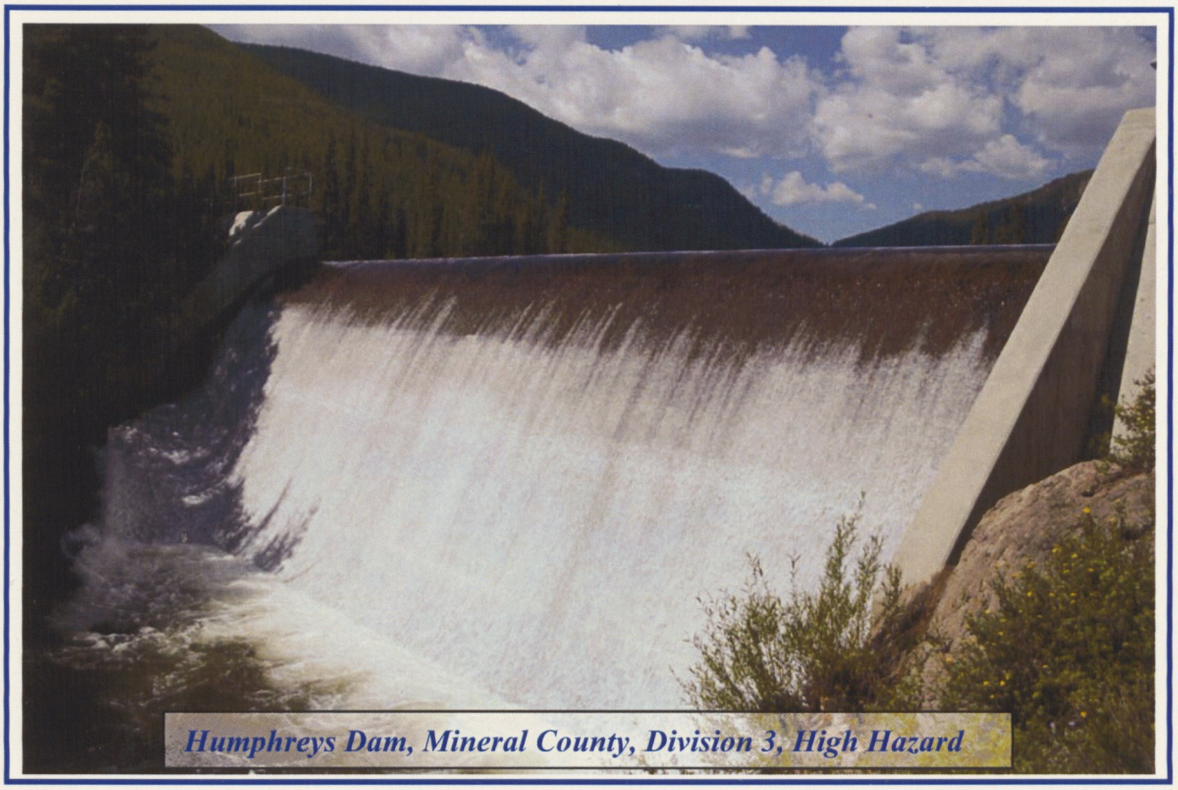
State Engineer's 22nd Annual Report on Dam Safety to the Colorado General Assembly

Fiscal Year 2005-06



Humphreys Dam, Mineral County, Division 3, High Hazard

Prepared by
Colorado Division of Water Resources
Office of the State Engineer

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STATE OF COLORADO 1876

Bill Owens
Governor

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EXECUTIVE SUMMARY

The Colorado Division of Water Resources' Dam Safety Branch mission is to prevent the loss of life and property damage and protect against the loss of water supplies due to the failure of dams in Colorado. The Dam Safety Program accomplishes that mission primarily through Safety Evaluations of Existing Dams (SEED) to determine the safe storage levels of reservoirs within the state. Additional program tools include a comprehensive set of regulations, policies, and procedures for the design, construction, and maintenance of dams; the safe operation of reservoirs; and emergency preparedness planning.

The Dam Safety Program is managed by the State Engineer in accordance with Title 37, Article 87 of C.R.S. and the Livestock Water Tank Act, Title 35, Article 49 of C.R.S. The program is implemented by the State Engineer through the Dam Safety Branch and Water Division field offices. The Colorado Dam Safety Program oversees a total of about 2,900 dams with 1,928 dams of jurisdictional size. Of these, about 1,802 are non-federal dams. Of the non-federal dams, approximately 677 or about 38 percent of the total non-federal dams are classified as dams that, in the event of a failure, would be expected to cause loss of life and/or significant property damage within the flood plain areas below the dams.

For FY 05-06, the Dam Safety Program accomplished a number of the goals and objectives identified in the past annual report. Through the diligent field observations of dam safety engineers statewide, several near-failure incidents were acted upon in time to diffuse potentially dangerous situations and possible loss of life. As a direct result of these actions, no loss of life or significant property damage occurred in Colorado in the 2005-06 timeframe. This is attributed to the increased awareness and responsibility of the dam owners for their dams, including emergency preparedness planning and to the enforcement of the regulations, policies, and procedures by the Division of Water Resources.

During FY 05-06, the State Engineer's Office approved five plans for new dams and 37 plans for alteration, modification, or enlargement of existing dams. Hydrologies studies for four dams were also approved for determination of the inflow design flood for spillway design. The estimated cost of construction for the submitted plans was over $60 million dollars.

During FY 05-06, a total of 816 dam safety inspections and 146 construction inspections were conducted by Dam Safety Engineers for a total of 962 inspections. In addition, 115 follow-up inspections were performed. At the conclusion of the reporting period, there were 178 dams restricted from full storage due to various structural deficiencies such as significant leakage, cracking and sliding of embankments, and inadequate spillways. Total storage restricted was 117,510 acre-feet. The restrictions provide risk reduction for the public and environment until the deficiencies identified are corrected. Although many dams were repaired and removed from the restricted list within the last year, a number of dams were also added to the list during the same time period. The change in the restriction from the same time last year resulted in a slight decrease in the number of dams on the restricted list and the volume of the restrictions decreased approximately 1,286 acre-feet. Approximately half of the dams on the Colorado Division of Water Resources restricted list have been on that list for ten years or longer.

The state has been able to acquire and maintain a full staff of experienced professional engineers, and has adequate statutes, regulations, policies, and procedures to implement and carry out the program.

This year, the Dam Safety Branch was successful in revising the *Rules and Regulations for Dam Safety and Dam Construction*, (Rules) and will be effective on January 1, 2007.

The key changes to the Rules as described in the public presentations include:

1. Elimination of the Intermediate dam size.
2. Revision and updating the nomenclature to be consistent with National Standards (i.e. hazard classification, Emergency action plans).
3. Revisions to the methodology for determining the Inflow Design Flood and spillway sizing.
4. Reduction of Probable Maximum Precipitation (PMP) due to elevation and location effects.
5. Modifications to the Embankment and Concrete Dam Design Requirements to bring the Rules in line with state-of-the-practice.

The Dam Safety Branch continues to use risk-based tools to help evaluate the jurisdictional dams in Colorado and prioritize the use program resources more efficiently and effectively. In addition, two major studies were completed to assist engineers and hydrologists develop consistent and reasonable PMP's and guidelines to estimate basin parameters for use in Inflow Design Flood (IDF) Studies. First, the beta version of the state-of-the-practice in Extreme Precipitation Analysis Tool (EPAT) for the West Slope was released. Initial use of EPAT has demonstrated that the tool emulates site-specific and Hydrometeorological Report (HMR) PMP events. The Branch is optimistic that this state-of-the-practice tool in hydrology and hydrometeorology in Colorado will be available east of the Continental Divide in 2007. Secondly, a draft of the Guidelines and Procedures for Estimating Basin Response Factors in Colorado was presented to the Branch in the fall. The final publication will be available for use in early 2007.

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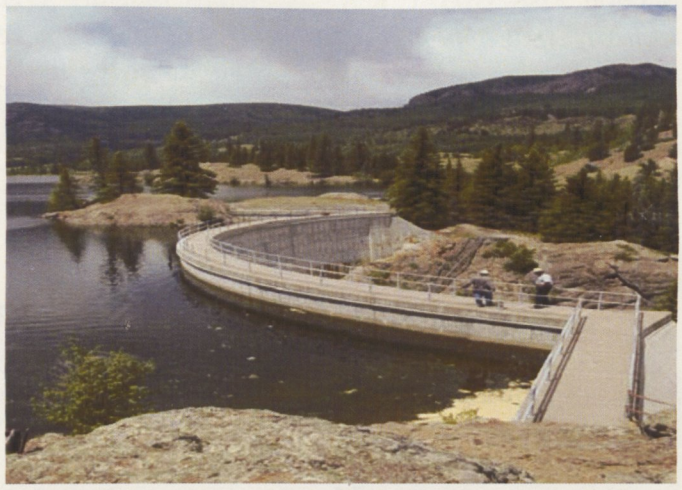
1.0 INTRODUCTION

1.1 Program Mission

The mission of the Colorado Dam Safety Program is to prevent the loss of life and property damage, determine the safe storage levels of reservoirs, and protect the state's water supplies from the failure of dams through the effective and efficient use of available resources. The program is firmly grounded in the use of periodic field observation of existing dams by highly qualified licensed professional engineers. The field observations, combined with engineering analyses form a basis for determining the safe storage levels of reservoirs within the state. Additional program tools include a comprehensive set of regulations, policies, and procedures for the design, construction, inspection, and maintenance of dams; the safe operation of reservoirs, emergency preparedness planning and emergency response. In the event a dam is found to be unsafe, the risk of adverse consequences due to failure of the dam is reduced by restricting the storage in the reservoir to a safe level. Plans for new dams in Colorado must be approved prior to construction. A comprehensive review and approval process ensures the highest possible standards are met with regard to public safety. The program is managed by the State Engineer in accordance with Title 37, Article 87 of C.R.S. and the Livestock Water Tank Act, Title 35, Article 49 of C.R.S. The "Rules and Regulations for Dam Safety and Dam Construction" and "Standard Specifications for Livestock Water Tanks and Erosion Control Dams" establish the procedures and requirements of the State Engineer in the implementation of these statutes.



Humphreys Dam, Mineral County
Division 3, High Hazard

1.2 Report Purpose

This report is submitted in compliance with Section 37-87-114.4, C.R.S., concerning the dam safety activities of the State Engineer and the Colorado Division of Water Resources relating to Sections 37-87-105 to 37-87-114, C.R.S.

2.0 PROGRAM OVERVIEW

2.1 Goals and Objectives

The Dam Safety Program is responsible for the approximately 2,900 jurisdictional and non-jurisdictional dams within the state. To effectively and efficiently allocate available resources, the Dam Safety Branch concentrates on the jurisdictional dams and reservoirs as defined in Section 37-87-105, C.R.S., as "*Dams that are greater than ten feet high as measured at the spillway, that impound a reservoir with twenty acres or more in surface area, or one hundred acre-feet or more in reservoir capacity at the high water line qualify as Jurisdictional.*" Both jurisdictional and non-jurisdictional dams are classified as to the estimated downstream consequences as a result of failure of the dam in the absence of flooding conditions. Table 1 describes the State of Colorado Dam Hazard Classifications for jurisdictional and non-jurisdictional dams as stated in the Revised Rules and Regulations for Dam Safety and Dam Construction to be effective on January 1, 2007.

TABLE 1
STATE OF COLORADO DAM HAZARD CLASSIFICATIONS

Classification	Definition
High (1)[(1)]	Loss of human life is expected to result from failure of the dam.
Significant (2)	Significant damage is expected to occur, but no loss of human life is expected from the failure of the dam.
Low (3)	Loss of human life is not expected and significant damage to structures and public facilities is not expected to result from failure of the dam.
NPH[(2)] (4)	No loss of human life is expected and damage will occur only to the dam owner's property will result from failure of the dam.

Notes:

(1) Classification nomenclature according to the 1988 Rules and Regulations for Dam Safety and Dam Construction.

(2) No Public Hazard

The following goals of the program have been identified:

1. To protect the public, the Dam Safety Branch shall determine the amount of water that is safe to impound in reservoirs of the state.
2. To protect the public from failure of dams, the Dam Safety Branch shall review and recommend approval of plans and specifications for the construction, modification and repairs of dams, in accordance with the current Rules and Regulations for Dam Safety and Dam Construction, implemented on September 30, 1988.

3. To reduce the risk of dam failure and adverse consequences and to more efficiently and effectively use the available resources within the program, the Dam Safety Branch shall implement and utilize a risk-based approach to prioritize the jurisdictional dams within the program.
4. To improve the functions of the Branch and to meet the public information needs, the Dam Safety Branch shall maintain a data information system.
5. To improve the technical proficiency of the Branch, the Division of Water Resources shall provide for training and professional development of the Branch personnel.
6. To improve the Dam Safety Program, to participate in the development of national policies on dam safety, and to take advantage of the continuing education and information available, the state shall be a full voting member of the Association of State Dam Safety Officials (ASDSO).

2.2 Organization

The State Engineer, through the Dam Safety Branch and the Division Engineers' offices, executes the Colorado Dam Safety Program. The Branch is overseen by the Deputy State Engineer and consists of a branch chief, dam safety engineers, and design review engineers. Starting in the mid-1980s the Dam Safety Branch was decentralized from the Denver office to enable a statewide presence. Dam safety engineers were transferred from the Denver office to the Division offices throughout the state. Dam safety engineers were located in Greeley, Pueblo, Durango, Montrose, Glenwood Springs, and Steamboat Springs. This allowed a more even distribution of dam safety engineers and allowed the engineers to be in close proximity to the dams they are assigned to regulate. The process of relocating dam safety engineers to the Division offices took until approximately the mid 1990s. After several years of working with the newly decentralized Dam Safety Branch, the need for additional strategic positioning of dam safety engineers within the state was identified. Between 2003 and 2005, two dam safety engineers were relocated to field offices in Grand Junction and Colorado Springs. Figure 1 shows the current distribution of dam safety and design review engineers within the state.

Boyd Lake, Labyrinth Spillway
Larimer County, Division 1, High Hazard

Dam safety engineers are responsible for execution of the program in their geographic area. The design review engineers and branch chief have responsibilities throughout the state and are located in Denver. A summary of the branch organization and personnel is included in Appendix A.

Interagency coordination occurs as necessary. A Memorandum of Understanding has been executed with the Division of Wildlife (DOW) regarding the responsibilities of each agency in carrying out the safety inspection of DOW dams. The DOW is performing safety inspections of DOW-owned Class 3 (low hazard) dams.

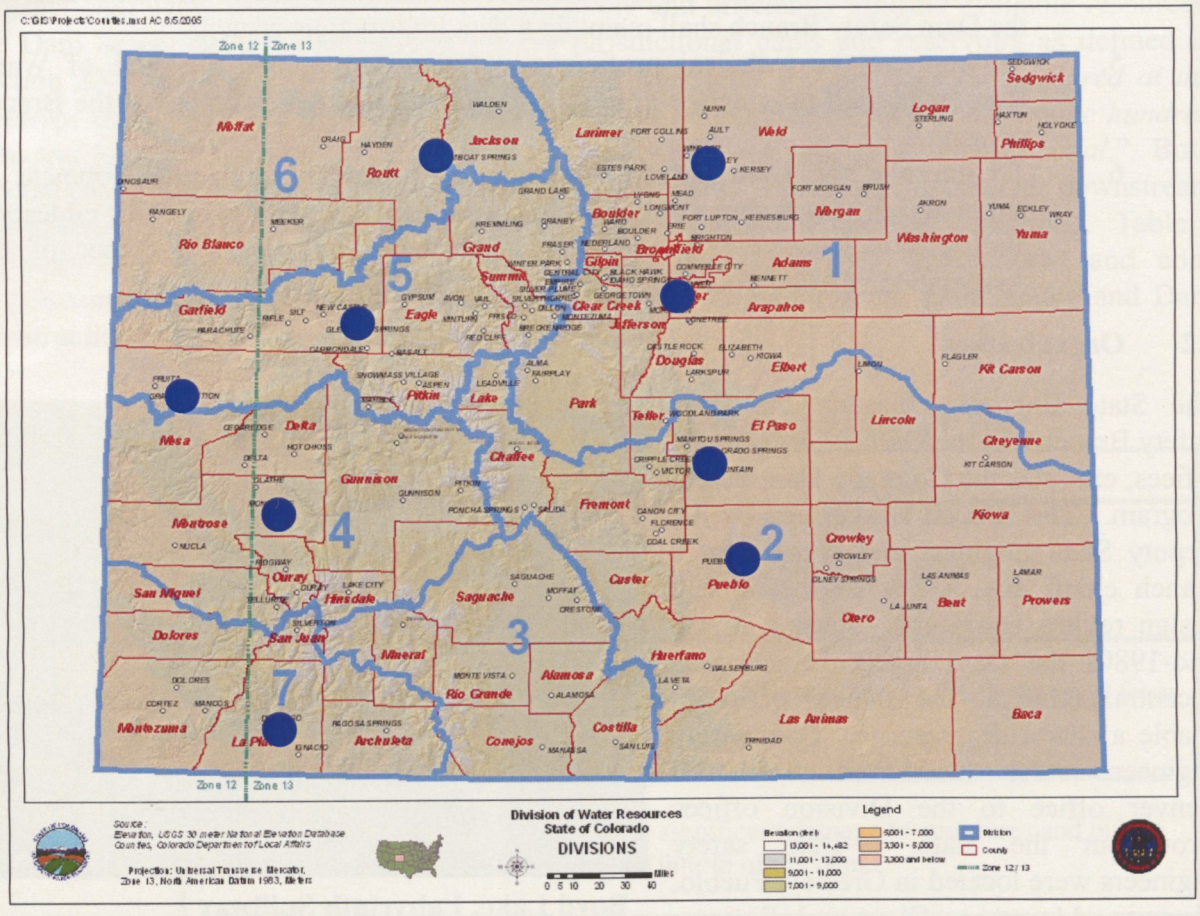


Figure 1 – Map of Colorado Showing Locations of Dam Safety Branch Personnel.

The Colorado Water Conservation Board (CWCB) construction fund is available to assist owners with the repair of their dams. The Dam Safety Branch closely coordinates the review, approval, and final acceptance of CWCB funded dam construction and/or rehabilitation projects.

2.3 Roles and Responsibilities

The branch chief has program-wide responsibility for formulating the goals of the program, recommending policies for implementing the rules and regulations, preparing procedures for carrying out the policies, providing technical guidelines for conduct of the work, communication, training, and coordination. The branch chief directly supervises the Design Review and Construction Inspection Unit activities.

The dam safety engineers' principal duties are to:

1. Respond to emergency situations.
2. Conduct dam safety field inspections of existing dams which provide the basis for determining the safe storage level of the reservoir.
3. Review the adequacy of spillways under the rules.
4. Set the safe storage level of reservoirs based in part on the results of field inspections and spillway adequacy reviews.
5. Review and recommend changes to dam Hazard Classifications.
6. Enforce the requirement for emergency planning.
7. Assist dam owners in developing their Emergency Action Plans (EAP), formerly Emergency Preparedness plans (EPP).
8. Provide design review and construction inspection of repairs and alterations when necessary.
9. Investigate complaints on the safety of dams.

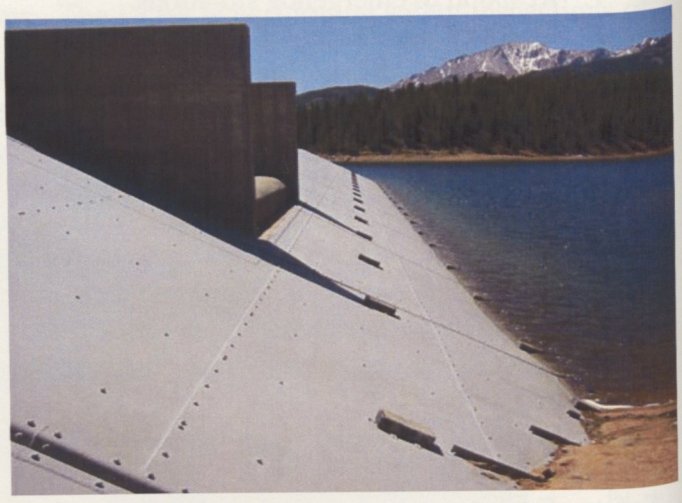
Safety Evaluations of Existing Dams (SEED) field inspections are performed periodically with the frequency of inspections determined by the hazard classification. High Hazard (Class 1) dams are inspected annually, Significant Hazard (Class 2) dams are inspected every other year, Low Hazard (Class 3) dams are inspected every 6 years, and No Public Hazard (NPH (Class 4) dams do not have a set inspection frequency. NPH dams are typically only inspected at the owner's request or in the event of a specific event such as a complaint or for a hazard classification review. The frequency of inspection maybe modified based on the results of a risk analysis.

Paonia Dam, Gunnison County
Division 4, High Hazard

Dam safety engineers also investigate dams constructed in violation of Section 37-87-105 (1) and (4), C.R.S., and conduct training on the inspection of dams for Division personnel, dam owners, interested agencies, engineers, and the public. In addition, they review and approve Livestock Water-tank and Erosion Control Dam applications and do other related work as assigned.

The design review engineer's primary duties are to review the design and construction documents for the construction, alteration, modification, repair, and enlargement of reservoirs or dams in accordance with Section 37-87-105, C.R.S. This involves comprehensive engineering reviews of the design and construction documents prepared by registered professional engineers experienced in the design and construction of dams. The reviews determine the adequacy of the design, compliance with the applicable state statutes, the current Rules and Regulations for Dam Safety and Dam Construction, and industry standards. The design review engineer recommends

approval of the project for construction to the State Engineer once all conditions have been met. Design review engineers also perform periodic inspections during dam construction to assure compliance with the approved plans and specifications and to evaluate proposed change orders. Upon successful completion of the projects, the design review engineer recommends to the State Engineer issuance of orders to allow water storage. Design review engineers also provide dam related technical assistance to other state agencies such as the Department of Health, the Division of Wildlife, Oil and Gas Conservation Commission, the Division of Minerals and Geology, the state's joint review process with the Department of Natural Resources, and the Division Engineers' offices, and perform other related work as required.



South Catamount Dam
Emergency Spillway
Teller County, Division 2, High Hazard

2.4 Summary of Colorado Dams

Currently, the Dam Safety Branch oversees a total of approximately 2,900 dams within Colorado. Of these, 1,928 are considered jurisdictional dams, of which about 1,802 are non-federal dams. Of the non-federal dams, approximately 677 or about 38 percent of the total non-federal dams in Colorado are classified as dams that, in the event of a failure, would be expected to cause loss of life and/or significant property damage.

Table 2 summarizes the distribution of dams by water division and hazard classification in Colorado.

TABLE 2
SUMMARY OF DAMS BY HAZARD CLASSIFICATION AND WATER DIVISION

HAZARD CLASS	WATER DIVISION							FEDERAL DAMS	TOTAL
	1	2	3	4	5	6	7		
High (Class 1)	150	42	12	31	39	13	16	42	**345**
Significant (Class 2)	134	49	15	37	49	13	22	13	**332**
Low (Class 3)	426	95	29	147	108	109	53	57	**1,024**
NPH (Class 4)	47	101	17	5	23	12	8	14	**227**
TOTALS	**757**	**289**	**73**	**220**	**219**	**147**	**99**	**126**	**1,928**

3.0 PROGRAM ACCOMPLISHMENTS

3.1 Dam Safety Branch Staff

The Dam Safety Branch achieved a milestone in 2006 by acquiring several quality engineers to provide a complete and diverse staff to achieve the mission and goals of the branch.

Mark Haynes was appointed Chief of the Dam Safety Branch in December. Mark has extensive experience and institutional knowledge with respect to the Colorado Dam Safety Program. He has been instrumental in the review and approval of over $350 million in dam construction projects in Colorado since 1992. Mark has coordinated much of the technical information for the National Dams Database and ASDSO. Mark also works closely with the team of dam safety engineers in the continuous improvement of the Colorado Dam Safety Program and provides leadership on dam safety and security issues at the national level.

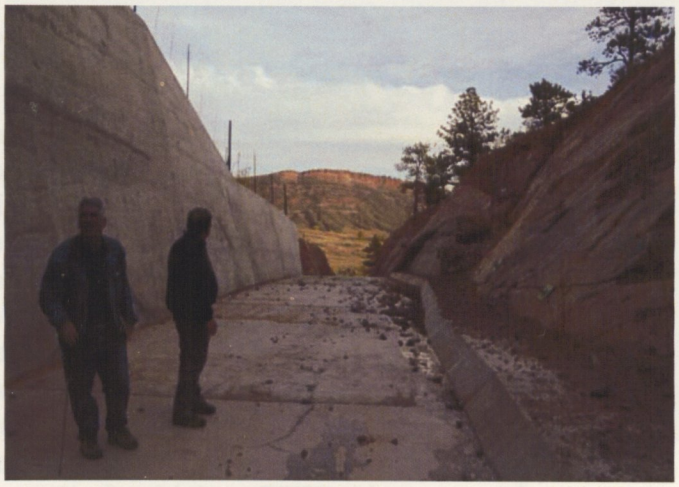
John Redding joined the Denver office in March as PE I, Dam Safety Engineer. John has nearly 10 years experience with Colorado water rights. John's primary duties will be performing Safety Evaluations of Existing Dams. John will also review design and construction documents for new dams and major modifications to existing dams.

John Batka joined the Division 1 office in Greeley in June as a PE II, Dam Safety Engineer. John has nearly 10 years experience in hydrology and hydraulics. John's primary duties will be to perform Safety Evaluations of Existing Dams and responding to emergencies in the western portion Division 1. John will also review design and construction documents for new dams and major modifications to existing dams in his region of Division 1.

Paul Perri joined Denver office in October as a PE II, Design Review and Construction Inspection Engineer. Paul has nearly 10 years of dam design and dam construction experience. His primary duties will include the review of the design and construction documents for the construction of new dams and major modifications to existing dams and the construction inspection of the approved projects to assure that the project construction is in conformance with the approved plans and specifications.

3.2 Dam Safety Inspections

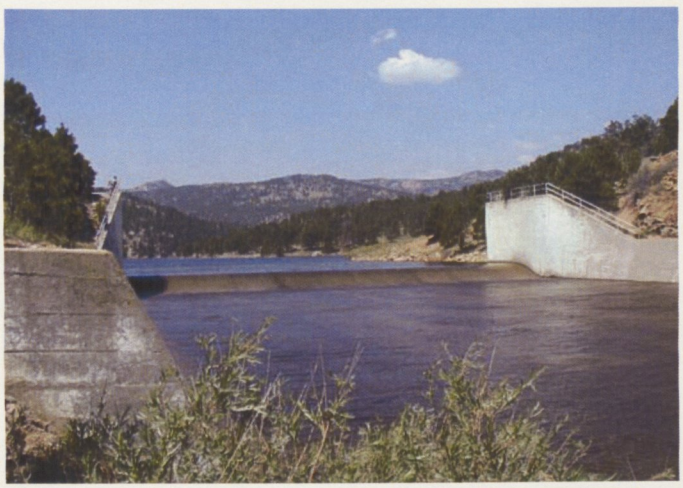
Each dam safety engineer's highest priority is to perform periodic field SEED of the dams in their territory of responsibility. Dams rarely fail without first showing visible signs of distress, which, when detected by a highly educated and trained eye, can be the difference between a catastrophic failure and prompt corrective action. Regular visual observation is, therefore, the most important tool available to each dam safety engineer.



Loveland Water Storage,
Emergency Spillway,
Larimer County, Division 1, High Hazard

The statutes specify that dam safety inspections consist not only of field inspections of the dam and appurtenant structures, but also include the review of previous inspection reports, drawings, and periodic monitoring reports provided by dam owners.

The review portion of each dam safety inspection includes an evaluation of the adequacy of the spillway, a review of the current hazard classification, and a review of the EAP (EPP) for High and Significant hazard dams (Class 1 and 2). Spillways for all dams are required to be able to pass the appropriate inflow design flood. The determination of the appropriate inflow design flood for a given dam is based on the size and hazard classification of the dam. The hazard classification review accounts for changes in the development of the flood plain below the dam. Recent suburban development below once rural dams may result in the potential for increased property damage or likely loss of life in the event of a dam failure. An increased hazard classification results in more diligence on the part of the dam safety engineer and dam owner, and may result in requiring safety modifications to the dam. EAPs (EPPs) are required for High and Significant Hazard dams (Class 1 and 2) due to the increased potential for loss of life and/or property damage in the event of a dam failure. EAPs (EPPs) must be kept up to date to be effective and yearly reviews and updates are normally appropriate. Periodic internal inspection of the outlet works and an annual evaluation of dam instrumentation monitoring data are also part of the workload as required by the regulations. Large diameter outlets can be inspected by man-entry using confined space procedures. Small diameter outlets are typically inspected by remote methods using video cameras designed for that purpose. The video inspection of outlets is the responsibility of the dam owner, with review of the videotape or DVD provided being performed by the dam safety engineers.



Button Rock Dam Emergency Spillway
Boulder County, Division 1, High Hazard

The findings of the dam safety inspection are documented in a report that rates the condition of the dam and appurtenant structures based on the field observations and document reviews. A copy of the Dam Safety Inspection Report Form is shown in Appendix B. The overall condition of the dam and reservoir is rated as satisfactory, conditionally satisfactory, or unsatisfactory (unsafe) for full storage and a recommendation is made for the safe storage level of the reservoir. The report also identifies repair and maintenance work the owner should perform to extend the useful life of the structure through normal annual activities. For items requiring more than a normal level of maintenance, and any engineering and monitoring requirements that are deemed necessary to assure the safety of the dam, the dam safety engineer may require the owner hire a Colorado licensed professional engineer to design and direct the work. Table 3 shows a summary of the state wide SEED activities for the report period.

TABLE 3

SAFETY EVALUATION OF EXISTING DAMS (SEED) ACTIVITIES SUMMARY FY 05-06

Activity	Dam Hazard Classification					Total
	High (Class 1)	Significant (Class 2)	Low (Class 3)	NPH (Class 4)	Other	
Inspections/Site Visits						
Dam Safety	247	162	156	3	3	571
Interim Dam Safety	0	36	9	0	0	45
Follow-up	71	52	21	1	1	115
Outlet Works	14	8	1	0	0	23
Federal Dams (non-FERC)	0	0	0	0	0	0
FERC Dams	5	0	1	0	0	6
Other	4	4	8	2	7	25
Reviews						
Hydrologic Studies	10	7	25	9	1	52
Stability Analyses	8	5	9	7	0	29
NJ Dam Applications	36	1	141	63	12	253
Outlet Inspection Reports	5	5	3	0	0	13
Federal Reports	2	0	1	0	0	3
FERC Reports	2	0	0	0	0	2
Monitoring Reports	41	9	0	0	0	50
Monitoring Data Evaluations	42	6	1	0	0	49
EAP (EPP) (new and updated)	85	40	4	0	0	129
Other	31	30	14	0	2	75
Hazard Classification Evaluations	0	1	0	0	0	1

As is shown in Table 3, the dam safety engineers collectively conduct about 800 to 900 dam safety related inspections each year. The dam safety engineers also spend a significant amount of time performing various reviews and analyses also shown in Table 3.

As shown previously in Table 2, over half of the jurisdictional dams in Colorado fall within the Low Hazard (Class 3) classfication and are, therefore, only inspected every six years. In order to maintain a high level of confidence regarding the condition of these dams between regular inspections, water commissioners within the various water districts are often tasked to observe the condition of Low Hazard dams. Dam safety engineers and water commissioners both spend much of their time working in the field. This cooperative working arrangement allows efficient use of the water commissioners' field time when they are near jurisdictional dams as part of

Genesee Dam No. 2, Foundation Inspection
Jefferson County, Division 1, High Hazard

Genesee Dam No. 2 Foundation Inspection, Jefferson County, Division 1, High Hazard

their regular water administration duties. They are also dispatched as needed to make specific observations and report on the condition of dams at critical times, such as during runoff season or following storms. A sample water commissioner observation report form is shown in Appendix C. Dam safety engineers review the reports and observations of the water commissioners to determine if additional work is warranted or necessary on their part. Efficient use of the water commissioners' field time and observational abilities allows the Dam Safety Branch to allocate this important resource to maintain a consistent level of public safety at all times.

For inspections of federally-owned and FERC-regulated dams that the State Engineer's Office does not typically participate in, the reports prepared by the federal agencies are received and reviewed in accordance with Memoranda of Understanding (MOU) between the Dam Safety Branch and the various federal agencies.

3.3 Design Review and Construction Inspection

A summary of the activities related to Design Review and Construction inspection during FY 05-06, is shown in Table 4.

TABLE 4
DESIGN REVIEW AND CONSTRUCTION ACTIVITIES SUMMARY FY 05-06

Activity	Dam Hazard Classification					Total
	High (Class 1)	Significant (Class 2)	Low (Class 3)	NPH (Class 4)	Other	
Reviews						
Design (new/enlarge)	1	1	3	0	0	5
Design (repair/modification)	10	10	17	0	0	37
Hydrology/ Site Specific PMP Studies	2	2	0	0	0	4
Construction Activities						
Pre-Construction Meetings	10	0	0	0	0	10
Construction Inspections	71	52	21	1	1	146
Construction Change Orders	43	6	8	0	0	57
Final Construction Acceptance	30	7	7	3	1	48
Other	10	1	1	0	1	13

The State Engineer's Office approved plans for five new dams or enlargement of existing dams and 37 plans for repairs or modifications to existing dams. The estimated cost of construction for the approved plans was $60,215,353, and $49,874.61 was collected for the examination and filing of the submitted plans.

A complete listing of the plans submited for review and approval are contained in Appendix C. In order to expedite the approval of repair plans for dams, the dam safety engineers located in the division offices review plans and specifications and perform the construction inspections on selected projects. In addition, two third-party reviews of the plans and specifications were performed in FY 05-06. This enables the owners to repair or construct their dams sooner by shortening the review time. The State Engineer provides review and approval of plans and specifications performed by third parties.

Cornerstone Pond No. 4 Construction
Ouray County, Division 4, Significant Hazard

Construction inspections are important to assure that the approved plans are being followed and to assure changed conditions encountered during construction do not jeopardize the safety of the design. The construction site visits are typically preceded by a review of the file and history of performance. In addition, coordination with the owner, owner's engineer, division staff, and other interested parties is made so they also have an opportunity to take part in the inspection.

Prewitt Dam
Emergency Spillway Construction
Washington County, Division 1, High Hazard

Upon completion of construction, the owner's design engineer submits copies of the "AS-CONSTRUCTED" plans showing any changes made during construction. These plans are reviewed by the engineer who monitored the construction for completeness before being accepted for filing. The superseded plans are disposed and the "AS-CONSTRUCTED" plans serve as the public record as required by the statutes.

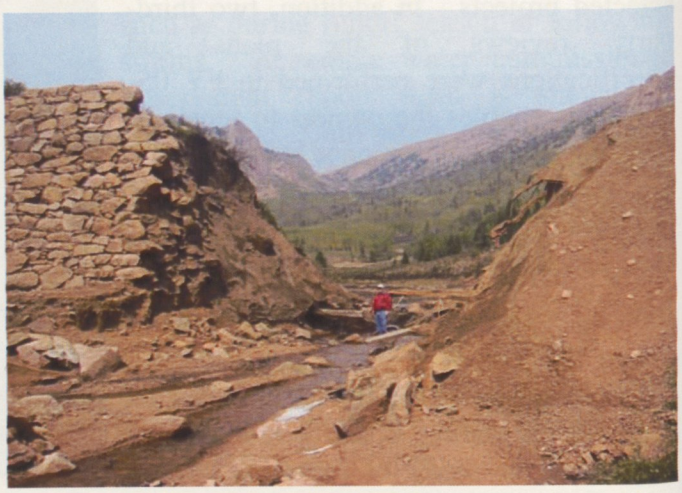
Section 37-87-114.5, C.R.S., exempts certain structures from the State Engineer's approval. These are structures not designed or operated for the purposes of storing water, and include: mill tailing impoundments permitted under Article 32 or Article 33 of title 34, C.R.S. (Minerals or Coal Mines), uranium mill tailing and liquid impoundment structures permitted under Article 11 of Title 25 of C.R.S., siltation structures permitted under Article 33 of Title 34, C.R.S. (Coal Mines), and structures that only store water below the natural surface of the ground.

Owners of small dams that do not fall under the jurisdiction of the State Engineer are required to submit a Notice of Intent to Construct a Non-Jurisdictional Water Impoundment Structure to the State Engineer prior to beginning construction under Section 37-87-125, C.R.S.

3.4 Dam Safety Incidents

3.4.1 Gillett Reservoir Dam Failure

The Division 2 office reported the failure of a dam failure near Gillett, Colorado. The failure caused road damage along State Highway 67 and there were no reports of injury or loss of life. Field observations by the Division Dam Safety Engineer revealed that poor quality and construction of an earthen embankment within a previous breach of the embankment was the probable cause of the failure.



Gillett Reservoir Dam, Failure Teller County Division 2

3.4.2 McElroy Dam

McElroy Dam Sinkhole Grand County Division 5, Low Hazard

McElroy Dam a Low Hazard dam in Grand County unexpectedly experienced large discharge of turbid water from the outlet. The flow and turbidity varied for a few days then a large sinkhole formed at the left end of the dam and just left of the outlet pipe. The owner had the dam breached in order to replace the deteriorated 18" CMP outlet pipe.

3.4.3 Other Dam Incidents

Intense rainfall events resulted in several dam incidents that were reported to the Dam Safety Branch throughout the year. The reports were followed through on, and provided good exercises of, the emergency communication system without having serious consequences.

Dam incidences reported are as follows:

1. Non-Roster Jurisdictional sized dam in Teller County, Division 1, experienced overtopping during an intense rainfall event. The dam was severely damaged but did not fail.
2. Keeton Dam in El Paso County, Division 1 is a restricted dam due to inadequate spillway experienced discharge flows out both the service and emergency spillways during an intense rainfall event.

3. J.O. Hill Dam in Douglas County, Division 1, experienced a storm that generated 100 year rainfall on 15 percent of the basin which generated the 100 year runoff of a 56-square-mile basin.

4. Stillwater Dam in Douglas County, Division 1 experienced a crack in the outlet/spillway conduit resulting in loss of embankment material.

5. Goose Pasture Tarn in Summit County, Division 1, experienced water seeping out of the service spillway into the RCC emergency spillway with the movement of fines.

3.5 Reservoir Storage Restrictions

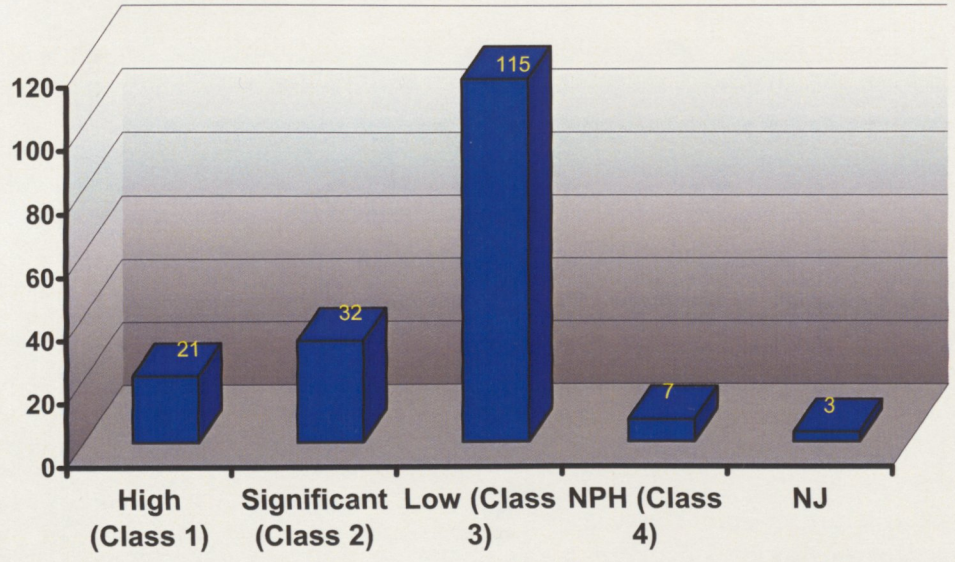
If the dam safety inspection finds that the overall conditions are unsafe, an order is written by the State Engineer restricting the storage of the reservoir to a safe level. Restriction letters are accompanied by orders to rehabilitate the dam to make it safe for full storage or to breach the dam. In the event the owner fails to comply with an order to make the dam safe, a breach order is issued to remove the hazard created by the dam and reservoir. If the findings are conditionally satisfactory, full storage is recommended contingent on appropriate monitoring being provided by the owner. In the event that conditions of any dam or reservoir are so unsafe as to not permit the time to issue or enforce a restriction, or a dam is threatened by a large flood, the State Engineer may immediately employ remedial measures to protect the public safety. An emergency dam repair cash fund is provided under the CWCB construction fund per Section 37-87-122.5, C.R.S.

Keeton Dam, Emergency Spillway,
El Paso County, Division 2, Low Hazard

Keeton Dam,
Emergency Spillway Construction,
El Paso County, Division 2, Low Hazard

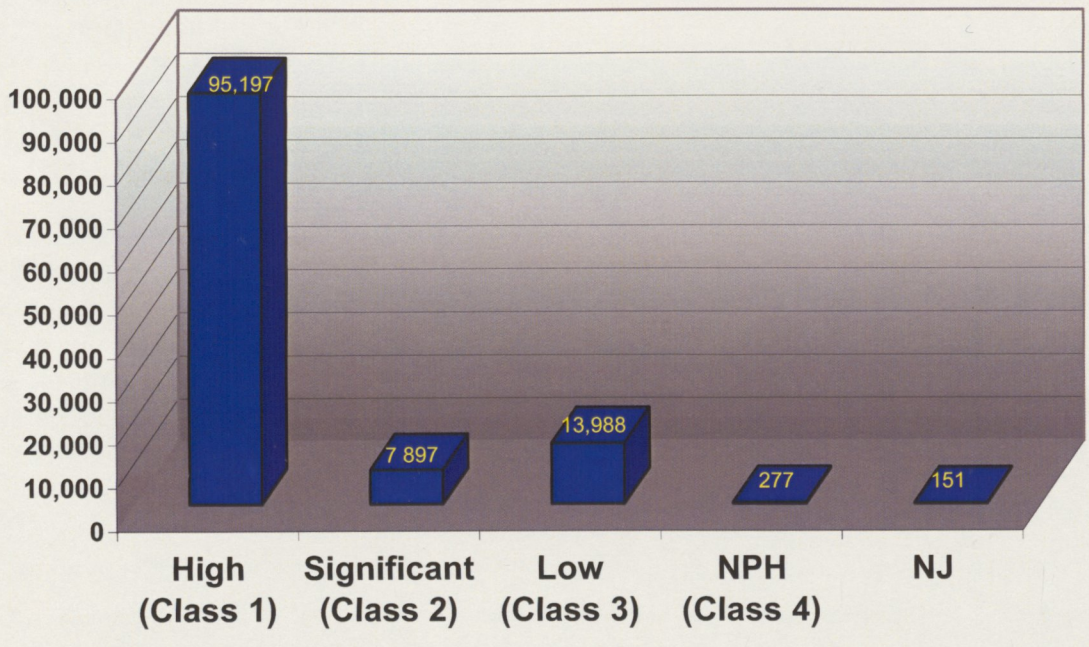
At the conclusion of the reporting period, there were 178 dams restricted from full storage due to various structural deficiencies such as significant leakage, cracking and sliding of embankments, and inadequate spillways. Figure 2 shows a chart of the number of reservoirs restricted around the state by hazard classification.

Figure 2
Number of Restricted Dams By Hazard Classification



At the conclusion of the reporting period, the total volume of storage lost due to storage restrictions is 117,510 acre-feet. Figure 3 presents a chart of the volume of reservoir storage lost to dam restrictions around the state in each of the hazard classifications.

Figure 3
Restricted Storage in Acre-Feet By Hazard Classification



A storage restriction on dams provides risk reduction for the public and environment until the problems are corrected. The owners are responsible for following the restricted operating levels and the restrictions are enforced by the Division Engineers. A complete list of the restricted reservoirs at the end of the reporting period is included in Appendix E. Although many dams were repaired and removed from the restricted list within the last year, a number of dams were also added to the list during the same time period. The change in the restriction from the same time last year resulted in a slight decrease in the number of dams on the restricted list and the volume of the restrictions decreased by approximately 1,286 acre-feet.

3.6 Staff Training

A critical element in the Dam Safety Program is the continued training of our personnel to maintain a high level of technical competency, to keep up with changing technology, to develop additional management and communication skills, and to keep abreast of changes in the development of dam safety programs across the country. The following training opportunities were achieved this year:

1. HEC-HMS Training Emmitsburg, MD (attended by 2 dam safety engineers);
2. FEMA Workshop on HEC-RAS Unsteady Flow, Emmitsburg, MD (attended by 1 dam safety engineer);
3. ASCE HEC-RAS Steady Flow Analysis, Denver, CO (attended by 1 dam safety engineer);
4. ASDSO Hydraulics of Spillways Technical Seminar Las Vegas, NV (attended by 2 dam safety engineers);
5. ASDSO Annual Conference, Boston, MA (attended by 4 dam safety engineers);
6. USBR Dam Tender Training, Grand Junction, CO (attended by 2 dam safety engineers)
7. USSD Annual Conference, San Antonio, TX (attended by 2 dam safety engineers)
8. Extreme Precipitation Analysis Tool (EPAT) Training, Denver, CO (attended by the Dam Safety Branch)
9. Pressurized Concrete Cylinder Pipe and Concrete Repair Technical Seminar, (attended by two Dam Safety Engineers);

3.7 Emergency Action Plans (Emergency Preparedness Plans)

Emergency preparedness for incidents at dams that jeopardize the public safety, including the failure of dams, has become an integral part of dam safety programs across the nation. The entire federal dam owning/regulating agencies and most states require that plans be formulated in order to detect incidents at dams, give adequate warning, and maintain preparedness in the event of a dam failure. Colorado has been actively involved in this area since 1981, ultimately requiring that Emergency Action Plans (EAP) {Emergency Preparedness Plans (EPP)} be prepared for High Hazard (Class 1) and Significant Hazard (Class 2) dams as part of the regulations for dam safety adopted in September 1988. Although all High Hazard dams have such a plan, much work is still needed to update, maintain, and exercise the plans annually. Approximately 129 EAPs (EPPs) were reviewed and updated during the year.

Approximately 98 percent of the Significant Hazard (Class 2) dams have EAPs (EPPs) on file. The owners of Significant Hazard dams that do not have a plan have been notified of the requirement to prepare them. The dam safety engineers continue to assist dam owners in the preparation of their EAPs (EPPs). In some cases, we have prepared the plans for the owners.

J.O. Hill Dam Emergency Spillway
Douglas County, Division 1,
Significant Hazard

3.8 Revisions to the Rules and Regulations

This year, the Dam Safety Branch was successful in revising the *Rules and Regulations for Dam Safety and Dam Construction* (Rules), and will be effective on January 1, 2007.

The key changes to the Rules as described in the public presentations include:

1. Elimination of the Intermediate dam size.
2. Revision and updating the nomenclature to be consistent with National Standards (i.e. hazard classification, Emergency action plans).
3. Revisions to the methodology for determining the Inflow Design Flood and spillway sizing.
4. Reduction of Probable Maximum Precipitation (PMP) due to elevation effects.
5. Modifications to the Embankment and Concrete Dam Design Requirements to bring the Rules in line with state-of-the-practice.

The branch received several comments from consulting engineers and the consultant-lead committees assisted in providing critical information on updating specific sections of the rules including the areas of Geotechnical Engineering, Concrete Dam Engineering and Engineering Geology. This process of open review and comment proved to be beneficial and, as a result, nobody contested the Rules at the hearing held in November, 2006.

3.9 Dam Safety Data Management Systems

The dams database (DAMS) has been updated and upgraded this fiscal year. While the main database is kept on a computer server in Denver, the dam safety engineers can access and update the data for their divisions through network connections. The Dam Safety Branch's capability to maintain the database and analyze dams was enhanced by the receipt of computer hardware and software for the Denver office and the division offices under the auspices of the National Dam Safety Program Assistance grants. This system is used to update the National Inventory of Dams (NATDAM or NID) periodically when requested by the U.S. Army Corps of Engineers.

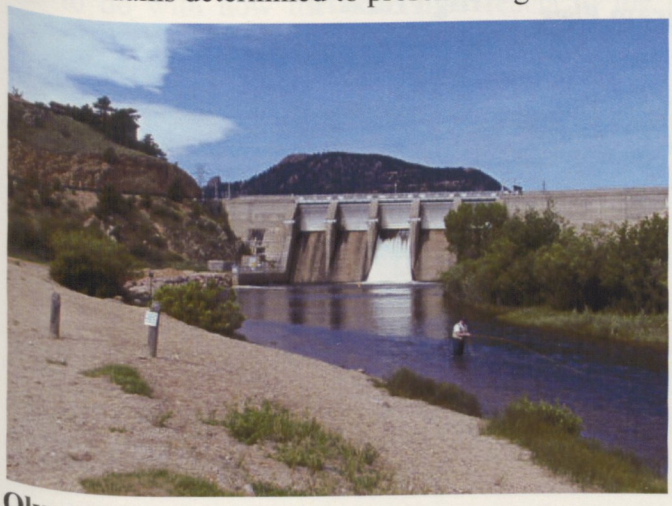
3.10 Publications/Internet

A number of publications are available at no cost on the Dam Safety web page at http://water.state.co.us/damsafety/dams.asp. The documents are in a variety of common formats including Microsoft Word and Adobe Acrobat PDF. Documents available include the Proposed Rules and Regulations for Dam Safety and Dam Construction, the 1988 Rules and Regulations, Project Review Guide, application forms, sample plans, Livestock and Erosion Control Dam Permits, and Notice to Construct a Nonjurisdictional Water Impoundment Structure, and the Guide to Construction and Administration of Dams in Colorado.

Elkhead Dam, Moffat, County Division 6, High Hazard

3.11 Risk-Based Approach

This year, the Dam Safety Branch was able to develop a Risk-Based Profiling System (RBPS) software tool to quickly rank the relative condition of High Hazard (Class 1) and Significant Hazard (Class 2) dams in Colorado. This ranking was used to more efficiently allocate resources to those dams determined to present the greatest risk to public safety.



Olympus Dam
Larimer County, Division 1, High Hazard

By March, the RBPS program enabled the dam safety engineers to rank all High (Class 1) and Significant (Class 2) Hazard dams in their areas of responsibility. Those rankings assisted the dam safety engineers in developing their schedules and priorities for the 2005-06 inspection season.

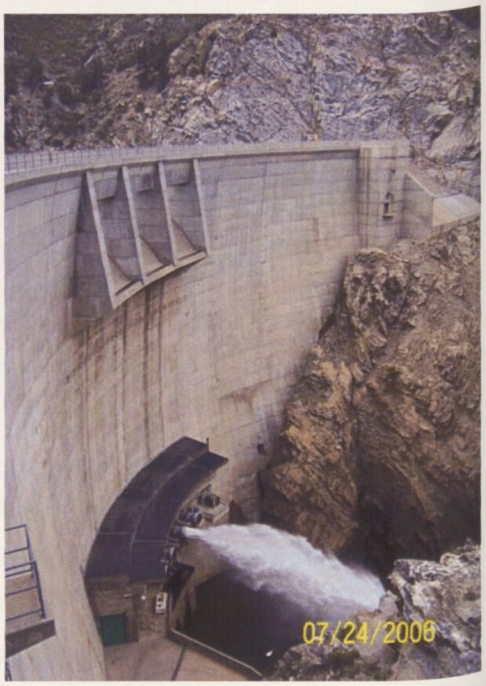
As the dam safety engineers become more familiar with the RPBS program, additional application of the Risk-Based methodologies, including increased implementation of Failure Modes and Consequence Evaluations (FMCE), will be pursued.

3.12 Federal Energy Regulatory Commission Non-Federal Dams

This year, several dam safety engineers participated in the Federal Energy Regulatory Commission (FERC) Part 12D Periodic Inspections and Potential Failure Mode Analysis (PFMA) workshops for the following non-federal dams regulated by FERC:

1. Strontia Springs Dam
2. Barker Dam
3. Trout Lake Dam
4. Clear Lake Dam

A PFMA workshop is an informal examination of potential failure modes for an existing dam and its appurtenances by a team of independent consultants, dam owner personnel and other people who are qualified either by experience or education to evaluate the dam and its appurtenances.



Strontia Springs Dam, Douglas County, Division 1 High Hazard

3.13 State of Michigan Dam Safety Program Peer Review

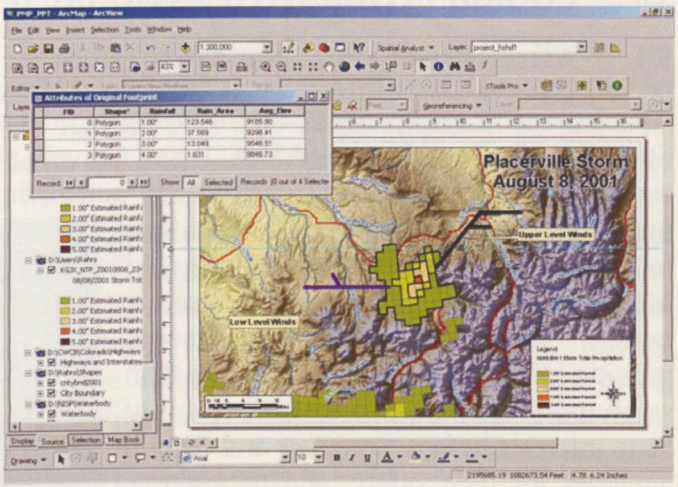
This year, Greg Hammer (Division 1 Dam Safety Engineer) served on a Peer Review Committee to review the dam safety program for the State of Michigan. This is a program under the sponsorship of ASDSO where a team reviews the dam safety program for compliance with the model program and evaluates ways to improve the program. The team of reviewers includes a state dam safety agent, a dam owner, and a private consultant. The program involves several days of preparatory review of reports, statutes and regulations for the program under review, and the team then travels to the offices to conduct interviews of employees involved with dam safety. Prior to leaving the site, the team prepares a report for the agency being reviewed.

4.0 SPECIAL STUDIES

4.1. Extreme Precipitation Analysis Tool

Funded by the Dam Safety Branch NDSP grant and the CWCB, a beta version of the Extreme Precipitation Analysis Tool (EPAT) for the West of the Continental Divide was released for use within the Dam Safety Branch in the Spring of 2006. The tool was initially developed for the western slope with drainage basins of less than 500 square miles.

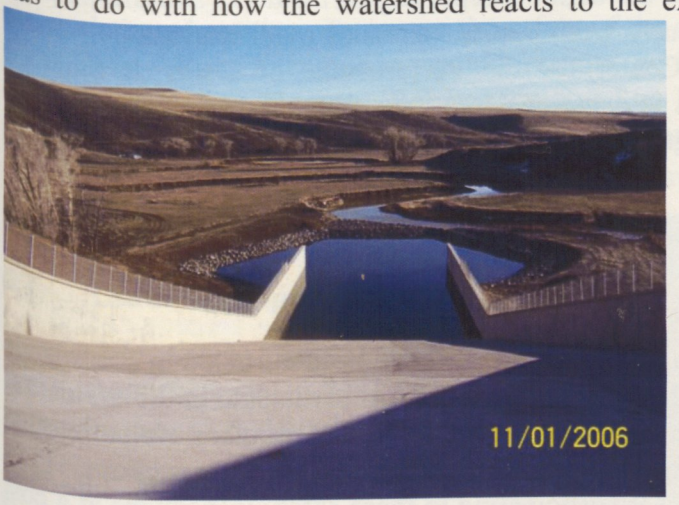
EPAT is an objective GIS-based analysis tool that utilizes existing National Weather Service storm databases as well as the Colorado extreme weather database developed by Colorado State University and modern meteorological techniques to analyze extreme precipitation events. EPAT provides dam owners an alternative to costly site-specific studies. The Branch will provide training sessions to the public on how to effectively use EPAT. The initial use of EPAT has shown that the tool emulates site-specific Probable Maximum Precipitation (PMP) and Hydrometeorological Report (HMR) PMP events. The Branch is optimistic that this state-of-the-practice tool in hydrology and hydrometeorology in Colorado will be available for the east of the Continental Divide in 2007.



Typical screen from an ArcView based GIS analysis of an Extreme Precipitation event.

4.2 Hydrologic Basin Response Study

The determination of spillway adequacy is based upon the development of an Inflow Design Flood (IDF) for the watershed above a given dam. A second part of the development of an IDF has to do with how the watershed reacts to the extreme precipitation event. Many "Basin Response Factors" can effect how much precipitation (water) from a given magnitude event actually "runs off" and needs to be safely handled by the spillway and passed through the reservoir to prevent overtopping the dam. As with the methodologies used for estimating extreme precipitation, the methods of estimating basin response factors used in determining the IDF are based on past research and have not been updated in over 40 years. Additionally, in many cases the empirically based response factors are based on studies performed in other states, making their application within Colorado questionable.



Elkhead Dam Emergency Spillway
Moffat County, Division 6, High Hazard

Through the efforts of a nationally recognized consulting hydrologist and a select group of dam safety engineers with an expertise in hydrology, a draft of the Guidelines and Procedures for Estimating Basin Response Factors in Colorado was presented to the Branch in the fall. Comments were provided and the final publication will be available for use in early 2007.

5.0 COORDINATION WITH NATIONAL DAM SAFETY PROGRAMS

5.1 Association of State Dam Safety Officials

All of the dam safety engineers in the Dam Safety Branch are members of the Association of State Dam Safety Officials (ASDSO) and actively participate in its programs, presenting papers, serving on task groups and committees, and taking advantage of ASDSO-sponsored training opportunities. The purpose of ASDSO is to provide a forum for the exchange of ideas and experiences on dam safety issues, foster interstate cooperation, provide information and assistance to dam safety programs, provide representation of state interests before Congress and federal agencies for dam safety, and to improve the efficiency and effectiveness of state dam safety programs. Mr. Jack Byers, Deputy State Engineer, is the state's representative to the ASDSO, and was recently elected to the Board of Directors of ASDSO. Mr. Byers also was recently appointed to the National Dam Safety Review Board.

Elkhead Dam Outlet Works Tower
Moffat County, Division 6, High Hazard

Procedures have been implemented to begin the national reporting of incidents and the findings of dam safety inspections where orders have been issued to make modifications for safety reasons. Incidents are reported to the Center for the Performance of Dams at Stanford University, in Palo Alto, California. This is a national program that has been developed by ASDSO and the Federal Emergency Management Agency (FEMA) for the accumulation of data for the improvement of design and safety evaluations of dams nationwide.

5.2 Federal Dam Safety Programs

5.2.1 General

Routine inspections of federal dams by dam safety engineers have been curtailed in accordance with a legislative audit recommendation. The branch, however, will participate in the evaluation of the safety of some federal dams for special issues and performance problem evaluations, in accordance with the procedure for obtaining approval to participate in these inspections. Less than about ten hours were spent this fiscal year participating in these safety inspections at a cost of less than $450.

5.2.2 Memoranda of Understanding

Memorandums of Understanding (MOU) have been executed with the U.S. Bureau of Reclamation (USBR), the U.S. Bureau of Land Management, and the Air Force Academy (AFA) relating to dam safety activities in Colorado. An MOU is also in development for the Fort Carson Army installation. The MOUs provide for the exchange of safety-related information of dams under each agency's jurisdiction. An MOU is also being updated with the U.S. Forest Service, Rocky Mountain Region, to provide coordination of mutual responsibilities for dam safety and their Travel Management Plan for the National Forests. This is necessary to provide access to private dams located within the forests. MOUs are being pursued with the other federal agencies such as the U.S. Army Corps of Engineers (USCOE) and the Federal Energy Regulatory Commission (FERC) to assure that the dams under their jurisdiction are being maintained in a safe condition and to coordinate activities and exchange of information and data.

5.2.3 Federal Energy Regulatory Commission Non-Federal Dams

In the past, the Branch has performed safety inspections of dams that are also regulated by FERC. In accordance with an agreement (since a formal MOU was not completed) with them, they were to furnish copies of their reports for branch records. More recently, the branch had curtailed participation in FERC regulated dams in accordance with a 1998 State of Colorado internal audit. However, during a recent review of the agreement and procedures for administration of FERC regulated dams, the need for a change in the current policy was identified. It was determined that the Dam Safety Branch does not regularly receive copies of FERC safety inspection reports. Further, it was clarified that unlike USBR and USCOE dams, the FERC does not own the dams they regulate and, in most cases, the dams are owned by Colorado based entities. To ensure the safety of the citizens of Colorado, it was determined that Dam Safety Branch engineers would resume performing dam safety inspection of FERC regulated dams in Colorado. Policy Memorandum No. 06-02 modifies recommendation #3 of the 1998 legislative audit resuming inspections on non-federal dams that are regulated by FERC.

6.0 FISCAL RESPONSIBILITY

6.1 Use of Appropriated Funds

Dam safety personal service expenditures for fiscal year 2005-06 were approximately $1,500,000.

With the passage of the National Dam Safety Program Act (NDSP), PL 104-303, and its subsequent funding, Colorado has applied for and received assistance grants each year since 1998. An additional grant was approved for 2005. These funds were used to provide advanced training to the Dam Safety Branch personnel in the fields of dam safety and risk analysis. Additional training is provided under the

Ritschard Dam, Grand County
Division 5, High Hazard

technical seminar provisions of the Act. The grant funds are also used to acquire emergency communication equipment, upgrade computers, and purchase engineering computer software programs and other equipment. Future grants may be available each year under the Act, subject to appropriations.

6.2 Receipt of Funds Generated by Filing Fees

Fees collected by the State Engineer and deposited in the General Fund for dam safety amounted to $55,721.59 for filing plans and specifications during the period.

7.0 ENFORCEMENT ORDERS AND PROCEEDINGS

No enforcement orders on dam safety were issued during the period.

8.0 LEGISLATION

No legislation affecting dam safety was enacted during the period.

9.0 SUMMARY OF FY 2006-07 PROGRAM GOALS

In addition to yearly program goals of inspections and design reviews, the following are additional program goals for FY 2006-07:

1. Reallocate resources based on the results of the risk-based profiling
2. Release the EPAT for the Front Range and San Luis Valley
3. Review and update current policy documents.
4. Implementation of the January 1, 2007 Rules and Regulations for Dam Safety and Dam Construction.
5. Update the Long-Range Dam Safety Plan.
6. Update the EAP Guidelines and Design Review Guidelines.
7. Update the Owners Dam Safety Manual.
8. Continue to provide professional training of branch personnel.
9. Improve coordination and communication of personnel within the program and Division Offices.
10. Continue to perform dam owner training by conducting one-day workshops at various locations throughout the state.
11. Expand the Division of Water Resources Dam Safety Branch's involvement in National Dam Safety and Security activities.

APPENDIX A

DAM SAFETY BRANCH ORGANIZATION AND PERSONNEL

DAM SAFETY BRANCH PERSONNEL

NAME	*LOCATION*	*GRADE*	*TITLE*	*RESPONSIBILITY*
Jack Byers	Denver	PE IV	Deputy State Engineer	Oversight of Colorado Dam Safety Branch Program, ASDSO State Representative and board member, national Dam Safety Review Board, Government Coordination and Security Council, Colorado Infrastructure Protection Committee
Mark Haynes	Denver	PE III	Chief, Dam Safety Branch	Oversight of Safety Evaluations of Existing Dams and Design Review and Construction Inspection Activities
Paul Perri	Denver	PE II	Design Review/Const. Inspect. Engineer	Engineering review of design documents and construction inspection
Mike Cola	Greeley	PE II	Dam Safety Engineer	Safety Evaluations of existing dams in Water Division 1
John Batka	Greeley	PE II	Dam Safety Engineer	Safety Evaluations of Existing Dams in Water Division 1
Greg Hammer	Greeley	PE II	Dam Safety Engineer	Safety Evaluations of Existing Dams in Water Division 1
Bill McCormick	Colorado Springs	PE II	Dam Safety Engineer	Safety Evaluations of Existing Dams in Water Divisions 1 and 2
Mike Graber	Pueblo	PE II	Dam Safety Engineer	Safety Evaluations of Existing Dams in Water Division 2
Dennis Miller	Durango	PE II	Dam Safety Engineer	Safety Evaluations of Existing Dams in Water Divisions 3 and 7
Jason Ward	Montrose	PE II	Dam Safety Engineer	Safety Evaluations of Existing Dams in Water Division 4
John G. Blair	Glenwood Springs	PE II	Dam Safety Engineer	Safety Evaluations of Existing Dams in Water Division 5
Garrett Jackson	Grand Junction	PE II	Dam Safety Engineer	Safety Evaluations of Existing Dams in Water Divisions 4 and 5, and review of design documents on the Western Slope
John R. Blair	Steamboat Springs	PE II	Dam Safety Engineer	Safety Evaluations of Existing Dams in Water Division 6
John Redding	Denver	PE I	Dam Safety Engineer	Safety Evaluations of Existing Class 3 Dams in Water Division 1, and assistance to Denver Design Review Unit staff

APPENDIX B

DAM SAFETY ENGINEER
DAM SAFETY INSPECTION REPORT FORM

ENGINEERS INSPECTION REPORT

INSPECTOR:

OFFICE OF THE STATE ENGINEER - DIVISION OF WATER RESOURCES - DAM SAFETY BRANCH — 1313 SHERMAN STREET, ROOM 818, DENVER, CO 80203, (303) 866-3581

DAM NAME: | T: | R: | S: | COUNTY: | DATE OF INSPECTION:

DAM ID: | YRCompl: | DAM HEIGHT(FT): | SPILLWAY WIDTH(FT): | PREVIOUS INSPECTION:

CLASS: | DAM LENGTH(FT): | SPILLWAY CAPACITY(CFS): | CAPACITY(AF):

DIV: | WD: | CRESTWIDTH(FT): | FREEBOARD (FT): | SURFACE AREA(AC):

EPP: 8/5/2002 | CRESTELEV(FT): | DRAINAGE AREA (AC.): | OUTLET INSPECTED:

CURRENT RESTRICTION

OWNER: | CONTACT NAME:

ADDRESS: | CONTACT PHONE:

INSPECTION PARTY :

REPRESENTING :

FIELD CONDITIONS OBSERVED

WATER LEVEL: BELOW DAM CREST _____ FT. Above Spillway _____ FT. GAGE ROD READING _____

GROUND MOISTURE CONDITION: DRY ☐ WET ☐ SNOWCOVER ☐ OTHER _____

DIRECTIONS: MARK AN X FOR CONDITIONS FOUND AND UNDERLINE WORDS THAT APPLY

Conditions Observed: GOOD | ACCEPTABLE | POOR

UPSTREAM SLOPE

PROBLEMS NOTED ☐ (0)NONE ☐ (1)RIPRAP - MISSING, SPARSE, DISPLACED, WEATHERED ☐ (2) WAVE EROSION - WITH SCARPS

☐ (3) CRACKS WITH DISPLACEMENT ☐ (4) SINKHOLE ☐ (5) APPEARS TOO STEEP ☐ (6) DEPRESSIONS OR BULGES ☐ (7) SLIDES

☐ (8) CONCRETE FACING - HOLES, CRACKS, DISPLACED, UNDERMINED ☐ (9) OTHER

CREST

PROBLEMS NOTED ☐ (10) NONE ☐ (11) RUTS OR PUDDLES ☐ (12) EROSION ☐ (13) CRACKS - WITH DISPLACEMENT ☐ (14) SINKHOLES

☐ (15) NOT WIDE ENOUGH ☐ (16) LOW AREA ☐ (17) MISALIGNMENT ☐ (18) IMPROPER SURFACE DRAINAGE ☐ (19) OTHER

DOWNSTREAM SLOPE

PROBLEMS NOTED ☐ (20) NONE ☐ (21) LIVESTOCK DAMAGE ☐ (22) EROSION OR GULLIES ☐ (23) CRACKS - WITH DISPLACEMENT ☐ (24) SINKHOLE

☐ (25) APPEARS TOO STEEP ☐ (26) DEPRESSIONS OR BULGES ☐ (27) SLIDE ☐ (28) SOFT AREAS ☐ (29) OTHER

SEEPAGE

PROBLEMS NOTED ☐ (30) NONE ☐ (31) SATURATED EMBANKMENT AREA ☐ (32) SEEPAGE EXITS ON EMBANKMENT

☐ (33) SEEPAGE EXITS AT POINT SOURCE ☐ (34) SEEPAGE AREA AT TOE ☐ (35) FLOW ADJACENT TO OUTLET ☐ (36) SEEPAGE INCREASED / MUDDY

DRAIN OUTFALLS SEEN ☐ No ☐ Yes Show location of drains on sketch and indicate ☐ (37) FLOW INCREASED / MUDDY ☐ (38) DRAIN DRY / OBSTRUCTED

☐ (39) OTHER

OUTLET

PROBLEMS NOTED ☐ (40) NONE ☐ (41) NO OUTLET FOUND ☐ (42) POOR OPERATING ACCESS ☐ (43) INOPERABLE

☐ (44) UPSTREAM OR DOWNSTREAM STRUCTURE DETERIORATED (45) OUTLET OPERATED DURING INSPECTION ☐ YES ☐ NO

INTERIOR INSPECTED ☐ (120) NO ☐ (121)YES ☐ (46) CONDUIT DETERIORATED OR COLLAPSED ☐ (47) JOINTS DISPLACED ☐ (48) VALVE LEAKAGE

☐ (49) OTHER

SPILLWAY

PROBLEMS NOTED ☐ (50) NONE ☐ (51) NO EMERGENCY SPILLWAY FOUND ☐ (52) EROSION WITH BACKCUTTING ☐ (53) CRACK - WITH DISPLACEMENT

☐ (54) APPEARS TO BE STRUCTURALLY INADEQUATE ☐ (55) APPEARS TOO SMALL ☐ (56) INADEQUATE FREEBOARD ☐ (57) FLOW OBSTRUCTED

☐ (58) CONCRETE DETERIORATED / UNDERMINED ☐ (59) OTHER

See Guidelines on Back of this Sheet

DAM NAME: Page 2 DAM I.D.: DATE:

MONITORING

EXISTING INSTRUMENTATION FOUND ☐ (110) NONE ☐ (111) GAGE ROD ☐ (112) PIEZOMETERS ☐ (113) SEEPAGE WEIRS / FLUMES
☐ (114) SURVEY MONUMENTS ☐ (115) OTHER
MONITORING OF INSTRUMENTATION ☐ (116) NO ☐ (117) YES PERIODIC INSPECTIONS BY: ☐ (118) OWNER ☐ (119) ENGINEER

GOOD ☐ ACCEPTABLE ☐ POOR ☐ MONITORING

MAINTENANCE AND REPAIR

PROBLEMS NOTED: ☐ (60 NONE ☐ (61) ACCESS ROAD NEEDS MAINTENANCE ☐ (62) CATTLE DAMAGE
☐ (63) BRUSH ON UPSTREAM SLOPE, CREST, DOWNSTREAM SLOPE, TOE ☐ (64) TREES ON UPSTREAM SLOPE, CREST, DOWNSTREAM SLOPE, TOE
☐ (65) RODENT ACTIVITY ON UPSTREAM SLOPE, CREST, DOWNSTREAM SLOPE, TOE ☐ (66) DETERIORATED CONCRETE - FACING, OUTLET SPILLWAY
☐ (67) GATE AND OPERATING MECHANISM NEED MAINTENANCE ☐ (68) OTHER

GOOD ☐ ACCEPTABLE ☐ POOR ☐ MAINTENANCE AND REPAIR

OVERALL CONDITIONS

Based on this Safety Inspection and recent file review, the overall condition is determined to be:
☐ (71) SATISFACTORY ☐ (72) CONDITIONALLY SATISFACTORY ☐ (73) UNSATISFACTORY

OVERALL CONDITIONS

The State Engineer, by providing this dam safety inspection report, does not assume responsibility for any unsafe condition of the subject dam. The sole responsibility for the safety of this dam rests with the reservoir owner or operator, who should take every step necessary to prevent damages caused by leakage or overflow of waters from the reservoir or floods resulting from a failure of the dam.

ITEMS REQUIRING ACTION BY OWNER TO IMPROVE THE SAFETY OF THE DAM

MAINTENANCE - MINOR REPAIR - MONITORING

☐ (80) PROVIDE ADDITIONAL RIPRAP:
☐ (81) LUBRICATE AND OPERATE OUTLET GATES THROUGH FULL CYCLE
☐ (82) CLEAR TREES AND/OR BRUSH FROM:
☐ (83) INITIATE RODENT CONTROL PROGRAM AND PROPERLY BACKFILL EXISTING HOLES:
☐ (84) GRADE CREST TO A UNIFORM ELEVATION WITH DRAINAGE TO THE UPSTREAM SLOPE:
☐ (85) PROVIDE SURFACE DRAINAGE FOR:
☐ (86) MONITOR:
☐ (87) DEVELOP AND SUBMIT AN EMERGENCY PREPAREDNESS PLAN:
☐ (88) OTHER
☐ (89) OTHER

ENGINEERING - EMPLOY AN ENGINEER EXPERIENCED IN DESIGN AND CONSTRUCTION OF DAMS TO: (Plans and Specifications must be approved by State Engineer prior to construction

☐ (90) PREPARE PLANS AND SPECIFICATIONS FOR REHABILITATION OF THE DAM:
☐ (91) PREPARE AS -BUILT DRAWINGS OF:
☐ (92) PERFORM A GEOTECHNICAL INVESTIGATION TO EVALUATE THE STABILITY OF THE DAM:
☐ (93) PERFORM A HYDROLOGIC STUDY TO DETERMINE REQUIRED SPILLWAY SIZE:
☐ (94) PREPARE PLANS AND SPECIFICATIONS FOR AN ADEQUATE SPILLWAY:
☐ (95) SET UP A MONITORING SYSTEM INCLUDING WORK SHEETS, REDUCED DATA AND GRAPHED RESULTS:
☐ (96) PERFORM AN INTERNAL INSPECTION OF THE OUTLET:
☐ (97) OTHER:
☐ (98) OTHER:
☐ (99) OTHER:

SAFE STORAGE LEVEL RECOMMENDED AS A RESULT OF THIS INSPECTION

☐ (101) FULL STORAGE
☐ (102) CONDITIONAL FULL STORAGE
☐ (103) RECOMMENDED RESTRICTION
☐ (104) CONTINUE EXISTING RESTRICTION

RESTRICTED LEVEL OFFICIAL ORDER TO FOLLOW →

FT. BELOW DAM CREST
FT. BELOW SPILLWAY CREST
FT. GAGE HEIGHT
NO STORAGE-MAINTAIN OUTLET FULLY OPEN

REASON FOR RESTRICTION

ACTIONS REQUIRED FOR CONDITIONAL FULL STORAGE OR CONTINUED STORAGE AT THE RESTRICTED LEVEL:

Engineer's Signature _____ INSPECTED BY
Owner's Signature _____ OWNER/OWNER'S REPRESENTATIVE DATE: / /

GUIDELINES FOR DETERMINING CONDITIONS

CONDITIONS OBSERVED - APPLIES TO UPSTREAM SLOPE, CREST, DOWNSTREAM SLOPE, OUTLET, SPILLWAY

GOOD

In general, this part of the structure has a near new appearance, and conditions observed in this area do not appear to threaten the safety of the dam.

ACCEPTABLE

Although general cross-section is maintained, surfaces may be irregular, eroded, rutted, spalled, or otherwise not in new condition. Conditions in this area do not currently appear to threaten the safety of the dam.

POOR

Conditions observed in this area appear to threaten the safety of the dam.

CONDITIONS OBSERVED - APPLIES TO SEEPAGE

GOOD

No evidence of uncontrolled seepage. No unexplained increase in flows from designed drains. All seepage is clear. Seepage conditions do not appear to threaten the safety of the dam.

ACCEPTABLE

Some seepage exists at areas other than the drain outfalls, or other designed drains. No unexplained increase in seepage. All seepage is clear. Seepage conditions observed do not currently appear to threaten the safety of the dam.

POOR

Seepage conditions observed appear to threaten the safety of the dam. Examples:
1) Designed drain or seepage flows have increased without increase in reservoir level.
2) Drain or seepage flows contain sediment, i.e., muddy water or particles in jar samples.
3) Widespread seepage, concentrated seepage, or ponding appears to threaten the safety of the dam.

CONDITIONS OBSERVED - APPLIES TO MONITORING

GOOD

Monitoring includes movement surveys and leakage measurements for all dams, and piezometer readings for Class I dams. Instrumentation is in reliable, working condition. A plan for monitoring the instrumentation and analyzing results by the owner's engineer is in effect. Periodic inspections by owner's engineer.

ACCEPTABLE

Monitoring includes movement surveys and leakage measurements for Class I & 11 dams; leakage measurements for Class III dams. Instrumentation is in serviceable condition. A plan for monitoring instrumentation is in effect by owner. Periodic inspections by owner or representative. OR, NO MONITORING REQUIRED.

POOR

All instrumentation and monitoring described under "ACCEPTABLE" here for each class of dam, are not provided, or required periodic readings are not being made, or unexplained changes in readings are not reacted to by the owner.

CONDITIONS OBSERVED - APPLIES TO MAINTENANCE AND REPAIR

GOOD

Dam appears to receive effective on-going maintenance and repair, and only a few minor items may need to be addressed.

ACCEPTABLE

Dam appears to receive maintenance, but some maintenance items need to be addressed. No major repairs are requirecl

POOR

Dam does not appear to receive adequate maintenance. One or more items needing maintenance or repair has begun to threaten the safety of the dam.

OVERALL CONDITIONS

SATISFACTORY

The safety inspection indicates no conditions that appear to threaten the safety of the dam, and the dam is expected to perform satisfactorily under all design loading conditions. Most of the required monitoring is being performed.

CONDITIONALLY SATISFACTORY

The safety inspection indicates symptoms of structural distress (seepage, evidence of minor displacements, etc.), which, if conditions worsen, could lead to the failure of the dam. Essential monitoring, inspection, and maintenance must be performed as a requirement for continued full storage in the reservoir.

UNSATISFACTORY

The safety inspection indicates definite signs of structural distress (excessive seepage, cracks, slides, sinkholes, severe deterioration, etc.), which could lead to the failure of the dam if the reservoir is used to full capacity. The dam is judged unsafe for full storage of water.

SAFE STORAGE LEVEL

FULL STORAGE

Dam may be used to full capacity with no conditions attached.

CONDITIONAL FULL STORAGE

Dam may be used to full storage if certain monitoring, maintenance, or operational conditions are met.

RESTRICTION

Dam may not be used to full capacity, but must be operated at some reduced level in the interest of public safety.

CLASSIFICATION OF DAMS

CLASS I

Class I - Loss of human life is expected in the event of failure of the dam, while the reservoir is at the high water line.

CLASS 11

Class II - Significant damage to improved property is expected in the event of failure of the dam while the reservoir is at the high water line, but no loss of human life is expected.

CLASS III

Class III - Loss of human life is not expected, and damage to improved property is expected to be small, in the event of failure of the dam while the reservoir is at high water fine.

Class IV - No loss of life or damage to improved property, or loss of downstream resource is expected in the event of failure of the dam while the reservoir is at the high water line.

APPENDIX C

WATER COMMISSIONER
DAM OBSERVATION REPORT FORM

WATER COMMISSIONER • DAM OBSERVATION REPORT • OFFICE OF THE STATE ENGINEER

DIVISION OF WATER RESOURCES • DAM SAFETY BRANCH

1313 SHERMAN STREET, ROOM 818, DENVER, CO 80203, (303) 866-3681

FIELD CONDITIONS OBSERVED

WATER LEVEL: BELOW DAM CREST _____ FT., BELOW SPILLWAY _____ FT., GAGE ROD READING _____

GROUND MOISTURE CONDITION: DRY _____ WET _____ SNOWCOVER _____ OTHER _____

DIRECTIONS: MARK AN X FOR CONDITIONS FOUND AND UNDERLINE WORDS THAT APPLY.

UPSTREAM SLOPE

PROBLEMS NOTED: ☐ (0) NONE ☐ (1) RIPRAP - MISSING, SPARSE, DISPLACED, WEATHERED ☐ (2) WAVE EROSION-WITH SCARPS ☐ (3) CRACKSWITH DISPLACEMENT ☐ (4) SINKHOLE (5) APPEARS TO STEEP ☐ (6) DEPRESSIONS OR BULGES (7) SLIDES ☐ (8) CONCRETE FACING-HOLES, CRACKS, DISPLACED, UNDERMINED ☐ (9) OTHER _____

CREST

PROBLEMS NOTED: ☐ (10) NONE ☐ (11) RUTS OR PUDDLES ☐ (12) EROSION ☐ (13) CRACKS - WITH DISPLACEMENT ☐ (14) SINKHOLES ☐ (15) NOT WIDE ENOUGH ☐ (16) LOW AREA ☐ (17) MISALIGNMENT ☐ (18) IMPROPER SURFACE DRAINAGE ☐ (19) OTHER _____

DOWNSTREAM SLOPE

PROBLEMS NOTED: ☐ (20) NONE ☐ (21) LIVESTOCK DAMAGE ☐ (22) EROSION OR GULLIES ☐ (23) CRACKS - WITH DISPLACEMENT ☐ (24) SINKHOLE ☐ (25) APPEARS TOO STEEP ☐ (26) DEPRESSION OR BULGES ☐ (27) SLIDE ☐ (28) SOFT AREAS ☐ (29) OTHER _____

SEEPAGE

PROBLEMS NOTED: ☐ (30) NONE ☐ (31) SATURATED EMBANKMENT AREA ☐ (32) SEEPAGE EXITS ON EMBANKMENT ☐ (33) SEEPAGE EXITS AT POINT SOURCE ☐ (34) SEEPAGE AREA AT TOE ☐ (35) FLOW ADJACENT TO OUTLET ☐ (36) SEEPAGE INCREASED/MUDDY

DRAIN OUTPALL SEEN ___ No ___ Yes ☐ (37) FLOW INCREASED/MUDDY (38) DRAIN DRY/OBSTRUCTED ☐ (39) OTHER _____

OUTLET

PROBLEMS NOTED: ☐ (40) NONE ☐ (41) NO OUTLET FOUND ☐ (42) POOR OPERATING ACCESS ☐ (43) INOPERABLE ☐ (44) UPSTREAM OR DOWNSTREAM STRUCTURE DETERIORATED (45) OUTLET OPERATED DURING INSPECTION? ☐ YES ☐ NO

INTERIOR INSPECTED ☐ (120) NO ☐ (121) YES ☐ (46) CONDUIT DETERIORATED OR COLLAPSED ☐ (47) JOINTS DISPLACED ☐ (48) VALVE LEAKAGE ☐ (49) OTHER _____

SPILLWAY

PROBLEMS NOTED: ☐ (50) NONE ☐ (51) NO EMERGENCY SPILLWAY FOUND ☐ (52) EROSION-WITH BACKCUTTING ☐ (53) CRACK - WITH DISPLACEMENT ☐ (54) APPEARS TO BE STRUCTURALLY INADEQUATE ☐ (55) APPEARS TOO SMALL ☐ (56) INADEQUATE FREEBOARD ☐ (57) FLOW OBSTRUCTED ☐ (58) CONCRETE DETERIORATED/UNDERMINED ☐ (59) OTHER _____

MAINTENANCE

PROBLEMS NOTED: ☐ (60) NONE ☐ (61) ACCESS ROAD NEEDS MAINTENANCE ☐ (62) CATTLE DAMAGE ☐ (63) BRUSH ON UPSTREAM SLOPE, CREST, DOWNSTREAM SLOPE, TOE ☐ (64) TREES ON UPSTREAM SLOPE, CREST, DOWNSTREAM SLOPE, TOE ☐ (67) GATE AND OPERATING MECHANISM NEED MAINTENANCE ☐ (68) OTHER _____

Conditions Observed

See Guidelines on Back of this Sheet

	GOOD	ACCEPTABLE	POOR
UPSTREAM SLOPE			
CREST			
DOWNSTREAM SLOPE			
SEEPAGE			
OUTLET			
SPILLWAY			
MAINTENANCE			

DIRECTIONS: ENTER PROBLEM NUMBER ( ) THEN LOCATION DIMENSIONS, DEGREE,

LOCATION OF PROBLEMS & COMMENTS: _____

MAINTENANCE – MINOR REPAIR – MONITORING – ACTION REQUIRED OF OWNER TO IMPROVE THE SAFETY OF THE DAM.

☐ (80) PROVIDE ADDITIONAL RIPRAP: _____

☐ (81) LUBRICATE AND OPERATE OUTLET GATES THROUGH FULL CYCLE: _____

☐ (82) CLEAR TREES AND/OR BRUSH FROM _____

☐ (83) INITIATE RODENT CONTROL PROGRAM AND PROPERLY BACKFILL EXISTING HOLES _____

☐ (84) GRADE CREST TO A UNIFORM ELEVATION WITH DRAINAGE TO THE UPSTREAM SLOPE: _____

☐ (85) PROVIDE SURFACE DRAINAGE FOR: _____

☐ (86) MONITOR: _____

☐ (88) OTHER _____

☐ (89) OTHER _____

DAM REQUIRES INSPECTION BY A FIELD ENGINEER

The State Engineer, by providing this dam safety observation report, does not assume responsibility for any unsafe condition of the subject dam. The sole responsibility for the safety of the dam rests with the reservoir owner or operator, who should take every step necessary to prevent damages caused by leakage or overflow of waters from the reservoir or floods resulting from a failure of the dam.

4/90 JTS

OBSERVATION BY WATER COMMISSIONER **DATE**

APPENDIX D

APPROVED PLANS
AND
SPECIFICATIONS LIST

APPROVED PLANS AND SPECIFICATIONS FOR NEW DAMS AND ALTERATIONS, ENLARGEMENTS OR REPAIRS OF EXISTING DAMS

NAME	DAMID	C-NO	CONST TYPE	APPROVAL	USE
BASSET #2	560107	C-1888	REPAIR	11/2/2005	RECREATION
SCHOLL	510124	C-1076A	REPAIR	11/3/2005	IRRIGATION
POOSE CREEK	440202	C-0606D	MODIFICATION	11/23/2005	RECREATION
GROSS	060211	C-0569D	MODIFICATION	11/23/2005	DOMESTIC
CANON WTRSHD. DET. C-4	120115	C-1302A	REPAIR	12/9/2005	FLOOD CONTROL
BLACK HOLLOW	030107	C-1811	MODIFICATION	1/13/2006	IRRIGATION
DEVINNEY	070321	C-1880	MODIFICATION	1/18/2006	IRRIGATION
GENESEE NO. 2	09___C	C-1887	NEW	2/15/2006	DOMESTIC
RALSTON	070224	C-0296C	MODIFICATION	2/25/2006	DOMESTIC
HORSESHOE LAKE (SOUTH DAM)	040244	C-0807F	MODIFICATION	3/20/2006	IRRIGATION
NORTH FORK	110115	C-0639A	MODIFICATION	4/5/2006	RECREATION
MARGARET SPURGEON #1	050312	C-0986B	MODIFICATION	4/6/2006	IRRIGATION
CORNERSTONE POND NO. 4	680119	C-1890	NEW	4/24/2006	RECREATION
LOVELAND LAKE	040201	C-1073B	REPAIR	4/24/2006	IRRIGATION
HIMMELLAND	380112	C-1215A	REPAIR	5/15/2006	RECREATION
CHRISTINE LAKE	380217	C-1868	MODIFICATION	5/15/2006	RECREATION
ELLA	400228	C-1905	REPAIR	5/24/2006	IRRIGATION
RIFLE CORRECTIONAL CENTER	390126	C-1803	NEW	6/12/2006	DOMESTIC
NUCLA DOMESTIC	600117	C-0797C	MODIFICATION	6/29/2006	DOMESTIC
CORNISH PLAINS	01___A	C-1894	NEW	7/6/2006	IRRIGATION
MUSKRAT	470304	C-1629A	MODIFICATION	7/7/2006	FISH AND WILDLIFE
DUNCAN	300130	C-1895	MODIFICATION	8/15/2006	OTHER
EMPIRE (OUTLET EMBANKMENT)	010210	C-0465C	MODIFICATION	8/15/2006	FISH AND WILDLIFE
MARSHALL LAKE	060203	C-0491D	MODIFICATION	8/29/2006	IRRIGATION
KELLY ROAD DETENTION	020609	C-1912	MODIFICATION	8/29/2006	FLOOD CONTROL
COAL RIDGE WASTE DAM #1	020118	C-0689B	MODIFICATION	8/29/2006	IRRIGATION
NOTTINGHAM	370119	C-1610B	MODIFICATION	9/6/2006	IRRIGATION
EAGLE PARK RESERVOIR	370103	C-1106F	MODIFICATION	9/6/2006	DOMESTIC
LOST LAKE #1	200127	C-1669A	REPAIR	9/11/2006	IRRIGATION
BALL LAKE	430215	C-1889	REPAIR	9/19/2006	FISH AND WILDLIFE
WATER SUPPLY NO 4	030333	C-1371A	MODIFICATION	9/19/2006	IRRIGATION
CRYSTAL CREEK	100116	C-0280C	MODIFICATION	10/1/2006	DOMESTIC
MARTIN ALTERNATE NO. 3	380221	C-1891	MODIFICATION	10/2/2006	IRRIGATION
HERMIT #1	200117	C-1532B	MODIFICATION	10/2/2006	RECREATION
TRUJILLO MEADOWS	220103	C-0722D	REPAIR	10/10/2006	RECREATION
MESA CREEK #2	720214	C-0622B	REPAIR	10/10/2006	RECREATION
LEWIS	500136	C-1911	MODIFICATION	10/10/2006	RECREATION
KEETON LAKE	100205	C-0289A	MODIFICATION	10/12/2006	DOMESTIC
YOAST	570202	C-1915	REPAIR	10/16/2006	IRRIGATION
EXXONMOBIL PDP	43___B	C-1896	NEW	10/30/2006	OTHER
STILLWATER	080444	C-1785B	REPAIR	10/30/2006	RECREATION
SOUTH SIDE	040213	C-0155A	MODIFICATION	10/30/2006	IRRIGATION

Total amount of storage created or removed from the restricted list = 6,741 acre-feet

APPENDIX E

RESERVOIR RESTRICTION LIST

STATE OF COLORADO --- DAM SAFETY BRANCH
LISTING OF DAMS UNDER STORAGE RESTRICTION ORDERS

FOR DIVISION: 1

DAMID	Haz. Class	Dam Name	Restricted Reservoir Level	Reason for Restriction	Gage Ht.	Action Date	Act. Type	Volume
010104	3	ADAMS & BUNKER #3	6.0 CREST	INADEQUATE FREEBOARD, SEEPAGE	0	5/22/1975	C	150
010115	2	BIJOU #2 DAM #1	GH 16 but not > GH 15 for > 30 days	scarping, seepage, no spillway	16	6/1/1993	C	2400
010132	3	J.B. COOKE	3 ft below top of headwall	provide minimum freeboard		5/6/1998	R	0
010138	3	DOVER	10.0 FT. CREST	POOR CONDITION		6/27/1996	I	60
010210	1	EMPIRE (OUTLET EMBANKMENT)	GH 29.0	lack of emergency spillway	29	3/7/1985	R	2779
010419	3	D.A. LORD #4	2.0 SPILLWAY	INADEQUATE SPILLWAY	0	9/19/1980	C	400
010505	2	PROSPECT	GH 35.5.	maintenance & monitoring issues	35.5	4/15/1981	R	588
010506	1	RIVERSIDE	GH 33.55 FT.	no spillway; 33.55 is max decree	33.5	5/9/1984	I	0
010612	3	NO NAME 1-1 #1	10 FT. CREST	SCOUR OF D/S SLOPE DUE TO FAILURE OF OUTLET		11/2/2000	I	100
010709	3	JOLLY JOHN	NO STORAGE	SCOUR HOLE FROM OUTLET	0	10/27/2000	I	297
010716	3	HOWARDS LAKE	3.0 FT. SPILLWAY	EROSION OF DAM AND CREST		6/3/1998	I	50
020109	3	BRIGHT VIEW #1	7.0 CREST	INOP. OUTLET, INADEQUATE FREEBOARD	0	9/30/1985	I	17
020113	3	CARLIN	5.0 CREST	NO SPILLWAY	0	7/29/1986	C	0
020115	3	LOWER CHURCH LAKE	3.0 FT CREST	INADEQUATE SPILLWAY		6/22/1999	I	0
020119	3	COLE	NO STORAGE	POOR CONDITION	0	6/30/1994	I	95
020314	3	NORTH STAR	5.0 BELOW DAM CREST	SINKHOLE ON DOWNSTREAM SLOPE		2/11/2003	R	
020322	2	SIGNAL #1	5.0 CREST	CONCENTRATD SPG AREAS&QUESTNBLE COND OF OUTLET	0	6/21/1993	R	60
020333	3	THOMPSON	5.0 CREST	INADEQUATE FREEBOARD, GENERALLY POOR CONDITION	0	10/7/1987	R	30
020411	2	NISSEN #2	1.75 SPILLWAY	LACK OF FREEBOARD		9/11/1995	I	50
020606	3	MOWER	3 Feet below Lowest Point of Dam Crest	Inadequate Spillway and Freeboard		5/22/2002	I	8
020615	3	HAVANA STREET DAM	NO STORAGE	NO SPILLWAY	0	6/17/1987	C	0
030107	1	BLACK HOLLOW	4.2 FT. SPILLWAY	INADEQUATE SPILLWAY	31	10/22/1997	I	999
030108	3	BOX ELDER #2	3.0 FT. SPILLWAY	EXCESSIVE SEEPAGE	6.5	8/8/1989	I	49
030122	2	CURTIS LAKE	GH 10 FT.	CREST, SLOPE, EXT. SEEP. AREA BELOW D/S TOE	10	7/2/1985	I	397
030128	3	DRY CREEK	GH 11.5 FT.	OUTLET DETERIORATION,SEEPAGE, INAD SW	11.5	1/17/1996	R	150
030138	2	GRAY #3	NO STORAGE	SINKHOLE OVER OUTLET	0	5/27/1997	I	100
030214	3	LAW, JOHN	3.0 CREST	INADEQUATE SPILLWAY AND FREEBOARD	11	6/22/1987	C	45
030220	3	MATTINGLY	2.0 FT. SPILLWAY	EROSION/3-5 FT. SCARP ON U/S FACE		10/23/1997	I	99
030225	3	MOUNTAIN SUPPLY # 1	10 FT. CREST	POOR CONDITION	5	11/5/1997	I	500
030226	3	MOUNTAIN SUPPLY # 2	10 FT. CREST	POOR CONDITION	5	11/5/1997	I	300
030227	3	MOUNTAIN SUPPLY # 6	3.0 CREST	NO SPILLWAY		10/19/2000	C	120
030229	3	MOUNTAIN SUPPLY # 8	NO STORAGE	POOR CONDITION	0	10/3/1978	I	643
030236	2	NORTH POUDRE #1	7.0 CREST	SEEP. @ HIGHER STGE. LEVELS/COND. OF UP SLOPE	9	10/17/1988	R	365

STATE OF COLORADO --- DAM SAFETY BRANCH
LISTING OF DAMS UNDER STORAGE RESTRICTION ORDERS

FOR DIVISION: 1

DAMID	Haz. Class	Dam Name	Restricted Reservoir Level	Reason for Restriction	Gage Ht.	Action Date	Act. Type	Volume
030301	2	NORTH POUDRE # 4	GH 17 FT.	POOR U/S FACE, GENERAL CONDITION	17	4/17/1984	R	562
030512	3	RIST CANYON	3.0 CREST	SEEPAGE, INADEQUATE SPILLWAY	0	4/19/1983	I	33
040123	2	FAIRPORT	6.0 SPILLWAY	POOR CONDITION	6	6/22/1987	R	363
040208	1	RIST - BENSON	Restricted to Below Gage Height	Seepage at Toe and on Embankment	10	7/5/2005	I	160
			10					
040213	2	SOUTH SIDE	8.0 CREST	DAM UNSAFE FOR ORIG. STOR. AMT.	8	7/7/1978	I	105
045234	3	IDE AND STARBIRD #1	3.0 CREST	POOR MN, ERODED U/S FACE, QUES. SPILLWAY	0	7/3/1985	I	0
050101	2	AKERS & TARR	7.0 CREST OCT. 1 - APRIL 1	SLIDE ON D/S SLOPE, SPGE. IN AREA OF ABAND OTL	0	3/23/1989	R	34
050132	3	HIGHLAND	3.0 BELOW TOP OF CONCRETE	NO SPILLWAY	0	11/26/1990	R	0
			WALL AT OUTLET					
050206	3	KNOTH	NO STORAGE	NEVER COMPLETED DAM	0	12/24/1985	I	204
050212	3	LITTLE GEM	10.0 CREST	EROSION ON U/S SLOPE & CRST,TREES ON U/S	0	10/11/1985	I	60
				SLOPE				
050301	3	STEELE BROTHERS #1	4.0 SPILLWAY	SAT. EMBKMT.;INOP. OS.;INAD. FBD.;SPWY.REPAIR	0	12/1/1987	I	34
050302	3	STEELE BROTHERS #2	3.0 SPILLWAY	TOTAL REHABILITATION REQUIRED	0	11/23/1987	I	14
050304	3	SWEDE	5.0 CREST	EMBANKMENT SEEPAGE & INADEQUATE FREEBOARD	0	11/14/1986	I	75
050308	2	UNION	GH 28.0	spillway design based on GH=28.0	28	12/6/1977	C	0
060122	4	GREEN LAKE NO. 1	3.0 CREST	SEEPAGE, NO SPILLWAY	0	10/12/1984	I	30
060124	4	GREEN LAKE NO. 3	3.0 CREST	LEAKS, INADEQUATE SPILLWAY FREEBOARD	0	10/8/1984	I	60
060202	1	MCKAY LAKE - EAST	GH 11 FT.	INAD. FREEBOARD, SEEPAGE	11	9/11/1995	I	90
060306	3	VARSITY POND	1 FT. SPILLWAY	SEEPAGE/SPILLWAY		8/31/1999	I	1
060314	3	HODGSON-HARRIS	6.0 CREST	POOR CONDITION		11/14/1995	I	60
070126	2	DEWEY NO. 1	3.0 CREST(NW)	POOR CONDITION	0	11/19/1990	I	15
070201	1	KALCEVIC	11.0 CREST	ERODED UPSTREAM SLOPE	0	2/10/1983	I	43
070202	3	KELLY	3.0 CREST	NO SPILLWAY,	0	12/5/1986	I	0
075311	1	SMITH	1.0 SPILLWAY	SEEPAGE	0	1/26/2000	R	100
080101	3	ALLIS	15.0 CREST	SLOUGHING, SEEPAGE	0	8/25/1992	R	50
080105	3	BAIRD #1	7.0 CREST	SEVERE BEAVER ACTIVITY, PLUGGED OUTLET	0	1/8/1990	I	25
080110	4	CANTRILL	NO STORAGE	NO SPILLWAY, INOPERABLE OUTLET	0	10/22/1987	I	37
080306	3	WAKEMAN	NO STORAGE	SPILLWAY EROSION		10/17/1994	I	110
080321	4	QUICK	NO STORAGE	NO SPILLWAY, INOPERABLE OUTLET	0	10/22/1987	I	64
080327	1	SKEEL	2.0 FT. SPILLWAY	POOR CONDITION		4/2/1997	R	10
080422	3	RAINBOW FALLS #5	9.0 CREST	INADEQUATE SPILLWAY	0	9/11/1985	I	25
080424	3	GERLITS	NO STORAGE	DAM PARTIALLY BREACHED DUE TO OVERTOPPING.	0	11/13/1984	I	10
090115	2	HARRIMAN	GH 19 FT.	EXCESSIVE SEEPAGE	19	11/12/1992	R	300
090138	4	HAYSTACK #1	NO STORAGE	SPILLWAY UNDERMINED	0	5/8/1987	I	3
090204	1	WILLOW SPRINGS #1	1.0 SPILLWAY	EROSION OF US FACE	13.5	9/14/2000	R	10

STATE OF COLORADO --- DAM SAFETY BRANCH
LISTING OF DAMS UNDER STORAGE RESTRICTION ORDERS

FOR DIVISION: 1

DAMID	Haz. Class	Dam Name	Restricted Reservoir Level	Reason for Restriction	Gage Ht.	Action Date	Act. Type	Volume
230102	1	ANTERO	GH 18 FT.	STAB. BERM CONST. & NEW INSTR. MONITORING	18	2/4/1986	R	6500
230104	3	BAYOU SALADO	One-Foot Below Spillway Crest	Unsatisfactory & Unsafe Condition of Spillway		8/29/2002	I	26
230126	2	LAKE GEORGE	Potential Instability Confirmed	Slope Stability Report Accepted		1/24/2006	C	
230308	3	MOUNTAIN	4.0 CREST	INSUFFICIENT FREEBOARD, SEEPAGE AT TOE	0	11/6/1985	I	3
230310	3	STOCKING POND	NO STORAGE	INADEQUATE SPILLWAY	0	6/13/1988	I	10
230311	3	SUN	5.0 CREST	SEEPAGE-RESTRICT O 8FT BELOW CREST	0	12/31/1984	R	6
230312	3	WIND	5.5 CREST	SATURATED D/S SLOPE	0	9/20/1985	C	3
480101	3	JOHNSON	4.0 CREST(3.0 CREST IRR. SEASON)	EROS. ON U/S FACE, IMPROPER FB., SEEP/D/S TOE	0	7/18/1994	C	68
640104	1	JULESBURG #4	GH 24 FT. FOR 90 DAYS, THEN GH 23 FT.	CONDITION OF OUTLET, EXCESSIVE SEEPAGE	24	5/2/1995	R	6964
640108	1	PREWITT	GH 26.5 FT.	NO SPWY & EXCESSIVE SEEPAGE	26.5	8/23/1990	I	2531
650121	3	DUCK	4.0 SPILLWAY	NARROW CREST, STEEP SLOPES	0	3/23/1987	I	15
650123	3	HANSHAW	5.0 CREST	seepage, slide, overall poor	0	7/7/1987	I	12

VOLUME OF STORAGE WATER LOST DUE TO RESTRICTION FOR DIVISION 1 29,676 AF **TOTAL NUMBER OF DAMS AFFECTED: 79 DAMS**

STATE OF COLORADO --- DAM SAFETY BRANCH
LISTING OF DAMS UNDER STORAGE RESTRICTION ORDERS

FOR DIVISION: 2

DAMID	Haz. Class	Dam Name	Restricted Reservoir Level	Reason for Restriction	Gage Ht.	Action Date	Act. Type	Volume
100131	3	GARDEN OF THE GODS GOLF COURSE	3.0 CREST	NO SPILLWAY	0	5/31/1988	I	0
100205	3	KEETON LAKE	10.O FT. SPILLWAY	EROSION OF SPILLWAY, LEAKAGE, PIPING	0	8/8/1997	I	10
100215	N	MODERN WOODMEN OF AMER. #2	NO STORAGE	INADEQUATE SPILLWAY, POOR REPAIR	0	8/12/1983	R	85
100309	3	VALLEY NO. 1	15.0 CREST	INOPERABLE OUTLET & BLOCKED SPILLWAY	0	12/27/1984	I	50
100402	2	VALLEY NO. 2	NO STORAGE	INOPERABLE OUTLET, OBSTRUCTED SPILLWAY	0	9/21/2000	C	185
110106	3	EVANS GULCH	3.0 CREST	INSUFFICIENT FREEBOARD	0	2/2/1985	R	2
120126	3	JORDAN #1	12 Feet Below Emergency Spillway Crest	Deterioration &Joint Offsets in Spillway Riser		10/26/2005	I	18
120136	3	PARK CENTER L & W #2	8.8 CREST	SLIDE ON DOWNSTREAM SLOPE	0	1/4/1989	R	11
120202	3	PARK CENTER L & W #10	GH 7 FT.	EXTENSIVE CRACKING ON THE CREST	7	10/2/1974	I	48
150116	3	OCCHIATO #1	10 FEET CREST	SLIDE		9/16/1999	I	3
160108	1	CUCHARAS #5	GH 100 FT.	POOR OVERALL CON. EMBKMT. HISTY. MVMNT.	100	7/21/1988	R	33000
160135	4	CLARK #1	8.0 CREST	ERODED UPSTREAM SLOPE	0	2/16/1994	R	80
170118	3	CUDAHY #1	5.0 FT. BELOW DAM CREST	INADEQUATE FREEBOARD AND INOPERABLE OUTLET		7/15/1985	I	900
170217	3	SWINK #1	5.0 CREST	IN DISREPAIR, ABANDONED	0	4/24/1986	I	500
170218	3	SWINK #2	5.0 CREST	IN DISREPAIR, ABANDONED	0	4/24/1986	I	600
170219	3	SWINK #5	5.0 CREST	IN DISREPAIR, ABANDONED	0	4/24/1986	I	750
170220	3	SWINK #6	5.0 CREST	IN DISREPAIR, ABANDONED	0	4/24/1986	I	650
170222	3	TIMPAS #3	10.0 CREST	IN DISREPAIR, ABANDONED	0	4/21/1986	I	500
180206	2	APISHAPA	22.0 CREST	SPILLWAY, OUTLET SILTED IN	0	2/18/1994	I	260
180207	3	SEVEN LAKES	7.0 CREST	DILAPIDATED CONDITION OF DAM	0	5/6/1987	I	1200
670236	1	TWO BUTTES	GH 20 FT.	HYDRAULICALLY INADEQUATE SPILWAY	20	1/24/1983	I	31465

VOLUME OF STORAGE WATER LOST DUE TO RESTRICTION FOR DIVISION 2 70,317 AF TOTAL NUMBER OF DAMS AFFECTED: 21 DAMS

STATE OF COLORADO --- DAM SAFETY BRANCH
LISTING OF DAMS UNDER STORAGE RESTRICTION ORDERS

FOR DIVISION: 3

DAMID	Haz. Class	Dam Name	Restricted Reservoir Level	Reason for Restriction	Gage Ht.	Action Date	Act. Type	Volume
200110	1	CONTINENTAL	GH 64.5	LEAKAGE	64.5	8/1/1995	R	7679
200127	3	LOST LAKE #1	Zero Gage Height	Deteriorated Service Spillway and Sinkholes	0	8/10/2006	I	1045
210102	1	TERRACE	7.0 SPILLWAY	DETERIORATED SPILLWAY	117	7/18/1984	I	2000
220103	2	TRUJILLO MEADOWS	1 foot below spillway crest	Excessive Seepage	23.6	8/25/2004	I	69
240101	3	EASTDALE #1	1.3 feet below spillway crest	Erosion of upstream slope	23	7/1/2004	I	420
260101	3	SAGUACHE	Zero storage	General neglect, inoperable U/S gate	0	6/28/2004	I	450

VOLUME OF STORAGE WATER LOST DUE TO RESTRICTION FOR DIVISION 3 11,663 AF TOTAL NUMBER OF DAMS AFFECTED: 6 DAMS

STATE OF COLORADO --- DAM SAFETY BRANCH
LISTING OF DAMS UNDER STORAGE RESTRICTION ORDERS

FOR DIVISION: 4

DAMID	Haz. Class	Dam Name	Restricted Reservoir Level	Reason for Restriction	Gage Ht.	Action Date	Act. Type	Volume
400103	3	ARCH SLOUGH	DAM WAS ABANDONED,BUT CAN STILL HOLD WATER	POOR CONDITION	0	12/12/1985	I	66
400212	3	CYPHER #1	4.0 BELOW EMERGENCY SPILLWAY CREST	REPAIRS NOT COMPLETED		1/14/2003	R	8
400228	3	ELLA	7-Feet Below Dam Crest	Inadequate Spillway & Overtopping Damage		9/20/2005	I	30
400306	2	GRANBY #12	GH 17 FT.	D/S FACE SLIDE DUE TO SEEPAGE	17	10/15/1987	R	0
400330	3	KNOX	FULL STORAGE FROM 4/1 TO 8/15 IF MONITORED	EXCESSIVE SEEPAGE AT TOE AND ON EMBANKMENT	17	1/8/1988	R	0
400405	3	LONE STAR #1	30.0 CREST	CRACKS ON CREST, UNAPPROVED PLANS, POOR CONSTR	0	7/31/1996	R	0
400411	3	MILITARY PARK		PIPING	10	9/7/2000	I	150
400413	2	MONUMENT	10.0 SPILLWAY, FILL/MONITORING PLAN IN PLACE	CRACKS ON DAM AND LEFT ABUTMENT SLIDE	33.5	4/29/1993	I	175
400419	3	OASIS	3 FEET BELOW NORMAL WATER SURFACE	UNCONTROLLED SEEPAGE		9/30/2003	I	40
400434	3	PITCAIRNE #1	5.5 FT. SPILLWAY	BEAVER DENS ON US FACE		8/2/2000	I	50
400508	3	RYAN	ZERO STORAGE	POOR CONDITION OF OUTLET WORKS		11/9/2004	I	60
400522	3	TODD	10.0 CREST	6FT ELEVATION DIFF ALONG CREST WITH NO SPLLWAY	0	10/19/1984	I	112
400524	3	TRIO	8.0 SPILLWAY	SLIDE ON DOWNSTREAM SLOPE	14	1/11/1989	I	75
400601	3	HARRY WHITE #2	5.0 CREST	POOR OUTLET VALVE,LACK OF FREEBOARD,MAINTENANC	0	8/9/1991	I	30
400619	3	LONE STAR #2	10.0 CREST	CONSTRUCTION WITHOUT APPROVED PLANS & SPECS	0	6/2/1988	C	0
400705	3	WEBSTER #1	NO STORAGE	POORLY CONSTRUCTED	0	5/6/1987	C	15
400707	3	WEBSTER #3	NO STORAGE	POORLY CONSTRUCTED	0	5/6/1987	C	15
410201	3	COFFEY RESERVOIR	NO STORAGE	GENERAL POOR CONDITION,CONST. WO/APP. PLANS	0	7/21/1988	C	90
410202	3	MOCK #1	9.0 CREST(AFTER 60 DAYS FULL)	BUILT WITHOUT APPROVED PLANS & SEEPAGE	0	4/26/1989	R	0
420116	2	FRUITA #1	20 FT. CREST	SLIDE ON DOWNSTREAM SLOPE		8/12/1998	I	100
420120	2	GRAND MESA #1	8 FT. SPILLWAY	OUTLET WORKS FAILURE	12	12/21/2000	I	300
420135	3	REEDER	Zero Storage	EXTENSIVE SEEPAGE, SINKHOLES AND DISREPAIR	0	12/14/2005	R	299
590113	2	MERIDIAN LAKE PARK #1	2.0 SPILLWAY (PRIN SPWY LOWERED)	SEVERE EROSION OF THE EMERGENCY SPILLWAY	0	6/4/1987	I	10
600105	3	BLUE LAKE #1	5.0 FEET SPILLWAY	POOR CONDITION		11/21/2001	I	100
600118	3	PAXTON	2.5 SPILLWAY	SEEPAGE	0	8/8/1988	R	100
600126	3	CUSHMAN	6.0 CREST	OUTLET-INOP. SPWY-INAD. EMB. SEEPS	0	7/29/1975	I	36

STATE OF COLORADO --- DAM SAFETY BRANCH
LISTING OF DAMS UNDER STORAGE RESTRICTION ORDERS

FOR DIVISION: 4

DAMID	Haz. Class	Dam Name	Restricted Reservoir Level	Reason for Restriction	Gage Ht.	Action Date	Act. Type	Volume
600127	1	PRIEST	3.0 CREST	INSUFFICIENT FREEBOARD	0	9/16/1985	I	25
620122	3	FISH CREEK #1	zero storage	stability, seepage, outlet control	0	9/11/2003	I	85
630103	3	BURG	ZERO STORAGE	DAMAGED OUTLET CONTROLS		9/30/2003	I	91

VOLUME OF STORAGE WATER LOST DUE TO RESTRICTION FOR DIVISION 4 2,062 AF TOTAL NUMBER OF DAMS AFFECTED: 29 DAMS

STATE OF COLORADO --- DAM SAFETY BRANCH
LISTING OF DAMS UNDER STORAGE RESTRICTION ORDERS

FOR DIVISION: 5

DAMID	Haz. Class	Dam Name	Restricted Reservoir Level	Reason for Restriction	Gage Ht.	Action Date	Act. Type	Volume
370113	3	WELSH	Zero Storage	Seepage, Deteriorated Outlet Conduit	0	7/7/2006	I	105
370116	3	G G LOWER	4.0 CREST	INADEQ FRBD., STABILITY OF DOWNSTREAM SLOPE	0	12/14/1992	R	7
370205	4	FORIER #3	NO STORAGE	ILLEGAL DAM /INADEQUATE SPILLWAY	0	11/9/1995	I	3
380113	2	HOPKINS	10 feet below crest, 7 feet below spillway	Excessive seepage		11/23/2004	R	55
380204	3	CHRISTENSON	Zero Storage	Sloughing of Downstream Slope	0	7/6/2005	I	11
380212	2	FLANNERY	1.0 FT SPILLWAY	SPILLWAY EROSION		9/17/2001	I	20
380217	2	CHRISTINE LAKE	3.5 FT CREST	NO SPILLWAY		5/4/2001	I	10
380219	1	POLARIS	5 FT BELOW DAM CREST	INADEQUATE SPILLWAY AND FREEBOARD	16	5/31/2005	I	271
450123	1	ALSBURY	5.5 ft BELOW SPILLWAY, 10.5 ft BELOW CREST	EXCESSIVE SEEPAGE	9055	6/7/2004	I	100
450126	3	RAGLE RESERVOIR NO. 1	ZERO STORAGE	ILLEGALLY AND POORLY BUILT	0	4/15/2005	I	1
500113	2	MATHESON	FULL STOR IN SPRING. DRAIN TO GH 30 BY 9/1	MONITORING DEVISE INSTALLED	30	10/30/2002	R	0
500126 56	3	MILK CREEK	15.0 CREST (AUG 1 THRU MAY 1)	EXCESSIVE LEAKAGE	0	5/10/1991	R	
510114	2	LITTLE KING RANCH	10.0 SPILLWAY	EXCESSIVE SEEPAGE	41	3/7/1978	C	439
510124	2	SCHOLL	SEASONAL GH 18 IN SPRING GH 10 BY JULY 1			3/30/2004	R	212
510129	N	ROCK CREEK	NO STORAGE	DAM BREACHED BY OWNER BUT WANTS TO REPAIR	0	6/28/1989	C	66
530114	3	HOLDEN	Zero Gage Height, No Storage	Seepage above serv Spwy on Downstream Slope	0	8/21/2006	R	31
530119	3	KELLY	7.5' BELOW DAM CREST, 3.5' BEL SERV SPILLWAY	INCREASE IN SEEPAGE		6/29/2006	R	84
530125	2	NEWTON GULCH	ZERO STROAGE AFTER 10/31/2006	NO ACTION. NOT FOLLOWING PAST RESTRICTION	0	6/19/2006	R	537
530129	3	STERNER	RELAX 5/1-8/15, 3.0 SPILLWAY	UNCONTROLLED LEAKAGE		8/2/1995	R	71
720115	1	BULL CREEK #4	3 FEET BELOW EMERGENCY SPILLWAY CREST	POOR CONDITION OF OUTLET AND DAM, SEEPAGE		8/18/2005	I	71
720117	3	CARPENTER	NO STORAGE	PIPING HOLE		8/23/1994	I	39
720126	3	CURRIER #2	1.0' BELOW SPILLWAY	SLIDE ON HILL ABOVE SPILLWAY IMPROVEMENTS MADE		6/9/2005	R	17
720136	3	HAWXHURST	Zero Gage Height, No Storage	Hole in Outlet Conduit and Sinkholes	0	8/21/2006	R	207

VOLUME OF STORAGE WATER LOST DUE TO RESTRICTION FOR DIVISION 5 2,413 AF TOTAL NUMBER OF DAMS AFFECTED: 23 DAMS

STATE OF COLORADO --- DAM SAFETY BRANCH
LISTING OF DAMS UNDER STORAGE RESTRICTION ORDERS

FOR DIVISION: 6

DAMID	Haz. Class	Dam Name	Restricted Reservoir Level	Reason for Restriction	Gage Ht.	Action Date	Act. Type	Volume
430205	3	BAXTER	5.0 FT. SPILLWAY	SEEPAGE, EROSION OF U/S FACE		11/13/1997	I	30
430212	3	WILSON #3	3.0 SPILLWAY	INOPERABLE OUTLET, INAD SPWY	3	9/30/1989	I	10
440106	3	BISKUP	5.0 SPILLWAY	DILAPIDATED CONDITION	0	8/19/1987	C	55
440120	3	DRESCHER	8.0 SPILLWAY	SEEPAGE & INSTABILITY	8	8/1/1988	R	159
440124	3	ELLGEN #2	Full Storage	New outlet pipe. Recommend restriction lifted.		2/16/1999	R	
440213	3	FLATTOP	5.0 FT CREST MAIN DAM	BREACHED, BEAVER DAMS, FREEBOARD		8/2/1999	I	50
540104	2	ELK LAKE	A point below the beaver den.	Beaver den, badger holes	30	3/6/2006	I	100
560105	3	HAUNTED SPRING	Zero Storage	Uncontrolled seepage/piping		9/9/2003	I	8
560107	3	BASSETT #2	5-FEET BELOW SPILLWAY CREST	ILLEGAL DAM, POOR CONDITION		10/21/2002	R	25
570114	3	LAKE EMRICH	15.0 CREST	SLIDES ON DOWNSTREAM SLOPE	0	8/30/1988	C	330
580303	N	LOWER SPRING CREEK	Dam Breached.	Approval of breach construction.	0	12/16/2003	R	0

VOLUME OF STORAGE WATER LOST DUE TO RESTRICTION FOR DIVISION 6 767 AF TOTAL NUMBER OF DAMS AFFECTED: 11 DAMS

STATE OF COLORADO --- DAM SAFETY BRANCH

LISTING OF DAMS UNDER STORAGE RESTRICTION ORDERS

FOR DIVISION: 7

DAMID	Haz. Class	Dam Name	Restricted Reservoir Level	Reason for Restriction	Gage Ht.	Action Date	Act. Type	Volume
300144	3	UPPER RAILROAD	5 Feet below Dam Crest	Inadequate Spillway& Unstable Downstream Slope		9/8/2005	I	4
320202	3	E. G. MERRITT	Zero Storage	Deteriorated Outlet Conduit, Inoperable Outlet		6/13/2006	I	41
320209	3	BISHOP	4 Feet Below Dam Crest	Seepage, Inadequate Spillway,Inoperable Outlet		6/13/2006	I	4
340106	3	HURST	NO STORAGE	OUTLET FAILURE	0	3/29/1999	I	35
340109	3	L.A. BAR	3 feet below dam crest	Insufficient freeboard, broken gate operator		11/2/2005	I	10
340119	3	J. O. SPENCER	NO STORAGE	INOPERABLE OUTLET	0	5/8/2000	I	16
340203	1	SUMMIT - MAIN DAM	NOT TO EXCEED 1.1 FT BELOW SPILL FOR > 3 WKS	EXCESSIVE SEEPAGE	23.6	6/3/1998	R	400
340204	3	BELL	ZERO GAGE HEIGHT	POOR CONDITION OF DAM AND OUTLET	0	6/29/2006	I	16
780111	2	PINON LAKE	3 FEET SPILLWAY	POOR CONDITION OF OUTLET		7/27/2001	I	86

VOLUME OF STORAGE WATER LOST DUE TO RESTRICTION FOR DIVISION 7 **612 AF** **TOTAL NUMBER OF DAMS AFFECTED: 9 DAMS**