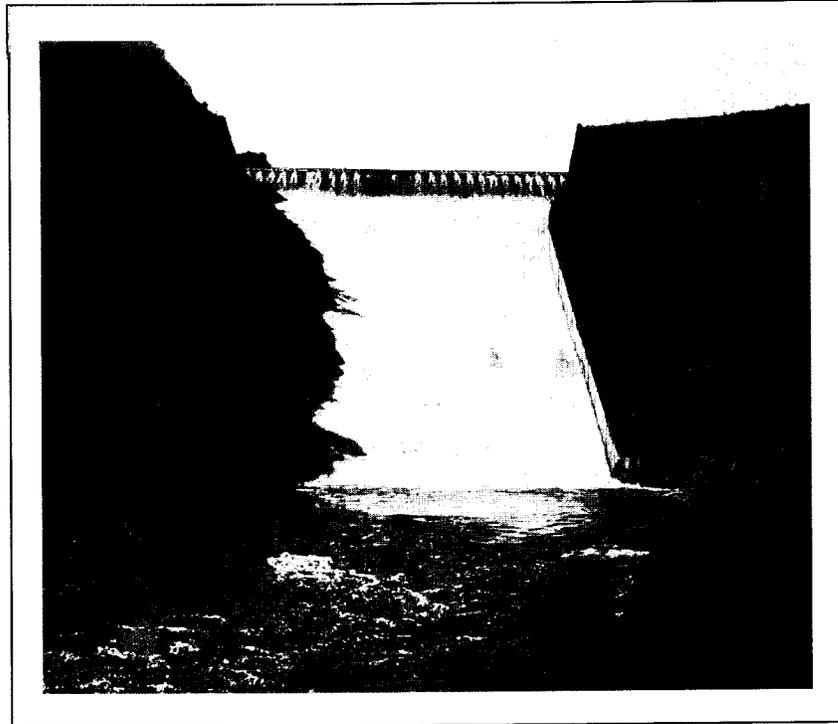


WATER STORAGE IN MONTANA

EXHIBIT 17
DATE 1/21/09
HB 8



Ruby Dam

A Report Submitted to the
Sixty-first Montana Legislature

Office of the Governor

Pursuant to
Montana Code Annotated, Sec. 85-1-704 (1991)



January 2009



TABLE OF CONTENTS

I. EXECUTIVE SUMMARY	3
II. INTRODUCTION	4
Renewable Resource Grant and Loan (RRGL) Program	4
Water Storage Special Revenue and Hydropower Earnings Accounts.....	4
Water Storage Project Classification and Terminology.....	5
Figure 1. Water Storage in Montana Project Location Map 2009	6
WATER STORAGE PROJECTS PRIORITIZED.....	7
Table 1. 2011 Biennium Water Storage Project Proposals Prioritized.....	7
III. JUSTIFICATION FOR 2011 BIENNIUM PROJECT PROPOSAL PRIORITIZATION	8
1) Ruby Dam Rehabilitation Project.....	8
2) Two-Dot Canal Rehabilitation Project (<i>Wheatland County</i>)	9
3) Deadman’s Basin Terminal Outlet Replacement Project (<i>Wheatland County</i>).....	9
4) Nevada Creek Canal Design and Construction Project (<i>Powell County</i>)	9
5) Martinsdale Dam Drain Rehabilitation Project (<i>Wheatland County</i>)	10
IV. ONGOING OR RECENTLY COMPLETED REPAIR OR REHABILITATION PROJECTS	11
Table 2. Recently Completed or Ongoing Water Storage Projects (2007 or 2009 Biennium).....	11
Ongoing or Recently Completed Projects.....	12
State-Owned Rehabilitation and Repair Projects.....	12
Ackley Lake Dam Rehabilitation (<i>Judith Basin County</i>).....	12
The Flint Creek Siphon Rehabilitation (<i>Granite County</i>).....	13
Middle Creek Dam Automated Instrumentation (<i>Gallatin County</i>)	13
Smith Creek Canal Seepage Abatement and Rehabilitation – Nilan Dam (<i>Lewis & Clark</i>)....	13
Nilan North Dam Terminal Outlet Structure Repair (<i>Lewis & Clark County</i>).....	13
Deadman’s Basin Outlet Structure Design (<i>Wheatland County</i>).....	14
Cataract Creek Dam Feasibility and Alternative Evaluation (<i>Madison County</i>).....	14
Tongue River Dam Prototype Panel Repair Project (<i>Big Horn County</i>)	14
Martinsdale North Dam Rip Rap Installation (<i>Wheatland County</i>)	14
Frenchman Dam Rehabilitation Feasibility Pre-construction Engineering (<i>Phillips County</i>) ...	15

Upper Taylor Dam Rehabilitation (<i>Powell County</i>)	15
Monitoring Instrumentation for State-Owned Projects (<i>Statewide & ongoing</i>).....	16
Canal Operations.....	16
Trust Lands Dam Inspection Program.....	16
Figure 2. Dams on School Trust Lands.....	18
Non-state owned Rehabilitation and Repair Projects.....	19
Lake Frances East Dam Rehabilitation (<i>Pondera County</i>).....	19
Carter Ponds Dam Reconstruction (<i>Fergus County</i>).....	19
Beaver Creek Dam – Seepage Control Berm (<i>Hill County</i>)	20
Mill Lake Dam Rehabilitation (<i>Ravalli County</i>)	20
Vandalia Dam Rehabilitation (<i>Valley County</i>)	21
V. HYDROPOWER.....	22
Recent Accomplishments	22
State Water Storage Projects Hydropower Retrofit Program	23
VI. APPENDIX	24
A. Water Storage Policy and Statutory Criteria	24
85-1-703. Water storage policy.....	24
85-1-704 Water Storage Project Prioritization Policy	24
B. State Water Storage Project Fact Sheets.....	25

I. EXECUTIVE SUMMARY

Montana law requires the Governor to submit a report on water storage to the Legislature each regular session. The Governor's Report on Water Storage in Montana prioritizes new rehabilitation and construction projects and summarizes rehabilitation and repair projects occurring during the previous two years. Appendix I contains MCA 85-1-703 Water Storage Policy and MCA 85-1-704, Priority Ranking of Water Storage Projects – Governor's Report.

For the 2011 Biennium, the Department of Natural Resources and Conservation (DNRC) will be requesting funding from the Water Storage Special Revenue and Hydropower accounts and Renewable Resource Grant and Loan Program (RRGL) grants for the rehabilitation of Ruby Dam, repairing and planning future construction projects on the Two-Dot Canal, the Deadman's Basin Outlet Extension Project, the Martinsdale East Dam Drain Rehabilitation, and repairing and planning future construction on the Nevada Creek Delivery Canals. DNRC is proposing retaining a dam safety engineer through the EPP process to be located within DNRC to document the condition of dams located on State School Trust lands.

In the last biennium, DNRC received a RRGL Program grant and a loan for the rehabilitation of Ackley Lake Dam. Additional funding for the project was requested as a biennial appropriation from the Water Storage Special Revenue Account. The rehabilitation is under construction with completion anticipated in the fall of 2008. The rehabilitation of the East Fork Siphon, part of the East Fork Water Project, (Granite County) will be completed in December of 2008. The outlet structure at the Nilan North Dam (Lewis and Clark County) was replaced in the spring of 2007 with a new structure.

New automated monitoring instrumentation was installed at Middle Creek Dam (Gallatin County) in the fall of 2008. The Smith Creek Canal (Lewis and Clark County) was repaired and relined to control seepage and increase water delivery efficiency. The final design for the Deadman's Basin Dam (Wheatland County) outlet structure was completed in preparation for a future rehabilitation project. The Deadman's Basin Supply Canal was also relined with funds from an NRCS grant, with the DNRC supplying in-kind design and engineering oversight services.

Elsewhere, the Tongue River Dam (Big Horn County) Prototype Panel Repair Project involved the repair of damaged concrete on the pre-cast panels of the emergency spillway. The Martinsdale North Dam (Wheatland County) Riprap Project which involved stabilizing a slope to eliminate continued plugging of the intake structure was completed in the fall of 2007.

DNRC staff is in the process of completing a rehabilitation feasibility study for Frenchman Dam (Phillips County). The study is tentatively scheduled for completion by December 2008. A rehabilitation feasibility study is also currently under development for Cataract Dam, located in Madison County.

Recently completed or ongoing work on non-state owned water storage projects include: The addition of a new upstream outlet tower and gates along with replacement of upstream concrete at Lake Frances East Dam (Phase II); reconstruction of Carter Ponds Dam; installation of monitoring wells at Beaver Creek Dam to collect data needed for the design and construction of a seepage berm; spillway modifications for Mill Lake Dam in the Bitterroot-Selway Wilderness scheduled for the fall of 2007; and planning for the rehabilitation of Vandalia Dam in Valley County.

Photos of the various projects are linked to the online version of the Governor's Report on Water Storage at: <http://dnrc.mt.gov/wrd>

II. INTRODUCTION

The Office of the Governor is required by statute to submit a report on water storage to the legislature each regular session. The Governor's Report on Water Storage in Montana reviews state water storage policy and statutory criteria used for prioritization of proposed projects; identifies water storage projects proposed for development, including the rehabilitation of existing projects and progress on new projects; and summarizes water storage projects in progress over the previous two years.

The focus of this report is on projects that are partially or fully funded by the state. Projects that are regulated by the state with outside funding sources are also included. The federal government has a number of ongoing projects, primarily considered as maintenance, that are not included in the report. The report includes a table summarizing the prioritized projects and a map (see Figure 1) indicating each project type and its location. Information of water storage policy and statutory criteria can be found in Appendix.

Renewable Resource Grant and Loan (RRGL) Program

The Montana Renewable Resource Grant and Loan (RRGL) Program provides grant and loan funding for projects that conserve, manage, develop, or protect renewable resources. RRGL loans are made available to public entities with proceeds from the sale of coal severance tax secured bonds and frequently are offered at a subsidized interest rate. The subsidy is paid with coal tax revenues. DNRC's recommendation includes the amount of financing needed to meet project and financing expenses and the interest rate suggested. Public loans are limited to an applicant's ability to repay under the standard repayment terms and by the bonding capacity of DNRC. Applicants who receive grant funding in conjunction with a loan do not receive an interest subsidy.

Statutorily, \$4M is available in funding for the RRGL Program. However, DNRC is requesting \$6.5M in funding for the 2009 legislative session (2011 Biennium) which includes a total of \$50,000 for private water project grants. In past sessions, the legislature has elected to apply a \$100,000 limit on individual grants, although it has authority to appropriate additional funding for projects. The 60th Legislature appropriated an additional \$2.2 million in grant funding in 2007 for the 2009 biennium, making it possible to fund 77 projects. In addition to the \$7.2 million made available for grants, \$400,000 was appropriated for project planning grants, \$100,000 for emergency grants, and \$100,000 to conduct an irrigation infrastructure inventory in the 2009 biennium. Of the 77 projects funded, 4 DNRC water storage projects received grant funding. (See Table 2.)

DNRC has requested RRGL grant funding for five water storage projects in the 2009 biennium. Additionally, \$2.45M in RRGL loans has been requested by DNRC for three state-owned water storage projects for the 2009 biennium. (See Table 1.) Matching federal funds and substantial private contributions are also used to help fund project rehabilitation costs. Funding approved in previous legislative sessions must be reauthorized by the current legislature.

Water Storage Special Revenue and Hydropower Earnings Accounts

Dams classified as high-hazard that are in unsafe condition receive first preference for use of funds from the state's Water Storage Special Revenue Account (Section 85-1-631 MCA). This account was designated by the 1991 Legislature to allocate 25 percent of the grant funds available, or

\$500,000 each biennium, under the Renewable Resource Grant and Loan (RRGL) program, to be used exclusively for water storage projects.

Revenue deposited in the Water Storage State Special Revenue Account provides funds “exclusively for construction, operation, rehabilitation, expansion, maintenance, and modification of state-owned water storage projects”. Money not expended from the water storage account during the previous biennium must remain in the account. Deposits to the account are placed in short-term investments and accrued interest is deposited in the account. Interest income of the resource indemnity trust fund would continue to provide \$500,000 deposited in the water storage state special revenue account created by MCA 85-1-631.

The Hydropower Program administers the development and operation of hydropower facilities on state-owned water projects. The Broadwater Power Project on the Missouri River near Toston is the only state-owned hydropower facility that has been built. Earned revenues are used to help finance the rehabilitation of water storage projects administered by the DNRC State Water Projects Bureau (SWPB). After debt payments and operating expenses, approximately \$1.3 million in funding is available to rehabilitate state-owned dams per year, assuming average river flows.

Water Storage Project Classification and Terminology

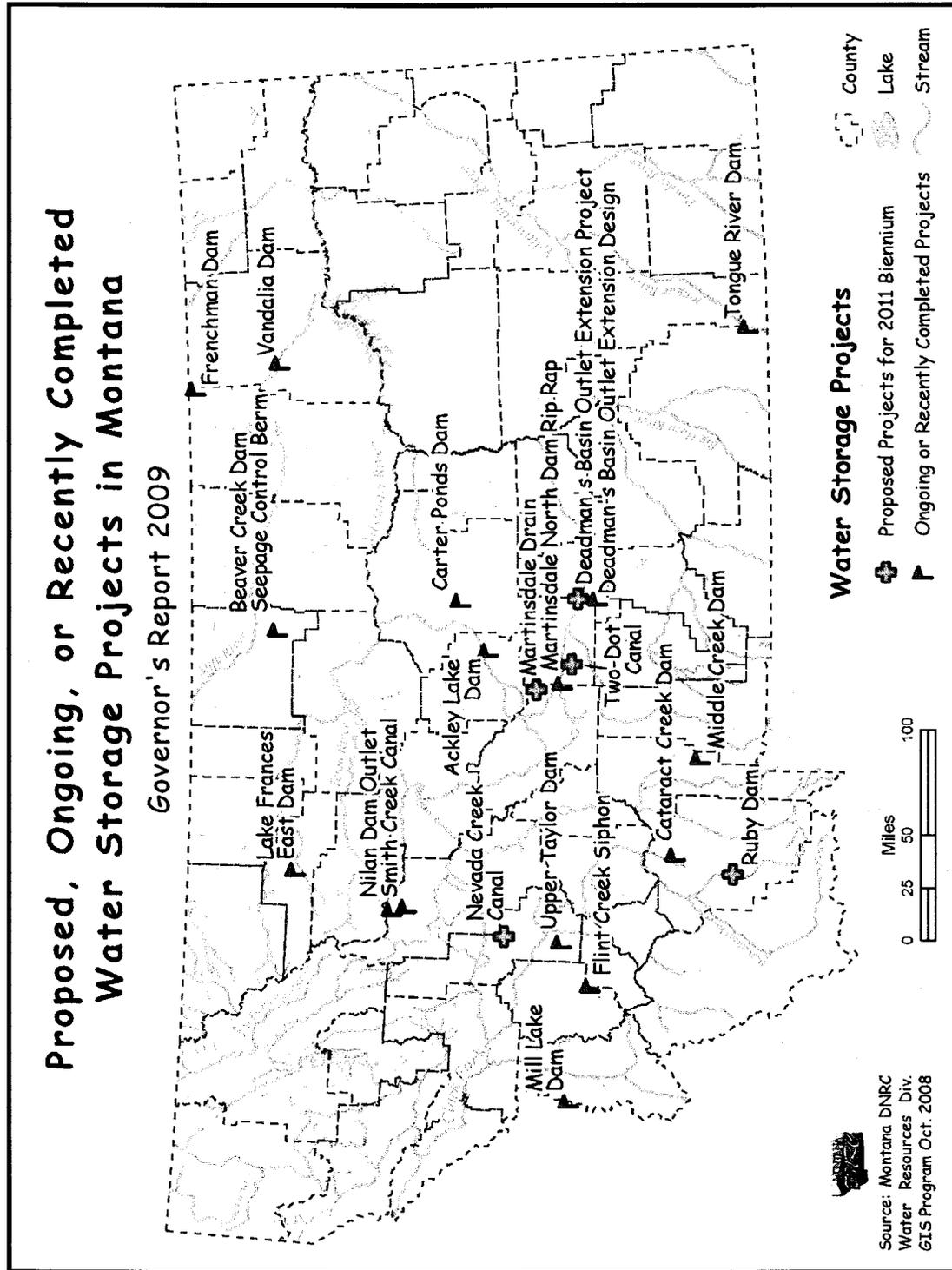
It is important that the reader have a basic understanding of principles and terms related to dam safety classification used in this report. Standards used by the State of Montana classify a dam spillway as *unsafe* if it would be unable to route the maximum inflow design flood or if the dam's structural integrity has become compromised since construction. A dam is classified as *high-hazard* if its failure has the potential for loss of human life, regardless of its age and current structural condition. The high-hazard classification should not be confused with an assessment of a dam's structural integrity or condition.

The state's highest priority for repair and rehabilitation is assigned to dams classified as high-hazard that are in unsafe condition. All water storage projects addressed in the Governor's Report are classified high-hazard, and will remain classified as high-hazard following the completion of any ongoing or proposed work. However, the safety issues with each project will eventually be resolved.

Repair of a project most often refers to scheduled or emergency action taken to return dam function to original design capacity or for a project to continue operation at a reduced, but safe level. *Rehabilitation* involves upgrading existing projects to comply with or exceed current design standards and often includes repair work. Design standards have evolved considerably since the construction of most of the state's dams and repair alone may not bring a facility into compliance with current design standards. The storage capacity of a project can be increased somewhat during rehabilitation, especially if it is determined to be a cost-effective alternative.

DNRC's State Water Projects Bureau (SWPB) is responsible for overseeing the operations, maintenance, and rehabilitation of 21 active state-owned water storage projects across the state. DNRC is also responsible for overseeing repairs, maintenance, and rehabilitation of over 250 miles of irrigation canals associated with ten state-owned projects. Canals are integral components of many state water projects, delivering water to water users served by the respective projects. Many of these canals were constructed in the 1930s and 1940s and are now in need of substantial rehabilitation. The Canal Operations Program is responsible for identifying and correcting operational deficiencies on state-owned canals.

Figure 1. Water Storage in Montana Project Location Map 2009



WATER STORAGE PROJECTS PRIORITIZED

One of the requirements of the water storage report is to prioritize storage projects proposals for the upcoming biennium. After careful evaluation of the nature and extent of deficiencies, potential for loss of life downstream, and economic impact should the project fail; the following suggested prioritization has been developed:

1. **Ruby Dam Rehabilitation** (Madison)
2. **Two-Dot Canal Rehabilitation** (Wheatland)
3. **Deadman's Basin Dam Terminal Outlet Replacement Project** (Wheatland)
4. **Nevada Creek Canal Design and Construction** (Powell)
5. **Martinsdale Dam Drain Rehabilitation** (Wheatland)

Table 1 lists storage project proposals for the 2011 Biennium in order of priority, and tabulates funding sources. Table 2 lists ongoing or recently completed storage projects during the past biennium. Dams classified as high-hazard that are in unsafe condition receive first preference for use of funds from the state's Water Storage Special Revenue Account (Section 85-1-631 MCA). Additionally, revenue received from the state's Hydropower Earnings Account is used to assist in the rehabilitation costs of active state-owned water projects.

The Montana Renewable Resource Grant and Loan (RRGL) Program provides funding for resource-related projects that conserve, manage, develop, or initiate the beneficial use of a renewable resource. As shown in Tables 1 and 2, matching federal funds and substantial private contributions are also used to assist with rehabilitation costs.

Table 1. 2011 Biennium Water Storage Project Proposals Prioritized

Storage Project Name (County) Applicant / Owner	RRGL Grant Rank/Amount Requested	Water Storage Special Revenue Account	RRGL Loan	Other (Funding source)
1) Ruby Dam Rehabilitation (Madison County) <i>Dept. of Natural Resources & Conservation (DNRC)</i>	\$100,000 (rank 9)	Pending Review	\$2,000,000	Pending Review
2) Two-Dot Canal Rehabilitation (Wheatland County) <i>DNRC</i>	\$100,000 (rank 25)			DNRC In-Kind \$18,511
3) Deadman's Basin Dam Terminal Outlet Replacement Project (Wheatland) <i>DNRC</i>	\$100,000 (rank 40)	\$514,500	\$400,000	DNRC In-Kind \$63,352
4) Nevada Creek Canal Design and Construction (Powell) <i>DNRC</i>	\$100,000 (rank 64)	\$20,035	\$50,000	Nilan Water Users Association \$12,450
5) Martinsdale Dam Drain Rehabilitation (Wheatland County) <i>DNRC</i>	\$100,000 (rank 42)			DNRC In-Kind \$29,525

III. JUSTIFICATION FOR 2011 BIENNIUM PROJECT PROPOSAL PRIORITIZATION

The following rehabilitation projects are prioritized by Montana Department of Natural Resources and Conservation (DNRC) according to the criteria identified by Sec. 85-1-704 (4) (MCA) listed in Appendix I of this report. The Renewable Resource Grant and Loan Program (RRGL), administered by DNRC, independently ranks project proposals using a set of criteria that includes priority consideration for water storage projects. A number of the projects addressed in this report are seeking partial funding from the RRGL Program.

1) Ruby Dam Rehabilitation Project (*Madison County*)

The Ruby Dam and Reservoir is located on the Ruby River, in Madison County approximately 7 miles south of Alder. The dam is owned by the DNRC and managed by the SWPB. The project has been operated by the Ruby River Water Users Association since the dam was built in 1938. Storage at full pool (top of the existing flashboards) is 37,642 acre-feet. 149 water users have 219 contracts for 38,845 acre/feet of water.

The spillway condition has been deteriorating for many years. An inspection conducted by the U. S. Army Corps of Engineers (COE) in 1981 found the spillway capacity inadequate and showing serious deterioration. For this reason, the COE classified the dam as unsafe according to the standards set forth under the National Dam Inspection Act, Public Law 92-367. The spillway has since deteriorated to the point that replacement of the entire structure is needed.

The proposed action calls for the construction of a new spillway with dimensions similar to the existing structure. The existing spillway would be removed. The new spillway will be designed to meet or exceed all current state dam safety requirements. The existing low level outlet control gate will be removed and the downstream portion of the outlet works conduit will be slip lined with a new control gate installed on the downstream dam toe. A new outlet terminal structure will also be constructed to replace the existing deteriorating structure.

Sedimentation has reduced the storage capacity of the reservoir by approximately 2,000 acre-feet over the past 70 years. In order to enhance and re-establish the original storage capacity of the reservoir, the proposed action calls for the spillway crest to be raised 7.0 feet above the existing flashboards, and the dam crest raised 4 feet. The action will increase the existing capacity of the reservoir from 37,642 (existing top of flashboards) to 45,115 acre-feet, providing an additional 7,473 acre-feet of storage (recovers the original water right plus 5,265 acre-feet). of which 2,600 acre feet is proposed to become an established minimum pool for the reservoir, and to support downstream fisheries and their beneficial uses.

The overriding goal of this project is to improve the efficiency, safety, and functionality of the dam for its continued use for agricultural irrigation and recreation. Public benefits from this project include providing reservoir water for agricultural irrigation, recreation, fisheries, and wildlife habitat. Greatly enhanced public safety is an additional and very significant benefit.

The estimated cost in 2007 dollars for this project is \$12 million. The Department is requesting an RRGL Program grant of \$100,000 (rank 9) and a loan of \$2,000,000. Other funding sources of the \$12M total may include a combination of general funds and Water Storage Account and Hydropower Earnings Account funding, including approximately \$132,000 of in-kind DNRC services. The proposal meets criteria 3 (a) (b) and (c) of the water storage statute.

2) Two-Dot Canal Rehabilitation Project (*Wheatland County*)

The Upper Musselshell Water Project located in Wheatland County is owned by DNRC and operated by the Upper Musselshell Water Users Association. This project includes three dams, two reservoirs, capturing a maximum of 30,134 acre-feet in storage, and five canals measuring 52 miles in length. The original project was completed in 1939. The 32-mile Two-Dot Canal carries water from the Musselshell River to Antelope Creek. The canal has deteriorated due to age and requires substantial rehabilitation. The canal is a critical component of the Upper Musselshell Project.

The proposed rehabilitation will stabilize potentially hazardous sloughing that is occurring on a hillside adjacent to U.S. Highway 12. Failure of the canal in this location would flood the highway and endanger the public. A \$100,000 RRGL Program grant (rank 25) is being requested. The DNRC will provide in-kind services totaling \$18,511, for a total project cost of \$118,511. The proposal meets criteria 3 (a) (b) and (c) of the water storage statute.

3) Deadman's Basin Terminal Outlet Replacement Project (*Wheatland County*)

Deadman's Basin Dam is located in Wheatland County, approximately 9 miles west of Ryegate, Montana (Figures 1 & 2). The dam, owned by DNRC and operated by the Deadman's Basin Water Users Association, was completed in 1941 and raised 10 feet in 1958. Annual inspections have reported seepage overtopping the outlet structure, erosion of material behind the outlet, excessive seepage and standing water on the downstream side of the dam, and deterioration of the outlet structure.

A relief ditch installed in the 1980s to alleviate the standing water has head-cut over the years and is now a possible route of soil piping. The exit gradient of the seepage at the downstream toe of the dam has a factor of safety below that required by State Dam Safety standards. The high exit gradient increases the potential for the movement of embankment materials and subsequent deterioration of the dam.

Project tasks include:

1. Remove the outlet structure, extend the conduit, and install a drainage system.
2. Build a new energy dissipating type of outlet terminal structure.
3. Build a 15-foot high toe berm with a filter blanket drain

The conduit extension will incorporate a seepage filtration collar to reduce the likelihood of sediment transport and piping.

DNRC is requesting an RRGL Program grant of \$100,000 (rank 40) and a loan for \$400,000 to contribute to the project. Additional funding includes \$514,500 from the Water Storage Account, and \$63,352 from DNRC in-kind contributions. The estimated total cost of the project is \$1,077,852. The design construction documents will be completed in 2008. The proposal meets criteria 3 (a) (b) and (c) of the water storage statute.

4) Nevada Creek Canal Design and Construction Project (*Powell County*)

Nevada Creek Dam is an earthen embankment dam located near Helmville in Powell County. The dam was completed in 1938 and is owned and operated by DNRC. Nevada Creek Dam is 105 feet high and 1,083 feet long. At normal full pool, the reservoir storage is 11,152 acre-feet.

The dam has two associated delivery canals, the North Canal and the Douglas Canal, both of which are in poor condition. The Douglas Canal is 12.6 miles long and the North Canal is 13.4 miles long. Stream channel migration and undercutting at the toe of the North Canal has raised concerns over stability issues. Other major issues that must be addressed are excessive seepage, over-steepened canal sections resulting in erosion and sedimentation, and site access.

The Douglas Canal has several locations showing severe seepage. The particular section proposed for lining under this grant is adjacent to Nevada Creek. The canal bank has shown some indication of sloughing in the past. If the canal bank were to fail in the subject reach, the canal water would dump into Nevada Creek, causing excessive environmental damage. The overall condition of the canals is promoting loss of water, increasing operations and maintenance costs, and is becoming a public and environmental hazard at certain locations.

DNRC's \$100,000 RRGL Program grant request (rank 64) will provide engineering services to model the delivery system, make recommendations on structural modifications throughout the system, provide a means to prioritize repair projects on both canals, and provide for some construction repairs. The proposal meets criteria 3 (a) (b) and (c) of the water storage statute.

5) Martinsdale Dam Drain Rehabilitation Project *(Wheatland County)*

Martinsdale Reservoir is located approximately 2.5 miles southeast of Martinsdale and was constructed in 1939. A large amount of seepage has historically occurred in the abutments of the North Dam since construction. Grouting programs conducted in 1941, 1962-63, and 1965 to control the seepage had limited success. Additional horizontal abutment drains were installed in 1985 to collect the seepage and improve the stability of the embankment. The configuration of the horizontal drain system makes it unsafe and difficult to monitor the drain flows. Accurate flow measurements are also difficult to obtain from the original toe drain system.

Additionally, sedimentation is occurring in the toe drain with no means to be accurately measured. Excessive seepage and sedimentation from the drains may indicate a potential problem within the dam, but this cannot be ascertained with the existing drain configuration. The need to measure drain flows and sedimentation rates is crucial to determining if rehabilitation is needed to keep the dam safe. In order to improve seepage collection and be able to make accurate measurements of drain flow rates and sedimentation transport volumes, rehabilitation of the drain structures is necessary.

The proposed work includes reconstruction of the drain systems to allow accurate and safe measurements of flow and sedimentation rates. The work includes adding manholes to the toe drain system for flow measurements and trapping sediment, and redirecting the outfall of the horizontal drain system further downstream which will allow for safe and accurate flow measurements of that drain system. Automated reservoir level instrumentation will be installed to allow continual monitoring of the reservoir. To address the remaining seepage, a right groin drainage system will be installed. The improved monitoring capabilities are required in order to comply with the current operating permit conditions. The total project budget is estimated to cost approximately \$129,525. A \$100,000 grant request has been submitted to the RRGL program and is ranked 42. The proposal meets criteria 3 (a) (b) and (c) of the water storage statute.

IV. ONGOING OR RECENTLY COMPLETED REPAIR OR REHABILITATION PROJECTS

Table 2. Recently Completed or Ongoing Water Storage Projects (2007 or 2009 Biennium)

Storage Project Name (County) Applicant / Owner	RRGL Grant Awarded 2007, 2009 Biennium	Water Storage Special Revenue Account	RRGL Loan	Other (Funding source)
State Owned Projects				
Ackley Lake Dam Rehabilitation (Judith Basin County) <i>DNRC</i>	\$100,000	\$300,000	\$200,000	Hydropower Earnings \$800,000
Flint Creek Siphon Rehabilitation (Granite County) <i>DNRC</i>	\$100,000	\$300,000	\$400,000	Hydropower Earnings \$320,000; NRCS Grant \$902,684
Middle Creek Automated Instrumentation (Gallatin County) <i>DNRC</i>	\$100,000			
Smith Creek Canal Lining and Rehabilitation Project (Lewis and Clark County)	\$100,000		\$50,000	
Nilan North Dam Outlet Repairs (Lewis & Clark)		\$105,000		
Deadman's Basin Outlet Structure Design (Wheatland County) <i>DNRC</i>		\$25,000		Hydropower Earnings \$50,000
Cataract Feasibility & Evaluation (Madison) <i>DNRC</i>				Hydropower Earnings \$75,000
Tongue River Dam Prototype Panel Repair Project (Big Horn) <i>DNRC</i>				\$152,000 – Remaining Tongue River Project Rehabilitation funds
Martinsdale North Dam Rip Rap Installation (Wheatland) <i>DNRC</i>	\$100,000 (2005)		\$92,000	Water users \$25,000 Hydro Earnings \$45,000
Frenchman Dam Rehabilitation Feasibility Engineering (Phillips) <i>DNRC</i>	\$100,000 (2005)			\$65,000 DNRC In-kind
Upper Taylor Dam Rehabilitation (Powell County) <i>Montana Dept. of Corrections</i> (MDOC)	\$80,000 (2003)			MDOC \$ 23,449
Monitoring Instrumentation for State-owned Dams <i>DNRC</i>				General Fund \$5,000 per year

Non-State Owned Projects				
Lake Frances East Dam Rehabilitation (Pondera) <i>Pondera County Canal Co.</i>				\$5000 – private grant and loan program; remainder privately funded
Carter Ponds Dam Reconstruction (Fergus) <i>Private w/ FWP Access</i>	\$100,000 (2007)			
Beaver Creek Dam (Hill) <i>Hill County</i>	\$100,000 (2007)			Hill County Reserves \$169,749
Mill Lake Dam Rehabilitation (Ravalli County) <i>Mill Creek Irrigation District</i>	\$100,000 (2003)		\$472,000 (2003)	Mill Creek I.D. \$290,487 (spec.) Mill Creek I.D. \$98,315 (in kind) Mill Creek I.D. \$25,498 (O&M)
Vandalia Dam (Valley) <i>Glasgow Irrigation District</i>	\$100,000 (2005)			

Ongoing or Recently Completed Projects

State-Owned Rehabilitation and Repair Projects

The following section contains current information concerning state owned projects that were in progress when reported in the 2007 Governors Report on Water Storage, or were started during the past two years. Some projects have been completed during the last two years, while work on others is expected to continue into the next biennium.

Ackley Lake Dam Rehabilitation (*Judith Basin County*)

Ackley Lake Reservoir is owned by DNRC, with daily operations and maintenance the responsibility of the Ackley Lake Water Users Association. The dam and canal system was constructed by the State Water Conservation Board in 1938. Water from the reservoir is used for irrigation and recreation. The dam and reservoir are located in Judith Basin County approximately 10 miles south of Hobson.

The construction phase of the rehabilitation project, which includes installation of a toe berm and drain system, began in September 2008. The rehabilitation of Ackley Lake Dam will bring this high hazard project into full compliance with Montana Dam Safety regulations. The project is schedule for completion by December of 2008.

The Flint Creek Siphon Rehabilitation (*Granite County*)

The Flint Creek Siphon is a 54-inch diameter, 4,056 foot-long steel pipe installed in 1938 and owned by DNRC. Water stored in East Fork of Rock Creek Reservoir is diverted from East Fork of Rock Creek, below the dam, over a divide to the Flint Creek drainage where it is used for irrigation of lands located between Phillipsburg and Drummond. The rehabilitation project, which will replace the old pipe with a new one, began in August 2008. Completion is scheduled for December 2008.

Middle Creek Dam Automated Instrumentation (*Gallatin County*)

Middle Creek Dam is located approximately 15 miles south of Bozeman in the headwaters of Hyalite Creek in the Gallatin Range. The purpose of this project was to enhance the current dam safety program at Middle Creek Dam, by (1) Installing an automated instrumentation system at the dam to improve the ability of DNRC to monitor and evaluate both reservoir operations and embankment performance, and (2) Evaluating the feasibility and cost of installing an early warning instrumentation system that would alert emergency response personnel in the event of a dam failure. The installation of the automated instrumentation began in September 2008, with completion scheduled by June of 2009.

Smith Creek Canal Seepage Abatement and Rehabilitation – Nilan Dam (*Lewis & Clark*)

The Nilan Dam Water Project is owned by the DNRC and operated by the Nilan Water Users Association. The Project was originally comprised of a 10,092 acre-feet, off-stream reservoir, a 5.5 mile-long supply canal, and three delivery canals, totaling 23.5 miles in length. Storage water carried by the supply canal is provided by two sources, Smith Creek and Ford Creek. The Smith Creek branch of the supply canal is 3.7 miles long. The construction of the original project was completed in 1951, and ownership of the 16.5-mile Florence Canal was transferred to the water users in 1995. The rehabilitation project is scheduled to begin in September 2008. Approximately 5,000 feet of the canal will be reshaped and graded, with 1,600 feet lined. The project is scheduled for completion by December 2008.

Nilan North Dam Terminal Outlet Structure Repair (*Lewis & Clark County*)

The Nilan North Dam is located 6 miles west of Augusta in Lewis & Clark County. The dam is owned by DNRC with daily operations and maintenance undertaken by the Nilan Water Users Association. The reservoir can store approximately 10,000-acre feet of water at full pool. The reservoir is a popular recreation area, with fishing the primary attraction.

The repair work included replacing the outlet structure and installing filters and drains at the outlet terminal structure to control and collect seepage. The outlet structure at the North Dam was in very poor condition structurally and had deteriorated to the point that additional small repairs and patching were not economical or feasible. There was also a considerable amount of seepage that exited in the location of the outlet. The new drain installation encircles the end of the conduit to safely discharge seepage water.

The rehabilitation provides a safe outlet structure and will control seepage at the dam. The repairs and improvements will enhance the longevity of the dam, promote effective water conservation, and greatly enhance public safety. The project was completed in the spring of 2007 for a cost of approximately \$126,083.

Deadman's Basin Outlet Structure Design (*Wheatland County*)

Deadman's Basin Dam and Reservoir are located in Wheatland County approximately 18 miles east of Harlowton. The dam is owned by DNRC and operated and maintained by the Deadman's Basin Water Users Association. The earth-fill dam is 60 feet high, has a crest length of 1,490 feet, and impounds 76,900 acre-feet of water at full pool. The stored water is used for irrigation and some minor municipal uses. Recreation is also a major benefit of the reservoir, although no specific allocation to this use currently exists. The dam was completed in 1941.

Western Water was awarded the contract for the design. A final design was submitted in September 2008. A RRGL Grant and Loan request has been submitted to help fund the construction phase of the project, which is tentatively scheduled for 2009, pending 2009 legislative funding approval.

Cataract Creek Dam Feasibility and Alternative Evaluation (*Madison County*)

Cataract Creek Dam is located in Madison County, about two miles southwest (upstream) from the Community of Pony and eight miles southwest of the Town of Harrison. The reservoir is fed by Cataract Creek, which originates 2.3 miles southwest of Cataract Creek Dam at Mason Lake. The Cataract Water Users Association operates the dam. The earth-fill dam was completed in 1959. HKM Engineering of Billings was awarded the contract for the feasibility study which is scheduled for completion by winter 2009.

Tongue River Dam Prototype Panel Repair Project (*Big Horn County*)

Tongue River Dam is located in Big Horn County on the Tongue River and is owned by DNRC and operated by the Tongue River Water Users Association. The Prototype Panel Repair Project involves the repair of damaged concrete on the pre-cast panels of the emergency spillway. Various prototype repairs were installed. The performance of these repairs is being evaluated over several seasons with varying weather conditions. The most effective, durable, and economical repair will be selected and implemented over the remainder of the spillway. This project was funded with \$152,000 in private funds obtained from a settlement from the Tongue River Dam Rehabilitation.

Martinsdale North Dam Rip Rap Installation (*Wheatland County*)

Martinsdale Reservoir is an off-stream storage project owned by DNRC and capable of storing 23,348 acre-feet of water. The reservoir is located about 2.5 miles southeast of the Town of Martinsdale. Water from the reservoir is used primarily for irrigation water supply, but is also used for water-based recreation. The reservoir, completed in 1939, includes two earthen embankment dams (East Dam and North Dam). The dams are classified as high hazard.

The outlet works is located through the North Dam near the right abutment. It consists of an intake structure, a 60-inch diameter reinforced concrete pipe tunnel, a dry tower with an operating gate and an emergency gate, and an outlet structure. The inlet to the outlet conduit has had a recurring problem with plugging from sediments. The inlet structure plugged in 1989, 2000, 2001, and 2002. The most serious incident occurred in September 2000. The plug was eventually removed by water jet cleaning of the outlet conduit from the downstream side of the outlet conduit, and pumping water into the inlet tower. About 200 cubic yards of sand, silt and gravel was removed from the outlet conduit and intake structure. Since 2000, significant funds have been spent unplugging the conduit and excavating sediment from around the intake structure.

DNRC assembled a funding package including a 2005 \$100,000 RRGL grant, a \$92,000 RRGL loan, \$45,000 from the Hydropower Earnings Account, and \$25,000 from the water users association. The project involved draining the reservoir, reshaping the area surrounding the inlet structure, and armoring the slope with rock. The project was completed in the spring of 2008.

Frenchman Dam Rehabilitation Feasibility Pre-construction Engineering (*Phillips County*)

Frenchman Dam is located about 22 miles north of Saco, in Phillips County. The project is situated on Frenchman Creek, a tributary of the Milk River. The drainage area of the project encompasses 2,460 square miles. The DNRC-owned dam is operated and maintained by the Frenchman Water Users Association. The dam is 44 feet in height and 2,100 feet long, with a dike on the west end that is 8 feet tall and 1,000 feet long. The original earth-fill dam was completed in 1951.

The dam failed on April 15, 1952 due to very high stream flows resulting from rapid snowmelt and a very rapid filling of the reservoir. The dam was reconstructed in 1952-1953 with a larger spillway and revisions to the seepage cutoff. Annual dam safety inspections have revealed voids that developed over time beneath the spillway. DNRC received an RRGL Grant in the amount of \$100,000 from the 2005 Legislative session and \$65,000 was provided by in-kind services from DNRC.

DNRC staff has initiated a rehabilitation feasibility study for the rehabilitation of Frenchman Dam. An engineering consulting firm was selected and conducted a hydrologic and water availability analysis. A drilling company was contracted to perform the borehole drilling and sampling. State Water Projects staff conducted the on-site geotechnical and geologic oversight during the drilling operations. Work was completed by late fall 2006. State Water Projects staff will finalize the feasibility study by December 2008.

Upper Taylor Dam Rehabilitation (*Powell County*)

The Montana Department of Corrections owns and operates Upper Taylor Dam. The dam is located on property of the Montana State Prison west of the City of Deer Lodge and is 40 feet in height and holds 300 acre-feet of water. The dam is used for irrigation by the State Prison Ranch.

Taylor Dam's principal and emergency spillways were grossly undersized and the corrugated metal outlet pipe has reached the end of its design life. Significant corrosion of the outlet pipe could lead to failure of the entire dam.

The Department of Corrections received a grant from the RRGL Program from the 2001 Legislature for engineering services to develop a rehabilitation design for Upper Taylor Dam. In 2003, the Department of Corrections received an RRGL grant of \$80,000 to fund one-third of the needed cost for repair. The remaining two-thirds of the necessary funding came from proprietary State Prison Ranch funds and machinery with labor provided by the Job Corps as part of a training program.

The work included the addition of an enlarged, rock-lined emergency spillway and slip lining of the current outlet pipe. The slip lining of the outlet pipe was completed in November 2006 and the rehabilitation was completed in fall of 2008.

Monitoring Instrumentation for State-Owned Projects (*Statewide & ongoing*)

Seepage monitoring is required as a condition of the operating permits for all dams regulated by the Montana Dam Safety Program. Twenty-two DNRC dams are regulated under the MT Dam Safety Program and have monitoring wells installed. The SWPB is currently upgrading the seepage monitoring data collection systems on DNRC's projects as funding allows.

To date, instrumentation systems have been installed on Tongue and East Fork Dams including new data loggers and other associated equipment. Instrumentation improvements are on-going at Middle Creek Dam. At locations where these systems are not in place, measurements are taken by hand. The data is collected monthly, reviewed and compared to historical trends. The ongoing process meets criteria 3 (a), (b), and (c) of the water storage statute.

Canal Operations

The DNRC State Water Projects Bureau Canal Operations Program is responsible for identifying and correcting operational deficiencies of 250 miles of state-owned canals. Major ongoing or recently completed activities include the following:

- Deadman's Basin Supply Canal – Additional lining was installed on the canal to remediate flood damage sustained in the spring flood of 2005. An extremely pervious reach of the canal, 2000-feet in length, will be lined by October, 2008.
- Smith Creek Supply Canal – A design, which will repair flood damage incurred by the canal in 2005, was completed. Approximately one half mile of the canal will be rehabilitated and lined with an EPDM membrane. Completion is anticipated in November, 2008.
- Martinsdale Outlet Canal – A concrete wing wall was replaced on a large chute-type drop structure, Drop Structure #2. The canal prism was lined for a distance of two hundred feet upstream from the drop structure in order to protect the soil supporting the drop structure from eroding. This work was completed in 2007.
- Flint Creek Main Canal – A construction contract was awarded to replace the 70-year-old East Fork Siphon. The existing 4000-ft, 54-inch diameter, steel conduit was replaced by a 48-inch diameter PVC pipe. Completion is scheduled for November, 2008.

Trust Lands Dam Inspection Program

Over the past two years, DNRC's Trust Lands Management Division (TLMD) has worked with the Water Resources Division to bring dams located on School Trust land into compliance with the Montana Dam Safety Act. The majority of dams located on School Trust lands were built by state land lessees in the 1950s and 60s and are aging and in need of repair. (See Figure 2) Several have potential to cause downstream loss of life should they fail. In some cases, as leases have been abandoned, DNRC has become the default responsible party for the dam as land owner. In order to document the magnitude of the problem, the Montana Dam Safety Program requested \$15,000 from the Federal Emergency Management Agency (FEMA) to: 1) Determine how many dams are located on trust lands; and 2) Assess the condition of a representative number of dams. An engineering student was hired to develop a GIS database of trust lands dams. A professional engineer was also hired to conduct inspections and report on the condition of the 176 dams inventoried and identified to be on State School Trust lands. Between July 2006 and May 2007 18 dams, chosen based upon location near population or the existence of known problems, were inspected. Although problems encountered in the 18 dams cannot be assumed to be proportionally representative of all Trust Land dams, conclusions can be drawn reasonably by examining this small percentage of dams.

Key findings include:

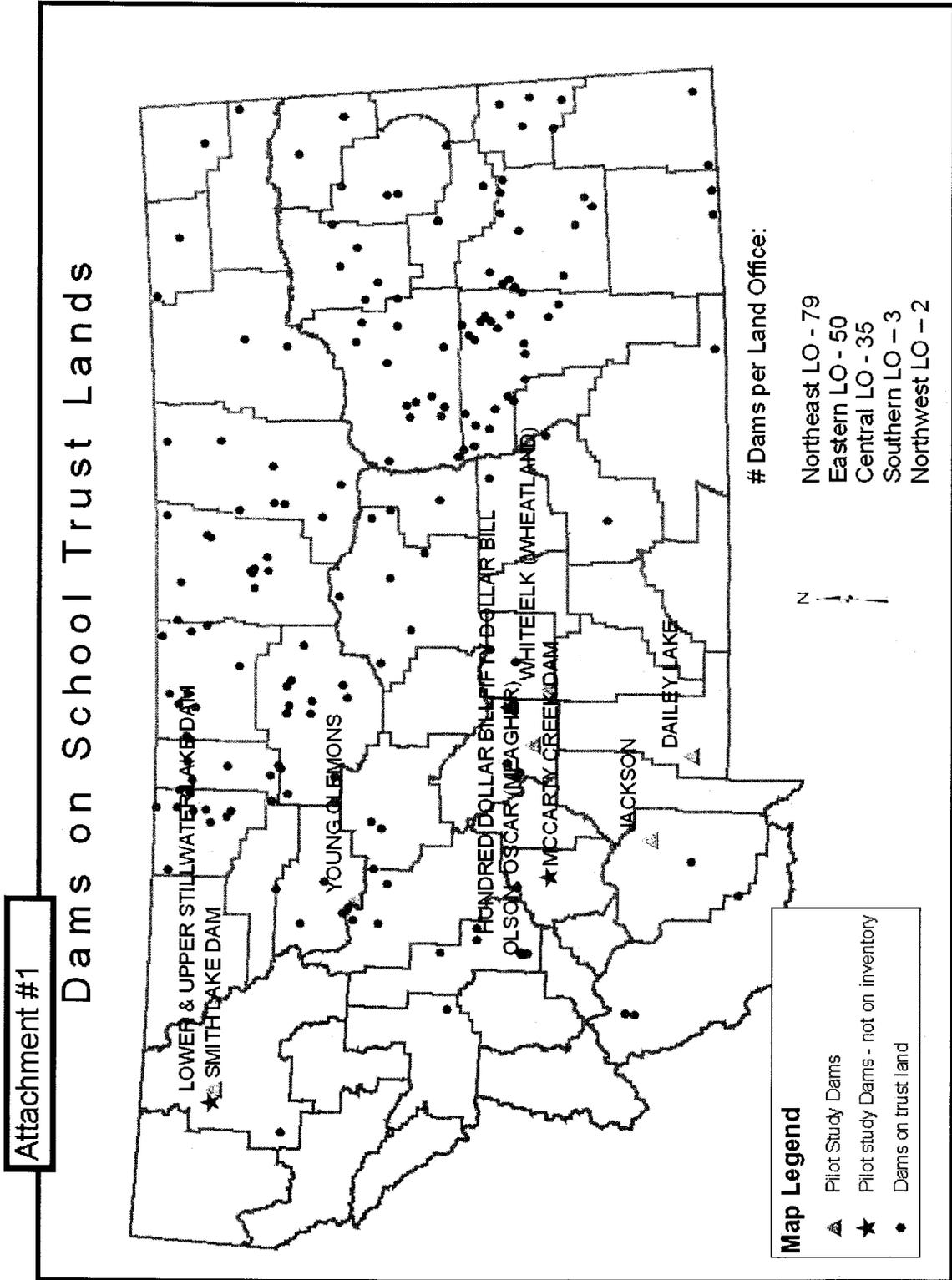
1. Outlet works are at the end of their useful life: Seventeen of the 18 dams have a corrugated metal pipe (CMP) outlet. CMP outlets reach the end of their design life in 30 years. Six of 7 recorded dam failures in Montana in the past 5 years were caused by failure of deteriorated CMP.
2. Potential for loss of life: Thirteen of the 18 dams have roads or occupied dwellings downstream. For dams with capacity greater than or equal to 50 acre-feet, a high hazard classification application must be submitted to the DNRC Dam Safety Program. For dams with capacity less than 50 acre-feet, an informal hazard assessment is necessary. An emergency action plan should be immediately developed for each dam with potential for loss of life downstream, regardless of capacity.
3. Lack of maintenance: All of the dams need maintenance. Lack of maintenance, such as tree and rodent removal and upstream slope protection is the cause of many failures or near failures nationwide (a rodent hole caused a dam in Garfield County to fail in 2002).
4. Compliance with Montana Dam Safety Act: Major repairs were done on 2 of the 18 dams without proper permitting or notification of Trust Lands. State law requires that dam owners submit a hazard classification application to the DNRC Dam Safety Program before proceeding with major dam repairs to any dam with a 50 acre-feet or greater capacity. For dams with a capacity less than 50 acre-feet, repairs should be coordinated with the Trust Lands Management Division.
5. Legal liability: DNRC Trust Land Management Division (TLMD) may be liable for any damages caused by a dam failure regardless of permitting status or capacity of dam.
6. Need for major repairs: Eleven of the 18 dams require major repairs, which could be very costly. Breaching a dam susceptible to failure may be a preferred alternative to repair.
7. Dam inventory updating: Three of the 18 Trust Land dams inspected were not on the dam inventory. The number of dams on Trust Lands could be greatly underestimated.

Conclusion/Recommendations

The majority of dams located on State School Trust lands are in need of maintenance, repair, rehabilitation, or breaching. The potential for loss of life from failure of the dams is unknown, but could be significant. DNRC could be held responsible for damages should dam failure occur. Trust Lands Management Division should initiate a program within the next two years to bring dams located on School Trust lands up to current dam safety standards. The Trust Land Dam Program should include the following components:

- 1) Outreach: Communicate current dam operation procedures, maintenance standards and requirements of state law to lease holders;
- 2) Identification & Assessment: Inventory all dams located on state lands and identify downstream hazards;
- 3) Compliance: Bring dams into compliance with the Montana Dam Safety Act;
- 4) Inspection: Conduct periodic inspections of dams (both state and lease holders); and
- 5) Repair or Removal: Hazardous dams must be repaired or breached. A funding mechanism must be in place to repair or remove potentially hazardous dams abandoned by lease holder.
- 6) To accomplish the forgoing tasks, DNRC is proposing retaining (1) FTE dam safety engineer through the EPP process to be located within DNRC.

Figure 2. Dams on School Trust Lands



Non-state owned Rehabilitation and Repair Projects

Lake Frances East Dam Rehabilitation (*Pondera County*)

Lake Frances is located in Pondera County, near the Town of Valier. The North and East dams, measuring twenty and sixty feet in height, create the reservoir. The Pondera County Canal and Reservoir Company owns both dams, which were constructed in 1908-1909. Storage capacity is 105,000 acre-feet, which is considered large for a privately owned reservoir. The stored water is used for irrigation, municipal use by the City of Conrad, and for recreation by the general public. Both dams are classified as high hazard since the failure of either structure presents the potential to cause loss of life and property damage.

The outlet works on the East Dam have been slowly deteriorating over time. In 2002, an extensive grouting program was conducted to seal voids in the earthen embankment. It is believed that slow piping of material into the outlet conduit caused the voids. In 2003, the outlet conduit and gate tower were sampled to evaluate the condition of the concrete. Originally, it was thought that complete outlet replacement would be needed. However, after additional investigation, it was determined that the outlet could be rehabilitated.

A two-phase rehabilitation approach was used. Phase I, completed in 2007, involved the addition of a downstream drainage system and berm. Phase II, completed in 2008, focused on the upstream section of the dam with the construction of a new outlet tower and replacement of the upstream conduit and intake structure. HKM Engineering completed the design and oversaw construction.

Carter Ponds Dam Reconstruction (*Fergus County*)

Upper and Lower Carter Pond Dams are located about six miles north of Lewistown. The Carter Ponds are widely used by the local community for fishing and recreation. The ponds also provide waterfowl habitat, storm water retention, and stock water. Each pond has a Montana Department of Fish, Wildlife, & Parks (FWP) fishing access site. The dams and most of the shoreline are privately owned, but a walk-in public easement surrounds both reservoirs. The upper pond site has been developed with a restroom, gravel boat launch, and picnic tables. The lower site is not developed. Fishing use is substantial with about 1,600 angler-days each year.

Early in 2004, the trickle tube on the lower dam collapsed, but the dam did not fail. In July 2004, the upper dam had a gradual failure due to pipe corrosion. DNRC recommended reconstruction or breaching of both dams. A rural fire hydrant that serves 200 to 300 people located at Upper Carter Pond was not functioning due to low water. The community was distraught at the prospect that the dams would require breaching.

The Fergus County conservation district in cooperation with Ducks Unlimited, a private landowner; local, state, and federal entities received an RRGL grant in 2007 (rank 22) of \$100,000 to match other funds being raised for the repair of both dams. The reconstruction was completed in summer of 2008 and each dam will now store approximately 140 acre-feet of water. The project was an example of how parties of interest could join together and save a project with multiple community and wildlife values.

Beaver Creek Dam – Seepage Control Berm (*Hill County*)

Beaver Creek Dam is located on Beaver Creek approximately 13 miles south of Havre. The dam is owned and operated by Hill County and provides flood control, recreation, irrigation, and fish and wildlife benefits for the residents of Havre and surrounding community. The project was planned, designed and funded by the Natural Resources Conservation Service (NRCS) under the authority of the Watershed Protection and Flood Prevention Act (PL-566). Hill County also provided funds for the project. Construction was completed in 1974. The dam is considered to be a high hazard structure and is regulated by DNRC.

Periodic inspections raised several concerns with seepage on the right abutment and with operation of the outlet works. In 2001 RRGL funds were awarded Hill County to hire an engineer to study repair options. Hill County contracted with HKM Engineering to evaluate problems at the dam. HKM developed alternatives for repair of the outlet works and preliminary design for repair of the right abutment seepage.

Seepage in this area has been a persistent concern since dam was constructed. Recent data collection efforts have shown that seepage pressure in the foundation is higher than originally anticipated. Engineers that have studied the data are in agreement that the seepage poses a serious threat to the stability of the dam. DNRC subsequently put a condition on the operation permit for the dam that the seepage problem must be addressed before 2009.

Hill County received an RRGL grant of \$100,000 (rank 17) in 2007 for final design and construction of a stability berm and drainage system on the right abutment of the dam. Hill County provided cost share funds in the amount of \$169,749. Several monitoring wells were drilled in summer 2008 and data will be collected for one year for adequate information to design and construct the berm.

Mill Lake Dam Rehabilitation (*Ravalli County*)

Mill Lake Dam is located in the Selway-Bitterroot Wilderness Area and is located approximately fifteen miles west of the Town of Hamilton. The dam is owned by the Mill Creek Irrigation District, regulated by the U.S. Forest Service, and stores water used for irrigation. The dam, built in 1908, is an unsafe, high hazard dam in need of rehabilitation to meet standards of the Montana Dam Safety Program. The dam spillway is unable to convey the Probable Maximum Flood, which is a requirement of the U.S. Forest Service. Repairs to this dam are challenging due to Forest Service restrictions regarding activities permitted within wilderness areas.

Mill Lake Dam was experiencing excessive seepage around the outlet pipe and embankment. In 2005, the outlet works was slip lined, the upstream face of the dam was lined and rip-rapped, and the deteriorated outlet pipe was slip-lined to alleviate seepage and a possible resulting dam breach. During the fall of 2007, a new inlet structure and outfall, including a measuring device, were installed. Additionally, early warning instrumentation was installed, and a portion of the dam crest was replaced with rock-filled gabion baskets. The third phase of the project includes the removal and replacement of riprap on the upstream face of the dam, lining of the upstream face of the dam, and spillway improvements. Phase three bids are currently being evaluated, and construction is scheduled for the summer and fall of 2009. Financing for the final phase of the project will include the balance of a \$100,000 Renewable Resource Grant and a \$572,000 Renewable Resource Loan that was authorized by the 2003 Legislature.

Vandalia Dam Rehabilitation (*Valley County*)

Vandalia Diversion Dam is located on the Milk River, about three miles west of Vandalia, in Valley County. The dam diverts water into Vandalia Main Canal for irrigation of land in the vicinity of the towns of Vandalia, Tampico, Glasgow, and Nashua. The dam has been in continuous use since it was constructed in 1917. The Glasgow Irrigation District (GID) and the US Bureau of Reclamation have performed regular maintenance and safety inspections over the years. An engineering analysis of the structure resulted in recommendations for repairs in several phases.

The primary goal of the project is to preserve the integrity and increase the service life of Vandalia Diversion Dam. A secondary goal is to conserve the water resources available to GID. Reduction of losses due to seepage and spilling will increase usable supply for district members and other upstream users. The 2005 legislature authorized a \$100,000 grant for the Glasgow Irrigation District to complete Phase III of repairs to Vandalia Dam. The project was contracted in the spring of 2008. Originally the project was to replace struts and walkways on the dam. An engineering study indicated that more immediate needs were to repair two dam gates and install a new seal on the gates and repair corroded concrete on the surface of the dam. Struts and walkways will be replaced if excess funds are available. The project is expected to be completed by December 2009.

V. HYDROPOWER

The State Hydropower Program administers the development and operation of hydropower facilities on state-owned water projects. To date, one hydropower facility, the Broadwater Power Project near Toston, has been built. With a maximum capacity of 10 megawatts, the Broadwater Project began generating power in June 1989. DNRC owns and operates the facility and contracts with NorthWestern Energy to sell the energy.

Earned revenues are used to help finance the rehabilitation of other State Water Projects Bureau (SWPB) water projects. In an average year (assuming mean precipitation runoff), the facility is capable of generating roughly 56 million kilowatt-hours of electricity and earns roughly \$3.5 million in revenue from energy and capacity sales. After debt payments and operating expenses, approximately \$1.3 million is available to rehabilitate state-owned dams.

Most of the water storage projects managed by the SWPB were completed in the late 1930s and early 1940s and have significant needs, either via spillway capacity, long-term seepage issues, or simply structural deterioration over time. The earned revenue from Broadwater is critical for maintaining and repairing these structures so they meet current safety standards and codes. Statistics concerning the Broadwater Power Project during are shown in below.

Broadwater-Missouri Power Project in FY 2007	
Operating availability	99%
Gross energy generation kilowatt-hours	48,908,739
Gross revenue from sales	\$3,503,190
Investment income	\$174,264
Operating costs	(\$455,902)
Bond payments	\$1,849,750
NET REVENUE	\$1,371,802

Recent Accomplishments

The implementation of major projects designed to resolve problems and enhance operations and maintenance was completed with the Spillway Bridge Replacement Project of 2006. Ongoing minor projects by the operation and maintenance staff include warehouse improvements, camera surveillance system, tool inventory and organization, and writing standard operating procedures for future reference. Some original equipment will require major repair and /or replacement including the main or turbine shaft seal. Staff and its consultants recently completed the Federal Energy Regulatory Commission (FERC) 5-Year Dam Safety Inspection and Report and Potential Failure Mode Analysis, and prepared the Strategic Technical Information Document. Preliminary feasibility studies for retrofitting other state water projects with hydropower are also being undertaken as market prices for electricity continue to rise.

State Water Storage Projects Hydropower Retrofit Program

Legislative authorization was given to DNRC's State Water Projects Bureau (SWPB) in 1981 to study the feasibility of constructing and operating small-scale hydropower on each of the state-owned water projects (Title 85, Chapter 1, Part 5). The legislation was the State's response to a national movement to develop new sources of energy within our own borders. According to the MCA statutes, if a potential hydropower project is feasible, the Department may develop the project's hydropower potential through leases with private parties as a first option, or through its own direct effort if leases are deemed unworkable.

In response to the legislative authorization, the SWPB completed numerous feasibility studies on its water projects in the 1980's, culminating in the construction of the Broadwater Power Project, which has a peak capacity of 10 Megawatts. Other state water projects that were studied in the 1980's had a combined total peak capacity of 15MW. In 1995, the SWPB updated the feasibility study for Tongue River Dam to coincide with the planned dam rehabilitation project. At that time, the project was deemed not feasible due to low market prices for electricity. The SWPB is currently assessing the feasibility of hydropower for the Ruby Dam Project to take advantage of possible cost savings from combining the dam rehabilitation project with construction of a hydropower facility.

While market energy prices were relatively low through the 1990's, generally speaking, prices have risen substantially since utility deregulation in Montana. As market prices continue to rise, the SWPB will continue to reassess hydropower potential on state water projects. Funding and staffing may limit the size of the effort.

VI. APPENDIX

A. Water Storage Policy and Statutory Criteria

The 1991 Montana Legislature passed into law a policy to define when water storage is the best solution for solving specific water problems. When storage is determined to be the best alternative, the policy identifies criteria to use in ranking state-funded projects. (Sections 85-1-701-704 MCA).

85-1-703. Water storage policy

(1) The legislature recognizes that water resources needs are growing, existing water facilities are aging and in need of repair, and new water storage projects have become more difficult to complete. Other types of actions will be needed to solve many emerging problems, but if storage is the best way to meet growing water needs and solve problems, it should be actively pursued.

(2) In determining the best solution for a particular water management problem, the state shall:

- a. carefully define the problem;*
- b. identify all options to solve the problem, including water storage;*
- c. determine whether water is physically and legally available to solve the problem; and*
- d. select the option that best meets the following criteria:*
 - i. technical feasibility*
 - ii. financial feasibility*
 - iii. economic feasibility*
 - iv. political feasibility*
 - v. legal feasibility, and*
 - vi. environmental feasibility*

85-1-704 Water Storage Project Prioritization Policy

The statute calls for this report to the legislature and describes its requirements. The statute also identifies different criteria to be used to prioritize new water storage projects, storage rehabilitation projects, and budget priorities for the allocation of state water storage development funds. Section 85-1-704 Prioritization of water storage projects - governor's report, states:

(1) The governor shall submit to each regular session of the legislature a report identifying specific water storage projects proposed for development, including the rehabilitation of existing projects and new project proposals. The report must contain:

- a) a list of water storage project priorities;*
- b) an implementation strategy for each priority project that identifies the resources (including specific budget requests), government actions, and other actions needed to accomplish the project;*
- c) a progress report on the development of water storage projects during the previous 2 years.*

(2) In setting priorities among new water storage projects, the governor shall consider whether a project:

- a) solves a severe water problem;*
- b) provides multiple uses and benefits;*
- c) provides for public uses;*
- d) shows strong evidence of broad citizen support;*

- e) *is able to obtain non-state sources of funding;*
 - f) *protects and seeks to enhance social, ecological, cultural, aesthetic values;*
 - g) *improves local and state economic development;*
 - h) *could resolve Indian and federal reserved water rights issues;*
 - i) *supports water conservation activities; and*
 - j) *promotes the use of water reserved under Montana law.*
- (3) *In setting priorities among water storage rehabilitation projects, the governor shall consider whether the project:*
- a) *is needed to protect public safety;*
 - b) *has impacts if not repaired or rehabilitated; and*
 - c) *accomplishes the goals listed in subsection (2)(a) through (2)(j).*
- (4) *In establishing budget priorities for the allocation of state storage development funds:*
- a) *First preference must be given to projects that resolve threats to life and property posed by high-hazard facilities that are in an unsafe condition;*
 - b) *Second preference must be given to projects that improve or expand existing water storage facilities; and*
 - c) *Third preference must be given to the planning and construction of new water storage facilities.*

B. State Water Storage Project Fact Sheets

Persons with disabilities who need an alternative accessible format of this document should contact:

Montana Department of Natural Resources and Conservation
Water Resources Division
1424 9th Ave.
P.O. Box 201601
Helena, MT 59620-1601
Phone: 406-444-6601/Fax: 406-444-0533

Tonque Dam



<http://dnrc.mt.gov/wrd>

Montana Department of Natural Resources and Conservation
Water Resources Division
1424 9th Ave
P.O. Box 201601
Helena, MT 59620-1601

Phone: 406-444-6646
Fax: 406-444-0533



RUBY DAM

Fact Sheet

PROJECT DESCRIPTION

- Located on the Ruby River, in Madison County, 7 miles south of Alder
- Owned by DNRC and operated by Ruby Water Users Association since 1938
- Project consists of:
 - Earthen Embankment Dam, 111 feet high, 846 feet long
 - Reinforced concrete chute spillway
 - Gated, reinforced concrete 90" outlet conduit
 - Constructed in 1938
 - Storage at full pool is 37,612 acre-feet, covering 970 surface acres.
 - Two canals deliver water to purchasers: West Bench, 12 miles long, 85cfs capacity;
 - Vigilante,
26 miles long, 115 cfs capacity
 - 191 water users have 225 contracts for 38,845 acre/feet of water

ECONOMIC VALUE TO THE RUBY VALLEY

- Affects 40,000 acres in the Ruby Valley
- Directly affects the Jefferson River especially late season flows
- Agricultural value of approximately \$9.6 million/year
- Recreational value of approximately \$2.6 million/year
- Approximate difference of \$3,000/ac. between irrigated land and dry land

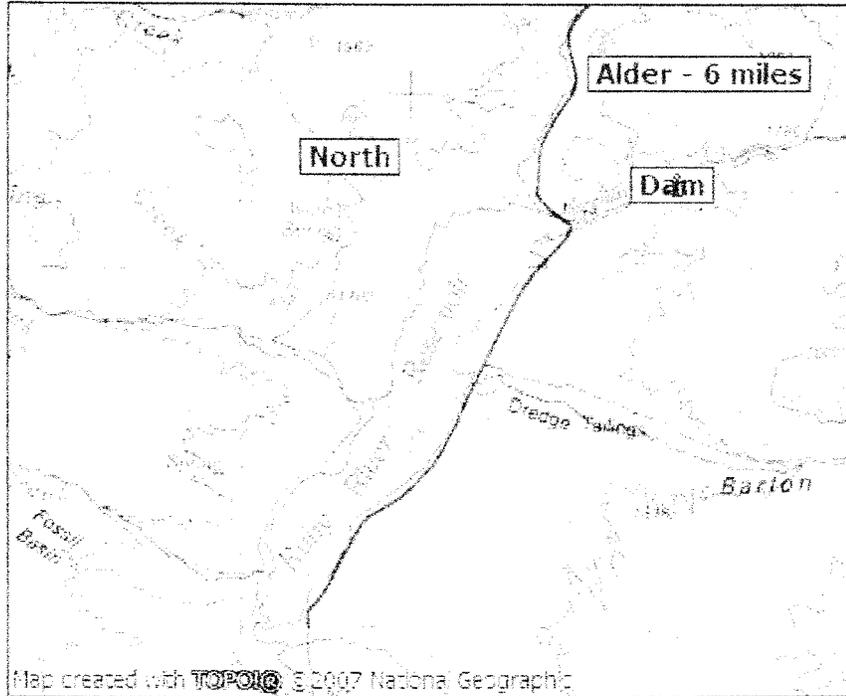
PROJECT DEFICIENCIES

- Severe concrete deterioration exists in the spillway floor and walls. Spillway replacement is needed to correct the deficiencies.
- Excessive seepage may threaten the structural integrity of the spillway.

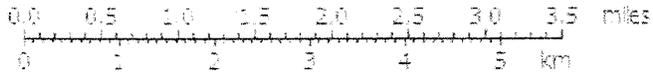
PROPOSED ACTIONS TO ADDRESS DEFICIENCIES

- A feasibility study to evaluate the problems at Ruby Dam at Ruby Dam was completed in 2007 by HLM Engineering of Billings. The \$285,000 feasibility study cost was authorized by the 2006 Legislature and paid by the DNRC.
This project is in need of major rehabilitation. The preferred alternative identified in the feasibility study for rehabilitation, which includes a new spillway, outlet conduit, drains, access road and additional storage that could be marketed for beneficial uses, will bring the dam into full compliance with current safety and design standards and greatly reduce the state's liability.
- The proposed rehabilitation will also allow for future hydropower development.

Estimated Cost:
\$13,000,000



**NATIONAL
GEOGRAPHIC**



To the Honorable Senators and Representatives of the Great State on Montana:

As we are all well aware, water is the lifeblood of the semiarid intermountain west. The Ruby River serves that purpose in the Ruby Valley and the Ruby Reservoir provides a critical stabilizing force in maintaining both irrigation and in-stream flows in the Ruby. In fact, members of the Jefferson River Watershed Group have credited the Ruby with providing sustained flows in the Jefferson during critical periods. The Ruby Reservoir is a vital agricultural and recreational resource to the region and the continued operation and maintenance of the dam is imperative.

The highly anticipated rehabilitation of the spillway and outlet works is necessary to provide safe maintenance and operation of the dam. Reduced storage capacity in the reservoir due to safety concerns would not only adversely affect agriculture in the area it would have a detrimental impact on the economy of the region.

My family has ranched in the Ruby Valley since 1866. My father worked on the construction of the Ruby Dam and I currently serve on the board of the Vigilante Canal. We own a ranch in the valley and I represent the interest of several other ranch owners in the valley through a business named Ranch Resources. There is no doubt in my mind, or in the minds of my clients, that the continued safe operation of the Ruby Reservoir is paramount in the functioning of the river system that we all depend on.

Only two other events in the recorded history of the Ruby Valley could compare in magnitude to the effect that the loss of the Ruby Reservoir would have on our economy. The first was the discovery of gold in Alder Gulch and the second was the construction of the Reservoir and canals. Both of those events brought an era of prosperity to the region. The inability to store water and stabilize flows for irrigation and recreation would bring unprecedented economic hardship to the Ruby Valley. At the time of construction, the water stored in the reservoir provided supplemental irrigation to 20,000 acres and new irrigation to 14,000 acres. If irrigation was lost to the 14,000 "new" acres and an annual lease rate of \$50 per acre was assumed, there would be an immediate annual impact of \$700,000 in lost agricultural value. If in fact every dollar is turned over four times in a small community, the local impact by the loss of irrigation alone would be \$2.8 million annually. The affect on the recreation related businesses would be just as substantial.

My roles as chairman of the Ruby River Watershed council and executive director of the Ruby Habitat Foundation allow me the privilege of a broad perspective of the effects of stored water. Agriculture, wildlife, sportsmen, local businesses and Montanans in general have benefited from the past 70 years of service by the DNRC and its predecessors, cooperating with the water users, in the operation of the reservoir and associated canals.

Given the deterioration of the spillway and outlet works of the reservoir, the situation is serious. I trust the Legislature will aggressively pursue funding for the necessary repairs and planned enhancements.

Please give this matter your valuable consideration and let me know if I can be of any assistance in this regard.

Sincerely,

Les Gilman
P.O. Box 638
Sheridan, MT 59749
406-842-5010
lgilman@3rivers.net

Factors for Consideration Regarding Dam Rehabilitation

-Deterioration of the spillway and outlet works is rendering the dam unsafe.

-The Ruby Valley economy depends on continued operation of the Dam and Reservoir.

-The continued operation of the Reservoir and associated canals has far reaching benefits in southwestern Montana including stabilized flows in the Jefferson River.

-A recent extensive groundwater study has concluded that the operation of the canals is a significant contributing factor in the sustained flows of the Ruby River and in the recharge of the groundwater levels in the valley. Discontinued operation would likely have implications for domestic wells.

-A 3.5 foot raise of the spillway height will only replace the storage capacity lost as a result of siltation and the established minimum pool.

-An in-depth analysis by independent economists have determined that based on recent agricultural prices (prior to the economic downturn), the irrigators, operating as the Ruby River Water Users, ability to pay is \$2M.

Project No. 18

Applicant Name Montana Department of Natural Resources and Conservation (DNRC)
Project Name Monitoring Coalbed Methane Development Effects on Surface Water Quality of the Tongue and Powder River Basins

Amount Requested \$ 300,000
Other Funding Sources \$ 152,200 U.S. Geological Survey, Montana
\$ 37,300 DEQ
\$ 28,300 Wyoming DEQ
\$ 28,300 Wyoming State Engineer Office
\$ 25,000 DNRC, Water Resources Division
Total Project Cost \$ 571,100

Amount Recommended \$ 195,000

Project Abstract (Prepared and submitted by applicant)

Coalbed methane (CBM) development in the Powder and Tongue rivers basins of southeastern Wyoming and Montana is rapidly expanding; large volumes of water, high in salt and sodium, are produced during extraction of coalbed methane and this water flows downstream into Montana. Agricultural producers rely on Tongue and Powder rivers water for production of hay to support cattle operations critical to southeastern Montana's economy. This project provides for: (1) collection of monitoring data for "real-time" management (for example, irrigation scheduling to obtain good quality water; data use by DEQ and the Montana CBM industry to monitor blending of CBM water and natural flow to meet water quality targets), and (2) analysis of data for trends over time. With location in the Powder and Tongue basins, this analysis will help identify changes in streamflow and water quality, significance of the changes, and if remedial measures are necessary.

The U.S. Geological Survey (USGS) Montana Water Science Center will collect streamflow and water-quality data, analyze the data, and prepare a final report. DNRC Water Resources Division (WRD) will provide technical oversight and assist with the project. The project focuses on the Montana portion of the Tongue and Powder rivers basins, but will also analyze data collected at USGS sites in Wyoming. The project requires 36 months to complete.

Technical Assessment

The Tongue and Powder rivers provide important surface water resources for the irrigated, semi-arid, agricultural lands in southeastern Montana. The headwaters of these rivers lie in Wyoming and then flow across the Powder River Structural Basin (PRSB) in Wyoming and Montana before entering the Yellowstone River. Due to aggressive coalbed methane (CBM) development in the PRSB, long-term surface water monitoring continues to be important since CBM extraction involves pumping relatively sodic groundwater from wells and discharging portions of the produced water into rivers. Data generated during the monitoring will be used (1) to continue to evaluate impacts of CBM development on water resources and fisheries in the basin, and (2) to make informed water management decisions in regard to continuing both agricultural applications and CBM-produced water discharge.

The primary objectives include: (1) collect water quality samples for laboratory analysis, (2) collect monitoring data used for "real-time" water management (such as irrigation schedule, water blending to meet water quality targets), (3) process the data for public access, and (4) evaluate data trends over time to help predict influences of natural resource development on the Tongue and Powder rivers. The goal is to provide information that irrigators, CBM developers, and state agencies can use to help maintain natural flow and water quality targets required for agricultural use. In addition, monitoring data will be collected as part of the Yellowstone Compact agreement between Montana and Wyoming.

The USGS has been monitoring surface water quality in the Tongue and Powder rivers watersheds irregularly since the 1970s, and more consistently since 2000. Concerns expressed by citizens, ranchers, agricultural water users, Indian Tribes, and state and federal resource managers since the surge in CBM production has resulted in this increase in water-quality monitoring and the potential for adverse environmental effects. However, funding for monitoring projects has been inconsistent, and funding for rigorous statistical analysis of trends at monitoring sites in Montana has never been obtained. Effective and important water resource management decisions cannot be made by water users in the watershed unless this analysis is completed.

As a result of ongoing uncertainties in funding, DNRC WRD requested the USGS to develop a proposed budget for federal FY 2009 that provides sufficient funding to (1) operate monitoring locations and an enhanced surface water-quality monitoring network in the Tongue River, Powder River, and Rosebud Creek watersheds, and (2) analyze available streamflow and water-quality data collected to date to characterize water quality trends. Although, the FY 2009 congressional funding request was received favorably by the combined Montana congressional delegation, the status of funding remains uncertain. Funding from the DNRC RDGP is requested to cover costs of the project in the event that federal funding is not approved.

Three alternatives were considered for this project: (1) no action, (2) seek funding for the project elsewhere, and 3) contract with a consulting firm to accomplish the work.

The no action alternative would result in a break in data collection and in the continuous monitoring record that has been developed for the watershed. This break in data will occur when continuous monitoring is of critical concern because of rapid and intensive CBM development in these drainage basins.

The alternative of hiring a private firm to accomplish the work is feasible, but could raise questions regarding the continuity and consistency of the existing data set available from the USGS. This alternative may not be cost effective without more long-term planning. However, some aspects of contracting data collection and analysis should be evaluated by DNRC. Locating a source of funding is still necessary.

The preferred alternative to seek funding elsewhere, such as the DNRC- -RDGP, is reasonable and will provide cost-effective, credible water quality data. The USGS has maintained and operated a series of stream gauge stations in the Tongue and Powder rivers basins over the past 50 years and has well-established and scientifically robust monitoring and data management operating procedures. Continuation of this data collection will be beneficial to water resource managers and decision makers. Contracting some portion of the data collection and analysis should be evaluated by DNRC and the USGS before authorization of the contract.

Financial Assessment

The total overall budget request for this project:

	RDGP	Matching Funds	Total
Salary and Wages	\$ 162,000	\$ 251,300	\$ 413,300
Fringe Benefits	\$ 0	\$ 19,800	\$ 19,800
Contracted Services	\$ 34,760	\$ 0	\$ 34,760
Supplies and Materials	\$ 15,420	\$ 0	\$ 15,420
Travel	\$ 47,100	\$ 0	\$ 47,100
Equipment	\$ 31,120	\$ 0	\$ 31,120
Miscellaneous	\$ 9,600	\$ 0	\$ 9,600
Total	\$ 300,000	\$ 271,000	\$ 571,000

Detailed expenses outlined in this application are reasonable for the scale and scope of the proposed project.

Contracted services and associated costs:

• Water-quality monitoring	\$ 158,000
• Continuous conductance	\$ 54,000
• SAR estimation	\$ 12,500
• Streamflow gauge installation	\$ 20,000
• Streamflow gauge operation	\$ 125,600
• Trend analysis, report preparation	\$ 175,000
• Website development and maintenance	\$ 26,000

The three year project budget was provided by the USGS Montana Water Science Center. The budget is based on extensive first-hand experience with data collection analysis in the Tongue and Powder rivers basins. These costs appear reasonable and contain a 5% adjustment over 2008 costs for anticipated inflation. However, it is recommended that the budget be reduced to cover the July 2010 to July 2011 period only. The data analysis and reporting budget of \$201,000, covering the July 2011 through July 2012 is not recommended for RDGP funding. This action equates to a 35% reduction in the amount of RDGP funds requested. The recommended RDGP funding level is \$195,000.

The USGS, Wyoming DEQ, Montana DEQ, and Wyoming State Engineers Office will provide matching funds for the project. The application contains a letter from the USGS supporting the project, but confirmation from the USGS and other tentative sources for matching funds should be obtained. It is also noted that commitments for matching funds are tentative depending on FY 2010 funding.

Environmental Evaluation

Environmental impacts associated with this project were evaluated. There is no new drilling, construction, or other surface disturbances associated with monitoring and data collection. No adverse long-term environmental impacts specific are expected to result. Beneficial results are primarily related to the collection of water-quality data for use in evaluating long-term water quality trends and water resource management. This data will be available for use in future decision making to regulatory agencies, watershed and citizen groups, irrigators, CBM producers, and the general public.

Minimal, if any, environmental impacts will result from proposed activities. Field tasks will include collection of water quality samples. Installation of several stream gauges to measure water-surface elevations will cause minimal, localized, and temporary disturbance.

Public Benefits Assessment

Benefits of this project as listed in the application: (1) maintain or improve the ability of Montana farmers and ranchers to use water and maintain economically feasible operations, (2) maintain or improve the ability of Montana DEQ and EPA to monitor and regulate the CBM industry of Montana and Wyoming, (3) maintain or improve the ability of the Montana CBM industry to meet permit requirements and develop CBM resources responsibly, and (4) provide information useful to the DNRC and attorney general's office in negotiating or litigating with Wyoming in transboundary disputes regarding water use and administration under water-quality laws and the Yellowstone River Compact.

In addition to the letter of support provided by the USGS, one letter signed by the Northern Plains Resource Council, Tongue River Water Users, Tongue and Yellowstone Irrigation District, and Tongue River Watershed Group was received.

Recommendation

A grant of up to \$195,000 is recommended for this project contingent upon DNRC approval of the project scope of work and budget.

At this time, the applicant has not responded with information requested regarding status of the Federal budget request to support this project. In the event that adequate federal funding is obtained, this proposal should be withdrawn from RDGP funding.

PUBLIC SERVICE COMMISSION STATE OF MONTANA

Greg Jergeson, Chair
Ken Toole, Vice-Chair
Gail Gutsche, Commissioner
Brad Molnar, Commissioner
John Vincent, Commissioner



1701 Prospect Avenue
PO Box 202601
Helena, MT 59620-2601
Voice: 406.444.6199
Fax #: 406.444.7618
<http://www.psc.mt.gov>
E-Mail: psc@mt.gov

RECEIVED

JAN 9 2008

LEGISLATIVE
FISCAL ANALYST

The Honorable Dave Kasten
Chair, Joint Long-Range Planning Subcommittee
Montana House of Representatives
State Capitol Building
Helena, Montana 59601

January 7, 2009

Dear Representative Kasten:

I wanted to take this opportunity to explain why the Public Service Commission has requested its application to the Reclamation and Development Grant Program (RDGP) for a "Geological Evaluation of Potential Sites for Compressed Air Storage in Montana" be withdrawn. We have been working closely with the experts at the Bureau of Mines and Geology on the issue of compressed air storage. However, due to unexpected changes in the Bureau's staff, they will not be able to participate in the work outlined in the grant if it were funded.

So, rather than risk tying up scant state financial resources with unsure plans on how the work would be completed, the Commission voted 5-0 on December 16, 2008 to request the application be withdrawn. I want to stress that despite this bump in the road regarding further Montana-specific research, compressed air storage continues to have significant potential and can play an important role in Montana's energy future. The PSC plans to continue exploring ways to help bring this new technology to our state.

Please let me know if you have any questions; I can be reached at 444.6199 or gjergeson@mt.gov.

Sincerely,

Greg Jergeson
Chair, Public Service Commission

SARAH CARLSON

PUBLIC INFORMATION/FEDERAL RELATIONS SPECIALIST

Phone: (406) 444-6171 Fax: (406) 444-7618

Email: scarlson@mt.gov

STATE OF MONTANA

PUBLIC SERVICE COMMISSION

1701 PROSPECT AVE., PO BOX 202601

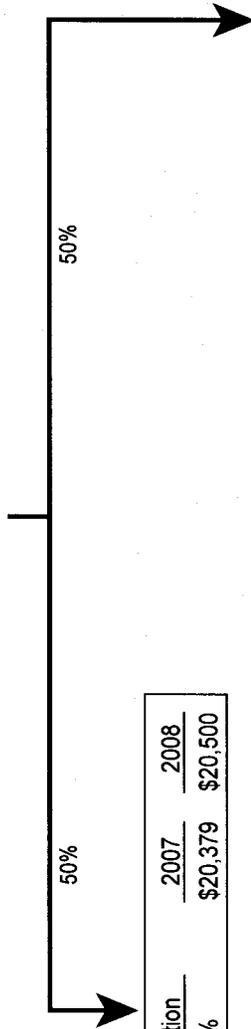
HELENA, MONTANA 59620-2601

HOME PAGE: <http://www.psc.mt.gov>



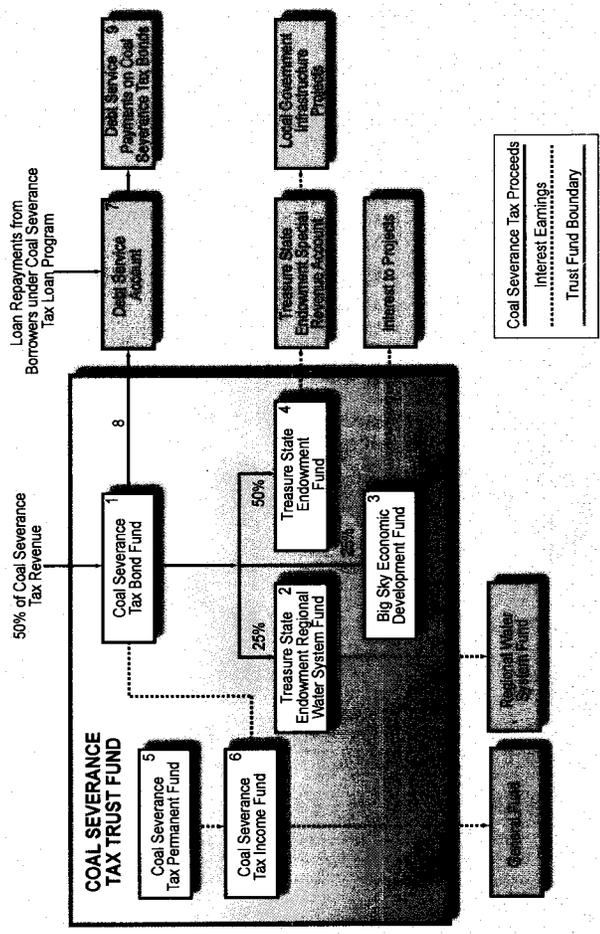
ts: 1-800-646-6150
Opportunity Employer"

Coal Severance Tax Collections



Account	Allocation	2007	2008
Trust Fund	50%	\$20,379	\$20,500

Coal Severance Tax Trust Fund Flow of Funds Summary



Coal Severance Tax Collections	Tax Allocation	FY 2007(\$1,000)	FY 2008(\$1,000)
Coal Severance Tax Trust Fund	100%	\$ 40,759	\$ 41,000
Coal Severance Tax Trust Fund	50.00%	20,379	20,500
General Fund	26.79%	10,919	10,983
Long-Range Building Program	12.00%	4,891	4,920
Program Funding	5.46%	2,225	2,239
Other			
Oil, Gas, and Coal Natural Resources	2.90%	1,182	1,189
Parks Acquisition and Management Trust	1.27%	518	521
Renewable Resource Loan Debt Service	0.95%	387	389
Cultural and Aesthetic Trust and Capitol Art	0.63%	258	259