear Creek and its tributaries from its source to and including the headgate of the Croke Canal in Golden, Colorado; the Standley Lake Tributary Basin (Tributary Basin), consisting of the lands directly tributary to Standley Lake, the Church Ditch, Farmers High Line Canal, Croke Canal (which carry water to Standley Lake), and lands directly tributary to these Canals; and Standley Lake (Standley Lake), consisting of the Lake itself.

Narrative Standard

In accordance with the Agreement, a narrative standard for Standley Lake was adopted in lieu of a numeric standard and control regulations. The parties agreed to additional testing, monitoring, and implementation of best management practices on a voluntary basis. The narrative standard for Segment 2, Big Dry Creek, Standley Lake reads: *The trophic status of Standley Lake shall be maintained as mesotrophic as measured by a combination of common indicator parameters such as total phosphorus, chlorophyll a, Secchi depth, and dissolved oxygen. Implementation of this narrative standard shall only be by Best Management Practices and controls implemented on a voluntary basis.*

Objectives

The Agreement provided that should the narrative standard not be met and substantial progress not made in reducing the nutrient loads to Standley Lake, additional measures may be required including numeric standards or effluent limitations for phosphorous and/or nitrogen in the Upper Basin, and for additional best management controls in Standley Lake. For purposes of the Agreement, the Clear Creek Basin is divided into three areas or segments: The Upper Clear Creek Basin (Upper Basin), consisting of Clear Creek and its tributaries from its source to and including the Croke Canal headgate in the City of Golden, Colorado; the Standley Lake Tributary Basin (Tributary Basin), consisting of the lands directly tributary to Standley Lake, the Church Ditch, Farmers High Line Canal, the Croke Canal, and lands directly tributary to these canals; and Standley Lake itself.

The Agreement further provided:

- The Upper Basin parties, in consultation with all other parties to the Agreement, shall prepare a Best Management Manual for non-point sources that cover disturbed areas of 1 or more acres
- The Upper Basin parties, in consultation with all other parties to this Agreement, will examine costs and effects of nutrient removal at Upper Basin wastewater treatment plants
- The Standley Lake Cities, in consultation with all other parties to this Agreement, will develop a Standley Lake Management Plan
- The parties will jointly design, implement, and fund, in such allocations as shall be agreed, a monitoring program to evaluate nutrient loading from point and non-point sources in the Upper Basin, nutrient loadings from non-point sources in the Tributary Basin, internal Lake loadings and the effect of nutrient reduction measures implemented by the various parties on the trophic status of Standley Lake.

This report is divided into four chapters Monitoring Program, individual reports from Upper Basin, Tributary Basin, and Standley Lake/Canal parties, with data provided in the appendix. The individual reports describe the pollution prevention actions taken in 2003.

Monitoring data results include tabular and trend analysis of measures relevant to the trophic status of Standley Lake, as follows:

- Nutrients
- Secchi depth
- Chlorophyll a
- Dissolved oxygen

These measures of trophic status are referred to in the narrative standard. The *Lakewatch* computer program is used by the Standley Lake Cities to evaluate both trends and trophic status of Standley Lake. Trend analysis includes the entire period of record (1994 through 2003), while tabular data is divided into three sections (current year, previous year and all other years to 1994). Tabular data for Clear Creek and Stanley Lake are set forth in Appendix C.

Monitoring Program Summary

In 2003, 16 Upper Clear Creek Basin and eight wastewater treatment plant (WWTP) sites were monitored. There were eight sampling events were conducted, one in February, April, May, June, July, August, October and December. Upper Clear Creek Watershed Association provided one sampler for one event, teams from the Standley Lake Cities and the City of Arvada collected the samples. All parties to the agreement, contributed to the monitoring program and all participants have agreed to continue the monitoring program in 2004.

Stream Gaging & Flow Summary

To provide the needed flow data for calculating stream loadings, the Upper Clear Creek Watershed Association, Standley Lake Cities, United States Geological Survey, Federal Highway Authority and the Colorado Department of Transportation continue to work on a program to maintain stream and staff gages. Flows for 2003 were at or near normal allowing Standley Lake to fill. Gages are located at sampling site numbers: CC10, CC20, CC26, CC35, CC40, CC50, and CC60. See the following sampling site map for these locations.

USGS Gage at Golden

	Mean Annual Value (cfs)	% of 1975 – 2002			Mean Annual Value (cfs)	% of 1975 – 2002
1975-2002	191	----		1998	210	111%
1994	129	68%		1999	257	135%
1995	324	170%		2000	183	96%
1996	220	115%		2001	169	90%
1997	271	142%		2002	71	37%
				2003	199	104%

Water and Wastewater Treatment / Collection Systems Summary

- Clear Creek High School installed a tertiary treatment plant in 2003.
- The City of Georgetown states it will undertake efforts to reduce I&I in 2004.
- The Saddleback development moved toward start-up and will be installing 86-89 Individual Sewage Disposal Systems on new homes from 2004 to build out. The TP limit for these homes is 8mg/L.
- Mount Vernon Country Club states it will upgrade its existing wastewater treatment plant in 2004. They do not plan to implement advance treatment at this time.
- The Black Hawk / Central City Sanitation District is constructing a new wastewater treatment plant to be completed in 2005. A more detailed record can be found in the Upper Clear Creek section, (Section II).
- A summary of EPA enforcement and compliance history online, (ECHO), for the upper basin wastewater treatment plants can be found in Section IV, page 3.

Non Point Source Control Efforts Summary

Non point source control efforts play an important role in improving water quality. Most governmental entities in the relevant basins have adopted and are implementing non-point source control regulations.

In 2003, the lower basin cities of Arvada, Northglenn, Thornton, and Westminster, submitted an application for and received coverage under a Phase II stormwater permit as required by the Clean Water Act. The cities have successfully completed identified program goals for 2003. These goals include but are not limited to the following six program areas; examples follow each program area:

- **Public Education and Outreach:** brochures, websites, school visits, utility inserts, and articles

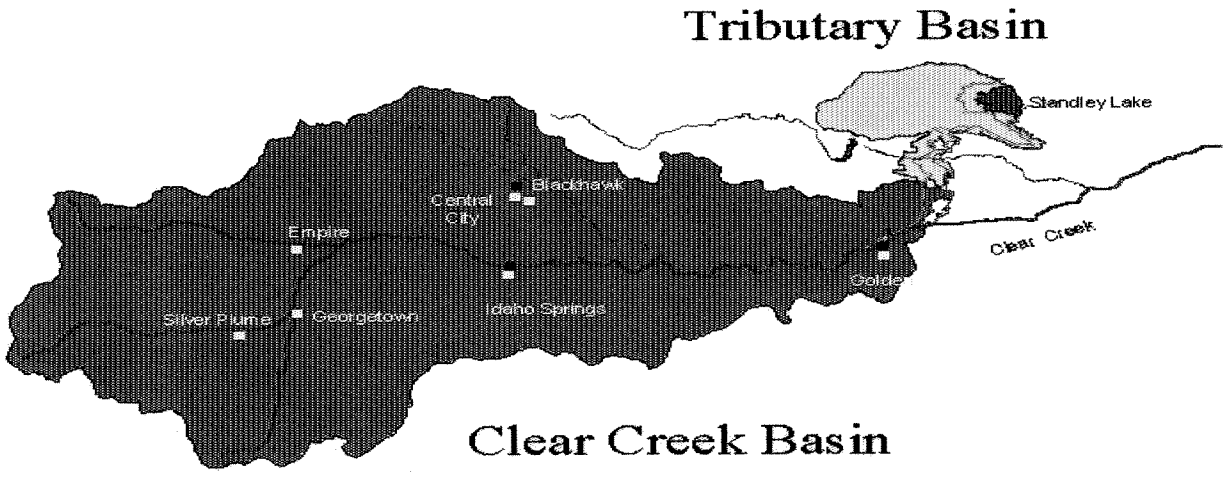
- **Public Participation / Involvement:** public hearings and / or encouraging citizen representatives on a stormwater management panel

- **Illicit Discharge Detection and Elimination:** develop a stormwater outfall map and implement a stormwater hotline
- **Construction Site Runoff Control:** inspections, compliance and enforcement, training, and receiving comments from the public
- **Post-Construction Runoff Control:** inspections, compliance and enforcement, and maintenance of BMPs
- **Pollution Prevention / Good Housekeeping:** develop runoff control plans and train municipal staff on pollution prevention measures and techniques

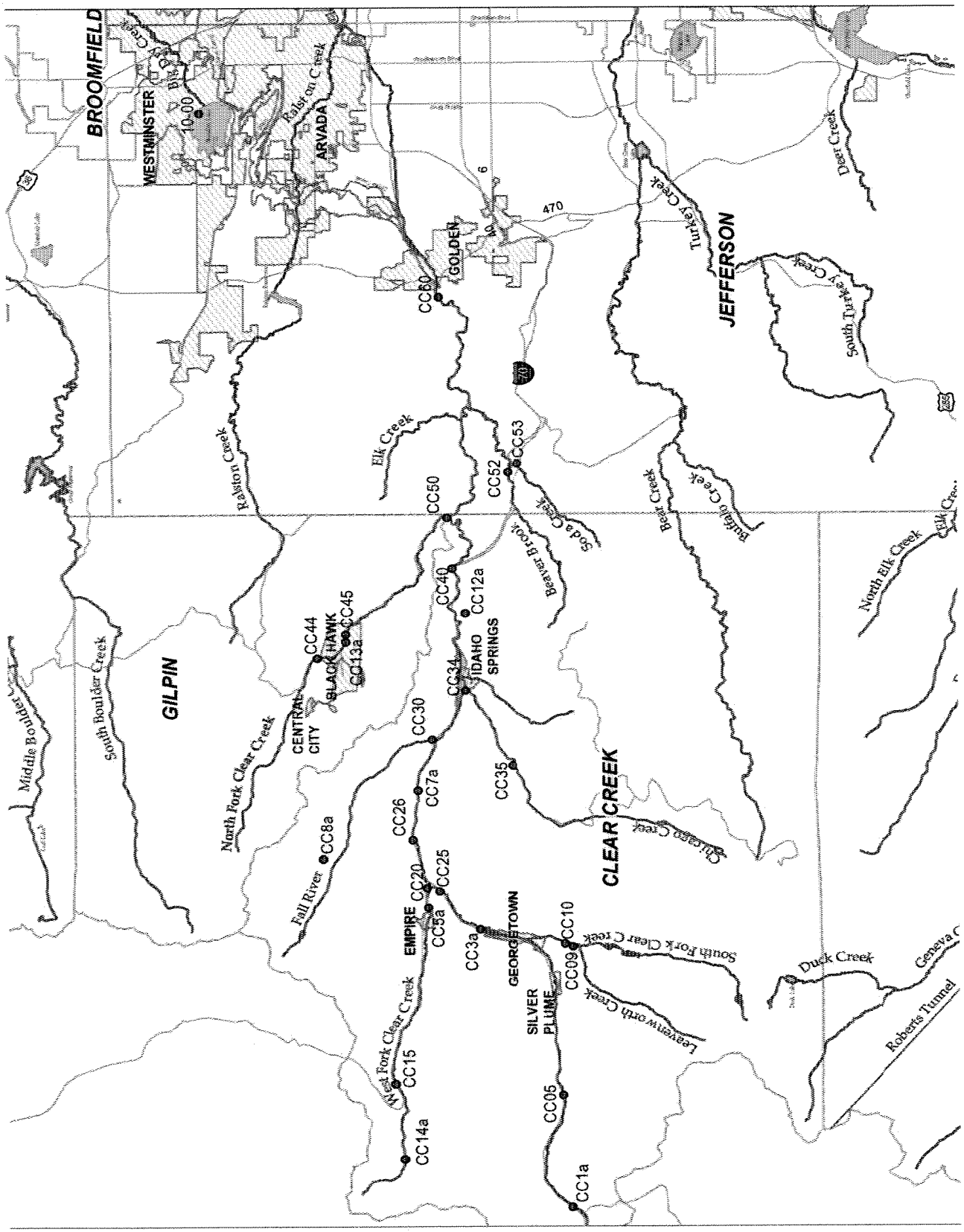
All of the lower basin cities have adopted regulations providing for erosion control during construction, permanent BMP's and illicit discharge prohibition. A complete list of adopted regulations for all signatories to the Clear Creek Watershed Agreement is in Appendix A. For specific information on completed programs call the Stormwater Coordinator for the city or county of interest. For information on Upper Basin pollution prevention/control efforts, see Section II, Upper Clear Creek Watershed Association (UCCWA).

Negotiations regarding the potential conversion of a section of the Church Ditch as a stormwater diversion structure to protect Standley Lake from pollutants entering the lake as a result of development in the tributary basin were restarted in 2003. Participants include the Standley Lake cities, the City of Arvada, Jefferson County, CDOT, and developers in the Standley Lake Tributary basin.

Standley Lake Watershed



Sampling Site Map



I. MONITORING PROGRAM

A copy of the Clear Creek Watershed Management Agreement is contained in Appendix B. Section II, paragraph 4, provides for joint design, implementation, and funding of a monitoring program to evaluate nutrient loading from point and non-point sources in the Upper Basin, nutrient loadings from non-point sources in the Tributary Basin, internal Lake loadings and the effect of nutrient reduction measures implemented by the various parties on the trophic status of Standley Lake.

Upper Clear Creek Basin Monitoring in 2003

Sixteen Clear Creek sites and eight wastewater treatment plants were monitored under the program in 2003. Eight sampling events were conducted, one in February, April, May, June, July, August, October and December. Two sampling teams collected the samples. Results can be found in Appendix C of this report.

Four samples were collected at each stream site. The samples were kept in coolers on ice and transported by the sampling teams to the City of Golden Environmental Services Laboratory by early afternoon of sampling day. One set of the twenty-four (24) samples and quality control samples was delivered to Northglenn and one set to Westminster. Analysis was performed as follows:

Entity	Parameter/Analyte	Sample Type
Northglenn	TP & Ortho P	Grab
Westminster	TN, NO3 & Ammonia	Grab
Thornton	TSS & VSS	Grab
EPA	Metals	Grab
Arvada	Splits/Spikes for TP & TN	Grab

Quality Assurance / Quality Control

As in previous years, quality control samples were collected, prepared, and analyzed. For each monitoring event, one 2-liter sample was randomly selected out of the 16 Clear Creek samples for preparation of both the spike and duplicate. The laboratories received the following quality control samples:

- Northglenn – spike and duplicate for Total Phosphorus (TP)
- Westminster – spike and duplicate for Total Nitrogen (TN)
- Arvada using Chadwick Ecological Services- spike and duplicate for both TP and TN

The spike recovery and relative percent difference data obtained from the quality control samples provides validation that the monitoring program data are acceptable. Results are in Appendix B.

Bacterial Source Tracking Study

Fecal contamination of drinking water sources is a serious public health issue in the United States. In 2003, John Albert, Colorado School of Mines graduate student, began conducting a research study to assess communities of *Escherichia coli* (*E. coli*) from the Clear Creek watershed.

Sources of contamination in a watershed can include wild and domestic animal and humans. The increasing problem of fecal contamination has spurred intense research on ways to identify sources of fecal contamination. Much of this research has been directed toward bacterial source tracking (BST), relying on distinguishing host specific biomarkers from fecal indicator organisms so that the source (humans, wild animals. Or domestic animals) of fecal material in water samples can be determined.

UCCWA and the Standley Lake cities will continue to cooperate with Mr. Albert in pursuing his graduate studies in the Basin in 2004. His research may assist in identifying sources of contamination and identifying pollution reduction measures.

Standley Lake Supply Canal Monitoring - Croke and Farmers High Line

Two canals, the Croke and Farmers' High Line, are sampled as a part of the monitoring program. One of the two canals was sampled normally within seven (7) days following each Upper Clear Creek Basin sampling event. There were three (3) sampling sites on each canal: the headgates, midpoints and inlets to Standley Lake. See Appendix C for results.

Thornton operated two auto-samplers at the headgates, Arvada at the midpoints, and Northglenn at the lake inlets. The auto-samplers were set up to draw one sample every hour for a 24-hour composite. The midpoint auto-sampler was set to start 4-6 hours after the headgate sampler and the lake inlet auto-sampler was set to start 4-6 hours after the midpoint auto-sampler. The delay in start times was varied based on flow velocity.

Northglenn performed ortho phosphorus and total phosphorus analysis on the canal samples. Thornton performed suspended solids, and volatile suspended solids analysis, and Westminster performed total nitrogen, nitrate, ammonia, conductivity and turbidity analyzes on the canal samples. Arvada collected splits of the canal midpoint samples and sent them to a contract laboratory for analysis of total nitrogen and total phosphorus. In 1995, grab samples were collected from the canals at the inlet to Standley Lake for organic carbon analysis at the Coors laboratory.

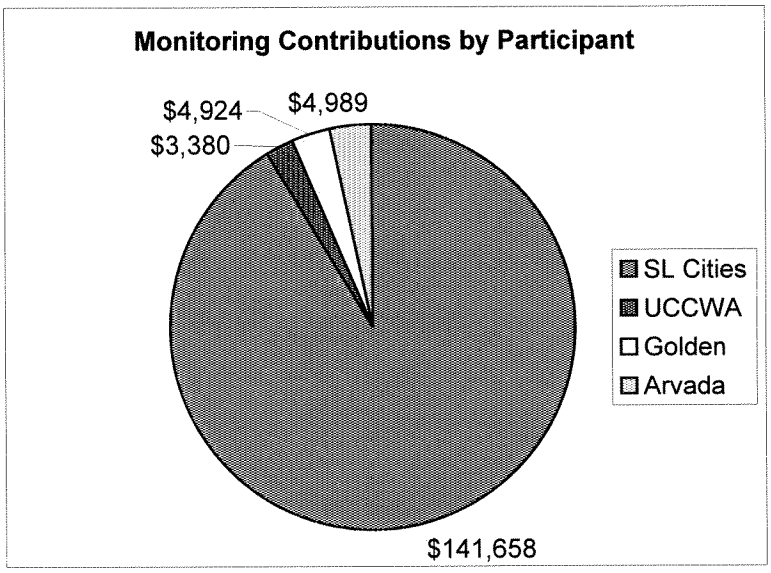
Standley Lake Monitoring

In 2003, Westminster laboratory staff sampled Standley Lake from a boat on 17 dates from March through November at site 10, on the east side of the lake near the dam. At this location, samples were collected at two levels: the photic zone (twice the Secchi disk depth) and five feet from the bottom. Samples were collected twice a month (weather permitting) in an attempt to accurately assess algal growth, anoxic period and lake turnover. Westminster measured water column turbidity and Secchi depth in the lake. Temperature, specific conductance, pH and dissolved oxygen were measured at 1-meter intervals. Westminster also performed total nitrogen, nitrate and ammonia analyzes. Northglenn performed total phosphorus and ortho-phosphorus analyzes. Thornton performed algae count, *E. coli*, fecal coliform, algae identification and chlorophyll a analyzes. Arvada collected split samples from 17 of the sampling events and sent them to Chadwick Ecological Services for total phosphorus, total nitrogen and chlorophyll a analyzes.

The Remote Underwater Sampling Station (RUSS) unit was deployed on Standley Lake on April 8th, 2003 and remained on the lake until November 25th, 2003. Two YSI 6600 Sondes were alternately placed on board the profiler approximately every other week. Both Sondes carried

sensors for temperature, pH, DO, turbidity, chlorophyll a, and conductivity. During the deployment period, the RUSS executed at least one full-column profile on 211 separate days. At the time the buoy was removed from the lake, two large Nalgene bottles were attached to the anchoring system as floats and filled with enough water for them to sit approximately two feet below the surface of the lake. It is hoped that this will prevent ice from enveloping the floats and destroying the existing anchors and lines so that they may be re-used during the next deployment in 2004. Data collected for this program are reported in Appendix D of the Historic Annual Report.

Monitoring Costs



Costs include administrative time for data entry, quality control and report writing at $30/hour. An exact rate for administrative duties was used when available. No costs for instrumentation are included. Commercial laboratory rate/sample was used when available.

The EPA participates in an ancillary metals monitoring program where the watershed sampling teams collected the samples in conjunction with the routine monitoring program. The analytic costs were approximately $13,500 in 2003.

Monitoring Program Contributions

Upper Clear Creek Watershed Association

X Contributed $2,000 to EMC sampling
X Provided one person for one sampling event on Clear Creek

Golden

X Contributed $2,000 to EMC sampling
X Prepared quality control samples
X Administered the Clear Creek / Standley Lake database
X Provided laboratory for field testing
X Printed Chain of Custody forms

Arvada

X Operated two auto-samplers for canal sampling
X Coordinated and funded independent quality control laboratory services
X Provided sampling personnel for Clear Creek and canal sampling
X Collected split samples from Standley Lake and canal mid-point monitoring
X Funded analyzes of split samples by an outside laboratory
X Provided funding for consultant to monitor Southern Access Road BMP's

Northglenn

X Contributed $2,000 to EMC sampling
X Performed phosphorus analysis (total and ortho-)
X Provided one auto-sampler and staff for canal sampling
X Coordinated canal sample delivery to labs
X Funded sampling supplies
X Provided funding for consultant to monitor Southern Access Road BMP's

Thornton

X Contributed $2,000 to EMC sampling
X Provided field testing instrumentation and analyzes
X Coordinated overall monitoring program
X Coordinated delivery of Clear Creek samples to laboratory
X Routinely provided sampling personnel for Clear Creek sampling
X Delivered sample bottles to sampling teams
X Provided one auto-sampler plus assistance with collection and delivery of canal samples
X Performed algae counts and identification, chlorophyll a, TSS/VSS, TOC & *E. coli* analyzes
X Purchased sample bottles
X Provided funding for consultant to monitor Southern Access Road BMP's

Westminster

X Contributed $2,000 to EMC sampling
X Purchased sample bottles and labels
X Conducted Standley Lake sampling program
X Provided boat and field testing equipment
X Routinely provided sampling personnel for Clear Creek sampling
X Performed total nitrogen, nitrite/nitrate and ammonia analyzes
X Contributed $ for consultant to monitor Southern Access Road BMP's

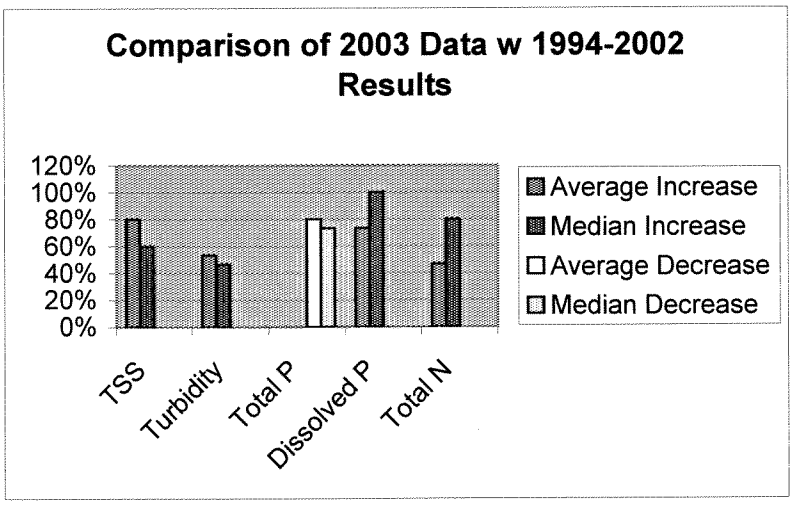
Monitoring Results

The table below compares 2003 data with 1994 through 2001 data results. As 2002 was a drought year and 2003 flows were near normal, no formal comparison was made between 2002 and 2003. Detailed tabulations by site for the years 1994 through 2003 are found in Appendix C.

CLEAR CREEK	2003 DATA TSS mg/L	Turbidity NTU	Total P mg/L	Dissolved P mg/L	Total N mg/L
# Sites w readings > '94-'01 data					
Max	2	3	1	2	5
Min	4	12	11	2	15
Average	12	8	3	11	7
Median	9	7	4	15	12
# Sites w readings = '94-'01 data					
Max	1	0	0	0	0
Min	10	1	1	12	0
Average	0	0	0	0	3
Median	3	0	0	0	2
# Sites w readings < '94-'01 data					
Max	12	12	14	13	10
Min	1	2	3	1	0
Average	3	7	12	4	5
Median	3	8	11	0	1

15 Clear Creek sites were used in the summary. NOT INCLUDED:CC34 (new site '03), CC52 (new site 12/01), CC54 (decommissioned '01) & CC55 (decommissioned '01) for reasons given in ()'s.

Clear Creek Summary Table Results



The highest total suspended solids reading occurred on 2/3/03 at site CC45, N. Fork immediately above the Black Hawk/Central City waste water treatment plant. The reading was 166 mg/L.

The lowest total suspended solids reading occurred on multiple dates and locations (see Appendix C). The reading was less than 1mg/L.

The highest turbidity reading occurred on 2/3/03 at site CC45, N.

Fork immediately above Black Hawk/Central City wastewater treatment plant. The reading was 256.80 NTU.

The lowest turbidity reading occurred on 4/1/03 at site CC10, Clear Creek downstream of Leavenworth Creek. The reading was 0.10 NTU.

The highest total phosphorus reading occurred on 5/15/03 at site CC25, mainstem of Clear Creek upstream of w. Fork below Georgetown. The reading was 0.101 mg/L.

The lowest total phosphorus reading occurred on 10/8/03 at site CC44, N. Fork upstream of Black Hawk/Central City wastewater treatment plant. The reading was 0.0034 mg/L.

The highest dissolved phosphorus reading occurred on 2/3/03 at site CC60, Clear Creek at Church Ditch Headgate. The reading was 0.0257 mg/L.

The lowest dissolved phosphorus reading occurred on multiple dates and locations (see Appendix C). The reading was <0.0025 mg/L.

The highest total nitrogen reading occurred on 2/3/03 at site CC50, N. Fork at confluence with mainstem. The reading was 1.78 mg/L.

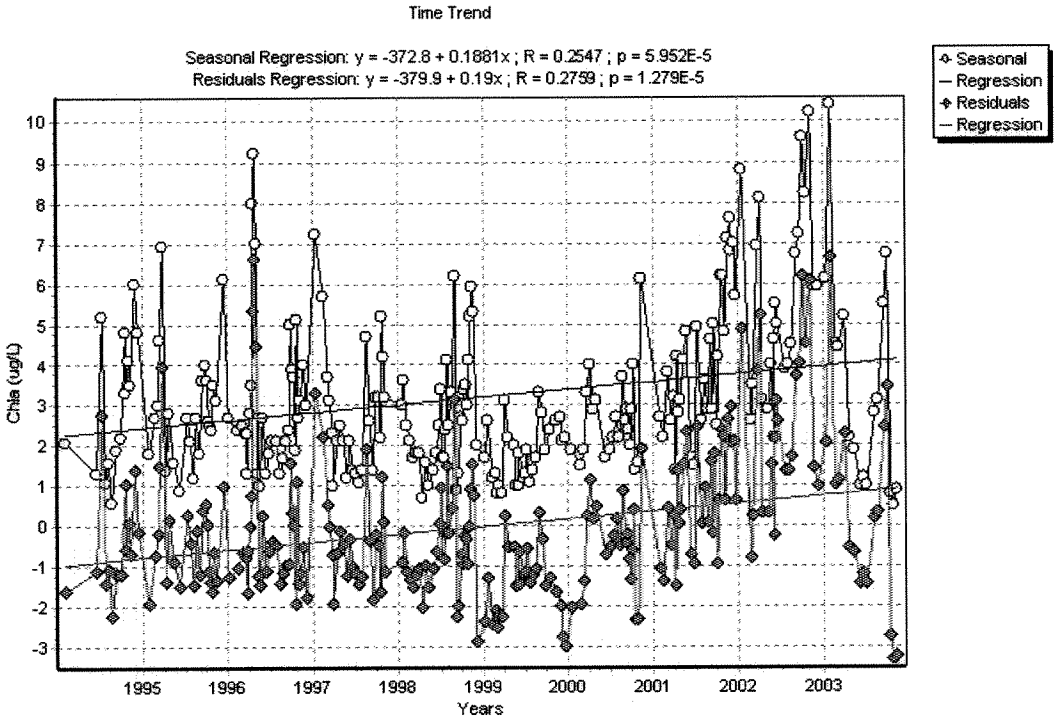
The lowest total nitrogen reading occurred on 10/8/03 at CC44, N. Fork upstream of Black Hawk/Clear Creek wastewater treatment plant. The reading was 0.05 mg/L.

Standley Lake Trophic Parameters

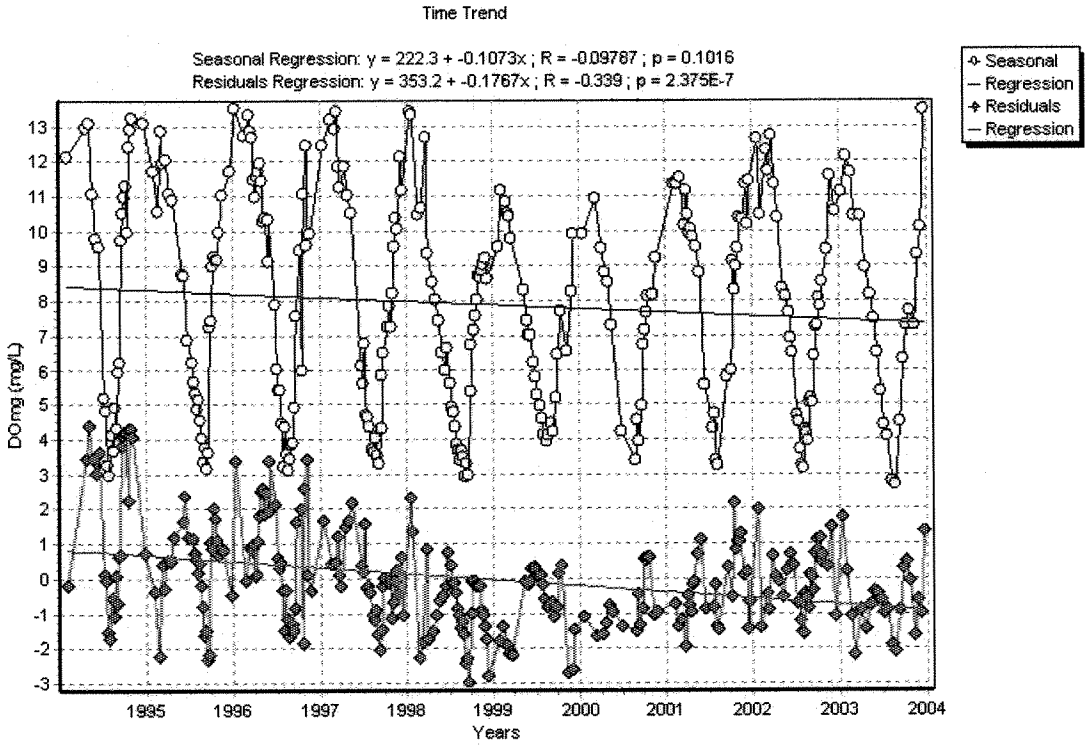
Lakes and reservoirs are rarely static in their water quality; rather they are influenced by ecological conditions within their contributing watershed, which are commonly modified by human activities. Trophic status indicators include but are not limited to those listed in the narrative standard, namely total phosphorus, chlorophyll a, Secchi depth, and dissolved oxygen. All indicators were measured at site SL10, near the dam face. Standley Lake was sampled from a boat on 17 dates from March through November at site 10. Samples were collected twice a month (weather permitting).

The following graphs were generated using *Lakewatch*, a trending software program. Graphs were generated using the entire data set (i.e. year round when available) for the years 1994 through 2003. The top regression line shows observed data, the bottom regression line, plotted as residuals, is deseasonalized data, i.e. data from which seasonal variation has been removed. Residual values are calculated using the polynomial (from the seasonal trend analysis) subtracted from the measured data. Regression lines using least square regressions are calculated for both sets of data. A low p-value means that there is a low probability that the fit of the line is attributable to chance, i.e. there is a high probability of a trend.

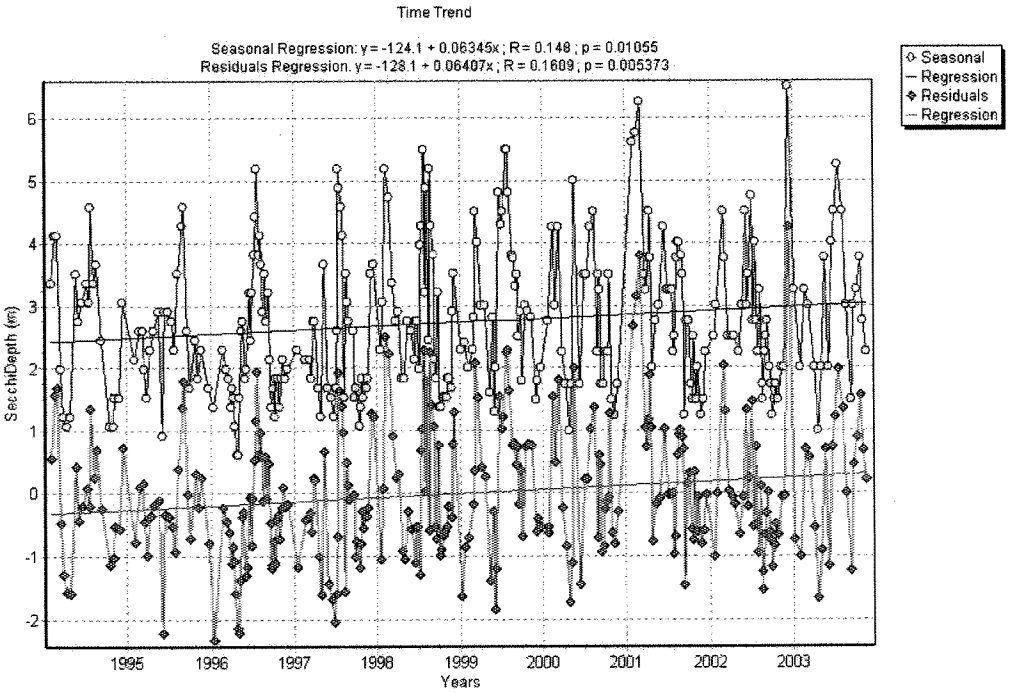
The following graph generated by the *Lakewatch* software program indicates that uncorrected chlorophyll a is trending upward and that the trend is significant, i.e. low probability that the fit of the line is attributable to chance. The slope of the residual or deseasonalized line indicate that chlorophyll a is increasing at an annual rate of 0.19 ug/L.



The following graph generated by the *Lakewatch* software program indicates dissolved oxygen levels are trending downward and that the trend is significant, i.e. low probability that the fit of the line is attributable to chance. The slope of the residual or deseasonalized line indicate that dissolved oxygen is decreasing at an annual rate of 0.18 mg/L. This trend is a sign that the lake is anoxic more frequently or for longer periods of time.



The following graph generated by the *Lakewatch* software program indicates Secchi depth is trending upward and that the trend is significant, i.e. low probability that the fit of the line is attributable to chance. The slope of the residual or deseasonalized line indicate that Secchi depth is increasing at an annual rate of 0.06 m. The interpretation is that the photic zone, the depth to which light penetrates, is trending deeper. Secchi depth is measured in the photic zone only.



Note: Individual reports are not reviewed or edited by participating entities. Therefore, they may not represent the opinions of the other parties.

II. THE UPPER CLEAR CREEK WATERSHED ASSOCIATION

City of Black Hawk

The City of Black Hawk continues to implement stormwater BMPs on a citywide basis, using the Urban Drainage & Flood Control District's Volume 3 (Best Management Practices) for guidance. For new construction projects, the City requires developers of sites larger than 1 acre to obtain a stormwater construction permit from CDPHE. In 2003, the City applied for and received two Phase II stormwater permits from the State; one for the City garage (which was classified as a transportation facility) and one for mine sites within the city. Black Hawk is currently implementing these permits.

In 2003, the City removed a mine tailings pile on Merchant Street, benefiting water quality.

Black Hawk/Central City Sanitation District

The Black Hawk/Central City Sanitation District completed 25,000 lineal feet of new 24" sanitary sewer interceptor line along State Highway 119 to the site of the new wastewater treatment facility. Construction for the wastewater treatment facility began in June 2003, and is scheduled to be completed in June of 2005. The new facility will include a Biological Nutrient Removal (BNR) system for phosphorus and nitrogen removal, ultraviolet (UV) disinfection, and final filtration.

The District continues to meet the permit requirements of its Colorado Discharge Permit System permit.

Central Clear Creek Sanitation District

The Central Clear Sanitation District activated sludge wastewater plant is operated in a mode designed to achieve nearly complete ammonia removal. This is accomplished by maintaining a very old sludge age. In addition, alum is added for phosphorus removal.

City of Central

The Central City by-pass road project (Central City Southern Access Road) includes all work necessary to build a four lane paved highway from the Hidden Valley Exit 243 on I-70 to Central City. Ames Construction Company will construct about 8.6 miles of new road. The construction efforts consist of design, excavation and fill of approximately 5.5 million cubic yards of rock, installation of temporary construction erosion control measures, construction of two bridge structures, installation of about 7,600 linear feet of stormwater drainage system, construction of rock retaining walls, limited mine waste pile capping, asphalt paving, guardrails, roadway signage and striping. The total project area is 434 acres with an estimated disturbed area of 208

acres. The proposed construction is scheduled in four phases. The highway is planned for completion by November 20, 2004. The project is on schedule and meeting construction expectations.

Ames construction has developed a Stormwater Management Plan (SMP). The SMP identifies the necessary construction best management practices, an aggressive schedule of inspection, and a continuous maintenance program. The SMP identifies 20 erosion and sediment control practices distributed between structural and nonstructural practices. Erosion control measures are being implemented prior to construction, inspected after each storm runoff event or at least weekly and corrected or repaired as needed. This set of practices is consistent with those practices advocated by CDOT in their 2002 *Erosion Control and Stormwater Quality Pocketbook.* The listed control measures are typical for this type of construction project. Based on inspection reports, erosion control measures are being implemented. The SMP was prepared for a design build project, which means that plans will not be complete. Consequently, the SMP serves as a guideline to reduce erosion problems during construction activities. Ames Construction has marked the standard plan sheets with the general types of temporary erosion control measures that should be applied to reduce erosion problems. Standard plan sheets locate stormwater drainage structures.

The Central City By-pass highway project doesn't directly incorporate many long-term water quality protection and prevention structures. The stormwater drainage system is adequate for the highway and is designed to accommodate the steep terrain. Some drainage related permanent velocity control practices are built into the project. Velocity control structures can have a water quality benefit by reducing downstream erosion potential. Since a significant portion of the new highway system is cut from hard rock, the erosion potential from the cut slopes is reduced. Clearly, the potential exists for future downstream water quality degradation associated with this construction project. The impact from spring runoff in 2004 will provide a better indication of the potential for future water quality degradation. Currently the project and construction managers are doing their parts to ensure that appropriate construction or temporary best management practices are implemented.

Central City has also completed the planning process for a new residential development named "Prospector's Run" (A.K.A. Eureka Heights Village). The development will be required to implement extensive BMPs, including stormwater detention ponds, silt fencing, and other erosion control measures. The development will ultimately contain 235 townhouse units. Phase IA will consist of 26 units; the foundations for the first units have recently been poured. Phase IA is in compliance with all BMP installation requirements.

Clear Creek County

Two major road projects have been ongoing in the County in the past year. The Southern Access Road (I-70 to Central City) has already been discussed above. The Guanella Pass project has been approved and is currently under construction. Clear Creek County is a cooperating agency on this project, which was initiated some 15 years ago to respond to significant erosion and sediment problems. A 14-year environmental review process and significant public input ensured an environmentally sound project. Numerous storm drainage structures, sediment capture basins, and retaining walls to prevent erosion have been incorporated into the final design.

The County is also actively participating in the ongoing programmatic EIS (Environmental

Impact Statement) process for the I-70 corridor, and will continue to push for water quality enhancements and mitigation where required.

The County has adopted a countywide Master Plan that focuses on greenway improvements along the Clear Creek corridor. This is an important element of the economic diversification plans for the County. Wherever possible, the County works to incorporate habitat improvements into the trail/access system, based on habitat enhancement guidelines of the Colorado Department of Parks and Outdoor Recreation. Thus far, approximately 12-1/2 miles have been completed. The County is working to obtain additional grants to fund future projects.

In 2003, the County issued 69 permits for ISDS (Individual Sewage Disposal Systems). Of that total, 14 were for repairs, and the remainder was for new systems. County staff conducted a total of 338 septic tank inspections in 2003. A typical system receives a total of 4 or 5 inspections: one before the permit is issued, an open-hole inspection, one or two component inspections of the leach field and tank, and a final grading inspection.

Clear Creek High School

The new Clear Creek High School Wastewater Treatment Plant began operations this past year. The facility has rather strict discharge limits for Total Inorganic Nitrogen (TIN) and Total Phosphorous (TP). These limits are 10 mg/L for TIN and 0.3 mg/L for TP, consistent with the court-ordered surface discharge limits (water decree Case No. 97CW380). The type of wastewater treatment chosen for this application was activated sludge with nitrification/denitrification followed by suspended membrane filters, and will sufficiently meet the discharge criteria. Inorganic nitrogen (NO3 and NO2) will be removed from the system in an anoxic zone (no dissolved oxygen), in which the microorganisms convert the NO3 and NO2 to nitrogen gas, which escapes harmlessly to the atmosphere. The TP is removed from the system by adding aluminum sulfate (alum), which reacts with the phosphorous in the wastewater to form a larger floc particle. The membrane filters then easily remove the floc. Past experience with this membrane system has demonstrated that these limits can be easily achieved. Preliminary sampling results for December 2003 show that the system is achieving the expected removal rates.

Clear Creek Ski Corporation

In 2003, the Loveland Ski Area completed a wetlands mitigation project, totaling approximately 1-1/2 acre. The ski area has a substantial water bar system in place to reduce erosion and protect water quality. This system is aggressively maintained. The ski area also has a very aggressive revegetation plan with a priority-based scale for impacted areas. A recently completed project, the #9 chairlift, is an example of this type of project. This revegetation project is in the very headwaters of the watershed, at an elevation of 12,701 feet. The project was extremely successful, with well-established growth in a difficult zone. The ski area also implements a fertilizer management plan, which limits application rates and thus protects water quality.

At the Loveland Ski Area's wastewater treatment plant, alum is added to aid with phosphorus removal. In 2003, the operator experimented with denitrification by operating the flow equalization tank in an anoxic mode. Preliminary results have been positive. This operational technique may have potential application at other wastewater plants in the basin that have a flow equalization tank in place. The facility is currently run in a mode designed to achieve nearly complete ammonia removal, by maintaining a very old sludge age.

Colorado Department of Transportation

CDOT continued its Highway Stormwater Monitoring project along I-70. CDOT continues to gather baseline data during snowmelt and runoff events along the highway. An annual report of the data is prepared and submitted to UCCWA for use in its library and database.

CDOT has been in discussions with the U.S. Army Corps of Engineers (COE) about potential funding opportunities. The COE has several funding programs that may be applicable to Clear Creek, especially for stream restoration projects. CDOT is heading up a sub-committee of UCCWA members to further explore these funding opportunities.

CDOT purchased a new sweeper for use along I-70 within Clear Creek and Jefferson Counties to improve maintenance BMPs by enabling CDOT Maintenance forces to sweep the Interstate more often. Highway sweeping has been found to be an effective BMP.

CDOT continues to work with CDPHE on addressing nonpoint sources along the SH 119 corridor in conjunction with Superfund Operable Unit 4 (OU4) efforts to remediate the North Fork of Clear Creek.

In 2003, CDOT completed planning for the installation of a pipeline in Idaho Springs to divert mine drainage from the Big 5 and Virginia Canyon to the Argo facility for treatment. This is a cooperative project with EPA, CDPHE, and the City of Idaho Springs. Construction will begin early in the summer of 2005.

Coors Brewing Company

Coors Brewing Company developed a 2-acre, 250,000-gallon/day constructed test wetland in 2003. The test wetland is located one-quarter mile east of McIntyre Street and just north of Clear Creek on Coors property in Golden.

Constructed wetlands have long been recognized for their cleansing abilities and are designed to remove or reduce pollutants from wastewater. This pilot wetland will test the effectiveness of wetlands as tertiary treatment (including nutrient removal), and offer a wildlife habitat and educational opportunity to the public. The project was designed and implemented in conjunction with Colorado Department of Natural Resources (DNR) biologists, based on a plan initiated and approved by them. The design incorporates energy savings and efficiency, water treatment test cells, wildlife habitat, and a public viewing area. Continuous monitoring of key water quality indicators will evaluate the wetland performance for removal of nutrients, sediment, and other parameters. Primary criteria that will be investigated include:

- Nitrogen and phosphorus removal,
- BOD removal,
- The need for plant harvesting, and

- Suspended solids removal.
- The variables that will be studied include:
- Type of plants,
- Hydraulic & organic loading rates,
- Phosphorus removal,
- Subsurface flow operation, and
- Anoxic/aerobic zone optimization.

The test duration will be two years.

Climax / Henderson Mine

In an effort to reduce metals and sediment loading to the stream, the Henderson facility has conducted stormwater inspections at both the mine site and at Urad, hired a vacuum truck to remove road sand and salt from stormwater ditches at the mine, conducted routine maintenance on the upper tailing decant line at Urad, monitored the recently constructed wetlands at Urad, and secured capital dollars in its 2004 budget for stormwater ditch improvements at Urad.

Town of Empire

The Empire wastewater treatment plant continues to use alum to remove phosphorus. Effluent phosphorus levels averaged 0.7 mg/l for 2003. The operator is also able to achieve nearly complete nitrification of ammonia through good day-to-day operations. In 2003, effluent ammonia levels were non-detect in 10 out of 12 months. The Town also received a grant in 2003 to install a stand-by generator.

Town of Georgetown

In 2003, the Town of Georgetown responded to a request from the health department to evaluate improvements to its wastewater plant. The Town engaged an engineering firm to guide it through the evaluation process for identifying and performing preliminary engineering analysis. The recommendations were submitted to the health department in late 2003 and the Town is working with the department to come to resolution on the specific improvements.

The recommended improvements to the wastewater plant include: new headworks and an automated screen, a new flume for more accurate flow monitoring, additional aeration and expanded aeration basins, a new chlorine contact basin, and new sludge storage.

Gilpin County

In 2003, Gilpin County issued permits to approximately 38 Individual Sewage Disposal Systems (ISDS). Of these new systems, most were required to include a pretreatment component, Advantex® System, which is a nitrogen-reducing recirculating filter technology.

The County is also pursuing EPA grants to allow the further cleanup of tailings piles in Russell Gulch. The first step will be to design and build a compost facility, which would produce composted material from local wastes (slash, horse manure). This composted material would then be used to help revegetate stabilized tailings piles.

City of Golden

Water Quality

- In 2003, the City implemented a long term water quality monitoring program for the Fossil Trace Golf Course, in accordance with Section 401 of the Clean Water Act. Golden's Water Quality Management Plan is designed to monitor 7 ground water and 5 surface water sites. The Plan includes guidance for protecting water and wetland resources through implementation of several Best Management Practices (BMPs). These activities are designed to address efficient irrigation techniques that promote water conservation, emphasize pollution prevention techniques and integrate all aspects of resource management.

Watershed/Other Activities

- $2,000 to the fourth phase of the Event Mean Concentration (EMC) Study performed by Clear Creek Consultants, Inc., a cooperative effort between Golden, the Upper Clear Creek Watershed Association and the Standley Lake Cities.
- $2,850 annual contribution to the Upper Clear Creek Watershed Association.
- $5,888 annual contribution to the Rooney Road Recycling Center including participation as a board member.
- The Environmental Services Division responded to 9 illicit discharges or spills involving waterline breaks, concrete spills, fuel spills and other miscellaneous incidents. All were satisfactorily resolved.

Stormwater Program

In 2003, the City applied for coverage under the Colorado Discharge Permit System for a Municipal Stormwater Permit. While program implementation is required to be complete by the end of the first permit term, March 9, 2008, the city's stormwater program was fully implemented by January 2003.

The construction site runoff control program managed 45 stormwater quality permits for activities disturbing over ½ acre of land, conducted 870 erosion and sediment control inspections, and issued 23 compliance orders and 2 stop work orders.

The long-term stormwater management program conducted 1,702 maintenance inspections of storm sewer systems including inlets, manholes and structural BMPs.

Some of the activities completed under the stormwater public education and outreach programs in 2003 include:

- distribution of stormwater information in elementary school packets;
- articles in the local, bi-monthly newsletter sent to all residents;
- interactive displays at a Public Works Expo;
- participation in Jefferson County Earth Day event;
- hosting a popular Xeriscape seminar series;
- stormwater BMP fact sheets sent to all businesses;
- promotion of stormwater information through public access television, city website, facility tours, and an environmental questions hotline;

- Golden Clean Up days;
- promotion of Mutt Mitt stations along Clear Creek and city trails;
- dry weather screening of storm sewer outfalls during routine maintenance program;
- pollution prevention training for municipal programs including fleet, golf course, parks, storm sewer, sanitary sewer, and street maintenance activities;
- incorporation of construction BMPs on capital projects; and
- a presentation at the March 23, 2003 Colorado Contractors Association Third Annual Stormwater and Erosion Control Forum on the requirements of the Phase II Stormwater program.

Drainage and Stormwater Capital Projects

- All drainage improvements associated with Fossil Trace Golf Course were completed in 2003. Improvements included detention and retention structures and filtration by wetland and grass swales.

- The Washington Avenue bridge project was completed in 2003. The new bridge has a greater span over Clear Creek, which will convey the 1% annual chance flood event (100 year flood) within the banks of Clear Creek.

City of Idaho Springs

Major renovations continue at the Idaho Springs wastewater treatment plant. Projects completed prior to this year include an automatic 450KVA standby back-up generator, and automated SCADA control system with enhanced remote read architecture, new hydraulic activated decanters, new sludge pumps, a rebuild of the chlorine contact chamber and the sulfur dioxide injection system.

Additional future WWTP projects are identified in the City of Idaho Springs 2004 – 2010 Capital Improvements Plan. Headworks improvements, including a mechanically cleaned bar screen, grit removal and classification, are scheduled for 2004. Other future capital improvement projects include a magnetic flowmeter for WWTP influent flow measurement (this project was partially implemented as part of other headworks improvements; additional flow measurement work may be added as part of the bar screen wash system currently under design); replacement of existing blowers; replacement of existing SBR recirculation pumps; and replacement of existing Cl_2/SO_2 feed equipment.

Additional sanitary sewer line replacement is also scheduled, to help reduce infiltration and improve maintenance of the collection system. (Infiltration into the collection system has already been significantly reduced by previous years' actions.) The City continues to implement its bi-annual maintenance agreement for the sewer lines.

Phase I of the Idaho Springs Reservoir was previously completed, thus reducing the potential for failure of the storage structure. This reservoir provides a collection basin during storm events, thus mitigating runoff into the watershed. Last year, the reconstruction of the spillway was addressed; this will further enhance the effectiveness of the reservoir as a watershed protection structure.

Idaho Springs has worked together with CDOT on the design of the Colorado Blvd. Project. The main impetus of this project was to improve drainage and water quality. The project design includes sediment capture and clean-out features.

Operational changes complementary to the new system have been put into practice. A detailed standing operation procedure was developed and is being implemented. These improvements have contributed significantly to assuring quality effluent at the WWTP.

Jefferson County

In 2003, Jefferson County adopted a program to require inspection of septic systems upon the sale of properties in the county. The County also obtained its Phase II stormwater permit from CDPHE. In compliance with this permit, the County has:

- Located and mapped 95% of its storm sewer outfalls (This information will be used to detect and eliminate illegal dumping and illicit discharges.);
- Adopted a new detail for storm sewer inlets (which includes an admonition not to dump waste into the storm sewer, as it drains to the streams); and
- Added a stormwater web site to the County's web page.

Mount Vernon Country Club

Mount Vernon Country Club (MVCC) is currently in the process of upgrading its wastewater treatment system. The existing mechanical system, which began operating in the early 1960's, has had difficulty adapting to the highly variable influent flows. Most activities at MVCC occur on weekends and during the summer months, causing much higher wastewater flows during these times. To react to these variable loadings, MVCC will abandon its existing aeration tank and clarifier, and will construct a lined, aerated lagoon with a 15-day detention time. The additional detention time provided by the lagoon will act as a buffer against flow variations and will provide a consistent effluent quality that meets or exceeds state regulations.

St. Mary's Glacier Water and Sanitation District

The wastewater treatment facility is operated a mode designed to achieve nearly complete ammonia removal. This is accomplished by maintaining a very old sludge age. Operational modifications to achieve denitrification at St. Mary's are planned for the future.

Shwayder Camp

Shwayder Camp continues to operate its 5,000-gallon per day recirculating sand filter to provide secondary treatment to its wastewater during the summer camp season. The Camp also uses water bars to help control sediment erosion.

Town of Silver Plume

The Town of Silver Plume is attempting to fix the drainage from Cherokee Gulch, which would improve water quality in Clear Creek. Silver Plume is also working together with Georgetown to upgrade the joint wastewater treatment plant.

III. TRIBUTARY BASIN ENTITIES REPORT

Tributary Basin Area

The Standley Lake watershed consisting of the Clear Creek basin above Golden and including the tributary basin (see map on page 22) consists of approximately 282,000 acres. The tributary basin consist of approximately 20,750 acres, at the end of 2003 approximately 10,120 acres or 48.8% of the total Tributary Basin is separated from the canals and Standley Lake and therefore do not drain into the canals or Standley Lake.

In 2003 Arvada worked with developers and the Farmers Highline Company (FHLC) to install bypass structure for the development at Westwood's Center located in the Ryan Gulch / Hyatt Lake drainage basin and Saddleback Development located along Moon Gulch, both historically had drained into FHL canal. The bypass structures eliminated approximately 70 acres of drainage from entering FHLC.

The City of Arvada, FRICO and developers of the Westwoods Center, Saddleback, and the 86th Avenue widening projects in Arvada worked together to bypass stormwater from the Croke; this resulted in runoff from approximately 30 acres from entering Croke Canal. Also, various BMP's including Vortech stormwater inlet structures are planned to help treat the stormwater from 86th Avenue prior to discharging to Standley Lake. Construction is expected to begin in 2004.

Arvada, the FHLC, and U.S. Fish and Wildlife have been in discussions regarding bypassing the drainage above Two Ponds Wildlife Refuge, from the FHLC. The project would include a new stormwater bypass pipe under the FHLC and Croke Canals as well as realignment of the FHLC to allow for a stormwater detention basin upstream of the canals. The Two Ponds drainage area includes portions of the City of Arvada that have been developed. The FHLC will begin a drilling/borrow area investigation in January 2004 with project construction expected in 2005.

Standley Lake Status

The Statement of Basis and Purpose for the narrative standard for Standley Lake adopted by the Water Quality Control Commission in 1994 stated: "Data collected over the last eleven years for chlorophyll *a* for Standley Lake indicates that the lake has been mesotrophic over that period. The trophic status of Standley Lake is based on the average magnitude of trophic state indicators measured during the period from March 1 through November 30."

The Tributary Basin Entities continue to believe that Standley Lake was mesotrophic during 1994 – 2002 and that the trophic status of the reservoir did not change in 2003. The opinion of the Tributary Basin Entities that the reservoir was mesotrophic during the 1994-2003 period is based on the fact that the average values for the most commonly used trophic state indicators of secchi depth, total phosphorus, and chlorophyll *a* are similar from 1994-2003, and place the reservoir well within the mesotrophic range. Based on this data and the data available for previous years for Standley Lake has been mesotrophic for the past 18 years.

City of Arvada

Source Control

- Arvada has continued to enforce its ordinance prohibiting unlawful discharges to its stormwater facilities. This ordinance was adopted in 1993.

- Arvada and Jefferson County Soil Conservation Service work with two elementary schools to place 68 medallions with the message "Dump-no-waste Drain to Creek". The students receive in-school programs about water quality, and how disposing of waste in the storm drain is detrimental to the environment. The students place the medallions on the drain inlets and distribute 1,286 door hangers to area residences with information about protecting the creeks and streams. The information is in the form of a door hanger. This program with Jefferson County Soil Conservation Service will continue in 2004.

Erosion Control During Construction

- Arvada has continued to enforce its existing ordinance concerning erosion and sediment control during construction. Arvada's existing erosion control ordinance was adopted in 1993 and incorporates by reference the criteria for erosion and sediment control during construction specified in the Urban Drainage and Flood Control District Criteria Manual, Volume 3 - Best Management Practices. Arvada's erosion control ordinance is consistent with the requirements of the Tributary Basin Management Plan.

Permanent Stormwater Quality Control for New Development or Significant Redevelopment

- Arvada continues to enforce the requirements that the owner or developer of a new development or a significant redevelopment must provide and maintain reasonable structural best management practices for permanent stormwater quality control within the development and it incorporates the criteria for permanent stormwater quality control specified in the Urban Drainage and Flood Control District Criteria Manual, Volume 3 - Best Management Practices.

- Arvada, Westminster, Northglenn and Thornton continued their discussions concerning the feasibility of using a portion of the Church Ditch beyond Little Dry Creek as a dedicated stormwater conveyance facility around Standley Lake.

Hazardous Substance Spills

In 2003 there were 24 spills to the storm drain system that required response by City personnel. None of the spills were in an area that drained to the canals that feed Standley Lake.

Central City Southern Access Road

The Central City by-pass road project (Central City Southern Access Road) will result in a four lane paved highway from the Hidden Valley Exit 243 on I-70 to Central City. Because this project has high potential to adversely affect downstream water quality degradation, the Standley Lake Cities and Arvada hired a consultant to review construction BMP's and inform parties to the Agreement of potential water quality impacts. Prior the hiring of the

consultant to monitor BMP's, the State of Colorado had found the site in violation of construction BMP's. The Standley Lake Cities and Canal companies have a complete write-up on the Southern Access Road on pages 32. Even with compliance with the State Stormwater Permit for construction activities the potential exists for future downstream water quality degradation associated with this construction project. What is most disturbing is that long-term stormwater management for protection of water quality is not designed into the project.

Other Activities

- Arvada collected water quality data from the Arvada Reservoir sedimentation basins, which shows the benefits of settling canal water before it enters a drinking water reservoir. In 2003 the following results were documented:

Parameter	% Reduction
Orthophosphate	44.6%
TP (ppb)	34.0%
TN (ppb)	20.5%
TOC	21.9%
TSS	50.4%
Pb	53.8%

- Arvada is an active member of the Rooney Road Recycling Center, which provides a very effective program for the recycling or safe disposal site for household hazardous wastes, including pesticides, herbicides, automotive products, electronic waste and a recycling program for tree and shrubs.

City of Golden and Jefferson County

Please see the Upper Clear Creek Watershed Association Section, (Section II, pages 18 and 21) for the 2003 Golden and Jefferson County activities.

IV. STANDLEY LAKE CITIES AND CANAL COMPANIES

Outstanding notice(s) of exceedence(s) in 2003:

The Standley Lake Cities completed a review of State discharge monitoring reports and EPA enforcement and compliance history online, (ECHO), for the upper basin wastewater treatment plants the following wastewater treatment plant(s) in the Upper Clear Creek Basin received or have outstanding notice(s) of exceedence(s) in 2003:

Facility Identifier	Exceedence Date	Parameter
Idaho Springs, City of	1st qtr, 2003	Copper, potentially dissolved
Idaho Springs, City of	3rd & 4th qtrs, 2003	Flow in conduit or thru treatment plant
Idaho Springs, City of	09/2002 to date	Not received; special study
Idaho Springs, City of	04/2003 to date	Not received; annual report
Idaho Springs, City of	07/2001 to date	Not received; study results
Idaho Springs, City of	11/1999 to date	Not received: 1st rpt, construction progress
Idaho Springs, City of	11/2000	Not received; final progress rpt
Idaho Springs, City of	12/2003	Not received; 1st rpt of progress
Idaho Springs, City of	12/2003	Not received; end construction
St. Mary's Glacier W&SD	09/03-10/03	Achieved late; submit I/II Report #2
Georgetown, Town of	4th qtr, 2003	pH
Georgetown, Town of	3rd qtr, 2003	Flow in conduit or thru treatment plant
Georgetown, Town of	3rd qtr, 2003	BOD, 5-day % removal
Georgetown, Town of	3rd & 4th qtrs, 2003	Solids, suspended % removal

A September 9, 2003 Colorado Department of Public Health and Environment inspection identified substantial deficiencies at the Town of Georgetown's wastewater treatment plant. Many of the deficiencies were noted in an inspection report from two years previously. The inspection report also found deficiencies in the Town of Georgetown's water treatment plant, including a discharge of treatment plant backwash directly into South Clear Creek. The violations/observations were:

Violations

- The water treatment facility was discharging backwash from their water treatment plant directly into South Clear Creek
- The wastewater operator's license expired 1 November 1997.
- Sample compositing was not adequate for permit compliance. *This violation was identified during the inspection conducted 18 April 2001.*
- Fecal coliform values reported on the DMR's were not calculated using the geometric mean as required in the permit.
- The Town experienced a sanitary sewer overflow at an inverted siphon crossing that was not reported.

Operational observation and recommendations:

- The daily, weekly, monthly and annual operational and maintenance activities should be formalized in to a written schedule and posted at the plant and reviewed and updated as needed, but at least annually. *WQCD recommended this procedure during the last inspection in April 2001.*

- Grease and floating scum was observed in the clarifier. The skimmer was not in good operating condition. *WQCD noted floating grease on the clarifier during the last inspection in April 2001.*
- The chlorine contact basin may not have the ability to provide proper disinfections contact time. This contact basin is short-circuiting from the feed pipe to the center discharge pipe. *WQCD noted this concern during the last inspection in April 2001.*
- It is considered good practice to perform duplicate sampling and analysis on 10% of your compliance samples for quality control/quality assurance purposes. Duplicates do not have to be conducted on all parameters, however completing duplicates on major parameters is recommended twice a year. *WQCD noted this recommendation during the last inspection in April 2001.*

The Memo concludes that these deficiencies, violation and observations are significant and suggest serious failures in the operation of the facility. These violations may have resulted in higher nutrient levels in the facility discharges.

Standley Lake Status

The Statement of Basis and Purpose for the narrative standard for Standley Lake adopted by the Water Quality Control Commission in 1994 stated: "Data collected over the last eleven years for chlorophyll *a* for Standley Lake indicates that the lake has been mesotrophic over that period. The trophic status of Standley Lake is based on the average magnitude of trophic state indicators measured during the period from March 1 through November 30."

Based on the preceding statement the Standley Lake Cities believe that Standley Lake was mesotrophic during 1994 through 2002, and that the trophic status of the reservoir did not change in 2003. However, the Standley Lake Cities do not believe that the time period of March 1 through November 30 accurately reflects the relevant time period over which the lake should be evaluated.

The cities are concerned with the upward trend for chlorophyll a and downward trend in dissolved oxygen. The Standley Lake Cities believe it will be important to observe the water quality trends closely and take further corrective action should it appear that water quality is deteriorating.

DITCH INFLOWS to STANDLEY LAKE

Farmers High Line and Reservoir Company

Van Bibber, Ralston, Leyden and Little Dry Creek drainages continue to be by-passed over/under the Farmers High Line Canal (FHLC). The spill gate at the Little Dry Creek structure, which can be operated remotely, provides the last line defense for protecting Standley Lake from stormwater or hazardous spills contamination.

The FHLC has been working with City of Arvada developers on the Westwood's Center located in the Ryan Gulch/Hyatt Lake drainage basin and Saddleback Development located along Moon Gulch that are adjacent to the FHL canal. Arvada and the developers agreed to bypass stormwater from the FHLC and the bypass structures were constructed in 2003. The Saddleback development is located along Moon Gulch and the Westwood's Center development is located in

the Ryan Gulch/Hyatt Lake drainage basin.

The FHLC, Arvada and U.S. Fish and Wildlife have been in discussions regarding bypassing the Two Ponds Wildlife Refuge drainage, which also includes drainage from portions of Arvada that are developed, from the FHLC. The project would include a new stormwater bypass pipe under both the FHLC and Croke Canals as well as realignment of the FHLC to allow for a stormwater detention basin upstream of the canals. The Two Ponds drainage area includes portions of the City of Arvada that have been developed. The FHLC will begin a drilling/borrow area investigation in January 2004 with project construction expected in 2005.

The FHLC has been submitting comments to Urban Drainage and Flood Control District plan for storm water management in the Fairmount area. The FHLC will support bypassing water from all of the canals that feed Standley Lake.

Modifications to the Bright and Brown Lateral checkgate were completed in 2003. The modifications restored FHLC capacity, improved operations and reduced seepage losses. Approximately 3 miles of the FHLC were cleaned in 2003. The spoils were placed below the canal bank and were graded to drain away from the canal.

The first flush of the canal was diverted around Standley Lake to avoid contamination from trash and debris, sediment, and other contaminants that accumulate in the canal over the winter.

CROKE CANAL (FARMERS RESERVOIR & IRRIGATION COMPANY AND STANDLEY LAKE OPERATING COMMITTEE)

The major drainages continue to be bypassed over the Croke Canal, including Van Bibber, Ralston, Leyden and Little Dry Creeks. Design work was completed for the renovation of the Van Bibber Creek bypass structure under the Croke Canal. FRICO has requested financial participation from Urban Drainage Flood Control District and Jefferson County for completion of this stormwater project. Land ownership issues also need to be resolved prior to commencement of construction.

FRICO has been working with City of Arvada developers on the Westwoods Center, Saddleback, and the 86th Avenue widening projects in Arvada. Arvada and the developers agreed to bypass stormwater from the Croke and bypass structures were constructed at the Westwoods Center and Saddleback Developments. Construction has not been initiated on the 86th Avenue widening project. Various BMP's including Vortech stormwater inlet structures are planned to help treat the stormwater from 86th Avenue prior to discharging to Standley Lake. Construction is expected to begin in 2004.

FRICO has been tracking the Fairmount Area Drainage study being sponsored by Urban Drainage and Flood Control District. The plan includes bypass of stormwater in the Fairmount Area from the canals that feed Standley Lake, which FRICO supports.

Approximately eight miles of the Croke Canal were cleaned restoring capacity to the canal. The spoils were placed below the canal bank and were graded to drain away from the canal.

Construction was completed on a hydraulic improvement project at the Croke Canal box culvert at 52nd and Indiana. The old structure was a flow restriction in the canal. The new structure allowed for safer conveyance of high flows in the Croke last spring.

The first flush of the canal was bypassed around Standley Lake to avoid contamination from

trash, debris, sediment, and other contaminants.

Construction progressed on the Standley Lake Dam Renovation Project. The new tunnels, pipeline, multi-level intakes, and new spillway have all been completed. Testing of the new water delivery structures is scheduled for February 2004 after the new tie-ins and valve house are completed. Total project completion is anticipated for May 2004.

CHURCH DITCH COMPANY (CDC)

Church Ditch

The Church Ditch Company issued three Watershed Protection violations in 2003. Engineering for Little Dry Creek bypass was started in 2003 and is slated to be finished in 2004. The following was accomplished in 2003:

- Construction of 3,000 foot concrete box culvert/60" HDPE pipe started in Golden
- Flush gate at Lewis Gulch was replaced
- Removed unauthorized equestrian trail along banks in West Woods Ranch subdivision
- Cleaned culvert crossing at 80th and Newman Street and cleaned ditch at Little Dry Creek
- Cleaned lateral for headgate #105 cleaned
- Removed unauthorized fencing in Bridledale subdivision
- Negotiation begun with Arvada Parks Department on equestrian compatibility

Woman Creek Reservoir

The Woman Creek Reservoir site was updated to increase its efficiency in protecting Standley Lake from runoff of the Rocky Flats Plant. Controls, operational programming and wiring were completed in 2003. New effluent valves are ordered and are expected to be installed in 2004. Access roads and maintenance yard were paved.

Kinnear Ditch Pipe Line (KDPL)

The KDPL intake structure from Coal Creek and South Big Dry Creek intake was cleaned. The access manhole riser 2,000 feet West of Indiana Street was repaired and the pipeline located and field marked.

Berthoud Pass Ditch

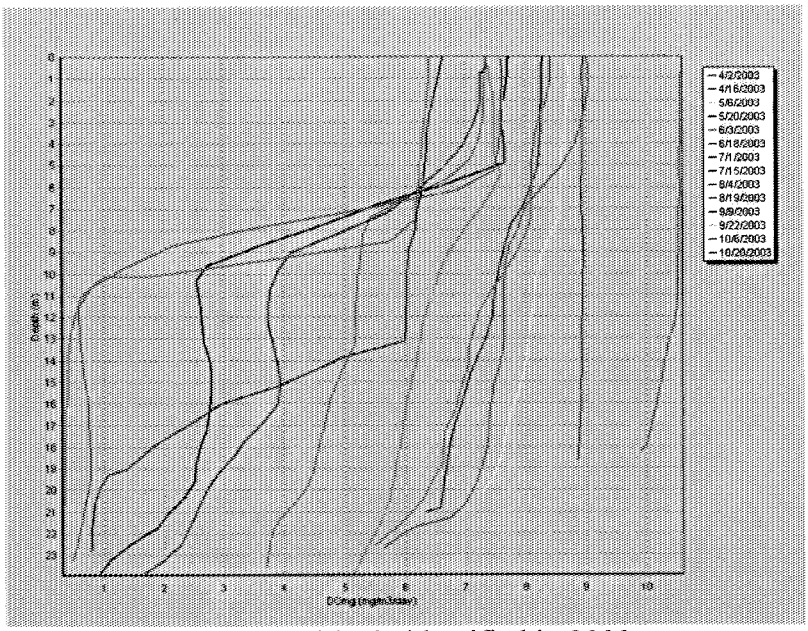
Negotiations with CDOT in 2003 resulted in CDOT agreeing to modify snow removal to minimize the deposition of sand and gravel in Berthoud Pass Ditch. CDOT also placed jersey barriers in the ski lodge parking lot and down the side of Highway 40 to direct runoff away from the ditch. Five tons of pea gravel was removed and 300 feet of ditch cleaned by Highway 40. Hatch covers were installed over intakes #1 and #2 and a leak repaired at intake #1.

Woman Creek Authority/ Standley Lake Wetlands

Negotiations with the Department of Energy on continued irrigation and maintenance of DOE wetlands began in 2003. The silt basin and intake from Church Ditch were cleaned and the irrigation system flushed. Plant material was evaluated for Army Corp. standards.

Standley Lake

Below is a chart of the DO profiles for 2003. They indicate that the Lake went anoxic (DO <2.0 mg/L) around the first of July. Typically, in years past, the Lake goes anoxic in mid July.



Eurasian Watermilfoil

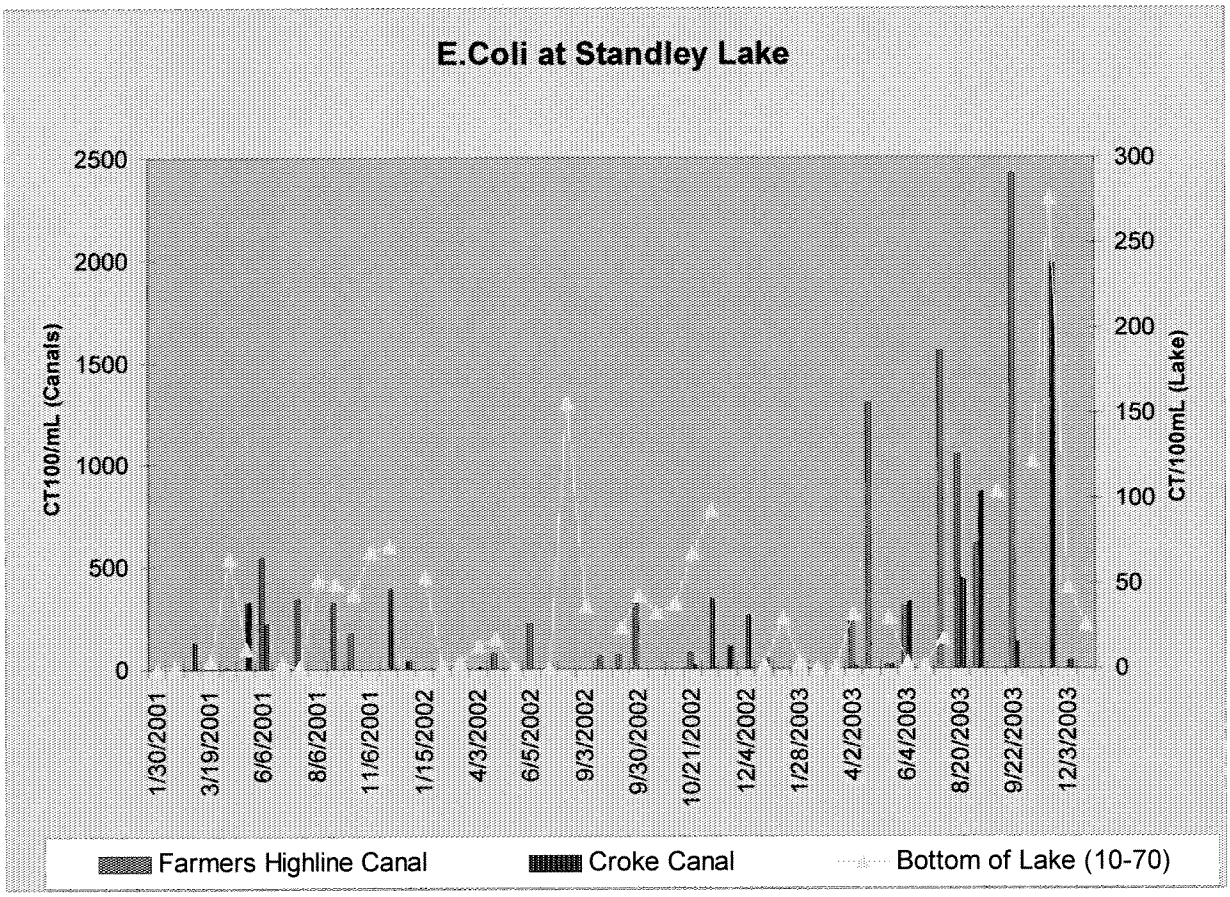
Eurasian Watermilfoil (EWM), *Myriophyllum spicatum L,* is a non-native, aquatic, noxious weed that grows rapidly and to a depth of 35 feet. EWM can grow in dense mats that severely interfere with recreation and provide a substrate for blue-green algae growth. Blue-green algae blooms can ultimately cause taste and odor events in drinking water supplies. EWM was first observed in Standley Lake in 1998. It was positively identified in 2000.

After co-sponsoring a conference on EWM in July 2001, the Standley Lake Cities decided to initiate a two-year test period to evaluate the effectiveness of the milfoil weevil, *Eurhrychiopsis lecontei* in controlling the spread of EWM. The milfoil weevil burrows into the stalk of the plant to lay eggs. The larva, once hatched, feed on the internal portion of the stalk preventing the passage of nutrients and growth of the plant, and loss of buoyancy. Three test sites were selected for the introduction of the weevil, which were introduced to the test sites in the summer of 2002.

A follow up survey performed in May of 2003 turned into a hunt for milfoil since the drought of 2002 had severely damaged the milfoil beds. Two surveys were performed, one using an underwater video camera, and the second using scuba divers. Neither survey found any significant beds of milfoil. In the late fall of 2003 however; significant milfoil beds reemerged on the South side of the lake in small clumps and intermittently dispersed.

There will be a survey in the spring of 2004. It is anticipated that milfoil will be substantially more abundant. If significant beds are found, weevil stocking will be carried out in the summer. Since the milfoil population has been diminished in size, re-introduction of the weevil at this time should be advantageous.

E.Coli Graph



E-coli is a bacterium that is common to the intestinal track of warm-blooded animals. They are an indication of pollution from point sources such as wastewater treatment plants and non-point sources such as failing septic systems and stormwater runoff. *E.Coli* do not generally pose a direct health risk but rather demonstrate the presence of fecal matter, which may carry pathogens. *E-coli* samples are taken monthly at location SL10-70, lake bottom. Both major canals, Croke and Farmers High Line, are also sampled at their respective inlets when diverting.

The graph shows that both the FHLC and Croke Canal had elevated *E-coli* levels in 2003 compared to previous years inflows. FHLC counts were higher than Croke Canal counts. Lake counts of *E-coli* are lower than those found in the canals.

Standley Lake Management Plan

The Standley Lake Management Plan, developed in accordance with the original UCCWA, addresses internal nutrient loading as well as loading from the Tributary Basin. The plan directs the operations of water supply, recreation, and activities in the watershed that may contribute nutrients to Standley Lake.

Standley Lake raw water supply operation practices continue to include lake bypass of canal first flushes, initial flows from spring runoff, and to the extent possible, storm events. Raw water supply operations also include spill notification programs to ensure prompt notification of spills to allow for preventative measures to prevent spill from reaching Standley Lake.

The Standley Lake Cities continue to conduct a cooperative water quality monitoring program of

EXHIBIT A

Clear Creek / Standley Lake

Watershed Agreement

AGREEMENT

The undersigned parties hereto agree as follows:

I. Preamble.

This Agreement seeks to address certain water quality issues and concerns within the Clear Creek Basin of Colorado, and specifically, such issues as they affect the water quality of Standley Reservoir, an agricultural and municipal water supply reservoir located in Jefferson County Colorado, which is supplied with water primarily from Clear Creek. For purposes of this Agreement, the Clear Creek Basin is divided into three (3) areas of segments: the Upper Clear Creek Basin ("Upper Basin"), consisting of Clear Creek and its tributaries from its source to and including the headgate of the Croke Canal in Golden, Colorado; the Standley Lake Tributary Basin ("Tributary Basin"), consisting of the lands directly tributary to Standley Lake, the Church Ditch, the Farmers High Line Canal, the Croke Canal, and lands directly tributary to these Canals; and Standley Lake ("Standley Lake"), consisting of the Lake itself.

The parties to this Agreement are governmental agencies and private corporations having land use, water supply, and/or wastewater treatment responsibilities within the Clear Creek Basin. The parties are: (1) UCCBA; (2) City of Golden; (3) City of Arvada; (4) Jefferson County; (5) Jefferson Center Metropolitan District; (6) City of Westminster; (7) City of Northglenn; (8) City of Thornton; (9) City of Idaho Springs; (10) Clear Creek County; (11) Gilpin County; (12) Black Hawk/Central City Sanitation District; (13) Town of Empire; (14) City of Black Hawk; (15) City of Central; (16) Town of Georgetown; (17) Town of Silverplume; (18) Central Clear Creek Sanitation District; (19) Alice/St. Mary's Metropolitan District; (20) Clear Creek Skiing Corporation; (21) Henderson Mine; (22) Coors Brewing Company; (23) Church Ditch Company; (24) Farmers High Line Canal and Reservoir Company; and (25) Farmers Reservoir and Irrigation Company. For purposes of this Agreement, the parties can be divided into four (4) functional groups, as follows: The Upper Basin Entities ("Upper Basin Users" or "UCCBA"), consisting of the members of the Upper Clear Creek Basin Association (generally representing entities with jurisdiction over land use and wastewater treatment activities in the Upper Basin that can affect water quality in the Upper Basin); the Tributary Basin Entities ("Tributary Basin Entities"), consisting of the Cities of Golden, Arvada, and Westminster, and the County of Jefferson and the Jefferson Center Metropolitan District (generally representing entities with jurisdiction over land use activities that can affect water quality in the Tributary Basin); the Standley Lake Cities ("Standley Lake Cities"), consisting of the Cities of Westminster, Northglenn, and Thornton, (representing the municipal water users from Standley Lake); and the three canal companies (the "Canal Companies"), consisting of the Church Ditch Company, the Farmers High Line Canal and Reservoir Company, and the Farmers Reservoir and Irrigation

Company (representing the entities that own and operate canals through which water is conveyed to Standley Lake for municipal and agricultural use).

In accordance with the geographical and functional divisions, this Agreement generally sets out rights and obligations with respect to certain water quality matters within the Clear Creek Basin (as above defined) by area or segment and by functional group.

II. Agreement.

1. The parties will submit a joint alternative proposal to the Water Quality Control Commission ("WQCC") in the matter captioned "For Consideration of Revisions to the Water Quality Classifications and Standards, Including Adoption of a Narrative Standard, for Segment 2, Standley Lake, of Big Dry Creek, in the South Platte Basin, and Adoption of a Standley Lake Control Regulation" on or before December 23, 1993. Said alternative proposal shall contain the following points:

a. Request the WQCC to adopt a narrative standard only for Standley Lake at this time, with further consideration of any control regulation or numeric criteria for implementation of the standard at or after the triennial review of the South Platte River to be held in 1997. The narrative standard shall require maintenance of Standley Lake in a mesotrophic state, as measured by a combination of relevant indicators, as recommended by the parties' consultants prior to December 23, 1993.

b. Request language in the Rule and in the Statement of Basis and Purpose for the regulation explaining that during the next triennium ending in 1997 ("triennium") the parties hereto will be conducting additional testing and monitoring, as well as implementing certain best management practices and controls on a voluntary basis, the results of which will be reported to the WQCC on an annual basis, and that point-source discharge permits written during the triennium shall not include any new or more stringent nutrient effluent limitations or wasteload allocations to meet the narrative standard. The proposed language will also refer to the intention of the parties and the Commission that should the narrative standard not be met at the end of the triennium, and substantial progress has not been made in reducing the nutrient loads to Standley Lake, additional measures may be required, including numeric standards or effluent limitations for phosphorous and/or nitrogen in the Upper Basin, and for additional best management controls in Standley Lake to be considered.

2. Should the WQCC fail to approve and adopt the substance of the proposed alternative described in paragraphs 1.a. and 1.b. above, this agreement shall automatically terminate and the parties shall be released from all other obligations and rights hereunder.

3. At or after the triennial review in 1997, the UCCBA and Standley Lake Cities agree that if substantial progress has not been made by the UCCBA in reducing its portion of nutrient loading and in developing controls to maintain appropriate reductions in nutrient loads to Standley Lake sufficient to maintain the narrative standard, they will jointly petition the Commission to adopt a control regulation for Standley Lake containing the following points:

    a. Total Phosphorous effluent limitation of 1.0 mg/l as P as a thirty (30) day average at the Upper Clear Creek Wastewater Treatment Plants, or such other numeric standard(s) or effluent limitations (s) for phosphorous or nitrogen, or in combination, with opportunity for point to point source and nonpoint source to point source trading among the entities that operate the UCCBA treatment plants, as has been determined will be effective in achieving and maintaining the narrative standard for Standley lake. Such numeric standard(s) or effluent limitation(s) shall be implemented over a three year period to allow time for the affected entities to fund, design and construct improvements necessary to meet the standards.

    b. In-lake treatment to reduce internal phosphorous loading by 50% from the 1989-90 measured loadings in the 1993 USGS report by Mueller and Ruddy, or such other standards for reduction of internal phosphorous and nitrogen loading as has been determined will be effective in achieving and maintaining the narrative standard for Standley Lake, within three (3) years.

4. The UCCBA, in consultation with the Standley Lake Cities and Tributary Basin Entities will prepare a Best Management Practices Manual by December 31, 1994 for nonpoint sources that will cover disturbed areas of 1 acre or more and use its best efforts to have it approved and adopted for implementation by all jurisdictions within the Upper Basin by July 1, 1995. This Manual will be prepared to deal with the geologic, topographic and weather conditions existing within the Upper Basin to facilitate the reduction of nutrient loading from the various activities of the Upper Basin. This Manual will be coordinated with the Standley Lake Cities and Tributary Basin entities. The plan will include a program for monitoring representative results, to be included in the overall basin monitoring plan. For purposes of development of BMPs, Jeffco will not be considered to be part of the UCCBA.

5. The UCCBA, in consultation with the Standley Lake Cities and the Tributary Basin Entities, will examine the costs and effects of nutrient removal at UCCBA wastewater treatment plants, including operational controls or

modifications which would decrease nutrient loads. Recommendations of such review shall be furnished to all the parties hereto by June 30, 1994. The UCCBA will use its best efforts to have its members implement operational modifications which can be implemented without significant capital improvements as quickly as reasonably practical.

6. The Standley Lake Cities, in consultation with the other parties, will develop a Standley Lake Management Plan by December 31, 1994 which will address in-lake nutrient loading and potential nutrient loading from lake activities, water supply operations, recreational activities, and activities in the watershed. The Standley Lake Cities will use their best efforts to implement the Lake Management Plan by June, 1995. It is understood that the water rights implications of the plan must be considered.

7. The parties will jointly design, implement, and fund in such allocations as they shall agree a monitoring program to evaluate (1) nutrient loadings from point sources; (2) nutrient loadings from non-point sources in the Upper Basin; (3) nutrient loadings from non-point sources in the Tributary Basin; (4) internal Lake loading; and (5) the effect of nutrient reduction measures implemented by the various parties on the trophic status of Standley Lake. The results of the monitoring program will be provided to the Water Quality Control Commission for informational purposes annually. A description of the monitoring program will be included with the Annual Reports.

8. The Tributary Basin Entities and the Standley Lake Cities, in consultation with the other parties, will develop Best Management Practices (BMPs) for each of their jurisdictions by December 31, 1994, and shall use their best efforts to have them adopted as regulations by July, 1995. The BMPs will be designed to remove pollutants to the maximum extent practical considering the costs and benefits of possible measures; provided, however that no retro-fitting of existing construction or development will be required.

9. The Tributary Basin Entities, the Standley Lake Cities and the Canal Companies will develop a Management Plan for the Tributary Basin, addressing stormwater quality and quantity, hazardous substance spills, canal flushing, crossing permits, the Canal Companies' stormwater concerns, and the water rights implications of the above by December, 1994, and use their best efforts to achieve adoption of the portions of the Plan under the control of each entity by July, 1995. If not all affected parties adopt the agreed measures, then the parties that have adopted such measures will determine whether or not to implement the Plan despite such non-adoption by one or more parties.

10. Each functional group (The UCCBA, The Tributary Entities, The Standley Lake Cities, and the Canal Companies) shall provide each other group with semi-annual reports detailing the progress made on the implementation of its responsibilities herein, including development of any BMPs, nutrient reduction programs or controls, or other items required by this agreement,

beginning in June, 1994. The parties shall also meet periodically after each report is completed to discuss progress by the parties. It is anticipated that the various functional groups may assign or appoint task groups or committees to address specific tasks or areas of concern (e.g. BMPs; ISDS; Wastewater Plant operational changes; monitoring, etc). If so, then the task groups shall provide the appropriate reports and participate in follow-up meetings.

11. This agreement may be enforced as a contract according to the laws of the State of Colorado; however, this agreement shall not create any right to claim or recover monetary damages for a breach thereof.

12. It is anticipated that other regional agencies with land use and/or water quality
responsibilities or impacts within the Clear Creek Basin (as above defined) may join in the parties' monitoring and other efforts pursuant to this Agreement.

13. This Agreement may be executed in counterparts.

APPENDIX B: MONITORING SITES

TABLE 1 – MONITORING SITES/FLOW GAGES

Clear Creek Monitoring Sites	Flow Monitoring Gages - USGS
1. Mainstem of CC at Bakerville (CC-05)	Staff gage
2. Leavenworth Creek (CC-09)	Recording gage
3. South Fork of CC at Leavenworth (CC10)	Recording gage
4. West Fork of CC below Berthoud (CC-15)	Staff gage
5. West Fork of CC below Empire (CC-20)	Recording gage
6. Mainstem of CC above West Fork (CC-25)	Recording gage
7. Mainstem of CC at Lawson gage (CC-26)	Recording gage
8. Fall River above mainstem of CC (CC-30)	Staff gage
9. Chicago Creek above Idaho Spgs WTP (CC-35)	Recording gage
10. Mainstem of Clear Creek upstream of Chicago Creek (CC-34)	none
11. Mainstem of CC below Idaho Spgs WWTP (CC-40)	Recording gage
12. North Fork of CC above BH/CC WTP (CC-44*)	Staff gage
13. North Fork of CC below BH/CC WTP (CC-45*)	none
14. North Fork of CC above confluence with CC (CC-50)	Recording gage
15. Beaver Brook (CC52)	none
16. Soda Creek (CC53)	none
17. Confluence of Soda Creek/Beaverbrook (CC54)	none SITE ABANDONED 2001
18. Mainstem of CC downstream of Tunnel 2 (CC-55)	none SITE ABANDONED 11/99
19. Mainstem of CC at Church Headgate (CC-60)	Recording gage

*re-numbered in 1999

CLEAR CREEK WATERSHED MANAGEMENT

MONITORING PROGRAM

2003 Upper Clear Creek Basin
Standley Lake Supply Canals
Standley Lake

Prepared by Clear Creek Watershed/Standley Lake
Monitoring Committee

TABLE of CONTENTS

INTRODUCTION

An agreement between the Upper Clear Creek Watershed Association, the "Tributary Basin" entities and the Standley Lake Cities was developed to address certain issues and concerns as might affect the water quality of Standley Lake (see appendix A for the agreement including a listing of parties to the agreement). Part of the agreement was to design and implement a Monitoring Program and is intended to be applied throughout its duration. The Clear Creek Watershed/Standley Lake Monitoring Committee (members representing the parties to the agreement) annually evaluate the results of the monitoring and make changes to the program as appropriate. The Monitoring Program with any changes or additions/deletions is documented in the annual report to the Colorado Water Quality Control Commission (WQCC).

Based on the agreement, a monitoring program was established to evaluate the following:

- Nutrient loadings from point sources in the Upper Clear Creek Basin.
- Nutrient loadings from non-point sources in the Upper Clear Creek Basin.
- Nutrient loadings from non-point sources in the Tributary Basin.
- Internal loadings on Standley Lake.
- Effects of nutrient reduction measures on the trophic status of Standley Lake.

After the agreement had been finalized an additional component was added to evaluate the effect of organic material from Clear Creek on the dissolved oxygen concentrations in Standley Lake, primarily during the spring/summer runoff period.

MONITORING SITES *

Clear Creek Monitoring Sites/Rationale

The sampling sites in the Upper Basin were selected to divide the stream into sections that would identify point and non-point contributions. These sites were selected as part of an initial sampling program in 1992-93 and where possible are consistent with the sites used in the Super Fund sampling program. The Super Fund sites were selected because of the potential to use the existing database in stream model calibrations. Stream flow monitoring stations were installed at the following corresponding sites: CC-10, CC-20, CC-25, CC-26, CC-35, CC-40, CC-50 and CC-60. Flows are also recorded at the Golden gage.

CC-05 Mainstem of Clear Creek (CC) at Bakerville
CC-09 Leavenworth Creek Added for 1999
CC-10 South Fork of CC at Leavenworth Creek
CC-15 West Fork of CC below Berthoud
CC-20 West Fork of CC below Empire
CC-25 Mainstem of CC above West Fork
CC-26 Mainstem of CC at Lawson gage Added 4/98
CC-30 Fall River above mainstem of CC
CC-34 Mainstem of CC upstream of Chicago Creek Added 2/03
CC-35 Chicago Creek above Idaho Springs Water Treatment Plant
CC-40 Mainstem of CC below Idaho Springs Wastewater Treatment Plants (WWTP)
CC-44* North Fork of CC above Black Hawk/Central City WTP intake
CC-45 North Fork of CC above Black Hawk/Central City WWTP
CC-50 North Fork of CC above confluence of mainstem of CC
CC-52 Beaver Brook Added in 2001
CC-53 Soda Creek Added in 2001
CC-54 Confluent of Soda Creek and Beaver Brook dropped for 2001
CC-55 ~~Mainstem of CC downstream of Tunnel #2~~ **~~abandoned site for 1999~~**
CC-60 Mainstem of CC at Church Headgate
*Original sampling site is CC-45. CC-44 added in 1999.

Wastewater Treatment Plant Monitoring Sites

15. Loveland (CC1a)
16. Georgetown (CC3a)
17. Empire (CC5a)
18. Central Clear Creek (CC7a)
19. St Mary's WWTP (CC8a) - added in 2001
20. Idaho Springs (CC12a)
21. Black Hawk / Central City (CC13a)
22. Henderson Mine (CC14a)

* Eisenhower Tunnel (CC15a) – not monitored. Data received from DMR

MONITORING SITES (cont.)

Canal Monitoring Sites

The canal sampling sites were selected to assess the relative loadings to the canals from Jefferson County, portions of Golden and portions of Arvada.

22. Church Ditch at Headgate on Mainstem of CC (TO1-AS or T01-GR)
23. Farmers High Line at Headgate on Mainstem of CC (TO2-AS or T02-GR)
24. Croke Canal at Headgate on Mainstem of CC (TO3-AS or T03-GR)
25. Church Ditch at 64th (T34-AS or T34-GR)
26. Farmer High Line Canal at 64th (T33-AS or T33-GR)
27. Croke Canal at 64th (T31-AS or T31-GR)
28. Church as it enters Standley Lake (T09-AS or T09-GR)
29. Farmer High Line Canal as it enters Standley Lake (T11 –AS or T-11GR)
30. Croke Canal as it enters Standley Lake (T04-AS or T04-GR)

Standley Lake

The site over the outlet was selected for monitoring because this is the site with the most historic data and is the area from which the water is drawn into the filter plants. By having one site, more samples over time can be taken for the same analytical effort and therefore, provide more data to assess the condition of Standley Lake. Monitoring locations are:

1. 10-0 – Surface (Secchi depth recorded only)
2. 10-70 – 5 feet from bottom
3. 10-PZ – Photic Zone (2X Secchi depth)

*Monitoring sites are contained in Table 1 ~~and Figures 1 and 2 of Appendix B.~~ and in the narrative description (pages 8, 9 and 10).

MONITORING SCHEDULE

Sampling dates for wastewater treatment plants and stream sites were selected to correspond to seasonally varying flow conditions in Clear Creek. Canal composites are collected within seven days of the stream sampling. Laboratory constants require that all sampling be conducted on a Monday, Tuesday, Wednesday, or a Thursday. Each year, sampling is done on approximately the same schedule.

1. Early February (Monday)
2. Early April (Tuesday)
3. Late May (Thursday)
4. Mid June (Wednesday)
5. Mid July (Monday)
6. Mid August (Tuesday)
7. Mid October (Wednesday)
8. Early December (Thursday)

During the spring / summer runoff period, generally mid-May to mid July, the Farmer Highline or Croke Canals, which ever is flowing greater, will be monitored. Standley Lake will be monitored every two weeks from March through November. This regularly spaced and frequent sampling is necessary to provide adequate data to evaluate the trophic status of Standley Lake.

MONITORING PROGRAM VARIABLES (with some limits noted)*

Stream Variables	Reporting Limits
Total Nitrogen	100 ug/L
Nitrate + Nitrite, Ammonia	10 ug/L
Total Phosphorus	2.5 ug/L
Diss. Ortho Phosphorus	2.5 ug/L
Suspended Solids, Total and Volatile	1 mg/L
Physical Properties: Temperature, pH, Specific Conductance and Turbidity	See SOP's

Canal Variables	Reporting Limits
Total Nitrogen	100 ug/L
Nitrate + Nitrite, Ammonia	10 ug/L
Total Phosphorus	2.5 ug/L
Diss. Ortho Phosphorus	2.5 ug/L
Suspended Solids, Total and Volatile	1 mg/L
Physical Properties: Temperature, pH, Specific Conductance and Turbidity	See SOP's

Lake Variables	Reporting Limits
Total Nitrogen	100 ug/L
Nitrate + Nitrite, Ammonia	10 ug/L
Total Phosphorus	2.5 ug/L
Diss. Ortho Phosphorus	2.5 ug/L
Suspended Solids, Total and Volatile	1 mg/L
Physical Properties: Temperature, pH, DO, Specific Conductance, Turbidity, Secchi depth (feet)	See SOP's
Chlorophyll a, algae count and identification	See SOP's

Wastewater Treatment Plant Variables	Reporting Limits
Total Nitrogen	100 ug/L
Nitrate + Nitrite, Ammonia	10 ug/L
Total Phosphorus	2.5 ug/L
Diss. Ortho Phosphorus	2.5 ug/L

Suspended Solids, Total and Volatile	1 mg/L
Physical Properties: Temperature, pH,	
Specific Conductance, Turbidity	See SOP's

* SOP's and QA/QC for these variables are contained in Appendix D, 1-3.

SAMPLE COLLECTION *

Stream All samples are grab samples.

Wastewater Treatment Plants All samples are grab samples.

Canals Samples are 24-hour time composite samples when possible. For the samples collected in conjunction with the upper basin stream and wastewater treatment plant monitoring component, a time delay in the downstream direction will be estimated so the same water is sampled from Golden to Standley Lake. The length of the delay will depend on the flow rate in each canal. If a composite sample is not available, a grab sample will be collected and analyzed in place of the composite sample.

Lake 10- PZ samples are a composite taken with a column tube through the photic zone (2X secchi depth). 10-70 samples are grabs samples.

*Standard Operating Procedures for sampling are contained in Appendix C, 1-3.

QUALITY ASSURANCE / QUALITY CONTROL PROGRAM*

Summary

Split and spike quality control samples are prepared for selected stream and lake parameters and are analyzed by three laboratories.

Laboratories
- Perkins Limnology Laboratory (formerly analyzed at the University of Missouri Limnological Laboratory) changed in 1999
- Northglenn
- Westminster

Variables
- Stream sampling- TP and TN
- Lake sampling – TP, TN, suspended and volatile solids, chlorophyll a

Discussion

Spike and split quality control samples are prepared for each of the 8 upper basin stream surveys by the City of Golden at their laboratory on the day of sampling. There are also 32 splits from the Lake sampling prepared by Westminster and sent to the University of Missouri for TP, TN,

suspended and volatile solids and chlorophyll a analyses. Samples from the wastewater treatment plants will not be regularly included in the split/spike portion of the QA/QC program because of the anticipated higher concentrations.
For purposes of this report, only the spike and duplicate results on the selected upper basin stream samples are reported.

QUALITY ASSURANCE / QUALITY CONTROL (cont.)

Preparation of Stream QC Samples

For each of the eight sampling surveys, there will be one split and one spike distributed to each laboratory. A different site is randomly selected each time. Samples are distributed as follows:

1. Split to UMLL for TP, TN
2. Split to Westminster for TN
3. Split to Northglenn for TP
4. Spike to UMLL for TP, TN
5. Spike to Westminster for TN
6. Spike to Northglenn for TP

*Quality Assurance and Quality Control Procedures for spike/duplicate preparation and sample handling for all laboratories are contained in Appendix D, 1-4.

DATA MANAGING and REPORTING

The City of Golden is responsible for collecting all monitoring data from the field and different laboratories and compiling this data in a spreadsheet format (EXCEL).

In 2003, the Standley Lake Cities spent approximately $20,000 on a joint Laboratory Information System (LIMS) that is hosted through the internet. This LIMS system is used to enter all of the Upper Clear Creek, Tributary, and Standley Lake data. All three cities have access to the LIMS system through a host. Each city shares a portion of the hosting costs of $3600 per year. Each city enters their own data and has a representative that is on a committee for peer review of the data. Each quarter, the data is peer reviewed, downloaded, and given to the City of Golden to compile into a spreadsheet format.

Data results of this program, along with other reporting requirements as stated in the Joint Agreement, will be reported on annual basis to the Colorado Water Quality Control Commission. Only data collected during the normal sampling schedule will be included in the Annual Monitoring Report. This data will be reported in tabular and graphic form. Data interpretation will not be a part of the Annual Monitoring Report. Following each regularly scheduled sampling event tabulated data reports will be sent to the Upper Clear Creek Watershed Association, Tributary Basin entities and the Standley Lake Cities.

CLEAR CREEK WATERSHED MONITORING PROGRAM

Sampling Points Narrative Descriptions

Upper Clear Creek Basin

POINT	DIRECTIONS AND DESCRIPTION OF LOCATION and Latitude/Longitude
CC05	1-70 westbound to Exit 221 (Bakerville) Exit; go south back over Interstate (left) Park at call box. Take sample upstream of parking area, read gage located downstream. [STAFF GAGE] (39-41-31N/105-48-15W)
CC09	Begin at intersection of 6th and Rose in Georgetown. Go 2.2 miles up Guanella Pass Road (go past the first lake). On left side of road, there is a drive marked "Silver Dale Post" that continues west parallel with Guanella Pass. Continue approximately 200 yards. Sample from the USGS recording gage at this site. [RECORDING GAGE] (39-41-11N/105-42-00W)
CC10	Travel back down Guanella Pass Road to the lake inlet. Park on right hand side of road. Sample from stream above lake inlet point. [RECORDING GAGE] (39-41-11N/105-42-00W)
CC15	Travel west on US 40 through Empire. Begin at Empire Dairy King and continue 6.0 miles west on US 40. There is a large pullout on the creek side of highway with a large tree in the middle of the pullout. Sample directly below the tree at the creek. Staff gage is along the north bank of stream next to a tree at the stream's edge. [STAFF GAGE] (39-46-05N/105-47-36W)
CC20	Returning back through Empire eastbound, travel along the road\ramp from US 40 to Westbound I-70. Immediately after turning onto road/ramp, there is a large open space on right side of road\ramp. Park in open space and cross road to the Colorado Dept. of Transportation (CDOT) fence enclosing their maintenance yard. Enter fence and sample approx. 100 feet downstream of bridge at recording gage. [RECORDING GAGE] (39-45-23N/105-39-34W)
CC25	There are two ways to access this sampling location 1) Travel along road/ramp from US40 to Westbound 1-70, Approximately 200 yards after passing bridge to frontage road and Easter Seals Handicamp facilities - pull off onto the right side. Walk down hill to the creek. Sample immediately downstream of the box culvert across from the recording gage.

CC25 (cont.)

Or 2) Travel west of 1-70 approx. 0.8 miles west of mile-marker 232.
Pull off interstate on right side immediately beyond guardrail for the bridge structure. Walk down hill to the creek. Sample immediately downstream of the box culvert across from the recording gage.
[RECORDING GAGE] (39-45-07N/105-39-41W)
THIS IS THE RECOMMENDED SAMPLING POINT FOR CC25.

CC26 Travel east from Georgetown and exit at Lawson. Travel frontage road through Lawson and go under 1/70 overpass. Immediately to your left is a parking area. Sample creek at gage and USGS sampling station by bridge. [RECORDING GAGE] (39-45-57N/105-37-32W)

CC30 From 1-70 (either direction) Exit 238 (Fall River Road/St. Mary's Glacier) Approx. 100 yards up Fall River Road, there is a small turnout on right by a wooden support wall. Cross road and sample creek at staff gage. [STAFF GAGE] (39-45-23N/105-33-20W)

CC34 From I-70 (either direction) Exit 240 (Mt. Evans). Pull of in the small parking area on the other side of the bridge. Sample the mainstem of Clear Creek across from the Forest Service building (upstream of Chicago Creek) from the pedestrian bridge. (39-44-26N/105-31-17W)

CC35 From 1-70 (either direction) Exit 240 (Chicago Creek)
Continue approx. 3.7 miles on Hwy 103.
Pull off on right shoulder just past green roofed house that looks like a barn. (on the left) Cross road and sample creek at recording gage. [RECORDING GAGE] (39-42-58N/105-34-15W)

CC40 Travelling eastbound on I-70 take US 6 exit. Pull off in parking area just east of the off ramp. (Kermit's Restaurant is across the road) Sample approx. 100 yards east of stop sign below recording gage.
[RECORDING GAGE] (39-44-47N/105-26-08W)

CC44 From the Black Hawk intersection travel westbound approx 1 mile on Hwy 119. There is a small wooden house and parking area on the left side of the road. This is the Black Hawk water intake. Walk approx. 100 feet upstream and sample at staff gage. [STAFF GAGE] (39-44-56N/105-23-57W)

CC50 Travel Hwy 119 eastbound toward US 6. Approximately 6.7 miles downstream of the Black Hawk/Central City WWTP and ¼ mile upstream from intersection is a pullout area to the right immediately before the junction. Sample at the recording gage.
[RECORDING GAGE] (39-44-56N/105-23-57W)

CC52 Exit I-70 eastbound at Beaver Brook/Floyd Hill (Exit #247). Turn Left to north frontage road (US Hwy 40). Travel east approx. 2.4 miles. Pull off to the side of road and sample Beaver Brook at this point. (39-43-7N/105-22-44W)

CC53 Continue travelling east bound 0.3 miles and cross second white bridge. Exit immediately on the right to Soda Creek Drive. Park on right. Sample Soda Creek upstream of bridge. (39-42-50N/105-21-42W)

CC54 Exit I-70 eastbound at Beaver Brook/Floyd Hill (Exit # 247). Turn left to north frontage road (US Hwy. 40). Travel east approx. 2.4 miles. Pull off to left side before first white bridge. Walk down hill on north side of road and sample Beaver Brook at this point. Continue travelling east bound 0.3 miles and cross second white bridge. Exit immediately on the right to Soda Creek Drive. Park on right. Sample Soda Creek upstream of bridge. *These sites originally numbered 52 and 53 but were combined at a single site (CC54) starting May 1999 and sampled through 2000. It has been abandoned for 2001.* Beaver Brook (39-41-34N/105-26-18W)
Soda Creek Junction (39-41-33N/105-26-19W)

CC55 Mainstem of Clear Creek east bound past tunnel 2 and past bridge. Pull off to right at mile marker 267. Go down "path" CAREFULLY. Sample at this point. THIS SAMPLE POINT ABANDONED IN 1999.

CC60 Approximately 1 mile west of intersection of Hwy. 58 and US 6. Park in pullout on south side of highway and walk down (or drive) downhill to Church Ditch diversion structure. Go across bridge on structure and sample from mainstem of Clear Creek. Do not sample from Church Ditch. (39-45-11N/105-14-40W)

APPENDIX C

Sampling Results, included are:

Clear Creek

Wastewater Treatment Plants

Canals

- Clear Creek
- Mid-way to Standley Lake
- Intake to Standley Lake

Standley Lake

- photic zone composite
- 10 feet from the bottom
- photic zone composite split sample results

Clear Creek Sampling Data for 02/03/03

Sample Site	Sample Location	Date	Time	Temp (C)	pH	Cond. (uS/cm)	Turb (NTU)	Diss. P (mg/L)	TP (mg/L)	TSS (mg/L)	VSS (mg/L)	NH3 (mg/L)	NO3/NO2 (mg/L)	TN (mg/L)	Comments
CC 05	Mainstem at Bakerville	2/3/2003	1030	0.2	8.60	156	0.8	<0.0025	<0.0025	3	2	<0.01	0.37	0.42	
CC09	Leavenworth Creek	2/3/2003	1000	0.4	9.30	55	0.1	<0.0025	<0.0025	1	<1	<0.01	0.09	0.10	
CC 10	Confluent of S. Fork & Leavenworth Ck	2/3/2003	1010	0.8	8.90	72	0.1	<0.0025	<0.0025	1	2	<0.01	0.10	0.13	
CC 15	Westfork below Berthoud	2/3/2003	1015	0.0	6.74	616	2.5	0.0041	0.0202	1	1	0.04	0.81	0.91	frozen
CC 20	Westfork below Lyon Creek & Empire	2/3/2003	1035	0.0	7.27	336	2.7	0.0034	0.0075	3	2	<0.01	0.50	0.55	
CC 25	Mainstem above Westfork	2/3/2003	1050	1.3	7.62	235	1.4	0.0254	0.0341	3	3	0.03	0.48	0.64	
CC 26	Lawson gage on mainstem	2/3/2003	1053	0.2	8.50	156	0.7	0.0049	0.0092	4	4	0.02	0.45	0.54	
CC 30	Fall River	2/3/2003	1124	0.1	7.81	130	1.1	0.0073	0.0109	4	4	<0.01	0.34	0.40	frozen
CC 34	Mainstem above Chicago Creek	2/3/2003	1114	0.2	8.50	173	5.0	n/m	n/m	n/m	n/m	n/m	n/m	n/m	metals only
CC 35	Chicago Creek	2/3/2003	1126	0.5	8.80	45	0.4	0.0058	0.0063	4.00	4.00	<0.01	0.13	0.22	
CC 40	Mainstem below Idaho Springs	2/3/2003	1143	0.1	8.02	376	3.0	0.0097	0.0256	3	4	0.01	0.43	0.57	
CC44	Northfork above Blackhawk WTP	2/3/2003	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	frozen
CC 45	Northfork above Black Hawk WWTP	2/3/2003	1229	1.0	7.13	3099	256.8	<0.0025	0.0543	166	36	0.11	0.16	0.72	
CC 50	Northfork right above confluence	2/3/2003	1251	3.3	7.41	902	27.3	0.0041	0.0233	9	5	0.08	1.23	1.78	
CC 52	Beaver Brook	2/3/2003	1154	0.4	8.40	284	0.3	<0.0025	0.0045	4	4	<0.01	0.49	0.56	
CC 53	Soda Creek	2/3/2003	1211	0.2	8.20	300	0.9	0.0034	0.0073	2	2	<0.01	0.30	0.38	
CC 60	Mainstem at Church Headgate	2/3/2003	1319	0.0	7.92	406	5.7	0.0257	0.0341	6	3	0.01	0.41	0.58	
CC 1a	Loveland WWTP	2/3/2003	0815	8.8	7.23	1157	2.8	1.488	1.756	16	13	0.10	34.30	36.40	
CC 3a	Georgetown Outfall	2/3/2003	0827	6.8	7.27	442	2.4	1.268	1.383	7	6	14.44	0.01	16.80	
CC 5a	Empire WWTP	2/3/2003	0830	6.8	6.90	404	1.5	0.0045	0.208	4	2	0.06	10.32	12.46	
CC 7a	CCCSD WWTP	2/3/2003	0740	6.3	7.14	1049	5.8	2.201	2.618	17	10	0.06	25.51	28.48	
CC 8a	St Marys WWTP	2/3/2003	0702	4.1	7.59	311	9.0	1.231	1.651	14	10	4.45	4.50	10.14	
CC 12a	Idaho Springs WWTP	2/3/2003	0811	9.9	7.04	417	10.3	1.243	1.644	22	19	0.89	2.53	4.74	
CC 13a	Black Hawk/Central City Effluent	2/3/2003	1222	14.7	7.02	856	2.6	0.053	0.218	6	7	0.07	6.63	8.03	
CC 14a	Henderson WWTP	2/3/2003	0830	10.1	6.67	475	7.7	0.366	0.465	14	12	l/e	l/e	l/e	
CC 15a	Eisenhower WWTP	2/3/2003	na	na	na	na	na	na	na	na	na	na	na	na	
T03-AS	Croke Canal at Clear Creek	2/6/2003	n/a	n/a	n/a	n/m	n/m	0.0069	0.0197	14	7	l/e	l/e	0.66	
T31-AS	Croke Canal at 64th	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	sample not collected
T04-AS	Croke Canal at Standley Lake	2/5/2003	n/a	n/a	n/a	n/m	n/m	<0.0025	0.0177	14	3	l/e	l/e	0.33	

Spike / Duplicate Sample Results

CCP73	CC-35	2/3/2003							0.0189					Spike TP - Northglenn results
CCD73	CC-35 Duplicate	2/3/2003							0.0051					Duplicate TP - Northglenn results
CCD73	CC-35 Duplicate	2/3/2003											0.21	Duplicate TN - Westminster results
CCN73	CC-35	2/3/2003											0.51	Spike TN - Westminster results

Outside Laboratory Results

CCNP73	CC-35	2/3/2003							0.017					Spike TP - Perkins Lab results
CCD73	CC-35 Duplicate	2/3/2003							0.008					Duplicate TP - Perkins Lab
CCD73	CC-35 Duplicate	2/3/2003											0.214	Duplicate TN - Perkins Lab
CCNP73	CC-35	2/3/2003											0.478	Spike TN - Perkins Lab results

le = lab error, nr = not required, is = insufficient sample

na = not applicable, nm = not measured, fe = field error

4/21/2004 h:\nuser\labs\clearcrk\2003cc.xls

Clear Creek Sampling Data for 04/1/03

Sample Site	Sample Location	Date	Time	Temp (C)	pH	Cond. (uS/cm)	Turb. (NTU)	Diss. P (mg/L)	TP (mg/L)	TSS (mg/L)	VSS (mg/L)	NH3 (mg/L)	NO3/NO2 (mg/L)	TN (mg/L)	Comments
CC 05	Mainstem at Bakerville	4/1/2003	0917	0.1	6.89	622	2.1	<0.0025	0.005	1	1	<0.01	0.51	0.61	Staff Gage unreadable
CC09	Leavenworth Creek	4/1/2003	1019	1.0	7.21	156	0.3	<0.0025	<0.0025	<1	1	<0.01	0.10	0.12	
CC 10	Confluent of S. Fork & Leavenworth Ck	4/1/2003	1029	3.1	7.45	136	0.1	<0.0025	<0.0025	<1	<1	<0.01	0.12	0.16	
CC 15	Westfork below Berthoud	4/1/2003	0925	2.3	7.50	788	0.31	0.0028	0.0147	<1	<1	0.05	0.57	0.66	
CC 20	Westfork below Lyon Creek & Empire	4/1/2003	0835	1.4	7.82	467	0.82	0.0031	0.0106	<1	<1	<0.01	0.49	0.55	
CC 25	Mainstem above Westfork	4/1/2003	0800	3.0	7.59	294	1.1	0.0065	0.0134	<1	<1	0.04	0.39	0.55	
CC 26	Lawson gage on Mainstem	4/1/2003	1100	3.8	7.65	376	1.8	0.0025	0.009	<1	<1	<0.01	0.39	0.54	Staff Gage 2.625
CC 30	Fall River	4/1/2003	0955	3.4	7.98	207	0.32	<0.0025	0.0043	<1	1	<0.01	0.54	0.62	Staff Gage 3.65 ft
CC 34	Mainstem above Chicago Creek	4/1/2003	1126	6.0	7.55	395	3.1	<0.0025	0.0092	I/e	I/e	0.02	0.50	0.75	
CC 35	Chicago Creek	4/1/2003	1144	1.2	7.54	127	2.2	<0.0025	0.0059	<1	1	<0.01	0.21	0.27	
CC 40	Mainstem below Idaho Springs	4/1/2003	1012	5.7	8.02	446	6.4	0.0027	0.015	9	3	0.01	0.56	0.72	
CC44	Northfork above Black Hawk-new	4/1/2003	1042	3.0	7.83	560	8.3	<0.0025	0.0073	14	4	<0.01	0.69	0.88	
CC 45	Northfork above Black Hawk-old	4/1/2003	1100	6.3	7.50	746	38.6	<0.0025	0.0073	45	9	0.03	0.76	0.94	
CC 50	Northfork right above confluence	4/1/2003	1120	9.3	7.85	740	14.5	<0.0025	0.0099	12	2	<0.01	1.04	1.22	
CC 52	Beaver Brook	4/1/2003	1213	3.9	7.43	578	13.5	0.0033	0.0106	6	2	<0.01	1.10	1.37	
CC 53	Soda Creek	4/1/2003	1230	5.5	7.56	445	126.3	0.0045	0.0247	100	19	<0.01	0.24	0.56	
CC 60	Mainstem at Church Headgate	4/1/2003	1147	8.3	8.03	506	9.1	0.0038	0.0164	11	4	<0.01	1.45	1.77	
CC 1a	Loveland WWTP	4/1/2003	0820	4.2	7.23	1427	4.22	2.408	2.916	10	8	0.04	25.10	32.25	
CC 3a	Georgetown Outfall	4/1/2003	0830	6.3	6.89	382	8.25	0.401	0.603	14	14	4.40	0.08	6.85	
CC 5a	Empire WWTP	4/1/2003	0700	8.3	7.80	437	3.2	1.028	1.276	7	7	0.03	4.57	4.73	
CC 7a	CCCSD WWTP	4/1/2003	0805	7.1	6.64	1032	3.41	1.925	2.246	I/e	I/e	0.04	22.40	55.10	
CC 8a	St Marys WWTP	4/1/2003	0705	10.2	6.57	218	4.32	0.485	0.616	5	4	<0.01	6.40	6.52	
CC 12a	Idaho Springs WWTP	4/1/2003	0745	10.3	6.86	485	10.4	0.549	0.836	18	16	0.16	1.95	2.96	
CC 13a	Black Hawk/Central City Effluent	4/1/2003	0800	14.1	6.83	910	4.9	0.047	0.321	6	5	0.05	6.57	7.83	
CC 14a	Henderson WWTP	4/1/2003	0815	8.8	6.63	210	6.6	0.466	0.537	9	7	0.01	5.66	5.88	
CC 15a	Eisenhower WWTP	na	na	na	na	na	na	na	na	na	na	na	na	na	
T02-AS	Farmer's Highline Canal at Clear Creek	4/3/2003	n/a	n/a	n/a	n/m	n/m	0.0037	0.0292	25	5	<0.01	1.08	1.47	
T33-AS	Farmer's Highline Canal at 64th	4/3/2003	n/a	n/a	n/a	n/m	n/m	0.0048	0.0442	73	7	0.02	1.35	1.82	
T11-AS	Farmer's Highline at Standley Lake	4/3/2003	n/a	n/a	n/a	n/m	n/m	0.0067	0.0451	95	8	0.03	1.25	1.63	

Spike / Duplicate Sample Results

CCP-74	CC-44	4/1/2003							0.0247						Spike TP - Northglenn results
CCD-74	CC-44 Duplicate	4/1/2003							0.0134						Duplicate TP - Northglenn results
CCD-74	CC-44 Duplicate	4/1/2003												0.84	Duplicate TN - Westminster results
CCN-74	CC-44	4/1/2003												0.99	Spike TN - Westminster results

Outside Laboratory Results

CCNP74	CC-44	4/1/2003							0.024						Spike TP - Perkins Lab results
CCD-74	CC-44 Duplicate	4/1/2003							0.017						Duplicate TP - Perkins Lab
CCD-74	CC-44 Duplicate	4/1/2003												0.896	Duplicate TN - Perkins Lab
CCNP74	CC-44	4/1/2003												1.056	Spike TN - Perkins Lab results

le = lab error, nr = not required, is = insufficient sample

na = not applicable, nm = not measured, fe = field error

Clear Creek Sampling Data for 05/15/03

Sample Site	Sample Location	Date	Time	Temp (C)	pH	Cond. (uS/cm)	Turb. (NTU)	Diss. P (mg/L)	TP (mg/L)	TSS (mg/L)	VSS (mg/L)	NH3 (mg/L)	NO3/NO2 (mg/L)	TN (mg/L)	Comments
CC 05	Mainstem at Bakerville	5/15/2003	0820	1.5	8.04	140	5.3	<0.0025	0.0048	10	2	<0.01	0.20	0.34	Staff Gage 4.4
CC 09	Leavenworth Creek	5/15/2003	0845	1.7	7.80	60.7	1.8	0.0035	0.0099	6	4	<0.01	0.06	0.26	Staff Gage 3.9
CC 10	Confluent of S. Fork & Leavenworth Crk	5/15/2003	0905	2.9	7.81	116.1	1.1	0.0028	0.006	6	6	<0.01	0.11	0.23	
CC 15	Westfork below Berthoud	5/15/2003	0921	3.3	8.14	441	4.9	<0.0025	0.0099	5	3	0.04	0.49	0.62	Staff Gage 3.95
CC 20	Westfork below Lyon Creek & Empire	5/15/2003	0940	5.9	7.97	310	31.4	0.0026	0.0106	12	2	0.01	0.34	0.45	EPA field dup
CC 25	Mainstem above Westfork	5/15/2003	0952	9.5	8.04	328	5.5	0.0032	0.0101	10	6	0.02	0.17	0.37	Staff Gage 4.04
CC 26	Lawson gage on Mainstem	5/15/2003	0935	8.1	8.03	334	4.6	<0.0025	0.0134	20	8	0.01	0.24	0.42	
CC 30	Fall River	5/15/2003	1013	4.1	8.12	89	18.1	<0.0025	0.0091	13	4	0.03	0.15	0.41	Staff Gage 4.08
CC 34	Mainstem above Chicago Creek	5/15/2003	0952	8.0	7.96	302	5.7	<0.0025	0.0111	20	5	<0.01	0.23	0.49	*new site starting Feb 2003
CC 35	Chicago Creek	5/15/2003	1005	4.4	8.20	79.1	5.2	0.0028	0.0075	8	4	<0.01	0.04	0.25	
CC 40	Mainstem below Idaho Springs	5/15/2003	1034	7.6	7.76	282	36.8	0.0026	0.0108	53	10	0.01	0.23	0.68	Staff Gage 4.20
CC44	Northfork above Black Hawk-new	5/15/2003	1105	3.9	7.84	78	18.8	0.0041	0.0077	18	4	<0.01	0.04	0.22	Staff Gage missing
CC 45	Northfork above Black Hawk-old	5/15/2003	1119	4.5	7.63	136	29.3	0.0043	0.0109	25	5	0.01	0.07	0.35	
CC 50	Northfork right above confluence	5/15/2003	1135	6.1	7.54	192	41.7	0.0104	0.0254	34	8	<0.01	0.18	0.42	Staff Gage 4.48
CC 52	Beaver Brook	5/15/2003	1035	7.6	8.09	176	3.8	0.0063	0.0072	11	5	<0.01	0.12	0.30	
CC 53	Soda Creek	5/15/2003	1045	9.1	7.85	316	3.1	0.0032	0.0103	8	4	<0.01	0.49	0.68	
CC 60	Mainstem at Church Headgate	5/15/2003	1202	8.8	7.42	266	68	<0.0025	0.0201	88	22	<0.01	0.28	0.67	Note: Church ditch overflowing into CC from above
CC 1a	Loveland WWTP	5/15/2003	0800	7.7	6.74	1596	2.8	2.149	2.995	2	2	0.03	8.69	8.92	
CC 3a	Georgetown Outfall	5/15/2003	0753	11.6	6.66	413	4.5	0.154	0.531	12	10	3.74	0.18	6.08	
CC 5a	Empire WWTP	5/15/2003	0850	11.6	7.04	403	1.87	0.032	0.8	7	3	0.06	6.82	7.00	
CC 7a	CCCSD WWTP	5/15/2003	0836	8.9	6.88	1011	6.8	2.623	3.527	24	14	0.11	22.00	50.1	
CC 8a	St Marys WWTP	5/15/2003	0647	4.9	7.23	323	1.2	0.655	1.401	2	1	<0.01	3.97	4.05	
CC 12a	Idaho Springs WWTP	5/15/2003	0725	13.0	6.58	495	13.4	I/e	3.074	39	28	0.22	6.87	9.39	
CC 13a	Black Hawk/Central City Effluent	5/15/2003	0820	17.6	7.07	958	2.21	0.975	3.086	4	3	0.06	6.24	7.87	
CC 14a	Henderson WWTP	5/15/2003	0745	9.8	6.82	281	6.81	0.498	1.393	12	7	0.01	6.41	6.74	
CC 15a	Eisenhower WWTP	na	na	na	na	na	na	na	na	na	na	na	na	na	
T02-AS	Farmer's Highline Canal at Clear Creek	5/20/2003	na	na	na	n/m	n/m	0.006	0.0537	35	6	<0.01	0.22	0.43	
T33-AS	Farmer's Highline Canal at 64th	5/20/2003	na	na	na	n/m	n/m	0.0076	0.0681	46	8	0.02	0.24	0.56	
T11-AS	Farmer's Highline at Standley Lake	5/20/2003	na	na	na	n/m	n/m	0.0103	0.0937	83	8	<0.01	0.23	0.49	

Spike / Duplicate Sample Results

CC-P75	CC44	5/15/2003							0.0364						Spike TP - Northglenn results
CC-D75	CC44 Duplicate	5/15/2003							0.0194						Duplicate TP - Northglenn results
CC-D75	CC44 Duplicate	5/15/2003												0.31	Duplicate TN - Westminster results
CC-N75	CC44	5/15/2003												0.53	Spike TN - Westminster results

Outside Laboratory Results

CCNP75	CC44	5/15/2003							0.044						Spike TP - Perkins Lab results
CC-D75	CC44 Duplicate	5/15/2003							0.036						Duplicate TP - Perkins Lab
CC-D75	CC44 Duplicate	5/15/2003												0.392	Duplicate TN - Perkins Lab
CCNP75	CC44	5/15/2003												0.559	Spike TN - Perkins Lab results

le = lab error, nr = not required, is = insufficient sample
na = not applicable, nm = not measured, fe= field error

Clear Creek Sampling Data for 06/11/03

Sample Site	Sample Location	Date	Time	Temp (C)	pH	Cond. (uS/cm)	Turb. (NTU)	Diss. P (mg/L)	TP (mg/L)	TSS (mg/L)	VSS (mg/L)	NH3 (mg/L)	NO3/NO2 (mg/L)	TN (mg/L)	Comments
CC 05	Mainstem at Bakerville	6/11/2003	0911	2.7	7.84	79	5.3	<0.0025	0.0057	<1	<1	<0.01	0.21	0.35	
CC 09	Leavenworth Creek	6/11/2003	0941	3.8	7.88	55	3.1	<0.0025	0.0047	<1	<1	<0.01	0.10	0.22	
CC 10	Confluent of S. Fork & Leavenworth Crk.	6/11/2003	0950	6.3	7.66	69	7.2	<0.0025	0.005	<1	<1	<0.01	0.10	0.26	
CC 15	Westfork below Berthoud	6/11/2003	0909	4.8	8.00	119	1.6	<0.0025	0.0054	<1	<1	0.01	0.21	0.30	
CC 20	Westfork below Lyon Creek & Empire	6/11/2003	0847	5.4	8.51	103	2.91	0.0034	0.0071	<1	<1	0.01	0.20	0.29	
CC 25	Mainstem above Westfork	6/11/2003	0827	7.1	8.13	89	4.13	0.0029	0.0069	l/e	l/e	<0.01	0.17	0.29	
CC 26	Lawson gage on Mainstem	6/11/2003	1017	7.0	7.68	96	11.2	<0.0025	0.0073	<1	<1	<0.01	0.18	0.29	
CC 30	Fall River	6/11/2003	0932	6.3	8.12	43	2.05	0.0041	0.0078	1	<1	<0.01	0.14	0.25	
CC34	Mainstem above Chicago Creek	6/11/2003	1031	7.6	7.63	92	11	<0.0025	0.0084	<1	<1	<0.01	0.18	0.43	
CC35	Chicago Creek	6/11/2003	1043	6.8	7.77	47	4.4	0.0035	0.0076	1	<1	<0.01	0.10	0.33	
CC 40	Mainstem below Idaho Springs	6/11/2003	0945	7.6	8.20	94	4.5	0.0041	0.0095	<1	<1	<0.01	0.17	0.30	
CC44	Northfork above Black Hawk-new	6/11/2003	1007	6.3	7.69	48	1.03	0.0041	0.0061	<1	<1	<0.01	0.02	0.12	
CC 45	Northfork above Black Hawk-old	6/11/2003	1017	7.3	8.03	91	1.23	0.0036	0.0066	<1	<1	0.02	0.04	0.19	
CC 50	Northfork right above confluence	6/11/2003	1040	9.7	8.22	122	3.29	0.0152	0.0236	<1	<1	<0.01	0.08	0.19	
CC 52	Beaver Brook	6/11/2003	1108	12.3	7.62	206	16.7	0.0026	0.0113	3	<1	0.03	0.14	0.63	
CC 53	Soda Creek	6/11/2003	1119	14.0	7.63	348	5.2	0.0058	0.0142	1	<1	<0.01	0.25	0.43	
CC 60	Mainstem at Church Headgate	6/11/2003	1103	11.0	8.28	104	7.89	0.0041	0.0109	7	<1	<0.01	0.17	0.31	
CC 1a	Loveland WWTP	6/11/2003	0800	7.3	6.96	1535	2.19	1.616	3.12	3	2	0.02	8.39	8.90	
CC 3a	Georgetown Outfall	6/11/2003	0844	8.7	6.89	336	7.97	0.052	0.296	2	2	0.90	1.35	3.23	
CC 5a	Empire WWTP	6/11/2003	fe	fe	fe	fe	fe	fe	fe	fe	fe	fe	fe	fe	No show-sampler car trouble
CC 7a	CCCSD WWTP	6/11/2003	0845	14.1	6.65	885	12.7	2.693	4.228	10	3	0.77	14.10	36.26	
CC 8a	St Marys WWTP	6/11/2003	0715	5.8	7.10	164	2.43	0.02	0.108	3	<1	<0.01	1.36	1.43	
CC 12a	Idaho Springs WWTP	6/11/2003	0830	14.0	6.72	472	6.46	0.285	0.569	22	10	0.12	3.96	4.90	
CC 13a	Black Hawk/Central City Effluent	6/11/2003	0800	20.5	7.04	873	2.08	3.306	3.482	2	<1	0.05	5.47	6.70	
CC 14a	Henderson WWTP	6/11/2003	0820	11.7	8.00	433	5.31	0.293	0.926	1	<1	<0.01	3.38	3.37	
CC 15a	Eisenhower WWTP	6/11/2003	na	na	na	na	na	na	na	na	na	na	na	na	
T02-AS	Farmer's Highline Canal at Clear Creek	6/12/2003	na	na	na	n/m	n/m	0.0054	0.0138	1	<1	<0.01	0.18	0.30	
T33-AS	Farmer's Highline Canal at 64th	6/12/2003	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	sample not collected
T11-AS	Farmer's Highline at Standley Lake	6/12/2003	na	na	na	n/m	n/m	0.009	0.0152	l/e	l/e	<0.01	0.18	0.29	

Spike / Duplicate Sample Results

CC-P76	CC5	6/11/2003							0.0199						Spike TP - Northglenn results
CC-D76	CC5 Duplicate	6/11/2003							0.0064						Duplicate TP - Northglenn results
CC-D76	CC5 Duplicate	6/11/2003												0.33	Duplicate TN - Westminster results
CC-N76	CC5	6/11/2003												0.55	Spike TN - Westminster results

Outside Laboratory Results

CCNP76	CC5	6/11/2003							0.019						Spike TP - Perkins Lab results
CC-D76	CC5 Duplicate	6/11/2003							0.006						Duplicate TP - Perkins Lab
CC-D76	CC5 Duplicate	6/11/2003												0.300	Duplicate TN - Perkins Lab
CCNP76	CC5	6/11/2003												0.527	Spike TN - Perkins Lab results

le = lab error, nr = not required, is = insufficient sample

na = not applicable, nm= not measured, fe = field error

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Clear Creek Sampling Data for 07/14/03

Sample Site	Sample Location	Date	Time	Temp (C)	pH	Cond. (uS/cm)	Turb. (NTU)	Diss. P (mg/L)	TP (mg/L)	TSS (mg/L)	VSS (mg/L)	NH3 (mg/L)	NO3/NO2 (mg/L)	TN (mg/L)	Comments
CC 05	Mainstem at Bakerville	7/14/2003	0935	5.90	7.94	83.5	0.74	<0.0025	<0.0025	<1	<1	<0.01	0.18	0.24	
CC 09	Leavenworth Creek	7/14/2003	1000	7.50	8.01	72.8	0.74	<0.0025	<0.0025	<1	<1	<0.01	0.05	0.11	
CC 10	Confluent of S. Fork & Leavenworth Crk	7/14/2003	1015	9.90	8.21	82.1	0.67	<0.0025	0.0028	<1	<1	0.01	0.09	0.18	
CC 15	Westfork below Berthoud	7/14/2003	0929	8.25	8.49	138.0	4.2	<0.0025	0.0032	<1	<1	0.02	0.22	0.39	
CC 20	Westfork below Lyon Creek & Empire	7/14/2003	0950	9.14	8.19	111.0	6.3	0.0026	0.0053	<1	<1	0.01	0.19	0.24	
CC 25	Mainstem above Westfork	7/14/2003	1001	12.32	8.03	95.0	2	<0.0025	0.0056	1	1	0.02	0.11	0.22	
CC 26	Lawson gage on Mainstem	7/14/2003	1045	11.70	8.20	105.1	0.61	<0.0025	0.0095	1	1	0.02	0.13	0.34	
CC 30	Fall River	7/14/2003	1020	11.23	7.94	38.0	5.2	0.0047	0.0065	1	<1	<0.01	0.10	0.19	
CC34	Mainstem above Chicago Creek	7/14/2003	1100	12.00	8.22	101.6	0.85	<0.0025	0.0051	2	<1	0.01	0.12	0.27	
CC 35	Chicago Creek	7/14/2003	1110	11.20	8.05	56.8	1.16	<0.0025	0.0058	2	1	<0.01	0.07	0.19	
CC 40	Mainstem below Idaho Springs	7/14/2003	1044	11.93	7.88	99.0	2.2	<0.0025	0.0070	2	2	<0.01	0.11	0.21	
CC44	North Fork above Black Hawk-new	7/14/2003	1111	12.26	7.62	60.0	6.5	0.0025	0.0067	2	1	<0.01	0.01	0.07	
CC 45	Northfork above Black Hawk-old	7/14/2003	1129	13.68	7.39	191.0	8.6	<0.0025	0.0065	9	1	0.02	0.02	0.10	
CC 50	Northfork right above confluence	7/14/2003	1150	17.12	7.45	266.0	6.1	0.0074	0.0189	4	2	0.01	0.11	0.23	
CC 52	Beaver Brook	7/14/2003	1135	15.00	8.25	609.0	6.87	0.0059	0.0095	7	1	0.02	0.58	0.82	
CC 53	Soda Creek	7/14/2003	1150	15.30	8.26	637.0	1.66	0.0076	0.0130	1	1	0.02	0.26	0.39	
CC 60	Mainstem at Church Headgate	7/14/2003	1221	15.11	7.57	114.0	3.8	0.0025	0.0063	<1	<1	<0.01	0.07	0.19	
CC 1a	Loveland WWTP	7/14/2003	f/e	10.10	6.91	f/e	52.5	0.2740	0.4000	44	36	0.79	0.01	3.41	
CC 3a	Georgetown Outfall	7/14/2003	f/e	13.30	6.78	f/e	5.4	0.0860	0.2190	10	9	2.97	0.03	4.97	
CC 5a	Empire WWTP	7/14/2003	0800	15.70	7.00	453	1.34	0.0860	0.3050	7	4	0.35	7.35	7.41	
CC 7a	CCCSD WWTP	7/14/2003	f/e	15.60	6.69	f/e	6.27	3.0180	4.2050	13	3	0.12	10.7	11.97	
CC 8a	St Marys WWTP	7/14/2003	f/e	9.60	6.66	f/e	2.68	<0.0025	0.0880	3	3	1.01	1.53	3.01	
CC 12a	Idaho Springs WWTP	7/14/2003	f/e	19.00	6.72	f/e	7.38	0.2430	0.4560	2	2	0.73	0.87	2.76	
CC 13a	Black Hawk/Central City Effluent	7/14/2003	0700	22.80	6.91	833	0.77	0.4080	0.5490	1	1	0.04	6.72	7.71	
CC 14a	Henderson WWTP	7/14/2003	800.0	12.50	7.12	401	5.84	0.2430	0.2930	7	4	<0.01	2.14	2.14	
CC 15a	Eisenhower WWTP	na	na	na	na	na	na	na	na	na	na	na	na	na	
T02-AS	Farmer's Highline Canal at Clear Creek	7/17/2003	n/a	n/a	n/a	n/m	n/m	0.0032	0.0179	6	3	<0.01	0.07	0.34	
T33-AS	Farmer's Highline Canal at 64th	7/17/2003	n/a	n/a	n/a	n/m	n/m	0.0032	0.0088	4	2	<0.01	0.10	0.30	
T11-AS	Farmer's Highline at Standley Lake	7/17/2003	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	sample not collected

Spike / Duplicate Sample Results

CC-P77	CC-34	7/14/2003							0.0183						Spike TP - Northglenn results
CC-D77	CC34 Duplicate	7/14/2003							0.0086						Duplicate TP - Northglenn results
CC-D77	CC34 Duplicate	7/14/2003												0.17	Duplicate TN - Westminster results
CC-N77	CC-34	7/14/2003												0.41	Spike TN - Westminster results

Outside Laboratory Results

CCNP77	CC-34	7/14/2003							0.0190						Spike TP - Perkins Lab results
CC-D77	CC34 Duplicate	7/14/2003							0.0110						Duplicate TP - Perkins Lab
CC-D77	CC34 Duplicate	7/14/2003												0.240	Duplicate TN - Perkins Lab
CCNP77	CC-34	7/14/2003												0.425	Spike TN - Perkins Lab results

le = lab error, nr = not required, is = insufficient sample

na = not applicable, nm = not measured, fe = field error

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Clear Creek Sampling Data for 08/12/03

Sample Site	Sample Location	Date	Time	Temp (C)	pH	Cond. (uS/cm)	Turb. (NTU)	Diss. P (mg/L)	TP (mg/L)	TSS (mg/L)	VSS (mg/L)	NH3 (mg/L)	NO3/NO2 (mg/L)	TN (mg/L)	Comments
CC 05	Mainstem at Bakerville	8/12/2003	0928	7.82	7.78	112	0.7	<0.0025	0.0044	1	1	<0.01	0.23	0.29	
CC 09	Leavenworth Creek	8/12/2003	0953	8.74	7.88	89	0.9	<0.0025	0.0032	<1	<1	<0.01	0.07	0.13	
CC 10	Confluent of S. Fork & Leavenworth Crk.	8/12/2003	1000	11.01	7.81	92	0.9	<0.0025	0.0066	2	2	<0.01	0.14	0.20	
CC 15	Westfork below Berthoud	8/12/2003	0918	10.60	7.30	246	0.42	0.0031	0.0078	<1	<1	0.03	0.39	0.47	
CC 20	Westfork below Lyon Creek & Empire	8/12/2003	0854	11.30	7.60	173	0.54	0.0033	0.0075	1	1	0.01	0.27	0.34	
CC 25	Mainstem above Westfork	8/12/2003	0836	15.00	6.79	135	1.49	0.0026	0.0112	1	1	0.02	0.15	0.32	
CC 26	Lawson gage on Mainstem	8/12/2003	1031	13.50	7.85	149	1.7	0.0028	0.0099	2	2	0.01	0.20	0.30	
CC 30	Fall River	8/12/2003	0939	11.80	7.11	36	0.95	0.0039	0.0075	2	2	<0.01	0.07	0.21	
CC34	Mainstem above Chicago Creek	8/12/2003	1059	14.19	7.80	129	2.7	<0.0025	0.0080	2	1	0.01	0.18	0.30	
CC 35	Chicago Creek	8/12/2003	1059	11.72	7.90	64	1.6	0.0056	0.0092	2	2	<0.01	0.08	0.19	
CC 40	Mainstem below Idaho Springs	8/12/2003	0954	15.80	7.04	142	2.71	0.0031	0.0112	8	3	0.01	0.19	0.33	
CC 44	Northfork above Black Hawk-new	8/12/2003	1020	14.50	7.28	84	0.61	0.0026	0.0041	1	<1	0.02	0.02	0.15	
CC 45	Northfork above Black Hawk-old	8/12/2003	1035	15.60	7.20	284	95.4	0.0045	0.0116	101	17	0.02	0.04	0.19	
CC 50	Northfork right above confluence	8/12/2003	1054	20.20	7.16	363	6.04	0.0038	0.0250	7	3	0.01	0.60	0.78	
CC 52	Beaver Brook	8/12/2003	1123	15.02	7.77	567	2.1	0.0042	0.0095	<1	<1	0.01	0.36	0.50	
CC 53	Soda Creek	8/12/2003	1136	15.99	7.79	581	1.5	0.0094	0.0218	2	2	0.01	0.17	0.30	
CC 60	Mainstem at Church Headgate	8/12/2003	1120	18.80	7.14	154	61.7	0.0082	0.0322	41	7	0.02	0.26	0.44	
CC 1a	Loveland WWTP	8/12/2003	0615	13.70	7.47	1997	3.41	0.978	1.2170	6	6	0.05	19.52	21.40	
CC 3a	Georgetown Outfall	8/12/2003	0800	15.30	6.91	298	2.91	0.293	0.4610	5	5	4.95	0.02	5.80	
CC 5a	Empire WWTP	8/12/2003	0850	16.50	7.70	475	4.83	0.493	1.3180	12	6	0.16	8.91	9.39	
CC 7a	CCCSD WWTP	8/12/2003	0816	19.00	6.64	938	4.72	2.504	3.5100	10	7	0.03	27.88	28.00	
CC8a	St Marys WWTP	8/12/2003	0703	11.50	6.95	305	3.06	0.276	0.3790	5	4	1.28	1.81	3.48	
CC 12a	Idaho Springs WWTP	8/12/2003	0755	19.10	6.49	327	6.04	1.433	1.6750	10	8	0.35	0.45	1.74	
CC 13a	Black Hawk/Central City Effluent	8/12/2003	0800	22.30	6.87	777	3.21	1.605	2.3630	6	6	0.13	7.46	9.05	
CC 14a	Henderson WWTP	8/12/2003	0850	13.40	7.34	377	5.14	0.457	0.5090	9	6	0.01	4.77	4.8	
CC 15a	Eisenhower WWTP	8/12/2003	na	na	na	na	na	na	na	na	na	na	na	na	
T02-AS	Farmer's Highline Canal at Clear Creek	8/15/2003	na	na	na	n/m	n/m	0.0032	0.0164	6	2	<0.01	0.19	0.34	
T33-AS	Farmer's Highline Canal at 64th	8/15/2003	na	na	na	n/m	n/m	0.0045	0.0223	8	3	0.02	0.20	0.37	
T11-AS	Farmer's Highline at Standley Lake	8/15/2003	na	na	na	n/m	n/m	0.0301	0.0985	25	4	0.07	0.20	0.77	

Spike/Duplicate Sample Results

CC-P78	CC-15	8/12/2003							0.0159						Spike TP - Northglenn results
CC-D78	CC-15 Duplicate	8/12/2003							0.0058						Duplicate TP - Northglenn results
CC-D78	CC-15 Duplicate	8/12/2003												0.51	Duplicate TN - Westminster results
CC-N70	CC-15	8/12/2003												0.77	Spike TN - Westminster results

Outside Laboratory Results

CCNP78	CC-15	8/12/2003							0.0130						Spike TP - Perkins Lab results
CC-D78	CC-15 Duplicate	8/12/2003							no value						Duplicate TP - Perkins Lab
CC-D78	CC-15 Duplicate	8/12/2003												0.454	Duplicate TN - Perkins Lab
CCNP78	CC-15	8/12/2003												0.737	Spike TN - Perkins Lab results

le = lab error, nr = not required, i.s. = insufficient sample

na = not applicable, nm = not measured, fe = field error n/s no sample collected

Clear Creek Sampling Data for 10/08/03

Sample Site	Sample Location	Date	Time	Temp (C)	pH	Cond. (uS/cm)	Turb. (NTU)	Diss. P (mg/L)	TP (mg/L)	TSS (mg/L)	VSS (mg/L)	NH3 (mg/L)	NO3/NO2 (mg/L)	TN (mg/L)	Comments
CC 05	Mainstem at Bakerville	10/8/2003	1005	3.4	7.30	159.0	0.87	0.0029	<0.0025	<1	2	<0.01	0.31	0.35	
CC 09	Leavenworth Creek	10/8/2003	1030	3.5	6.90	121.6	0.41	0.0027	<0.0025	<1	<1	<0.01	0.09	0.15	
CC 10	Confluent of S. Fork & Leavenworth Crk.	10/8/2003	1040	3.6	7.20	112.5	0.76	0.0034	0.006	<1	2	<0.01	0.14	0.24	
CC 15	Westfork below Berthoud	10/8/2003	0920	4.6	7.49	337.0	0.4	0.0027	0.0046	30	<1	0.03	0.58	0.67	
CC 20	Westfork below Lyon Creek & Empire	10/8/2003	0945	5.5	7.68	220.0	2.1	0.0044	0.0086	7	2	<0.01	0.35	0.42	
CC 25	Mainstem above Westfork	10/8/2003	0957	7.2	7.95	149.0	1.7	0.0055	0.0074	5	2	0.01	0.20	0.28	
CC 26	Lawson gage on Mainstem	10/8/2003	1115	3.3	7.60	187.0	0.98	0.0048	0.0058	2	2	<0.01	0.23	0.33	
CC 30	Fall River	10/8/2003	1020	6.1	7.72	48.0	2.2	0.0029	0.0062	2	1	<0.01	0.16	0.27	
CC34	Mainstem above Chicago Creek	10/8/2003	1130	3.0	7.50	177.1	1.46	0.0039	0.0055	2	1	<0.01	0.22	0.30	
CC 35	Chicago Creek	10/8/2003	1149	5.4	6.80	65.2	0.76	0.0034	0.0574	1	<1	<0.01	0.10	0.20	
CC 40	Mainstem below Idaho Springs	10/8/2003	1036	7.0	7.84	185.0	2	0.0036	0.005	3	<1	<0.01	0.21	0.30	
CC44	Northfork above Black Hawk-new	10/8/2003	1144	7.9	7.76	105.0	0.8	0.0029	0.0034	1	1	<0.01	<0.01	0.05	
CC 45	Northfork above Black Hawk-old	10/8/2003	1158	9.7	6.94	426.0	72.3	0.0044	0.0106	81	8	0.02	0.03	0.13	
CC 50	Northfork right above confluence	10/8/2003	1218	12.3	8.21	497.0	20.1	0.0055	0.0241	13	3	<0.01	0.26	0.45	
CC 52	Beaver Brook	10/8/2003	1210	8.3	7.70	620.0	0.99	0.0029	0.0067	4	1	<0.01	0.31	0.42	
CC 53	Soda Creek	10/8/2003	1220	10.4	7.20	590.0	1.01	0.0067	0.0383	2	1	<0.01	0.14	0.28	
CC 60	Mainstem at Church Headgate	10/8/2003	1246	10.0	8.08	206.0	4.5	0.0046	0.0099	2	<1	<0.01	0.17	0.28	
CC 1a	Loveland WWTP	10/8/2003	se	se	se	se	se	se	se	se	se	se	se	se	
CC 3a	Georgetown Outfall	10/8/2003	se	se	se	se	se	se	se	se	se	se	se	se	
CC 5a	Empire WWTP	10/8/2003	f/e	18.5	6.95	477.0	1.5	0.8	1.402	4	2	0.22	7.66	8.31	
CC 7a	CCCSD WWTP	10/8/2003	se	se	se	se	se	se	se	se	se	se	se	se	
CC8a	St Marys WWTP	10/8/2003	se	se	se	se	se	se	se	se	se	se	se	se	
CC 12a	Idaho Springs WWTP	10/8/2003	se	se	se	se	se	se	se	se	se	se	se	se	
CC 13a	Black Hawk/Central City Effluent	10/8/2003	f/e	20.1	7.20	774.0	2.8	0.256	0.432	2	3	0.06	4.02	5.13	
CC 14a	Henderson WWTP	10/8/2003	f/e	13.9	6.95	398.0	3.1	0.969	0.985	3	2	0.02	10	10.4	
CC 15a	Eisenhower WWTP	na	na	na	na	na	na	na	na	na	na	na	na	na	
T02-AS	Farmer's Highline Canal at Clear Creek	10/15/2003	na	na	na	n/m	n/m	0.0027	0.0176	<1	<1	0.02	0.24	0.51	
T33-AS	Farmer's Highline Canal at 64th	10/15/2003	na	na	na	na	na	na	na	na	na	na	na	na	sample not collected
T11-AS	Farmer's Highline at Standley Lake	10/15/2003	na	na	na	n/m	n/m	0.0027	0.058	39	1	0.01	0.15	0.37	

Spike / Duplicate Sample Results

CC-P79	CC-60	10/8/2003							0.0234						Spike TP - Northglenn results
CC-D79	CC- Duplicate	10/8/2003							0.0161						Duplicate TP - Northglenn results
CC-D79	CC- Duplicate	10/8/2003												0.28	Duplicate TN - Westminster results
CC-N79	CC-60	10/8/2003												0.46	Spike TN - Westminster results

Outside Laboratory Results

CCNP79	CC-60	10/8/2003							0.026						Spike TP - Chadwick Lab results
CC-D79	CC- Duplicate	10/8/2003							0.005						Duplicate TP - Chadwick Lab
CC-D79	CC- Duplicate	10/8/2003												0.265	Duplicate TN - Chadwick Lab
CCNP79	CC-60	10/8/2003												0.737	Spike TN - Chadwick Lab results

le = lab error, nr = not required, i.s. = insufficient sample

na = not applicable, nm = not measured, fe = field error se = sampling error

Clear Creek Sampling Data for 12/04/03

Sample Site	Sample Location	Date	Time	Temp (C)	pH	Cond. (uS/cm)	Turb. (NTU)	Diss. P (mg/L)	TP (mg/L)	TSS (mg/L)	VSS (mg/L)	NH3 (mg/L)	NO3/NO2 (mg/L)	TN (mg/L)	Comments
CC 05	Mainstem at Bakerville	12/4/2003	0904	0.05	7.52	160	0.5	<0.0025	<0.0025	<1	<1	<0.01	0.42	0.46	
CC 09	Leavenworth Creek	12/4/2003	0935	0.34	7.57	139	<1	<0.0025	<0.0025	<1	<1	<0.01	0.15	0.18	
CC 10	Confluent of S. Fork & Leavenworth Crk.	12/4/2003	0947	1.92	7.94	125	0.3	<0.0025	<0.0025	2	1	<0.01	0.17	0.2	
CC 15	Westfork below Berthoud	12/4/2003	0934	0.8	8.08	290	0.66	0.0029	0.0060	<1	<1	0.04	0.7	0.81	
CC 20	Westfork below Lyon Creek & Empire	12/4/2003	0952	0.5	8.01	192	1.4	0.0027	0.0060	1	<1	0.01	0.49	0.58	
CC 25	Mainstem above Westfork	12/4/2003	0838	1.28	7.55	196	0.2	0.0161	0.0198	2	2	0.02	0.36	0.47	
CC 26	Lawson gage on Mainstem	12/4/2003	1001	0.5	7.91	147	1.14	0.0063	0.0107	4	3	0.02	0.42	0.51	
CC 30	Fall River	12/4/2003	1011	0.5	8.06	65	0.18	<0.0025	0.0035	<1	<1	<0.01	0.27	0.31	
CC34	Mainstem above Chicago Creek	12/4/2003	1021	0.03	7.68	278	1.2	0.0036	0.0078	<1	<1	0.01	0.44	0.51	
CC 35	Chicago Creek	12/4/2003	1040	0.21	7.61	73	0.9	<0.0025	0.0077	5	2	<0.01	0.15	0.22	
CC 40	Mainstem below Idaho Springs	12/4/2003	1029	0.2	7.75	61	0.17	0.0036	0.0079	<1	<1	0.01	0.41	0.49	
CC 44	Northfork above Black Hawk-new	12/4/2003	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	frozen
CC45	Northfork Above Blackhawk-old	12/4/2003	1101	1.1	7.56	289	29.1	<0.0025	<0.0025	19	7	0.04	0.07	0.23	
CC 50	Northfork right above confluence	12/4/2003	1119	1.9	7.29	319	6.88	<0.0025	0.0051	<1	<1	0.01	0.44	0.59	
CC52	Beaver Brook	12/4/2003	1114	0.04	7.88	611	0.6	<0.0025	0.0025	3	2	<0.01	0.54	0.62	
CC53	Soda Creek	12/4/2003	1127	1.6	7.93	611	1.5	0.0048	0.0072	<1	<1	<0.01	0.42	0.53	
CC 60	Mainstem at Church Headgate	12/4/2003	1150	0.1	7.54	171	1.56	0.0046	0.0088	13	4	0.01	0.41	0.59	
CC 1a	Loveland WWTP	12/4/2003	0745	10	7.81	1087	11.1	1.288	1.488	5	5	0.04	31.9	34.5	
CC 3a	Georgetown Outfall	12/4/2003	0830	6	6.94	328	6.48	I/e	0.920	4	3	6.60	0.93	8.65	
CC 5a	Empire WWTP	12/4/2003	0830	9.2	8.60	501	1.01	0.543	0.656	2	2	0.07	13	13.3	
CC 7a	CCCSD WWTP	12/4/2003	0831	6.8	6.89	966	5.47	1.612	2.898	27	10	0.19	17	23.84	
CC8a	StMarys WWTP	12/4/2003	0747	7.2	6.92	288	4.93	0.077	0.267	6	4	0.81	4.04	5.83	
CC 12a	Idaho Springs WWTP	12/4/2003	0645	13.5	0007	0323	0009	0.335	0.691	11	<1	0.08	0.36	1.89	
CC 13a	Black Hawk/Central City Effluent	12/4/2003	0955	14.7	7.21	863	2.54	0.068	0.359	<1	<1	0.05	2.85	4.13	
CC 14a	Henderson WWTP	12/4/2003	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	
CC 15a	Eisenhower WWTP	na	na	na	na	na	na	na	na	na	na	na	na	na	
T03-AS	Croke Canal at Clear Creek	12/10/2003	na	na	na	n/m	n/m	0.0048	0.0179	n/s	n/s	0.02	0.4	0.58	
T31-AS	Croke Canal at 64th	12/10/2003	na	na	na	n/m	n/m	0.0056	0.0161	n/s	n/s	<0.01	0.47	0.59	
T04-AS	Croke Canal at Standley Lake	12/10/2003	na	na	na	n/m	n/m	0.0087	0.0354	n/s	n/s	0.01	0.43	0.71	

Spike / Duplicate Sample Results

CC-P80	CC-30	12/4/2003							0.0133						Spike TP - Northglenn results
CC-D80	CC-30 Duplicate	12/4/2003							0.0035						Duplicate TP - Northglenn results
CC-D80	CC-30 Duplicate	12/4/2003												0.41	Duplicate TN - Westminster results
CC-N80	CC-30	12/4/2003												0.56	Spike TN - Westminster results

Outside Laboratory Results

CCNP80	CC-30	12/4/2003							0.012						Spike TP - Chadwick Lab results
CC-D80	CC-30 Duplicate	12/4/2003							0.004						Duplicate TP - Chadwick Lab
CC-D80	CC-30 Duplicate	12/4/2003												0.282	Duplicate TN - Chadwick Lab
CCNP80	CC-30	12/4/2003												0.497	Spike TN - Chadwick Lab results

le = lab error, nr = not required, i.s. = insufficient sample

na = not applicable, nm = not measured, fe = field error, ns = no sample collected

Standley Lake Sampling Data 2003

Sample Site	Sample Location	Date	NH3 (mg/L) as N	NO3+NO2 (mg/L) as N	Total Nitrogen (mg/L) as N	Secchi (meters)	Algae (CT /ml)	Chlorophyll *a* uncorrected (ug/L)	D-PO4 (mg/L)	T-PO4 (mg/L)	TSS (mg/L)	VSS (mg/L)
10-00	Surface	3/5/2003				3.0						
10-70	about 5 feet from bottom near dam	3/5/2003	0.03	0.04	0.46				<0.0025	0.0118	8	3
10-PZ	Photic Zone (2X Secchi depth) near dam	3/5/2003	0.01	0.02	0.22		204	4.4	<0.0025	0.0134	2	2
10-00	Surface	4/2/2003				2						
10-70	about 5 feet from bottom near dam	4/2/2003	0.02	0.12	0.38				<0.0025	0.0081	36	8
10-PZ	Photic Zone (2X Secchi depth) near dam	4/2/2003	<0.01	0.15	0.34		89	5.2	<0.0025	0.0078	40	24
10-00	Surface	4/16/2003				1.0						
10-70	about 5 feet from bottom near dam	4/16/2003	0.02	0.24	0.43				<0.0025	0.0126		
10-PZ	Photic Zone (2X Secchi depth) near dam	4/16/2003	0.02	0.24	0.52		70	2.2	<0.0025	0.0154		
10-00	Surface	5/6/2003				2						
10-70	about 5 feet from bottom near dam	5/6/2003	0.08	0.29	0.65				<0.0025	0.0152	13	3
10-PZ	Photic Zone (2X Secchi depth) near dam	5/6/2003	0.02	0.28	0.58		19	1.9	<0.0025	0.0089	3	1
10-00	Surface	5/20/2003				3.75						
10-70	about 5 feet from bottom near dam	5/20/2003	0.06	0.29	0.53				0.0061	0.0103		
10-PZ	Photic Zone (2X Secchi depth) near dam	5/20/2003	0.03	0.27	0.5		33		0.0037	0.0112		
10-00	Surface	6/3/2003				2						
10-70	about 5 feet from bottom near dam	6/3/2003	0.06	0.33	0.68				0.0065	0.0193	5	4
10-PZ	Photic Zone (2X Secchi depth) near dam	6/3/2003	0.02	0.23	0.44		12	1.0	0.004	0.0147	<1	<1
10-00	Surface	6/18/2003				4						
10-70	about 5 feet from bottom near dam	6/18/2003	0.06	0.33	0.68				0.0125	0.015	n/m	n/m
10-PZ	Photic Zone (2X Secchi depth) near dam	6/18/2003	0.02	0.23	0.44		11	1.2	l/e	0.0083	n/m	n/m
10-0	Surface	7/1/2003				4.5						
10-70	about 5 feet from bottom near dam	7/1/2003	0.02	0.45	0.73				0.0035	0.0233	14	n/m
10-PZ	Photic Zone (2X Secchi depth) near dam	7/1/2003	0.02	0.26	0.43		12	1.0	0.0038	0.0128	2	n/m
10-0	Surface	7/15/2003				5.25						
10-70	about 5 feet from bottom near dam	7/15/2003	0.02	0.45	0.7				0.0063	0.0233	n/m	n/m
10-PZ	Photic Zone (2X Secchi depth) near dam	7/15/2003	0.03	0.22	0.41		18	1.8	0.0031	0.0062	n/m	n/m
10-0	Surface	8/4/2003				4.5						
10-70	about 5 feet from bottom near dam	8/4/2003	0.02	0.41	0.66				0.0072	0.0185	n/m	n/m
10-PZ	Photic Zone (2X Secchi depth) near dam	8/4/2003	0.01	0.17	0.35		20	2.8	<0.0025	0.0075	n/m	n/m
10-0	Surface	8/19/2003				3						
10-70	about 5 feet from bottom near dam	8/19/2003	0.03	0.34	0.52				0.0067	0.0266	n/m	n/m
10-PZ	Photic Zone (2X Secchi depth) near dam	8/19/2003	0.02	0.15	0.36		25	3.1	0.0035	0.0173	n/m	n/m
10-0	Surface	9/9/2003				1.5						

Standley Lake Sampling Data 2003

Sample Site	Sample Location	Date	NH3 (mg/L) as N	NO3+NO2 (mg/L) as N	Total Nitrogen (mg/L) as N	Secchi (meters)	Algae (CT /ml)	Chlorophyll a uncorrected (ug/L)	D-PO4 (mg/L)	T-PO4 (mg/L)	TSS (mg/L)	VSS (mg/L)
10-70	about 5 feet from bottom near dam	9/9/2003	0.016	0.14	0.52				0.0226	0.0478	14	n/m
10-PZ	Photic Zone (2X Secchi depth) near dam	9/9/2003	0.01	0.13	0.34		161	5.5	0.0035	0.0102	6	n/m
10-0	Surface	9/22/2003				3						
10-70	about 5 feet from bottom near dam	9/22/2003	0.09	0.12	0.38				0.0109	0.0269	n/m	n/m
10-PZ	Photic Zone (2X Secchi depth) near dam	9/22/2003	0.02	0.13	0.32		14	6.7	0.0053	0.0132	n/m	n/m
10-0	Surface	10/6/2003										
10-70	about 5 feet from bottom near dam	10/6/2003	0.02	0.12	0.42	3.25			0.007	0.0192	16	4
10-PZ	Photic Zone (2X Secchi depth) near dam	10/6/2003	<0.01	0.1	0.34		44	0.8	0.0041	0.0114	4	2
10-0	Surface	10/20/2003				3.75						
10-70	about 5 feet from bottom near dam	10/20/2003	0.02	0.08	0.29				0.0036	0.0165	n/m	n/m
10-PZ	Photic Zone (2X Secchi depth) near dam	10/20/2003	<0.01	0.07	0.27		67	0.5	0.0034	0.0088	n/m	n/m
10-0	Surface	11/4/2003				2.75						
10-70	about 5 feet from bottom near dam	11/4/2003	0.03	0.08	0.33				0.0045	0.0124	5	2
10-PZ	Photic Zone (2X Secchi depth) near dam	11/4/2003	0.02	0.07	0.26		65	0.9	0.0041	0.0135	3	1
10-0	Surface	11/17/2003				2.25						
10-70	about 5 feet from bottom near dam	11/17/2003	<0.01	0.04	0.26				<0.0025	0.0116	n/m	n/m
10-PZ	Photic Zone (2X Secchi depth) near dam	11/17/2003	<0.01	0.04	0.23		246	18.2	<0.0025	0.0113	n/m	n/m
10-0	Surface	12/2/2003				2.75						
10-70	about 5 feet from bottom near dam	12/2/2003	0.02	0.02	0.32				<0.0025	0.0191	8	2
10-PZ	Photic Zone (2X Secchi depth) near dam	12/2/2003	0.01	0.01	0.22		200	12.9	<0.0025	0.0121	2	2
10-0	Surface	12/17/2003				2.75						
10-70	about 5 feet from bottom near dam	12/17/2003	0.02	0.03	0.23				<0.0025	0.0074	n/m	n/m
10-PZ	Photic Zone (2X Secchi depth) near dam	12/17/2003	0.01	0.03	0.27		237	5.4	<0.0025	0.0072	n/m	n/m

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le= lab error n/m = not measured * corrected data

2003 QC Calculations - Data Entry Page

SAMPLING DATE	2/3/2003	4/1/2003	5/15/2003	6/11/2003	7/14/2003	8/12/2003	10/8/2003	12/4/2003
Sample Name	CC73	CC74	CC75	CC76	CC77	CC78	CC79	CC80
Creek spiked/duplicated sample:	CC-35	CC-44	CC-44	CC-5	CC-34	CC-15	CC-60	CC-30
PHOSPHORUS- NG								
Original Sample Value - TP	0.0063	0.0073	0.0077	0.0057	0.0051	0.0078	0.0099	0.0035
Duplicate Sample Value - TP	0.0051	0.0134	0.0194	0.0064	0.0066	0.0058	0.0161	0.0035
Spike Factor - TP	0.01375	0.0125	0.0100	0.0150	0.01125	0.0100	0.0125	0.01125
Spiked Sample Value - TP	0.0189	0.0247	0.0364	0.0199	0.0183	0.0159	0.0234	0.0133
NITROGEN-WESTY								
Original Sample Value - TN	0.22	0.88	0.22	0.35	0.27	0.47	0.28	0.31
Duplicate Sample Value - TN	0.21	0.84	0.31	0.33	0.17	0.51	0.28	0.41
Spike Factor - TN	0.275	0.175	0.200	0.225	0.200	0.275	0.175	0.225
Spiked Sample Value - TN	0.51	0.99	0.53	0.55	0.41	0.77	0.46	0.56
OUTSIDE LAB RESULTS								
Dup. Sample Value - TP	0.008	0.017	0.036	0.006	0.011	0.013	0.005	0.004
Spike Sample Value - TP	0.017	0.024	0.044	0.019	0.019	no value	0.026	0.012
Spike Factor - TP	0.0138	0.0125	0.0100	0.01500	0.01125	0.0100	0.0125	0.01125
Dup. Sample Value - TN	0.214	0.896	0.392	0.3	0.24	0.454	0.27	0.282
Spike Sample Value - TN	0.478	1.056	0.559	0.527	0.425	0.737	0.74	0.497
Spike Factor - TN	0.275	0.175	0.200	0.225	0.200	0.275	0.175	0.225
TP average of orig/dup.	0.0057	0.01035	0.01355	0.00605	0.00585	0.0068	0.013	0.0035
TN average of orig/dup.	0.215	0.86	0.265	0.34	0.22	0.49	0.28	0.36
Duplicate (% RPD) Allowable Limit = less than 25% - Std. Methods								
Northglenn - TP	21.1	58.9	86.3	11.6	25.6	29.4	47.7	0.0
Westminster - TN	4.7	4.7	34.0	5.9	45.5	8.2	0.0	27.8
Spike (% recovery) of AVERAGE of original & duplicate #s Allowable limit = 80% - 120% - Std.Methods								
Northglenn - TP	96.0	114.8	228.5	92.3	110.7	91.0	83.2	87.1
Westminster - TN	107.3	74.3	132.5	93.3	95.0	101.8	102.9	88.9
Chadwick Labs - TP	65.5	56.0	80.0	86.7	71.1	na	168.0	71.1
Chadwick Labs - TN	96.0	91.4	83.5	100.9	92.5	102.9	269.7	95.6