March 3, 2004

Annual Performance Report

Assistance No. X7-97048701

Basin Environmental Project Commission
March 2004

Applicant: Idaho Department of Environmental Quality on Behalf of the Basin Environmental Improvement Project Commission

Contact: Rob Hanson

Amount Granted: $2,000,000

Introduction

The State of Idaho Legislature established the Coeur d'Alene Basin Environmental Improvement Project Commission ("the Commission") in its 2001 Session to implement, direct, and/or coordinate environmental remediation, natural resource restoration, and related measures to address water quality and heavy metal contamination in the Coeur d'Alene Basin of Idaho in a manner that is protective of human health and the environment, and consistent with local, state, federal, and tribal participation, resources, and authorities. The Basin Commission works through the direct exercise of certain authorities of the state of Idaho (as described in Section 39-8106 of the enabling legislation) and through its coordination with other entities and governments and their exercise of independent authorities.

The 2002 appropriation act for the Environmental Protection Agency included a line item in the amount of $2,000,000 for the "Commission" to carry out a pilot program for environmental response, natural resource restoration and related activities. Pursuant to CWA 104(b)(3) the Idaho Department of Environmental Quality (DEQ), on behalf of the "Commission", obtained funding to support work projects of this Commission. The DEQ is serving as the initial administrator for these funds. Grant number X7-97048701 was granted on February 14, 2003 in the amount of $2,000,000.

The major objectives of these projects are to 1) conduct studies on water quality trends and improvement in Lake Coeur d'Alene, 2) conduct pilot project research on bank stabilization techniques to reduce sediment loading to the South Fork Coeur d'Alene River and into Lake Coeur d'Alene, 3) conduct training and education for lake shore owners and users on lake stewardship to reduce nutrient and sediment loading to the lake, and 4) conduct a pilot experiment or demonstration project on reducing groundwater metal loading by addressing inflow and infiltration to a demonstration community water treatment facility infrastructure. The results from these projects will be transferable to other areas and communities within the Coeur d'Alene Basin to reduce, eliminate or prevent water quality pollution.

This report provides a status update on each of the above projects pursuant to administrative condition 3 of the grant and includes a) a comparison of actual accomplishments with the goals and objectives

established for the reporting period, b) reasons why established goals were not met, if appropriate, and c) other pertinent information on progress of the project.

PROJECT DESCRIPTION

Task 1. ***Conduct monitoring of lake water quality to assess nutrient, sediment, and metal loading and trends in lake water quality; to assess improvement/impacts from upstream environmental improvement projects; and assess impacts from further development projects along the lakeshore.***

Deliverable:	Development and initiation of a lake monitoring plan to assess nutrients, sediments, and metal trends for an initial three-year period. An annual summary will be presented to the Commission and a final report will be prepared at the end of this period to summarize results and recommendations for future monitoring efforts.
Date:	January 31, 2006
Cost Estimate:	$675,000

Status: The Basin Commission Technical Leadership Group (TLG) formed a working committee for purposes of development of a lake monitoring plan to meet the objectives of the Clean Water Act grant and to provide information on water quality and trends in Lake Coeur d'Alene. The work product was an intensive three-year plan for monitoring in Lake Coeur d'Alene. The Idaho Department of Environmental Quality, as recipient of the Clean Water Act grants, on behalf of the Coeur d'Alene Basin Environmental Improvement Commission and EPA will share oversight of the lake limnological study and evaluation program. The numerous monitoring tasks will be conducted cooperatively among the U.S. Geological Survey, U.S. Fish and Wildlife Service, Idaho Department of Environmental Quality, and Coeur d'Alene Tribe. Participation by other agencies such as Idaho Department of Fish and Game is encouraged.

The U.S. Geological Survey will conduct limnological sampling of the five pelagic stations and operate and sample the riverine monitoring stations. Limnological sampling at the twelve littoral stations will be conducted by the Coeur d'Alene Tribe. Ecological health sampling will be conducted by the U.S. Fish and Wildlife Service and the Coeur d'Alene Tribe and, potentially, Idaho Department of Fish and Game.

The IDEQ entered into a subgrant agreement with the Coeur d'Alene Tribe to oversee and coordinate the work of the USGS. It also developed a subgrant with the USFWS for the biological monitoring component of the lake monitoring plan.

The goal of the lake study is to utilize highly focused sampling of physical, chemical, and biological characteristics over a range of spatial and temporal conditions in order to evaluate the interaction of metals, nutrients, lake productivity, and ecological health. The limnological data will be complementary to concentration and load data for sediment, metals and nutrients monitored at the lake's two primary inflows, the Coeur d'Alene and St. Joe Rivers, and the lake's outlet, the Spokane River. These latter monitoring stations are being supported by the EPA in the Basin Environmental Monitoring Program (BEMP) and are not directly part of this three-year lake study.

The scope of the lake study program is segregated into the following four data-collection and evaluation activities:

1. Mass balances of metals and nutrients.
2. Nutrients and lake productivity.
3. Fate and transport of metals.
4. Ecological health.

The geographic scope of the study includes the following four habitat types:

1. Lacustrine, pelagic zone of lake.
2. Lacustrine, littoral zone in selected bays of lake.
3. Palustrine and riparian, selected shoreline areas of lake.
4. Riverine, mouths of Coeur d'Alene and St. Joe Rivers and Spokane River, downstream of Coeur d'Alene Lake's outlet.

The USGS began monitoring activity in October 2003. They will be providing annual updates on monitoring results to the TLG and the Basin Commission. Expenditures on monitoring activities during 2003 totaled $50,000.

Task 2. ***Conduct pilot study projects to test various methods to stabilize the stream banks, restore natural vegetation buffers, and implement storm water and erosion control programs to minimize runoff from adjacent lands, within the Coeur d'Alene Basin and tributaries to Lake Coeur d'Alene. Specific actions will be developed following finalization of the Lake Management Plan update, and in consultation with the Commission's Technical and Citizen advisory groups. The selected actions will then be incorporated into the Commission's work plans.***

Deliverable:	Design, construction, and monitoring of bank stabilization study project(s) to evaluate methods, construction approaches, and effectiveness. A post project evaluation report will be prepared to summarize results and recommendations for future stabilization efforts.
Date:	July 1, 2004 (revised dated July 1, 2006)
Cost Estimate:	$445,000

Status: As an initial work activity under this task, the IDEQ contracted with the Kootenia Shoshone Soil and Water Conservation District (KSSWCD) to perform an inventory of existing bank stabilization methods and approaches constructed on the lower Coeur d'Alene River as well as the St Joe River. Phase I was a literature survey of projects constructed which was complied in their report entitled: Riverbank Stabilization Inventory April 2003. Phase II of the inventory was anticipated to involve photo documentation of the identified stabilization efforts as well as an evaluation conducted by regulatory agency experts on bank stabilization. Phase II was not conducted as the water level in the river was raised and many of the stabilization projects were inundated. Phase II work will be conducted in 2004. Costs incurred for Phase I work total approximately $1700.00.

Preliminary planning and engineering for a bank stabilization pilot project was also initiated in 2003. IDEQ retained Terragraphics Environmental Engineering to conduct the preliminary design. The project location and project design was the subject of numerous meetings of the Technical Leadership Group and the bank stabilization Project Focus Team. In addition, citizen input was received during several meetings and through comments made on the 404 application submitted to the Corps of Engineers. The project was not implemented by the end of 2003 as several issues remain to be worked out with the various regulatory agencies and stakeholders involved. Concerns raised by reviewers about the design, the appropriateness of the location, and the performance monitoring needs during the 404 permit review and ESA consultation would have resulted in design and work plan changes and possible site location changes. It was not possible to resolve these issues, obtain a permit and biological opinion, and get contracts in place for this field season. Expenditures for preliminary engineering conducted in 2003 was approximately $53,000.00.

To proceed, Lower Basin projects must overcome considerable philosophical differences among stakeholders and a major number of technical uncertainties. Based on the number and broad range of comments received by the USACE on the 404 permit application for the pilot project, it is evident that more time and effort needs to be spent:

a) Getting firm agreement among stakeholders as to what specific question(s) the project should be designed to answer with the acknowledgement that cost is scope dependent.
b) Getting firm agreement among stakeholders as to how detailed and quantitative the answer(s) must be.
c) Getting firm agreement among stakeholders on what minimum data collection is required, and, who is going to conduct it, when are they going to collect it, and what it will cost.
d) Getting firm agreement among stakeholders on what specific designs the project should include.
e) Determining in advance what are the expectations of the regulatory entities.
f) Allowing time for review of the project design and monitoring plan by the PFT.

IDEQ has established the following timeline for design, permitting and construction of this pilot project during 2004 which is outlined below:

Jan. 2004 – IDEQ solicits by e-mail a list of PFT members committed to play an active role in planning, design, and work plan development. (completed)

Jan. 2004 – IDEQ sends out an e-mail requesting feedback on items ‘a’ to ‘e’ above. (completed)

Feb. 2004 – IDEQ circulates the feedback to the PFT. (completed)

Feb. 2004 – IDEQ convenes a PFT meeting to get agreement on those 5 items as well as whether to recommend to the Basin Commission one project or two or a combination. (completed)

March 2004 – IDEQ circulates among the PFT a table listing potential project sites known by IDEQ and a request for any unknown by IDEQ but known by others.

March 2004 – IDEQ distributes revised potential project sites list and requests PFT site preferences and rationale be shared with PFT members. A call or meeting is scheduled to make final selection of the preferred site and backup locations. IDEQ obtains access from property owners.

April 2004 – IDEQ assigns TerraGraphics the task of preparing a draft design and a work plan, which includes a monitoring plan. The monitoring plan may be comprised of plans prepared by others.

May 2004 – IDEQ/TerraGraphics circulates draft work plan and design and estimated costs to the PFT and requests approval. Calls and meetings will be scheduled as necessary. IDEQ has initial discussions with regulatory agencies about the design and permitting process.

May 2004 – IDEQ/Terragraphics present the PFT-approved work plan and design to the TLG.

June 2004 – IDEQ/Terragraphics present the TLG-approved work plan and design and costs to the Basin Commission for approval. Modifications are made as necessary.

July 2004 – IDEQ submits the 404 Permit Application and the Biological Assessment for approval.

July 2004 – IDEQ releases a Request for Proposals to hire a contractor.

Aug. 2004 – Terragraphics initiates monitoring of the physical aspects of the selected project sites. Monitoring of other aspects of the sites may be conducted by others.

October 2004 – Construction starts.

The expected deliverable of this grant is the design, construction, and monitoring of project(s) that evaluate bioengineering techniques, construction approaches, and stability and habitat effectiveness. The results from these projects will be transferable to other areas and communities within the Coeur d'Alene Basin to reduce, eliminate or prevent water quality pollution. To allow construction in the fall of 2004 and at least one season of monitoring the final deliverable for this task is now scheduled to be completed in July 2006.

Task 3. ***Develop and implement a Lake Stewardship educational program(s) for lake shore owners and users for voluntary actions to reduce nutrient and sediment loading to the lake.***

Deliverable:	Design and implementation of a pilot education and outreach program for lake shore owners and boaters on lake stewardship to control nutrient and sediment loading into the lake. A post project evaluation report will be prepared to summarize results and recommendations for future education and outreach programs and approaches.
Date:	January 1, 2005
Cost Estimate:	$80,000

Status: IDEQ entered into a subgrant with the Coeur d'Alene Tribe in the amount of $40,000 to be expended over two years to assist in the lake education and information program. In addition, IDEQ entered into a contract with KSSWCD to assist in the outreach effort.

- During 2003 both entities along with IDEQ staff completed the following:
- Conducted research on existing outreach programs and obtained copies of informational materials,
- Prepared an educational booth and operated it at the Kootenai County Fair
- Began development of a lake map and educational brochure to be shared at civic meetings and boat launches,
- Began development of a power point educational presentation to be shared with school groups, civic groups, and homeowner associations. This presentation will be given to the Basin Commission at its March meeting prior to formal outreach endeavors. A speaker's bureau is being formed to carry the presentation to these various groups in 2004.

Expenditures during 2003 were limited as many hours of volunteer time of IDEQ and Tribal staff were contributed to the effort. Approximately $4,000 was charged to this task in 2003. In 2004, work under this task will include finalization of the lake map, distribution to civic groups and at boat ramps, development of a public speakers bureau and presentations to various school groups and civic organizations. An informal evaluation system will also be implemented to test message effectiveness and general level of public awareness of the need to be good stewards of Lake Coeur d'Alene.

Task 4: ***Groundwater Metal Loading Study/Demonstration Project***

Deliverable:	Pilot project completion report and evaluation of the pilot study on its efficiency and effectiveness of metal loading reduction through I/I improvements, and potential applicability to the downstream WWTP system.
Due Date:	January 31, 2005
Cost Estimate:	$800,000

Status: Metals data collected at the Mullan Wastewater Treatment Plant (WWTP) indicate that total metal loading increase as flows increase during the spring months. The reasons for this include:

- leached metals from the tailings used to bed collection system pipes carried by groundwater (infiltration),
- high background levels of metals in area soils (infiltration), and
- surface runoff of leached metals from contaminated sources (inflow).

The ability to remove the metals from the WWTP effluent is further complicated by the increased flows during the spring months. Wet weather flows regularly exceed the WWTP's capacity, with peak flows of 5 to 10 times the average flow rates. These extreme peaks are directly attributable to the inflow and

infiltration (I/I) into the system. Ultimately, metals loading are increased, requiring higher treatment efficiency and larger capital improvements.

A study completed in 2002 identified the probable locations of inflow and infiltration into the collection system. Based on those findings, a systematic approach of removing both the metals and additional water sources was undertaken. Methods of rehabilitating the mainlines and service lines were reviewed for applicability in Mullan. Construction documents were developed, the project was bid, and construction is underway. Presumably, the improvements currently under construction will reduce metals and hydraulic loading to the WWTP.

Consequently, samples were taken at the WWTP and from installed groundwater monitoring wells to identify baseline metals levels. The baseline levels will be compared to post-construction levels to tabulate the impacts from this project and the potential to transfer these technologies to other areas in the Basin.

The following sections review the items previously discussed, present progress to date, and summarize planned activities to complete the study.

Development of Construction Documents and Work Undertaken

The 2002 report on the Mullan collection system was reviewed along with previous sewer inspection records and system notes. Additional sewer inspections were undertaken to locate services, identify inactive services (i.e., abandoned service lines no longer connected to residences), and identify pipe conditions.

The pipeline rehabilitation methods were selected based on this additional information. After a review of pipeline repair options, the rehabilitation methods selected for actual implementation on the mainline and service lines included conventional construction, Cured-In-Place-Pipe (CIPP), and pipe bursting. Conventional construction was included for comparison with the two trenchless rehabilitation methods (CIPP and pipe bursting). Each method may be summarized as follows:

Conventional Construction involves traditional open pit excavation. This technique impacts surface soils, which, throughout the Basin are being catalogued and remediated to reduce human health exposure to heavy metals. Remediation typically involves placement of a clean barrier over contaminated materials. Conventional construction techniques either disturb this barrier, leading to recontamination of the surface and/or replacement of the barrier, or lead to potential tracking of contaminated materials to otherwise clean areas. Management of these soil barriers is subject to an Institutional Control Program (ICP) in the "Box", but such a program does not exist in Mullan at this time.

CIPP Rehabilitation involves sliding a resin-impregnated polyester tube into an existing pipeline. The material is then cured under pressure either by steam or hot water. Service connections are reconnected by cutting into the cured liner where necessary by a remote controlled unit from within the pipe. When completed, the CIPP creates a continuous and seamless pipe within a pipe, effectively sealing cracks or broken sections of the pipe, which could result in groundwater infiltration.

Pipe Bursting involves replacement of a deteriorated gravity sewer pipe by pulling a new pipe through the original pipe using a static, hydraulic, or pneumatic hammer "moling" device. The hammer is larger than the existing pipe, expanding and breaking it as it pushes the old pipe out of the way, leaving a tunnel for the new pipe. The replacement pipe is then either pulled or pushed into the bore. Sewer services are reconnected to the new pipe through small excavations from the surface. Additional excavation is required at one end of the old pipe for feeding the new pipe and is occasionally required at the terminus. This technology allows undersized lines to be replaced with larger lines.

Bid documents were developed into four separate schedules to maximize flexibility during construction and allocate available funding without exceeding the project budget. Bids were opened on August 26, 2003. Due to the limited amount of work under each rehabilitation method, the time of year, and the location of Mullan with respect to major trenchless contractors, unit costs were higher than usually seen on larger projects. The project includes the following work:

- CIPP rehabilitation – 360 feet of 8-inch sewer and 732 feet of 12-inch sewer. Rehabilitated areas include:
    - Earle Avenue from 5th Street to 6th Street,
    - 4th Street from Earle Avenue to Fisher Avenue,
    - Fisher Avenue from 3rd Street to 4th Street, and
    - 3rd Street from Fisher Avenue to U.S. Hwy 10.
- Pipe bursting – 495 feet of 6-inch sewer lines to 8 inch, and 346 feet of 8-inch sewer lines to 8 inch. Rehabilitated areas include:
    - Fisher Avenue from 4th Street to 5th Street,
    - Fisher Avenue from 5th Street towards 6th Street, and
    - Fisher Avenue from 6th Street to 7th Street.
- Conventional Construction – 602 feet of 8-inch sewer lines. Conventional construction was only used where sewer alignments had to be modified along Fisher Avenue.
- Lateral Rehabilitation – 43 services, with an estimated total footage of 2316 feet, are eligible for rehabilitation. A combination of conventional methods, CIPP, and pipe bursting will be utilized as determined by closed-circuit television (CCTV) inspection performed by the contractor. The engineer and contractor are working together to select the optimal rehabilitation technology.

Construction Progress to Date

Construction began on September 15, 2003. Service line rehabilitation was quickly identified as the critical path for meeting the construction schedule due to the potential for poor weather. The contractor began by locating the service lines at the residences and performing CCTV inspections. Conventional construction for new manholes followed, immediately preceding the mainline pipe bursting activities, which began on September 29, 2003. Pipe bursting continued until the first week of October. CIPP rehabilitation began on October 1, 2003, and ended on October 3, 2003. Conventional construction of the mainlines was completed by October 24, 2003.

Service line rehabilitation began the week of October 5, 2003. Because the CCTV inspections and review by the engineer and contractor were completed early in the project, the contractor was able to order materials and keep working without interruptions.

The key to successfully completing these tasks was coordination by the General Contractor of the overlapping schedules and work areas by at least three different construction crews. Through it all, sanitary service was maintained and only one late construction night resulted. The project is currently on budget, with the potential for savings on some service lines that are in better condition than anticipated. Lateral rehabilitation is expected to be completed by early- to mid-November.

Since the mainline construction has been completed and most of the laterals are complete, the contractor has mobilized a yard clean-up crew to clean remediated yards that were disturbed during construction. The contractor is also testing imported materials for conformance to previously stipulated "clean" levels where a clean cap is required.

During construction observation, notes specific to each rehabilitation method are being logged for an overall comparison of the alternatives and the ability to implement these methods in other areas. Items such as time of construction, amount of excavation, susceptibility for construction problems, potential for tracking materials, etc. are being noted.

Impacts to the Treatment Plant

This project will have a direct impact on the existing wastewater collection infrastructure. By rehabilitating the most critical sections of the collection system, I/I is expected to be dramatically decreased. This decrease in I/I may result in a proportional decrease in metals loading. Influent wastewater samples will be taken following project completion to verify any metals loading reductions.

Only limited flow data is available at this time, but flows to the Mullan WWTP are apparently lower than over the same period of time in previous years. Average flows in 1996 and 1997 for the same period in October were 132,000 and 139,000 gallons per day (gpd), respectively. In the middle of construction in 2003, the average flow was 74,000 gpd. This decrease is despite a large amount of groundwater that entered the system during construction through manhole installation, temporary trench dewatering, and tie-ins to existing lines. The trend is encouraging, albeit preliminary, but more data is required to verify this trend.

To date the project has uncovered many sanitary service lines that were cracked and had offset joints as well as two manholes that had no base, allowing water to well up into the sewer. The true impacts from this construction will not be observed until high groundwater and peak runoff conditions are experienced.

Baseline Metals Levels

Samples of the Mullan WWTP influent were taken during the spring of 2003 to supplement the previous testing done in 1999. The data was analyzed to determine trends in the metals levels versus influent flow. Seven samples were collected in 2003, with flows ranging from 194,000 to 543,000 gpd, and used in conjunction with the ten samples collected in 1999, with flows ranging from 164,000 to 654,000 gpd. Each sample was tested for cadmium, lead, and zinc. The test results were plotted against flow to identify characteristic relationships between the metals of interest and influent flows.

A positive trend between metals load and flow was realized for each of the metals in question. The relationship for lead is an exception however, and needs to be explored further. A 95% confidence interval was included on the data to identify statistically significant changes in loading after construction.

Additional sampling will be conducted in the spring of 2004 for comparison. Presumably, if the metals loading has changed, a plot of the 2004 and subsequent data will lie outside of the confidence interval associated with the 1999 and 2003 data. This may be evidenced by a change in slope and/or a change in the y-intercept.

The influent metals load is comprised of the following sources:

- groundwater (infiltration),
- leaching materials from bedding used during the original sewer construction (infiltration),
- drinking water and other domestic use, and
- surface flow (inflow).

Three of the four sources were directly or indirectly sampled prior to and during construction. The only source that was not sampled was surface flow. The other sources were sampled as follows.

Four groundwater monitoring wells were installed north and south of Earle Avenue to obtain upgradient and downgradient groundwater samples. The samples collected from these wells should reflect background metals levels in the shallow groundwater. The samples show metals levels in the groundwater are approximately 1.5 to 348 times those in the drinking water.

In addition to the background metals in the groundwater, leaching from the pipe bedding material may result in elevated metals levels in the sewage. Due to the inherent difficulty and cost of sampling leaching from pipe bedding from within the pipes, samples of the groundwater present in the open excavations at manholes were taken during construction instead. The soils were striated, with some layers containing the black slag, which was historically used for pipe bedding in the Silver Valley. The samples are currently being analyzed, with results pending.

The domestic water supply was sampled in three general areas—prior to and after filtration at the water treatment plant, and at several residences in town. The composite water sample collected from ten homes in Mullan is believed to be the most representative metals sample for domestic water due to sample size and the potential for leaching metals from interior plumbing. The average metals levels were 0.637 ppb for cadmium, 2.86 ppb for lead, and 0.284 ppm for zinc.

In general, the metals levels in the WWTP influent are above the observed domestic water system levels but below the groundwater levels. The influent metals levels are, therefore, a combination of the above sources, lending support for the hypothesis that infiltration and inflow is partially responsible for the elevated metals levels at the Mullan WWTP. When the remaining samples are analyzed and post-construction sampling has been completed, it will be possible to better identify the relative impact of this project and metals contributions from other sources such as domestic wastewater.

Eliminating I/I from this system results in lower metals loading and improves receiving water quality. The successful techniques will then be potentially transferable to the larger downstream Page WWTP. In

addition, the cost/benefit of various construction techniques applied will also be evaluated, factoring in the degree to which such techniques could minimize disturbance of contaminated surface soils.

Expenditures during 2003 were approximately $570,000. In 2004 the remaining project budget will be utilized to similarly address one additional area of suspected inflow and infiltration problems within the City of Mullan. In addition, the system will be monitored during the spring runoff period to further assess the effectiveness of flow and metal reductions to the treatment plant.