Nonpoint Source Management Program

Prepared to Fulfill the Requirements of
Section 319 of the Clean Water Act

Prepared by the Water Quality Control Division
in association with the
Colorado Nonpoint Source Task Force

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ACRONYMS USED IN THE NONPOINT SOURCE MANAGEMENT PROGRAM

BMP	Best Management Practices
WQCD	Water Quality Control Division, State of Colorado
WQCC	Water Quality Control Commission
EPA	Environmental Protection Agency
ACP	Agricultural Conservation Program
WQSP	Water Quality Special Project
201(g)(1)(b)	Governor's discretionary funds; wastewater construction grant funds used for nonpoint source management; also called 201(g) funds
GAWS	General Aquatic and Wildlife System
BLM	Bureau of Land Management, U.S. Department of Interior
USFS	U.S. Forest Service, U.S. Department of Agriculture
EO	Executive Order
USDA	U.S. Department of Agriculture
ASCS	Agricultural Stabilization and Conservation Service, U.S. Department of Agriculture
SCS	Soil Conservation Service, U.S. Department of Agriculture
ACEC	Area of Critical Environmental Concern
ES or CE or CES	ES refers to the federal Extension Service, U.S. Department of Agriculture; CE or CES refers to the state Cooperative Extension or Cooperative Extension Service
CTA	Conservation Technical Assistance
GPCP or GP	Great Plains Conservation Program
CRP	Conservation Reserve Program
PL	Public Law

PL-566	Public Law 566, Watershed Protection and Flood Prevention Act/Small Watersheds Program
HUA	Hydrologic Unit Area
FY	Fiscal Year
CRS	Colorado Revised Statutes
USDI or DOI	U.S. Department of Interior
RC&D	Resource Conservation and Development
SMCRA	Surface Mining Coal Reclamation Act
SMZ	Streamside Management Zone
ORV	Off Road Vehicles
AML	Abandoned Mine Land
DOW	Division of Wildlife, State of Colorado
WPCRF	Water Pollution Control Revolving Loan Fund
HB	House Bill
MOU	Memorandum of Understanding
RCWP	Rural Clean Water Project
mg/l	milligrams per liter
RAIDS	Riparian and Aquatic Inventory Data Summary
NCWCD	Northern Colorado Water Conservancy District
CCWCD	Central Colorado Water Conservancy District
LSPWCD	Lower South Platte Water Conservancy District
SCD	Soil Conservation District
BOR	Bureau of Reclamation, U.S.Department of Interior
PIP	Project Implementation Plan
CSCB or CSSCB	Colorado State Soil Conservation Board
CASCD	Colorado Association of Soil Conservation Districts
SLB	State Land Board
COE	Army Corp of Engineers

NPS	National Park Service, U.S. Department of Interior
SWCP	Soil and Water Conservation Practices
MLRD	Mined Land Reclamation Division
PTMD	Passive Treatment of Mine Drainage
CMA	Colorado Mining Association
CEC	Colorado Environmental Coalition
CERCLA	Comprehensive Environmental Response Compensation and Liability Act

The purpose of the Colorado Nonpoint Source Management Program is to provide an implementation strategy for the treatment of the water quality problems previously identified in the Colorado Nonpoint Assessment Report. Nonpoint sources are those which are diffuse in nature and are not regulated through the permit program of the Clean Water Act. These sources are commonly associated with: urban runoff, agriculture, forestry and logging, construction, hydrologic modification, and abandoned and/or inactive mines. The primary pollutants normally associated with these activities are sediment, salinity, heavy metals, nutrients (phosphorus and nitrogen) and bacteria.

The Colorado Nonpoint Source Management Program was prepared by the Water Quality Control Division of the Colorado Department of Health with the assistance of the Colorado Nonpoint Source Task Force. It is intended to meet the requirements as outlined by Section 319 of the Federal Clean Water Act. The Task Force is comprised of a broadly constituted committee representing governmental agencies, environmental groups, and special interest groups. The Task Force served as an advisory body and assisted in the collection of data as well as the writing and editing of this report.

The concept which was present throughout the development of the management program and is recommended in the management program is a voluntary approach to nonpoint source controls. The Task Force also believed that one essential missing ingredient in nonpoint source control is education. Education should occur in at least three phases. First, the public must become aware of the extent of nonpoint source pollution and the results if nothing is done to address the problem. Second, the public must be made aware of the best management practices which are available to treat an identified source. Third, the public must become aware of the possible sources of financial assistance to install the needed best management practices. All the steps in the education process can be emphasized through the use of demonstration projects and education programs. With the proper education and planning, the Nonpoint Source Task Force believes the public will proceed to implement this management program on a voluntary basis. The following offers a brief summary of the six chapters of the document.

Chapter I
INTRODUCTION

The Federal Clean Water Act of 1987 established a new direction for the water quality efforts of Colorado and special emphasis was placed on nonpoint source pollution. Section 319 of the Act stated a requirement that each state would develop an assessment report and a management program prior to consideration for federal grants. The assessment was completed in April, 1988.

Section 319 outlined the various components of an acceptable management program which are:

A. Best Management Practices (BMP's) will be identified to reduce pollutant loading from sources listed in the assessment report.

B. Programs to achieve implementation of the BMP's designated.

C. A schedule containing annual milestones for implementation of the best management practices.

D. A certification by the Attorney General of Colorado that the laws of this state provide proper authority for implementation of BMP's.

E. Sources of federal assistance and funding as well as other sources.

F. List of federal financial assistance programs and development projects which the state will review for consistency with the state management program.

Chapter II
ORGANIZATION FOR NONPOINT SOURCE MANAGEMENT

The Water Quality Control Division, located in the Colorado Department of Health, has the primary responsibility for the nonpoint source program in Colorado. The Governor has appointed a nine member board to serve as a regulatory and policy setting entity for water quality issues. This board is known as the Water Quality Control Commission. The Governor also provides the final action on the management program prior to its submission to EPA.

The Colorado Nonpoint Source Task Force was formed at the request of the Water Quality Control Division in May, 1987. The Task Force has served as an advisory and work group for the Division. To address the various concerns of nonpoint source pollution, four subcommittees were formed as part of the overall Task Force. These are: Agriculture/Silviculture, Urban and Construction Runoff, Mining, and Hydrological modification. A mission statement and membership list was developed for the Task Force and each subcommittee.

To address each demonstration project submitted for funding, a process for prioritization was developed. Once projects have been ranked using this system, the Task Force can make recommendations for funding to the Water Quality Control Division. Also to assist in the evaluation of project proposals, project implementation plan requirements were developed.

Best Management Practices (BMP's) are both structural and nonstructural techniques which either prevent or reduce pollution from nonpoint sources. A BMP list has been developed on the state level but specific BMP's or a combination of BMP's will need to be developed for each project. Attention must also be given to the operation, maintenance, and replacement of BMP's after the initial establishment.

Chapter III
EXISTING RESPONSIBILITIES, AUTHORITIES, AND PROGRAMS FOR CONTROL OF NONPOINT SOURCES

The goal of Section 319 of the Clean Water Act is to control nonpoint sources of water pollution. A number of agencies located at the federal, state, and local levels of government are currently involved in or have some responsibility for nonpoint source control. In most cases, no additional authority will be required to solve nonpoint source water problems.

One of the requirements of Section 319 is that each state should review relevant federal financial assistance programs and projects which may affect water quality through nonpoint sources. A comprehensive list has been developed and included in this management program.

Chapter IV
AGRICULTURE/SILVICULTURE NONPOINT SOURCE PROGRAM

Agriculture/silviculture includes the cultivation of cropland, the raising of livestock and the harvesting of forest products. This broad definition includes nonpoint source generating activities such as irrigated and dryland farming, grazing activities, feedlots, tree harvesting and road construction on public lands. The assessment report delineates 2,200 miles of stream affected by agriculture/silviculture activities as well as 16,000 surface acres of water bodies. Also underground water supplies are impacted in some areas. Sediment, salinity and nutrients are the primary pollutants.

Streambank erosion is attributed to a vast majority of the sediment problems in the state. Therefore, both site specific demonstration projects and statewide programs have been developed to control this source.

Sedimentation from forestlands is mainly caused by road construction and/or maintenance. Other timber harvesting practices produce erosion and sediment, but since 80-90% of the sediment involved roads, the Task Force felt that it would primarily concentrate on activities involving roads at this time.

A list of projects has been included in the management program. These listed watersheds are recommend for implementation of BMP's to improve water quality currently impacted by agriculture/silviculture nonpoint source activities.

Chapter V
URBAN AND CONSTRUCTION RUNOFF IN COLORADO

Uncontrolled runoff from construction sites pose a threat to Colorado's waters. Runoff can contain nutrients, metals, organic materials and suspended sediments. These pollutants have the potential of adversely impacting beneficial uses of the receiving waters. Most of the urban and construction problems have been identified as being of medium severity.

In addressing urban and construction runoff priorities, the regulatory program which the EPA has proposed for stormwater discharges also must be considered. Implementation of these regulations in the 1990s will move some urban runoff sites from a nonpoint source to a point source concern.

The Best Management Practices (BMP's) suggested in this management program fall into two categories. First of all, erosion control BMP's which are intended to provide improved water quality from construction areas. Second, long term or urban BMP's which are intended to reduce elements such as phosphorus and nitrate which stimulate aquatic weeds and algae and, which serve as long term treatment devices.

In addition to these BMP's, a model ordinance for erosion control is included in the BMP appendix for this section. This model ordinance is intended to provide guidance to communities which may want to adopt such an ordinance, or update their existing ordinance.

Chapter VI
MANAGEMENT PROGRAM FOR NONPOINT SOURCE MINING IMPACTS

The Colorado Nonpoint Assessment Report identifies nearly 1,300 miles of streams as being affected by abandoned/inactive mines. Heavy metals and acids are pollutants of concern from these sites and these can be chronically or acutely toxic to aquatic life.

The objective of the management program for mining is to achieve improvement in water quality and its beneficial uses such as recreation, water supply, and aquatic life. At this time, management practices for control of mine drainage are still experimental in nature. Therefore, a variety of treatment techniques may require demonstration projects to determine performance, maintenance, and economic feasibilities. The demonstration of techniques is intended to lead to criteria which will have wide applicability for use in Colorado watersheds impacted by inactive/abandoned mining.

A list of projects for implementation is included as well as recommended BMP's which will address the nonpoint source concerns of abandoned/inactive mines.

Chapter I

Introduction to Nonpoint Management Programs

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Background

The Federal Clean Water Act of 1987 established a new direction for the water quality efforts of the nation. Nonpoint source water pollution, which is pollution which is not regulated as point sources and caused by diffuse sources, is recognized as a serious impediment to meeting the goals of the Clean Water Act. The Act states specifically:

> "... it is the national policy that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this Act to be met through the control of both point and nonpoint sources of pollution."

In keeping with this philosophy the Clean Water Act was amended to include Section 319 Nonpoint Source Management Programs. This new section provides the legal basis for the implementation of nonpoint source programs and identifies the requirements states must meet to qualify for assistance under the Act. Section 319 stresses two items which must be completed by a state previous to consideration for grants to ameliorate nonpoint source problems. These items are:

1) State assessment report

2) State management program

The Assessment report provides an analysis of nonpoint source water quality problems. The management program provides a direction for correction of these problems. For the State of Colorado these two items will be produced separately, but will be combined to provide the basis for nonpoint source decision making in Colorado. The remainder of this report will be devoted to the management program.

Requirements of State Nonpoint Source Management Program

Section 319 (b) describes the contents of the State management program. Implementation of the management program is intended to control pollution from nonpoint sources in the four fiscal years following submission of the program. The contents of the program required under 319 (b) are as follows:

(b) State Management Programs

2. Specific contents - each management program proposed for implementation under this subsection shall include each of the following:

(A) best management practices and measures which will be used to reduce pollutant loadings resulting from each category, subcategory, or particular nonpoint source designated in the State's Assessment Report, taking into account the impact of the practice on ground-water quality.

(B) programs (including, as appropriate, nonregulatory or regulatory programs for enforcement, technical assistance, financial assistance, education, training, technology transfer, and demonstration projects) to achieve implementation of the best management practices designated under subparagraph (A).

(C) a schedule containing annual milestones for (i) utilization of the program implementation methods identified in subparagraph (B), and (ii) implementation of the best management practices identified in subparagraph (A) by the categories, subcategories, or particular nonpoint sources designated in the State's Assessment Report. Such schedule shall provide for utilization of the best management practices at the earliest practicable date.

(D) a certification by the attorney general of the State or States (or the chief attorney of any State water pollution control agency which has independent legal counsel) that the laws of the State or States, as the case may be, provide adequate authority to implement such management programs or, if there is not adequate authority, a list of such additional authorities as will be necessary to implement such management program and a schedule and commitment by the State or States to seek such additional authorities as expeditiously as practicable.

(E) sources of Federal and other assistance and funding [other than assistance provided under subsections (h) and and (i)] which will be available in each of such fiscal years for supporting implementation of such practices and measures and the purposes for which such assistance will be used in each of such fiscal years.

(F) the Federal financial assistance programs and Federal development projects for which the State will review individual assistance applications or development projects for their effect on water quality pursuant to the procedures set forth in Executive Order 12372 as in effect on September 17, 1983, to determine whether such assistance applications or development projects would be consistent with the program prepared under this subsection; for the purposes of this subparagraph, identification shall not be limited to the assistance programs or development projects subject to Executive Order 12372 but may include any programs listed in the most recent Catalog of Federal Domestic Assistance which may have an effect on the purposes and objectives of the State's nonpoint source pollution management program.

The remainder of this report will detail Colorado's approach to fulfilling these Federal requirement, and explaining the management programs for control of nonpoint sources.

Chapter II

Organization for Nonpoint Source Management

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Background

This report is intended to provide the required management programs for control of problems identified in the Colorado Nonpoint Assessment Report. The intent of Colorado's nonpoint source program is, to encourage a voluntary approach to controlling and, preventing nonpoint source water pollution. This will be achieved through both incentive programs such as grants and loans to test nonpoint source control technologies and education programs to raise awareness and provide research of specific nonpoint source issues. The use of Section 319 and other sources of funds for "demonstration projects" to test best management practices (BMP's) is critical to this program. These specific projects will be the basis for building a program of nonpoint source control. Statewide issues of concern such as education, research and maintenance of a statewide nonpoint source control strategy are critical in preventing nonpoint source water pollution.

As explained in the following section, the coordination of management responsibilities between the Water Quality Control Commission, Water Quality Control Division, and the Colorado Nonpoint Source Task Force are essential in meeting the intent of the nonpoint source program. A process involving all three of these entities is explained in the following pages. Also found in this chapter is information regarding guidelines for preparation of reports to qualify projects for Section 319 funding, a process for prioritizing those proposed projects, and a discussion of best management practices (BMP's).

I. Management of Colorado's Nonpoint Source Program

A. Role of State Water Quality Agencies in Nonpoint Source Management

1. Water Quality Control Division (Division)

The Water Quality Control Division, located in the Colorado Department of Health, has primary responsibility for conduct of the nonpoint source program in Colorado. Included in these responsibilities are preparation and updating of the State Assessment and Management Programs Reports, reviewing federal activities relating to nonpoint sources, maintaining the statewide manual of BMP's, preparing lists of nonpoint source funding priorities, and any necessary contract administration to achieve the goals of Section 319.

The Division carries out these responsibilities within the framework of both state and federal laws and regulatory requirements. The Division serves as staff to the Water Quality Control Commission in both a regulatory and policy framework. Therefore, any statewide regulatory or policy needs for nonpoint sources may be generated or reviewed by the Division with appropriate recommendations to the Commission.

The Division is assisted in nonpoint source decision making by the Colorado Nonpoint Source Task Force. The Task Force is comprised of agencies at the state, local and federal level and as well, interest groups involved in nonpoint source water quality issues. The Division is a member of the Task Force and serves to coordinate nonpoint activities to meet statewide needs. The Task Force proposes changes in the form of updates to the State Assessment Report, Management Programs, and BMP's as well as proposing demonstration project areas and educational programs for nonpoint source funding efforts.

2. Water Quality Control Commission (Commission)

The Water Quality Control Commission is a nine member board, appointed by the Governor, to serve as a regulatory and policy setting entity for water quality issues in Colorado. Therefore, the Division is guided in its efforts to conduct the nonpoint source program by the Commission.

The Commission also holds public meetings or hearings, as required, on portions of the state nonpoint source program. These public forums allow public input into the state Assessment Report, Management Program activities, and priorities for nonpoint source funding. Commission adoption of these documents, and their updates, serve as final agency action.

3. The Governor

Section 319 of the Clean Water Act requires the Governor to provide EPA with the state Assessment Report and Management Programs for nonpoint sources. Therefore, the Governor's action on these items stands as final state action. The Governor acts upon recommendations for these items, through the request of the Water Quality Control Commission, and follows their recommendations on these items.

B. Role of the Colorado Nonpoint Source Task Force in Nonpoint Source Management

The Colorado Nonpoint Source Task Force was formed, at the request of the Water Quality Control Division, in May 1987. The Task Force was formed to serve as a combination advisory and work group to assist the Division in creating Colorado's nonpoint source program. The Task Force provides a two tier approach to assisting the Division in developing and maintaining nonpoint source programs. The first tier is an advisory committee of twenty-five members which directly advises the Division on nonpoint issues. The second tier consists of subcommittees with open membership which provide direction to the advisory committee representing specific areas of nonpoint source concern. The role of the subcommittees of the Task Force is particularly critical in defining the direction of the Colorado Nonpoint Source program. These subcommittees will serve to provide maintenance of a statewide program and to provide strategies for nonpoint source control.

The Task Force plays a vital role in continuing efforts to assess nonpoint source problems as well as to propose and implement programs and projects for control of these sources. The Task Force is comprised of a broad range of federal, state, and local agencies, and as well interest groups concerned with nonpoint source water pollution. This amalgamation of interests brings to the Task Force the primary agencies involved in sponsoring and funding nonpoint source projects. The following mission statement and membership roster was adopted by the Task Force during the process of producing this management program:

Mission Statement Nonpoint Source Task Force

The mission of the Nonpoint Source Task Force is to serve as the advisory council to the Water Quality Control Division for the nonpoint pollution program. To accomplish this mission, the Task Force is comprised of agencies and groups involved in efforts to control these sources and also interests which may be affected by these efforts.

The Task Force will serve in the following roles:

1) To review and make recommendations for proposed changes to the Colorado Nonpoint Assessment Report.

2) To determine appropriate management programs for control of nonpoint sources and to update and modify these programs as necessary.

3) To develop a best management practices (BMP's) handbook for nonpoint sources and update the handbook as necessary.

4) To prioritize and recommend demonstration projects and necessary programs for nonpoint source control funding.

The Task Force will serve to review and coordinate the efforts of the various subcommittees of the Task Force. The subcommittees shall have open membership to insure public input into specific nonpoint source control program. The Task Force will have a more limited membership, and be comprised of agencies and interest groups involved in nonpoint source pollution issues, and will make final recommendations to the Water Quality Control Division on nonpoint source issues. The following is a roster of members of the Task Force, as of January 1990.

1) Water Quality Control Division

2) Mined Land Reclamation Division

3) Colorado Soil Conservation Board

4) Colorado Division of Wildlife

5) U.S. Forest Service

6) Bureau of Land Management

7) Soil Conservation Service

8) Environmental Protection Agency

9) North Front Range Water Quality Planning Association

10) Urban Drainage and Flood Control District

11) Colorado Water Congress

12) Denver Regional Council of Governments

13) Northwest Colorado Council of Governments

14) Colorado Mining Association

15) Colorado Association of Soil Conservation Districts

16) Colorado Environmental Coalition

17) Cherry Creek Basin Association

18) Summit Water Quality Association

19) Colorado Counties Inc.

20) Northern Colorado Water Conservancy District

21) Colorado River Water Conservation District

22) Bureau of Reclamation

23) United States Geological Survey

24) Central Colorado Water Conservancy District

25) Currently Vacant

Attached as Appendix A to this document are the Rules of Operation of the Colorado Nonpoint Source Task Force. The Rules of Operation describe the process for decision making and membership of the Task Force.

The task force provides direct guidance to the Division for conducting the nonpoint source program. The Task Force has four subcommittees which represent the major categories of nonpoint concern in Colorado, these are:

1. Agricultural/silviculture Subcommittee

2. Mining Subcommittee

3. Urban and Construction Runoff Subcommittee

4. Hydrologic Modification Subcommittee

These subcommittees serve to bring forward specific recommendations for projects, programs, management practices, or assessment issues from their area of expertise. These recommendations are then considered by the advisory committee for final recommendation to the Division. These subcommittees provide a device for broad public input into the state's nonpoint source program.

The following is the mission statement and core membership roster of the various subcommittees:

Mission Statement Urban and Construction Runoff Subcommittee

The mission of the urban and construction runoff subcommittee is to serve as the advisory council to the Colorado Nonpoint Source Task Force and the Water Quality Control Division for urban and construction runoff pollution problems. To accomplish this mission the subcommittee is comprised of agencies and individuals involved in efforts to control these sources and also interests which may be affected by these efforts.
The subcommittee will serve in the following roles:

1) To review and make recommendations for proposed changes to the Colorado Nonpoint Assessment Report.

2) To determine appropriate management programs for control of urban and construction runoff and to update and modify these programs as necessary.

3) To develop a best management practices (BMP's) handbook for urban and construction runoff, and update these practices as necessary.

4) To prioritize and recommend urban and construction runoff projects for nonpoint source funding.

5) To serve as a focal point for public input to the urban and construction runoff management programs.

6) To determine public information and education needs for urban and construction nonpoint sources.

The subcommittee will have open membership, but the following organizations represent a core group which should be intimately involved in the subcommittee:

Water Quality Control Division

Urban Drainage and Flood Control District

Cherry Creek Basin Association

Summit Water Quality Committee

Colorado Environmental Coalition

Colorado Municipal League

Colorado Division of Highways

Colorado Association of Home Builders

Mission Statement of the Agriculture/Silviculture Subcommittee

The agriculture/silviculture subcommittee was organized to assist the Task Force and Division in the development of the agriculture and silviculture nonpoint source assessment, management programs, and BMP's. The subcommittee is composed of Federal, State, and local agencies involved in agriculture and silviculture as well as interested and affected groups or individuals.

The subcommittee will serve in the following roles to advance a nonregulatory agriculture/silviculture nonpoint program:

1) To review and revise the agriculture and silviculture portion of the state assessment report.

2) To propose or revise voluntary programs for control of agricultural and silviculture nonpoint sources.

3) To identify agricultural and silviculture projects for nonpoint source funding, and review agricultural and silviculture watershed projects seeking nonpoint source funding.

4) To propose and revise agriculture and silviculture BMP's.

5) To serve as a point for public input for agriculture and silviculture nonpoint source issues.

6) To determine public education and information needs for agriculture and silviculture nonpoint sources.

The subcommittee will have open membership, but the following agencies and groups are recommended as a core group which should be intimately involved in the subcommittee:

Water Quality Control Division

Colorado Soil Conservation Board

Soil Conservation Service

Bureau of Land Management

Colorado State Forest Service

U.S. Forest Service

Northern Colorado Water Conservancy District

Colorado Environmental Coalition

Colorado Association of Soil Conservation Districts

Center for Holistic Resource Management

Cooperative Extension Service

Mission Statement Abandoned/Inactive Mine Subcommittee

The mission of the abandoned/inactive mine subcommittee is to serve as the advisory council to the Colorado Nonpoint Source Task Force and the Water Quality Control Division for abandoned and inactive mining pollution problems. To accomplish this mission the subcommittee is comprised of agencies and individuals involved in efforts to control these sources, and also interests which may be affected by these efforts.

The subcommittee will serve in the following roles:

1) To review and make recommendations for proposed changes to the Colorado Nonpoint Assessment Report.

2) To determine appropriate management programs for control of abandoned/inactive mines and to update and modify these programs as necessary.

3) To develop a best management practices (BMP's) handbook for abandoned/inactive mines and update these practices as necessary.

4) To prioritize and recommend abandoned/inactive mine projects for nonpoint source funding.

5) To serve as a point for public input for abandoned and inactive mining nonpoint source water quality issues.

6) To determine public education and information needs for abandoned and inactive mining nonpoint sources.

The subcommittee will have open membership, but the following organizations represent a core group which should be intimately involved in the subcommittee:

Water Quality Control Division

Colorado Environmental Coalition

Colorado Mining Association

Colorado Division of Wildlife

Mined Land Reclamation Division

Mission Statement of the Hydrologic Modification Subcommittee

The mission of the hydrologic modification subcommittee is to serve as the advisory council to the Colorado Nonpoint Source Task Force and the Water Quality Control Division for pollution problems related to hydrologic modification. To accomplish this mission the subcommittee is comprised of agencies and individuals involved in efforts to control or reduce negative water quality impacts from hydrologic modifications and also interests which may be effected by these efforts.

The subcommittee will serve the following roles:

1. To review and revise the hydrologic modification portion of the Colorado Nonpoint Source Assessment Report.

2. To propose and revise programs for control of negative impacts resulting from hydrologic modifications.

3. To identify and prioritize hydrologic modification projects for nonpoint source funding.

4. To propose and identify appropriate references to assist in reduction of negative water quality impacts resulting from hydrologic modifications.

5. To serve as a focal point for public input for hydrologic modification issues.

6. To determine public education and information needs for hydrologic modification nonpoint sources.

The subcommittee will have open membership, but the following agencies and interests are recommended as a core group which should be involved in the work of the subcommittee.

Water Quality Control Division

Denver Water Department

Pueblo Water Board

City of Colorado Springs

Northern Colorado Water Conservancy District

Colorado River Water Conservancy District

Middle Park Water Conservancy District

Colorado Water Congress

Grand County

Colorado Division of Wildlife

Colorado Water Resource and Power Development Authority

U.S. Forest Service

Colorado Environmental Coalition

Northwest Colorado Council of Governments

The hydrologic modification subcommittee was formed later than the other three subcommittees and consequently a management program for control of this source is not proposed at this time.

II. Process for Prioritization of Projects for Nonpoint Source Funding

The object of Section 319 management programs is to prioritize watersheds for installation of management practices which will improve water quality and the beneficial uses of these waters. Prioritization of project areas, for funding of demonstration projects and research activities is then central to progress under this section of the Act. This portion of the organization chapter will delineate a process for prioritizing projects for funding, discuss research and statewide educational needs and their relationship to 319 and 201 funding, and also provide guidance for the preparation of project implementation plans which will demonstrate the need for nonpoint source funding.

Prioritization of demonstration projects involves ranking projects through the use of a priority system (Table 1). The Nonpoint Source Task Force assists the Division in applying ranking criteria and other factors to determine the priority of nonpoint source projects. Once demonstration projects have been ranked using this system, the Water Quality Control Division may prepare a priority list for funding specific projects. This process allows both tangible and intangible benefits to be weighed in the ranking process. Statewide educational projects will be funded based upon their merit, as judged by the Water Quality Control Division. These projects will not be ranked using priority ranking criteria.

The Water Quality Control Commission reviews final state priorities for funding of demonstration projects and statewide programs based on the recommendations of the Division, the Task Force, and the merit of individual projects. Ranking of projects and recommendations for funding will occur on a yearly basis, so as to coincide with federal nonpoint source funding and to provide an ongoing process for evaluating statewide nonpoint source needs.

DEMONSTRATION PROJECT RANKING SYSTEM

Table 1

Priority System Format

Part I

Threshold Requirements - All demonstration projects must provide information to prove that each of the four following requirements has been satisfactorily addressed before the project may be considered for ranking under Part II of this system. All projects must be recognized in the Colorado Nonpoint Assessment Report and recommended for action in this management program.

A. Matching Funds Availability - Matching fund availability must be documented by the project applicant. This documentation must include the source(s) of funds and a commitment to spending on the proposed project.

B. Project Implementation Plan - This plan will provide the documentation of the water quality/nonpoint source problem, lead agency for implementation of the project, and alternatives for improvements, and the anticipated results of the project. More details on project implementation plan requirements is provided in Table 2.

C. Data Credibility - This requirement insures that the data used to substantiate a problem source to instream or groundwater pollution is well documented and involves monitored or "hard" data rather than evaluated or "soft" data.

D. Maintenance Agreement - This agreement will insure that the project owners or managers will provide maintenance of the BMP's or improvements for the life of said BMP's or improvements.

Part II

Ranking System - All projects which have satisfactorily completed Part I requirements may proceed for ranking consideration under Part II. Two separate lists of priorities will result from this ranking process. First those projects with proposed total fund request in excess of $50,000 and second those projects with proposed total fund requests under $50,000. This two tier system is intended to assure a mixture of projects rather than favoring either high or low cost projects.

A. Impacts to Beneficial Uses - Points shall be assigned based upon the number of beneficial uses impacted by a nonpoint source problem for which the project is designed. Beneficial uses are aquatic life, recreation, water supply and agriculture. The Commission adopted stream classifications will be the basis of determining beneficial uses.

1. Number of Beneficial Uses Impacted:

A. One Use . . . . . 4 Points
B. Two Uses. . . . . 6 Points
C. Three Uses. . . . . 8 Points
D. Four Uses . . . . . .10 Points

2. Severity of Impact to Beneficial Use - Points shall be assigned based upon the severity of impact noted in the Colorado Nonpoint Assessment Report, and the number of miles of stream, or surface acres of lake impacted by the nonpoint source.

A. Low Impact - little evident impact is noted to beneficial uses due to the nonpoint source contribution:

Less than five miles or 200 acres effected. . . . . 1 Point
Between 5 and 10 miles, or 200 and 2000 acres . . . 3 Points
More than 10 miles or 2000 acres. . . . . 5 Points

B. Moderate Impact - Some impact to the beneficial use is noted, but the use is not severely impacted:

Less than five miles or 200 acres effected. . . . .10 Points
Between 5 and 10 miles, or 200 and 2000 acres . . .15 Points
More than 10 miles or 2000 acres. . . . . .25 Points

C. High Impact - A beneficial use is severely impacted:

Less than five miles or 200 acres effected. . . . .30 Points
Between 5 and 10 miles, or 200 and 2000 acres . . .35 Points
More than 10 miles or 2000 acres. . . . . .40 Points

3. State and National Priorities. - Points shall be assigned based upon recognition of special status of waters or uses those waters provide. Points may be awarded under both parts A and B

(A) National Priorities - A nonpoint source project area impacts either: a threatened or endangered species, a Wilderness area, or a Wild and Scenic River . . . . . 5 Points

(B) State Priorities - A nonpoint source project area impacts either: a Gold Medal Fishery, or Wild Trout Water, a State Park or Recreation Area, or water classified by the Commission as High Quality 1 or 2 . . . . . .5 Points

B. Potential for Restoration Points - Points are awarded according to the assumed effectiveness of BMP's, and the transferability of demonstrated technologies.

1. Effectiveness of BMP's or Improvements.

Points shall be assigned based upon the assumed effectiveness of proposed projects to either restore beneficial uses or reduce the severity of nonpoint source impacts. Degree of severity is based upon the designation found in the Colorado Nonpoint Assessment Report.

A. Improvements are minor or beneficial uses are maintained:

1. in low severity waters. . . . . .4 Points
2. in medium severity waters . . . . . .8 Points
3. in high severity waters . . . . . 12 Points

B. Beneficial uses are partially restored or severity partially reduced:

1. in low severity waters. . . . . 10 Points
2. in medium severity waters . . . . . 20 Points
3. in high severity waters . . . . . 30 Points

C. Beneficial uses are substantially restored or severity substantially reduced:

1. in low severity waters. . . . . 15 Points
2. in medium severity waters . . . . . 30 Points
3. in high severity waters . . . . . 45 Points

2. Demonstration Value of Proposed Project Improvements

Points are assigned based upon the transferability of project technologies to other sites in Colorado

A. Limited use of project technology may result . . . .5 Points
B. Moderate use of project technology may result. . . 10 Points
C. Extensive use of project technology may result . . 15 Points

NONPOINT SOURCE INFORMATION/EDUCATION PROGRAM

In order for a successful nonpoint source program to occur in Colorado there is a need to inform and educate the public about nonpoint source pollution problems. The lack of public knowledge and understanding is quite evident by the absence of governmental funding and public involvement in the area of nonpoint source pollution. One of the most important goals for a statewide education program is to establish that nonpoint source pollution is everyone's problem and there is a definite role for its cleanup and prevention for every citizen in Colorado. These educational efforts to address water quality concerns can be both individual and collective, and prevention is the most desired alternative as opposed to treatment.

An information/education program must be an encompassing program and not just a collection of individual projects. A sound program will avoid duplication of manpower and funds, as well as promote cooperation on projects by all interested parties. Interagency cooperation is a must to address the numerous water quality concerns.

Objectives

1. Establish a basic understanding by the public of water, water ecosystems, water quality, and nonpoint source pollution.

2. Through this understanding, create a public awareness of nonpoint source pollution and its potential causes.

3. Educate the public to recognize their contribution to nonpoint source pollution and enhance their role in its reduction.

4. Promote the use of best management practices which address nonpoint source pollution.

5. Promote interagency cooperation to complete the goals of the information and education program.

Possible Projects

- Statewide Newsletter
- System for Technology Transfer
- Publications
- Establishment of a Speakers Bureau
- Development of Curriculum for Schools
- Display Booth
- Slide Presentations
- Videos
- Brochures

III. Project Implementation Plan Guidelines

In order for a project to be considered for ranking and funding, a project implementation plan report must be prepared and submitted to the Task Force and Division for review. This report will document baseline conditions, proposed improvements, anticipated water quality and beneficial use improvements, project costs, and long term monitoring, maintenance and financial arrangements. Table 2 is an outline of the items deemed important in a project implementation plan report. Previous to preparing a report, it is recommended that interested parties meet with funding agencies, the Nonpoint Source Task Force, and the Water Quality Control Division to discuss project implementation plan and funding requirements.

Table 2

Project Implementation Plan Requirements

1. Problem Description

   A. General area description
      1. Geography, land uses, land types.
      2. Soils, vegetation types.

   B. Instream problem
      1. Pollutants, monitoring, sources of loading
         a. Physical
         b. Biological
         c. Chemical
      2. Linkage to Colorado nonpoint source assessment report and management programs

   C. Impact to beneficial use
      1. Quantify nonpoint source problem to beneficial uses - expert opinions on impacts to aquatic life, drinking water, etc.

2. Alternatives for Control of Nonpoint Source Problems

   A. Control of various sources
      1. Describe source control, i.e., BMP's

   B. Anticipated benefit to the restoration of beneficial uses

   C. Costs of alternatives

3. Selected Alternative

A. Costs, including ongoing maintenance

B. Rationale for selection of alternative
   1. Benefit to uses
   2. Financial rationale

C. Expected benefit of project

D. Federal, State and Local permitting requirements
   1. 404/401 permits
   2. air quality permits
   3. construction/building permits

4. Roles and Responsibilities of Agencies Involved in Proposed Project

A. Relationship of Agencies to the problem and the proposed solution

B. Signed Agreement among agencies for implementation of project measures
   1. Construction
   2. Operation and management
   3. Maintenance

C. Proof of ownership, right of way, permission to enter, or other agreements required to construct project

5. Sources of funding

A. Total costs

B. Grant request i.e., 319, 201g(1)B, ACP, etc.

C. Non-Federal match
   1. Commitment to local match
   2. Source of local match

6. Monitoring and Evaluation Plan

A. Documentation of the effects of improvements
   1. At point of control
   2. Instream
      a. Physical
      b. Biological
      c. Chemical

B. Yearly report

7. Implementation Schedule

A. Timeframes for construction and completion

IV. Best Management Practices

Best management Practices (BMP's) are both structural and nonstructural techniques which either prevent or reduce pollution from nonpoint sources. Section 319 requires that the state include a list of BMP's for use in each significant category (agriculture, silviculture, mining, urban and construction runoff, and hydrologic modifications) of nonpoint source generating activity. Attached to each management program (Chapters IV, V, and VI) is a list of BMP's for use in Colorado. These recommended BMP's represent the work of the Task Force, and its subcommittees, to determine the best available practices at this time. These BMP's may be modified or new BMP's added to the list by the Task Force as necessary.

The list of BMP's represent the first stage of a two stage system of selecting BMP's for use through Section 319. The lists found in the management programs are general, although specifications for these practices are available in Appendix A, B and C of this document. The second stage of BMP's require tailoring a selected BMP or combinations of BMP's to achieve water/stream quality goals in a specific situation. This tailoring of BMP's should be considered in a broad framework of water/stream quality goals, various alternatives to achieve those goals, costs of alternatives, and the long term operation and maintenance of such systems.

Implementation of BMP's to correct nonpoint source water quality problems is intended to be a voluntary program in Colorado. The nature of nonpoint source pollution, a diffuse and ephemeral source, makes institution of a permit program for dischargers impractical. It is therefore the intent of the nonpoint source program to encourage installation of BMP's in areas of critical nonpoint source problems through the use of grants, loans and voluntary efforts for construction. In some cases, benefits derived from treating nonpoint sources may well encourage point source permit holders to be actively involved in nonpoint source projects.

In the event that these BMP's are adopted by other regulatory agencies or are incorporated in other regulatory schemes, and the BMP's are thus imposed through independent legal authority, there is a third stage of BMP selection. In such cases the third stage of BMP selection requires that the agency imposing the BMP's must assess whether imposing BMP's is allowed by law. While the BMP's listed in this management program may be useful if voluntarily accepted, additional rulemaking may be required prior to imposition of BMP's in a regulatory scheme.

A long term commitment to operation, maintenance and replacement of BMP's is a requirement of any project for nonpoint source improvement. Although initial capital costs for construction of BMP's may be low when compared to traditional point source treatment projects, the cost of operation, maintenance and replacement may lead to ongoing expenses which must be considered during the planning of a project. Without proper operation, maintenance, and replacement, many BMP's and water quality improvements will be lost over time.

To determine the effectiveness of nonpoint source improvements, a system of monitoring of BMP's must be established. Monitoring of BMP's is an emerging science. In some cases this monitoring may differ greatly from established water quality monitoring techniques which focus solely on water chemistry. Nonpoint source projects are often times intended to improve or restore a classified use of waters, particularly aquatic life uses. Therefore, biological and habitat monitoring may be an important part of determining BMP effectiveness.

This need has been recognized on a national level by many governmental agencies and other organizations. A number of monitoring systems such as GAWS, Rapid Bio-Assessment, the Index for Biotic Integrity, and others, are all proposed to deal with these monitoring needs. The Division and Task Force should track the progress of these mechanisms for their applicability in Colorado. Individual control projects must carefully assess the need for monitoring BMP effectiveness and the type of system whether it is chemical, biological, habitat or some combination of these systems oriented. Consultation with the Division and Task Force is strongly recommended prior to establishing a monitoring system.

The Colorado Nonpoint Source Program actively seeks cooperative monitoring efforts with other state and federal land use agencies. At present, ongoing or planned monitoring programs are being undertaken with: the Colorado Division of Wildlife, Colorado Mined Land Reclamation Division, U.S. Forest Service, U.S. Bureau of Land Management, U.S. Soil Conservation Service, and U.S. Environmental Protection Agency. Monitoring responsibilities are outlined in Project Implementation Plans and coordinated by the Colorado Nonpoint Source Program.

Nonpoint source impacts in Colorado are primarily generated by inactive mines, agricultural, or urban activities. Although the nature of inputs vary within these categories, in general, resource damage occurs when the dislocation in physical, chemical, or biological components surpasses the natural resilancy of the system. Within a particular watershed, monitoring methodologies are designed to tract key contaminants or processes while assessing impacts to the forementioned levels of system function. Temporally, sampling is designed to target critical periods of the hydrograph when loadings or concentrations of contaminants are expected to be greatest. For watersheds impacted by metal mining, critical sampling intervals are spring high flow periods when the highest instream concentrations of contaminants may most severly stress the ambient biota. In watersheds impacted by agricultural or urban landuse practices, water quality sampling should also be timed to storm events and irrigation schedules with the primary variables being sediment, pesticides, as well as toxics transport. The overall objective of nonpoint source monitoring programs is to document impacts, or assess the effectiveness of BMP'S, on the major physical, chemical, and biological components of the system. This requires an intergrated approached including: chemical water quality analysis, toxicity testing with Ceriodaphnia spp. and fathead minnows (Pimephales promelas), habitat and biotic assessment in accordance with Rapid Bioassessment Protocols For Use In Streams and Rivers (EPA 1989), and fish population and biomass analysis. Selected individual BMP effectiveness is determined by placing monitoring stations immediately upgradient and downgradient of the treatment area and review of the physical, chemical, and biological data by trained professionals at both the state and federal level.

The Colorado Nonpoint Source Task Force, through its subcommittees', will track the progress of various BMP's demonstrations. This tracking will include field verification of techniques as well as review of monitoring reports to determine surface and groundwater quality. Through this process recommended BMP's may be critiqued for effectiveness and implementation projects reviewed for water quality improvements.

Chapter III

Existing Responsibilities, Authorities, and Programs for Control of Nonpoint Sources

Introduction

The goal of Section 319 of the Clean Water Act is to control nonpoint sources of water pollution. In order to achieve this goal roles of regulatory authorities, responsibilities of land management agencies, and the applicability of various funding programs must be analyzed to find the proper approach for control of these problems. A number of agencies located at the local, state and federal levels of government are currently involved in or have responsibility for nonpoint sources control. In most cases no additional authority will be required to solve nonpoint source water problems. The object of this chapter is to define the existing structure of nonpoint source control authorities and programs which may be utilized for specific nonpoint abatement projects.

I. State Water Quality Regulatory Authority

The control of water quality in Colorado is established in the Colorado Water Quality Control Act (CRS 25-8-101). This law provides regulatory and administrative power to the Colorado Department of Health to control water quality. The Water Quality Control Commission (WQCC), established by the law, may adopt regulations necessary for the protection of water quality.

Section 25-8-205, Control Regulations specifically empowers the WQCC with this regulatory authority which may include control of nonpoint sources. This regulatory power may be used to either control specific nonpoint sources which affect waterbodies or may set quality standards which protect water bodies and may thereby require control of nonpoint sources to achieve those standards. Regulations may also be adopted which provide an administrative procedure for voluntary actions designed to control nonpoint sources. These regulatory authorities offer avenues for control of nonpoint sources when voluntary, incentive or other nonregulatory measures have failed. Examples of regulatory control of nonpoint sources in Colorado include the Lake Dillon (4.1.0 of WQCC regulations) and Cherry Creek Reservoir (4.2.0 of WQCC regulations) phosphorus control regulations. An example of regulation which allows voluntary actions is 4.5.0 of the WQCC regulations, "Passive Treatment of Mine Drainage Regulations."

The Water Quality Control Division of the Department of Health is the administrative body charged with protection of water quality in Colorado. The Division is responsible for the issuance of discharge permits, enforcement of WQCC adopted regulations, and monitoring water quality in Colorado. Significant in this regard, from a nonpoint source perspective, is the issuance of permits for stormwater discharge. This Federally mandated program will be in place by 1992 and will provide for permits to control urban runoff quality in major metropolitan areas.

The Division also administers the Passive Treatment of Mine Drainage Control Regulation which provides a method for voluntary control of nonpoint source abandoned/inactive mine pollution.

II. Federal Agencies Involved in Nonpoint Source Control

Several Federal agencies are involved in nonpoint source control efforts. The Bureau of Land Management and the U.S. Forest Service have extensive responsibilities relating to public lands uses and protection of those lands. The Soil Conservation Service, the Agriculture Stabilization and Conservation Service, the Agriculture Research Service, and the Extension Service administer programs which provide assistance to private landowners for water quality improvement. The President's Water Quality Initiative (1989) brings additional emphasis to water quality issues for federal agencies.

A. BLM & USFS Land Management Responsibilities

The Federal Land Policy and Management Act, National Forest Management Act and Resource Planning Act require that significant land holding Federal agencies, such as the BLM and USFS, maintain an ongoing land planning process which evaluates, among other items, environmental impacts of various uses of Federal lands. These plans guide the general activities of land uses on Federal lands; therefore, these plans are important in assessing water quality impacts from proposed activities. These plans also delineate lands which require treatment to improve existing or anticipated future conditions.

These planning efforts (Resource Management Plans for the BLM and USFS Land and Resource Management Plans) are required by the National Environmental Policy Act to assess the environmental impacts of such plans, therefore these plans should undergo a thorough examination and comment process by the state nonpoint source agency to ensure that public lands are meeting nonpoint source program goals. The WQCD and Nonpoint Source Task Force have a significant role in the review of these plans to ensure that nonpoint source management program goals are met.

A second level of planning activities which require scrutiny on Federal lands are specific activities and actions such as timber sales, road building, grazing permits and watershed activity plans. These plans deal with the specifics of land uses and determine the protective measures and improvements for specific land units. A list of specific actions which the Water Quality Control Division will for consistency with the state nonpoint source program, pursuant to EO 12372 and EO 12088, are listed later in this chapter. The implementation of structural measures for the purposes of water quality improvements on federal lands requires compliance with the NEPA. An Environmental Impact Statement is completed for Resource Management Plans and National Forest Plans. An Environmental Assessment must be completed prior to implementation of specific activities or actions on an individual site.

Finally, both the BLM and USFS have funding programs available for improvement of public lands. It is important that water quality concerns delineated in the Colorado Nonpoint Assessment Report and prioritized in this Management Program be prioritized for these funds to improve water quality. These efforts must be accounted for in BLM and USFS planning efforts.

B. Federal Agricultural Assistance Programs

Several programs administered by agencies in the U.S. Department of Agriculture may be pertinent to landowners seeking to improve nonpoint source water quality problems. These programs are not necessarily intended to have water quality as a primary focus; however, water quality is a factor for consideration in funding of specific projects. The Nonpoint Source Task Force and the Water Quality Control Division will pursue use of these funding programs for nonpoint purposes. The following is a brief summary of those programs:

1. Agricultural Conservation Program (ACP)

This program offers cost sharing for soil, water, and forestry practices of long term benefit. It is administered by the Agricultural Stabilization and Conservation Service (ASCS) of the U.S. Department of Agriculture (USDA). The Soil Conservation Service (SCS) of the USDA, through the local soil conservation districts, provides technical assistance in determining where soil and water conservation practices are needed and feasible, preparing farm and ranch conservation plans, and designing specific best management practices. SCS also supervises and certifies the proper installation of some of these practices.

Assistance under ACP may provide up to 80% of the costs for conservation practices. Farmers, ranchers, and nonindustrial owners of forest land are eligible for ACP funds. In recent years an emphasis on water pollution control has led to ACP funding being used for control of nonpoint sources. Particularly, ACP special project funding may be used to combat water quality problems. Nationally, ACP is funding a large number of water quality special projects. The projects provide significant additional cost share assistance to small watershed areas to deal with nonpoint water quality problems on a local basis.

2. Conservation Technical Assistance (CTA)

Technical assistance for the application of conservation practices is provided to cooperators of soil conservation districts by the SCS under Public Law 74-76. Preparation and application of individual conservation plans is the main form of technical assistance provided. This assistance includes interpreting existing soil survey data and conducting site-specific investigations of soil, plant, water, and other physical conditions to determine appropriate alternative systems of land use and land treatment. It also includes assistance in applying the land treatment systems described in the plan, including design, layout, and installation of conservation practices.

3. Great Plains Conservation Program (GPCP)

This program, administered by the SCS through the local soil conservation districts, was originally designed to help control wind and water erosion in the Great Plains states. All counties east of the Continental Divide in Colorado are therefore included under the purview of this program. Top priorities of the GPCP are erosion control on non-irrigated cropland and range land improvement. Nonpoint source control is a lower priority of GPCP, but is eligible for funding consideration. GPCP may provide cost sharing of up to 80% for conservation practices however, average cost sharing is less than 65%.

4. Conservation Reserve Program (CRP)

This program, a portion of the Food Security Act of 1985 administered by the ASCS, is designed to remove highly erodible lands from agricultural production and return those lands to grass and/or trees. Landowner who remove these lands from production are eligible for rental payments for these lands from the federal Government for 10 years. This program holds promise for nonpoint source control since its aim is highly erodible lands. A provision in CRP allows farmers to enroll cropland located within 66 to 99 feet of streams or waterbodies as filter strips to reduce sediment. This program has the potential to be highly effective in reducing erosion and improving water quality. In Colorado 1.7 million acres of land have been removed from production through this program.

5. Watershed Protection and Flood Prevention Act (P.L. 566)

This program helps rural and urban communities improve and develop the water and land resources of watersheds up to 250,000 acres. The concept of P.L. 566 is very broad and as a result, nonpoint source control may be accomplished within the framework of water management and conservation practices. State agencies and local nonprofit organizations are eligible to apply for loans of up to $10 million dollars per project. SCS provides technical assistance in this program as well as administering the grant funding of projects.

6. Colorado River Basin Salinity Control Program

This program is designed to reduce salt loadings to The Colorado River Basin in order to maintain standards established in 1972. Both the United States Department of Agriculture and the United States Department of Interior are involved in programs designed to control nonpoint sources of salt loading. The Bureau of Land Management and Bureau of Reclamation are also actively involved in salinity reduction measures from a variety of sources. Salinity reduction measures for individual farms are handled by the USDA. State participation in the salinity control program is coordinated through the water quality management planning process for nonpoint sources and the discharge permit program for point sources. The Colorado River Basin Salinity Control Forum provides a process for the states of the basin to coordinate their activities and provide guidance to the Federal agencies.

7. Resource Conservation and Development (RC&D)

This program is designed to promote resource development and resource conservation in multicounty areas. The emphasis of this program is to provide a local focus on development and conservation issues using existing governmental and volunteer organizations. The SCS through RC&D funding may provide a local coordinator to RC&D areas to accomplish their goals. The local emphasis and coordination of agencies provides a good setting for addressing control of nonpoint sources.

8. Demonstration Projects

Part of the USDA response to the President's Water Quality Initiative is to establish large scale demonstrations to encourage the accelerated adoption of currently available and new technology for water quality improvement. Cost share assistance is provided through the Agricultural Conservation Program; leadership for the projects is shared between the Extension Service and Soil Conservation Service. A limited number of projects will be funded throughout the country; in 1990, 8 were funded and another 8 will be funded in 1991.

9. Hydrologic Unit Areas

Another part of the USDA response is the hydrologic unit area water quality project. The purpose is to accelerate technical and cost share assistance to landusers to address agricultural nonpoint sources of pollution. Leadership is shared between the Soil Conservation Service and Extension Service, with cost share assistance available through ACP. A total of 275 areas are expected to be funded in a five year period.

III. State Programs and Agencies Involved in Nonpoint Source Control

Several agencies of State government are involved in land management and funding programs. These programs may be accessed to improve upon nonpoint source problems in Colorado.

A. State Board of Land Commissioners

This Board, appointed by the Governor, oversees activities on all state-owned lands. Since the Land Board administers 3,000,000 surface acres of land and 4,000,000 million acres of mineral rights, the potential for impact from these lands is great. The Land Board leases state lands for a number of purposes which produce revenues for the state school system. These lands are utilized for grazing and croplands, timber production, and mineral production. Many of the watersheds identified as impacted by nonpoint sources in Colorado contain state lands. In the future, an agreement between the Land Board and the Water Quality (WQCC and WQCD) agencies may be necessary to ensure protection of water quality. The Land Board also administers a Land and Water Improvement Fund. This fund established by state law provides up to $75,000.00 per year to be used for improvements to soil and water resources located on state lands. This fund may be used for water quality improvements including nonpoint source programs.

B. Mined Land Reclamation Board and Division

The Mined Land Reclamation Board, appointed by the Governor, and its administrative staff, the Mined Land Reclamation Division, are involved in both the prevention of water quality problems from existing mining operations and rehabilitation of old mining sites.

A permitting system assures reclamation of new and existing mining sites from a nonpoint source perspective. Therefore, most efforts for nonpoint source water quality purposes are focused on abandoned or inactive mining sites. The Mined Land Reclamation Division is very active in pursuing new and experimental technologies to reclaim the waters emanating from these historic sites. The Abandoned Mine Land fund (AML) has been a real asset in providing funds to assist in this effort. The AML funds are generated through a fee placed on coal production areas.

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C. Soil Conservation Board

The legislative mandate to the Board is to provide the State of Colorado with a program of soil and water conservation to control wind and water erosion, prevent floods and preserve adequate underground water reserves. The Board represents the eighty soil conservation districts of the State in the state government processes. The Board and districts are involved in a number of soil conservation projects which are beneficial to water quality particularly in the fields of agriculture, rangeland grazing, and subdivision construction processes.

D. Colorado Division of Wildlife

The Colorado Division of Wildlife (DOW) is involved in projects to improve habitat for aquatic life. These projects may include nonpoint source correction. The DOW staff also offers expertise in water quality and aquatic life habitats. This expertise is essential in diagnosing effects of pollution on aquatic environments and proposing solutions to these problem areas. Involvement of the DOW in nonpoint source projects is therefore essential.

E. Colorado Water Quality Control Division

The Division, in addition to its regulatory and staff functions discussed earlier in this chapter, also administers two funding programs which may be used to assist in correcting nonpoint source problems.

The Federal Wastewater Construction Grant Program offers grants for 55% of the costs of construction of publicly owned wastewater facilities. The Clean Water Act amendments of 1987 expanded this program through section 201 G(1)b to include funding of nonpoint source projects. This section would allow the Governor of the state to request up to 20% of the annual construction grant fund be used for nonpoint source projects. The Construction Grant Program will be phased out in Federal Fiscal Year 1994, therefore if this source is to be utilized for nonpoint sources, efforts must be made in the near future to access its funds.

The second funding program administered by the Division is the State Water Pollution Control Revolving Loan Fund (WPCRF). The WPCRF was established in the Clean Water Act to replace the Construction Grant Program. The intent of the program is to provide financial assistance to governmental entities for the construction of water quality projects, including nonpoint sources, to improve water quality within the state. The first priority of the WPCRF is to fund wastewater facility improvements, nonpoint source projects are a second priority for this source of funding.

F. Colorado Department of Agriculture

The Colorado Department of Agriculture has responsibilities in two main areas concerning water quality. The Chemigation Act of 1987 gave the Department the responsibility to address the process whereby chemicals are applied to the land or crops in or with water through a closed irrigation system. A permitting process has been established if an irrigator applies chemicals through a closed irrigation system such as a circular sprinkler. The second area concerning water quality gives the Department responsibility in the designation of geographic areas where there is a significant risk of contamination of groundwater from agricultural activities conducted at or near the land surface. This activity will be completed in cooperation with the Department of Health and Cooperative Extension Service.

IV. Local Programs and Authorities for Control of Nonpoint Sources

Local programs, ordinances and voluntary efforts are crucial to the implementation of many nonpoint source improvement projects. On ground construction and long term monitoring and maintenance will, in many cases, be the responsibility of local entities. Additionally, local ordinance and education programs can do much to prevent nonpoint source problems.

A. Municipal Ordinances and Authorities

Local municipalities can provide assistance to prevent nonpoint source pollution through several avenues. Municipalities may pass ordinances to control nonpoint sources. In particular enabling legislation found in CRS 29-20-101 allows local municipalities to control land use activities through regulations. These authorities can be very helpful in controlling erosion from land disturbance activities.

Additionally local governments such as towns, cities, counties, special districts, soil conservation districts, and water conservancy districts may enter contracts and therefore accept grants and carry out nonpoint source correction projects. Section 319 also allows "soft match" or "in kind services" as the 40% of local matching funds. This provision may be very helpful if local governments are willing to provide these services in lieu of hard cash for matching federal grants.

V. Other Organizations Involved in Nonpoint Control Efforts

Many volunteer, conservation, and environmental groups have interests in controlling nonpoint sources. Groups such as Trout Unlimited, the Sierra Club, the Isaac Walton League, the Colorado Volunteers and others may sponsor project, or provide a source of matching "in kind" services for construction projects. This level of support, interest, and help is essential in carrying out successful nonpoint source projects.

VI. Review of Federal Projects and Actions for Consistency with Section 319 Goals

One of the requirements of Section 319 is that each state review relevant Federal financial assistance programs and federal development projects which may effect water quality through nonpoint sources. The intent of a consistency review will be to determine if such proposed programs or projects will either adversely impact water quality through the generation of nonpoint sources, or fail to include provisions for improving waters impacted by past or ongoing nonpoint source generating activities. Such a review may include a request that such Federal programs and projects be consistent with this voluntary 319 management program.

Implementation of BMP's to correct nonpoint source water quality problems, where such BMP's are identified solely as part of the state Section 319 program, is voluntary in Colorado. Therefore, in the absence of independent statutory or regulatory authority, reference in other state and federal enactments to Colorado's Section 319 program, including BMP's developed thereunder, shall not establish an enforceable requirement that BMP's be implemented other than voluntarily.

The following list reflects programs listed in the 1987 Catalog of Federal Domestic Assistance which the Water Quality Control Division has deemed may impact water quality through nonpoint sources. Therefore, review of the following programs may be requested by the Water Quality Control Division. Specific Memorandums of Understanding (MOU's) to deal with Federal Consistency issues are recommended in the coming year.

Department of Agriculture

10.054 Emergency Conservation Program

10.062 Water Bank Program

10.063 Agricultural Conservation Program

10.064 Forestry Incentives Program

10.068 Rural Clean Water Program

10.069 Conservation Reserve Program

10.070 Colorado River Salinity Control

10.414 Resource Conservation and Development Loans

10.416 Soil and Water Loans

10.418 Water and Waste Disposal Systems for Rural Communities

10.419 Watershed Protection and Flood Prevention Loans

10.423 Community Facilities Loans

10.500 Cooperative Extension Service

10.652 Forestry Research

10.664 Cooperative Forestry Assistance

10.901 Resource Conservation and Development

10.902 Soil and Water Conservation

10.904 Watershed Protection and Flood Prevention

10.906 River Basin Surveys and Investigations

10.910 Rural Abandoned Mine Program

Department of Commerce

11.300 Economic Development - Grants and Loans for Public Works and Development Facilities

Department of Defense

12.100 Aquatic Plant Control

12.104 Flood Plain Management Services

12.105 Protection of Essential Highways, Highway Approaches and Public Works

12.106 Flood Control Projects

12.108 Snagging and Clearing for Flood Control

12.109 Protection, Clearing and Straightening Channels

12.110 Planning Assistance to States

Department of the Interior

15.214 Non-Sale Disposal of Mineral Material

15.250 Regulation of Surface Coal Mining and Surface Effects of Underground Coal

15.252 Abandoned Mine Reclamation Program

15.501 Distribution System Loans

15.502 Irrigation Systems Rehabilitation and Betterment

15.503 Small Reclamation Project

15.605 Fish Restoration

15.611 Wildlife Restoration

15.916 Outdoor Recreation - Acquisition, Development and Planning

Department of Transportation

20.205 Highway Planning and Construction

Environmental Protection Agency

66.418 Construction Grants for Wastewater Treatment Works

66.433 State Underground Water Source Protection

66.435 Clean Lakes Cooperative Agreements

66.700 Pesticides Enforcement Program

66.802 Hazardous Substance Response Trust Fund (Superfund)

66.804 State Underground Storage Tanks Program

Federal development projects and plans for Federal lands may impact water quality and are therefore also important in the Federal consistency review. Therefore, the following actions of Federal agencies in Colorado may be requested for review by the Water Quality Control Division.

Forest Service (USDA)

Revisions or Amendments to Land and Management Programs

Timber Activities (sales)

Range Activities

Chemicals/Pesticides

Area Analysis/cumulative impacts analysis

Recreation Development

Transportation Plans

Water Development

Watershed Rehabilitation Projects

Watershed Management

Public Water Supply Watershed Management

Hydrologic Modification

Wetlands Protection

Rise to the Future/Fisheries Program

Riparian Management Plans

SMZ Activities/(stream-side impact zone)

Minerals Exploration & Development

ORV Activities/off-road vehicles

D-J/W-B Activities (Dingall-Johnson & Wallop-Breoux-fish and game)

Bureau of Land Management (DOI)

Revisions or Amendments To Land and Management Programs

Watershed Projects

Mineral Exploration & Development

Coal, Oil and Gas Leasing

Coal Reclamation

Off Road Vehicles Activities

Timber Activities

Grazing Allotment/Grazing Management

Chemicals/Pesticides

Area Analysis/Cumulative Impacts

Public Watershed Management

Wetlands Protection

Riparian Management Plans

Hydrologic Modification

Transportation Plans

Watershed Activity Plans

ACEC Plans (Area of Critical Environmental Concern)

Soil Conservation Service/Agricultural Stabilization and Conservation Service

ACP (Agricultural Conservation Program)

GPCP (Great Plains conservation Program)

PL-566 (Small Watersheds)

RCWP (Rural Clean Water Project)

Colorado River Salinity

Hydrologic Units

Demonstration Projects

DEPARTMENT OF DEFENSE

Defense Installations

Land Management Plans

Waste Management Plans

Re-vegetation Plans

Corps of Engineers

Proposed authorizations for:

Dredging

Channel improvement

Erosion control structures

Dams or flood control works

Land acquisition for spoil disposal or other purposes

DEPARTMENT OF TRANSPORTATION

Federal Highway Administration

Highway Construction/Reconstruction

BUREAU OF RECLAMATION (DOI)

Irrigation Development

OFFICE OF SURFACE MINING/SMRCA

Abandoned Mine Lands Program

Mineral Developement

Lease sale activities

FISH AND WILDLIFE SERVICE

Management of National Wildlife refuges and proposed acquisitions

NATIONAL PARK SERVICE

National Park management plans and proposed acquisitions

Chapter IV.

Agriculture and Silviculture Nonpoint Source Management Program

Introduction

This agriculture/silviculture management program is prepared, by the agriculture and silviculture subcommittee of the Colorado Nonpoint Source Task Force, to fulfill the requirements of Section 319 of the Federal Clean Water Act. The intent of the program is to identify means of controlling agricultural/silviculture nonpoint source impacts identified in the Colorado Nonpoint Assessment Report. The management programs describe not only high priority watersheds which require best management practices installation but also statewide educational and research needs which will further advance the knowledge of agricultural/silviculture nonpoint source impacts and control practices in Colorado.

Impacts of Agriculture and Silviculture Nonpoint Sources

Agriculture/silviculture, for the purposes of this management program, includes the cultivation of cropland, the raising of livestock, and the harvesting of forest products. This broad definition of agriculture/silviculture includes nonpoint source generating activities such as irrigated and dryland farming, grazing activities, feedlots, tree harvesting, and small road construction on public lands. The Colorado Nonpoint Assessment Report (January 1990) delineates approximately 2,200 miles of stream affected by these agricultural/silvicultural activities. Additionally 16,000 surface acres of waterbodies are identified as impacted by agriculture. Agriculture has been identified as impacting groundwater at several locations within the state.

In Colorado the primary pollutants of concern from agriculture are sediment and salinity (total dissolved solids). These pollutants occur naturally due to the inherent erodibility of soils. Man's activities can greatly increase the rate of erosion and lead to the siltation of stream beds, as well as lakes and reservoirs. Siltation may lead to loss of aquatic habitat in both streams and standing water bodies.

Nutrients such as phosphorus and nitrate which result from agricultural activities also pose a threat to water quality. Application of fertilizers to cropland may lead to increased nitrate levels in groundwater, and may stimulate the growth of algae or nuisance weeds in lakes and reservoirs. High levels of nitrate (in excess of 10 mg/l) in drinking water supplies pose a threat to public health. Recreational activities in lakes and reservoirs may be restricted by over enrichment of standing waters, which lead to eutrophication.

Nonpoint Source Agricultural and Silvicultural Management Program Priorities

The Colorado Nonpoint Assessment Report indicates that agriculture nonpoint impacts are felt throughout the state. This is particularly true of the impacts of sediment and salinity. The impacts of nutrients, due to agricultural activities, in standing waterbodies appear to be most severe in the Platte River Basin. Groundwater impacts from agricultural practices are largely unknown. The lack of a well coordinated database is a major roadblock to understanding groundwater problems in Colorado.

In determining priorities for agricultural management programs three factors must be considered: implementability of proposed projects, water quality benefits, and education and research needs. A combination of specific on-ground improvements and statewide programmatic needs should be the result of a balanced nonpoint program.

Priorities for the state management program for agriculture and silviculture include priorities for implementation and technical assistance projects, statewide educational needs, and groundwater needs. A list of priority watersheds for demonstration projects is found on pages 40 thru 47. The statewide and groundwater priorities are listed below.

Statewide program needs include a number of public education and information programs, and coordination of governmental entities to achieve nonpoint source goals. Ongoing educational and information efforts in the areas of streambank erosion, irrigation, nutrient and pesticide management are crucial in the area of agriculture. Other important programs include a statewide information mechanism (a newsletter) which will inform the public of not only agricultural, but a full range of nonpoint source program information. Additionally, technology transfer through a number of media, will be very important as the results of various demonstrations, both local and national are obtained.

As stated earlier groundwater impacts attributable to nonpoint sources are largely unknown in Colorado. In an attempt to gain more knowledge about groundwater quality in Colorado the Nonpoint Source Task Force formed a groundwater study group. This group is comprised of federal, state and local governmental agencies involved in groundwater activities, and other interested public interest groups.

Priorities for the study group include:

1) establishing a computerized statewide groundwater data base;

2) establishing protocols for groundwater monitoring;

3) coordinating efforts of agencies to gain groundwater quality information;

4) conduct groundwater monitoring throughout Colorado;

Groundwater monitoring is currently being conducted by a number of agencies. Nonpoint source funding has been utilized to sample wells in the San Luis Valley. Groundwater monitoring efforts remain a high priority for the agriculture nonpoint source efforts in Colorado.

Coordination of various governmental agencies involved in agriculture and silviculture activities is crucial to ensuring a well developed nonpoint source program. Therefore, it is a priority that these agencies work together to achieve water quality goals. Examples of such cooperation include the USDA (SCS/CE) water quality plan, the efforts of the state ASCS Conservation Review Group, and the state groundwater study group. The continuation of these groups and their efforts are supported by this management program. Additionally, the milestones listed in the next section of this document further these goals.

Milestones for Agricultural/Silvicultural Nonpoint Source Management

CES Proposed Milestones

By November 1, 1990, Cooperative Extension will prepare a water quality notebook containing publications on water quality standards, testing, agriculture impacts on water quality, domestic water quality and waste water treatment. Copies will be distributed to Cooperative Extension county offices and Soil Conservation Service area offices.

By July 1, 1990, Cooperative Extension will provide HACH water test kits to 8 county offices for measuring nitrates, conductivity and pH in the field. The first eight counties are Adams, Jefferson, Larimer, Logan, Morgan, Park, Sedgewick and Weld.

By June 1, 1991, Training will be provided to Cooperative Extension agents on HACH methods

SCS Milestones:

By March 1, 1991 and each year thereafter, the joint SCS/CE water quality plan will be reviewed and revised.

By March 1 of each year, SCS, CE, and ASCS will present to the Ag/Silv Subcommittee their nominations for hydrologic unit area, demonstration area and ACP water quality special project proposals, using the USDA Water Quality initiative guidelines for 1990 (until they are replaced). With concurrence from the subcommittee, the proprosals will be submitted to the appropriate national office. Notifications of selections will be made prior to the start of the federal fiscal year.

The soil/pesticide interaction rating table for Colorado will be compared annually with the national SCS pesticide database, and revised as needed.

By April, 1991, SCS will revise all aspects of the Field Office Technical Guide, including resource management systems and standards and specifications, to address water quality issues and concerns.

By March 1 of each year, all potential agricultural/silvicultural projects will be submitted to the Agriculture/Silviculture Subcommittee of the Colorado Nonpoint Source Task Force. Each proposal will be prepared using the Project Implementation Plan requirements. The subcommittee will prioritize the projects, recommend an appropriate funding program and redirect the proposals to the responsible agency for fine-tuning to meet the specific program's planning requirements. Potential funding sources include PL-566, ACP, RCWP, RC&D, 319/201(g)(1)(b), etc., as well as the USDA water quality initiatives: demonstration projects, hydrologic units area, and ACP water quality special projects.

USFS Milestones:

By October 1, 1990, write a draft Soil and Water Conservation Practices Handbook to consolidate those measures proven effective in controlling nonpoint source pollution from silvicultural and other actions. These practices will include Statewide standards and guidelines found in all Forest Land and Resource Management Plans.

The Forest Service will be available to assist the State in using these practices to revise the State's management program BMP handbook as appropriate.

By October 1, 1991 revise the existing 1982 Memorandum of Understanding between BLM, USFS, and the State of Colorado to be specific with the Federal consistency requirements of Section 319 of the Clean Water Act.

By December 31, 1991 National Forests in Colorado will update their watershed improvement programs as needed to comply with objectives of the Clean Water Act and Forest Land and Resource Management Plans.

Implement the Riparian Action Plan by December 31, 1995 specifying actions to: (1) improve internal and external awareness of, and commitment to managing for riparian-dependent resources; (2) classify, evaluate, and manage riparian areas to achieve healthy conditions for riparian-dependent resources; and (3) develop demonstration areas as examples of positive riparian management.

BLM Milestones:

Continue to input of riparian data into the RAIDS data storage base for statewide use.

By October 1, 1991, revise the existing 1982 Memorandum of Understanding between BLM, the Forest Service, and the state of Colorado to be specific with Federal consistency requirements of Section 319 of the Clean Water Act.

By November 1, 1991, implement various riparian area improvements throughout the state on the public lands.

Each year BLM will plan, design, and construct approximately $400,000 to $500,000 of rangeland improvements using recommended best management practices available at this time. Additionally, approximately $100,000 of maintenance will be scheduled and performed for existing projects.

Each year, at least 5 allotment management plans (AMP's) will be prepared which incorporate best management practices for rangeland management.

By January 1, 1991, BLM forest and woodlands in Colorado will be managed in such a way as to maintain a desired ecosystem. Decisions concerning biological diversity, noncommercial species values, forest age and size distribution along with harvest techniques, prescribed fire and other best management practices are used to achieve this goal.

By January 1, 1991, Colorado BLM will begin directing use away from fragile resources, protect intensively used sites, construct other facilities to accommodate the use, or directly regulate use if all else fails--in order to maintain the distinctive character of public lands recreation resources.

By January 1, 1991, Colorado BLM will more aggressively promote a wise use ethic among visitors which encourages responsible use of the land itself and respect for other visitors--to maintain highly valued land resources and visitor experiences.

By January 1, 1991, Colorado BLM will develop a systematic recreation resource monitoring strategy and implement it on-the-ground to ensure adequate resource protection

Priority Watersheds and Projects

The following is a list of watersheds in Colorado which are supported by this management program for actions to deal with agricultural and silvicultural nonpoint source problems. Funding for the projects on the list covers anticipated actions over the next four fiscal years (FY 90 - FY 94) and includes both planning and implementation. This list is highly dependent upon the availability of 319 and other state, local and federal funding sources. All projects listed may substantially improve water quality and beneficial uses, but do not reflect priority order for project improvements.

This list may be amended by the Nonpoint Source Task Force through the recommendations of the agriculture/silviculture subcommittee. Such an amendment may occur previous to an official update of the management program by the Water Quality Control Commission. Such amendment shall be noted by the Nonpoint Source Task Force and included in the next update of the management program. Any party disagreeing with the determination of the Nonpoint Source Task Force to amend the list, may appeal the determination to the Water Quality Control Commission.

The following is a list of the funding anacronyms found on the following pages. Chapter III provides information on each of these funding programs:

319 - Section 319 of the Clean Water Act funds

201(g) - Wastewater Construction Grants Funds of the Clean Water Act, converted to nonpoint purposes

USDA - refers to ACP Water Quality Special Project, ACP regular allocation, Great Plains Conservation Program, Hydrologic Unit Areas, Demonstration Project, PL566, and RC&D as possible funding sources.

BLM - Bureau of Land Management land improvement funds

USFS - U.S. Forest Service land improvement funds

SLB - State Land Board land and water improvement funds

Priority Watersheds/Projects for Agricultural/Silvicultural Nonpoint Source Activities*

Project/Watershed	Category	Responsible Agency	PIP Completion	Project Implementation	Source of Funding
Platte River Reservoirs (off stream) Lower South Platte Drainage (PLATTE RIVER BASIN)	agriculture	DOW, WQCD, NCWCD local reservoir companies	FY 93	FY 94-95	319, 201(g)
Boulder Creek Boulder County (PLATTE RIVER BASIN)	agriculture	City of Boulder SCS	Complete	FY 89-95	319, 201(g)
Laramie River Tributaries Larimer County (PLATTE RIVER BASIN)	silviculture	USFS	FY 91	FY 92	USFS
Lower Lone Tree Weld County (PLATTE RIVER BASIN)	agriculture	SCS, ASCS, CE	FY 91	FY 92-95	USDA, 319
Little Thompson Larimer/Weld Counties (PLATTE RIVER BASIN)	agriculture	SCS, SCD	FY 91	FY 91-95	USDA, 319
Dry Creek Boulder County (PLATTE RIVER BASIN)	agriculture	SCS, SCD City of Boulder	FY 91	FY 91-95	319

*This is a list of watersheds which are recommended for action to address agricultural and silvicultural nonpoint source problems. The list covers anticipated actions over the next four fiscal years (FY 90 - 94) and includes both planning, implementation and educational needs. This list is highly dependent upon the availability of 319 and other federal funding sources.

Priority Watersheds/Projects for Agricultural/Silvicultural Nonpoint Source Activities*

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Project/Watershed	Category	Responsible Agency	PIP Completion	Project Implementation	Source of Funding
Lower South Platte Salinity and Irrigation Management Program (PLATTE RIVER BASIN)	agriculture	Lower South Platte Water Conservation District	FY 91	FY 91-95	319, 201g
Three Mile Creek Park County (PLATTE RIVER BASIN)	agriculture	DOW, SCS, SCD, BLM, USFS	FY 91	FY 92-95	319 USDA, 201(g)
Boxelder Creek Larimer County (PLATTE RIVER BASIN)	agriculture	SCS, SCD	FY 92		319
Boxelder Creek Adams/Weld Counties (PLATTE RIVER BASIN)	agriculture	SCS, SCD	FY 92		319
South Platte River Douglas and Park Counties (PLATTE RIVER BASIN)	Other (Off Road Veh)	USFS	FY 91	FY 92	USFS
Badger Creek Fremont and Park Counties (ARKANSAS RIVER BASIN)	agriculture silviculture	MOU in place - many agencies	FY 89	FY 90-92	319, 201g, ACP, SLB

* This is a list of watersheds which are recommended for action to address agricultural and silvicultural nonpoint source problems. The list covers anticipated actions over the next four fiscal years (FY 90 - 94) and includes both planning, implementation and educational needs. This list is highly dependent upon the availability of 319 and other federal funding sources.

Priority Watersheds/Projects for Agricultural/Silvicultural Nonpoint Source Activities*

Project/Watershed	Category	Responsible Agency	PIP Completion	Project Implementation	Source of Funding
Fountain Creek El Paso and Pueblo Counties (ARKANSAS RIVER BASIN)	silviculture agriculture urban runoff	MOU in place - many agencies	FY 91	FY 92-95	PL566, ACP, COE, 319, SLB, DOW, RC&D
Trinidad Lake Las Animas County (ARKANSAS RIVER BASIN)	agriculture	SCS	FY 91	FY 92-95	PL566
Patterson Hollow (includes Hungerford Hollow and all irrigated land below Highline and Otero Canals) Otero and Pueblo Counties (ARKANSAS RIVER BASIN)	agriculture	SCS, CE, ASCS	FY 90	FY 91-94	USDA, 319
Holbrook System (formerly Cheraw Lake) Otero County (ARKANSAS RIVER BASIN)	agriculture	SCS, CE, ASCS	FY 91	FY 92-95	USDA, 319 ACP Water Quality Special Project
Bessemer Ditch Pueblo County (ARKANSAS RIVER BASIN)	agriculture	SCS,SCD	FY 91	FY 91-95	ACP, 319
Buckskin Flats (ARKANSAS RIVER BASIN)	agriculture	SCS	FY 91	FY 91-98	GPCP

* This is a list of watersheds which are recommended for action to address agricultural and silvicultural nonpoint source problems. The list covers anticipated actions over the next four fiscal years (FY 90 - 94) and includes both planning, implementation and educational needs. This list is highly dependent upon the availability of 319 and other federal funding sources.

Priority Watersheds/Projects for Agricultural/Silvicultural Nonpoint Source Activities* 8ZIE

Project/Watershed	Category	Responsible Agency	PIP Completion	Project Implementation	Source of Funding
Upper Black Squirrel El Paso County (ARKANSAS RIVER BASIN)	agriculture	SCD, SCS, others	FY 91	FY 92-95	319
Limestone-graveyard Bent County (ARKANSAS RIVER BASIN)	agriculture	SCS	FY 92	FY 93-96	USDA, 319
Fort Bent Canal System Prowers County (ARKANSAS RIVER BASIN)	agriculture	SCD, SCD	FY 92	FY 93-97	319, USDA
Lamar Canal Prowers County (ARKANSAS RIVER BASIN)	agriculture	SCD, SCS	FY 93	FY 94-98	319, USDA
Granada area Prowers County (ARKANSAS RIVER BASIN)	agriculture	SCD, SCS	FY 92	FY 93-97	319, USDA
Bristol area Prowers County (ARKANSAS RIVER BASIN)	agriculture	SCD, SCS	FY 93	FY 94-98	319, USDA

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Priority Watersheds/Projects for Agricultural/Silvicultural Nonpoint Source Activities*

Project/Watershed	Category	Responsible Agency	PIP Completion	Project Implementation	Source of Funding
Hydraulic Ditch Fremont County (ARKANSAS RIVER BASIN)	agriculture	SCS, SCD	FY 92	FY 93-97	319, USDA
Canon Heights Fremont County (ARKANSAS RIVER BASIN)	agriculture	SCS, SCD	FY 93	FY 93-97	319, USDA
San Luis Valley (RIO GRANDE RIVER BASIN)	agriculture	CE, SCS, ASCS	FY 90	FY 91-94	USDA, Demonstration Project
Alamosa Creek Conejos County (RIO GRANDE RIVER BASIN)	agriculture	SCS, SCD	FY 92	FY 93-97	319, USDA
Rio Grande Streambank Project Rio Grande County (RIO GRANDE RIVER COUNTY)	agriculture	SCD, SCS	FY 91	FY 92-96	319, USDA
North Fork Republican Yuma County (REPUBLICAN RIVER BASIN)	agriculture	SCS, CE, ASCS	FY 90	FY 91-94	319, USDA** Hydrologic Unit Area Project
Red Rock Canyon Montrose County (COLORADO RIVER BASIN)	agriculture	NPS, BOR	FY 91	FY 92	NPS, 319, ACP, BOR, Colo. River Salinity

* This is a list of watersheds which are recommended for action to address agricultural and silvicultural nonpoint source problems. The list covers anticipated actions over the next four fiscal years (FY 90 - 94) and includes both planning, implementation and educational needs. This list is highly dependent upon the availability of 319 and other federal funding sources.

Priority Watersheds/Projects for Agricultural/Silvicultural Nonpoint Source Activities* 0816

Project/Watershed	Category	Responsible Agency	PIP Completion	Project Implementation	Source of Funding
Lower Wolf Creek Moffat County (COLORADO RIVER BASIN)	agriculture	BLM	FY 89	FY 91-93	BLM
Milk/Alkali Creeks Eagle County (COLORADO RIVER BASIN)	agriculture	BLM Eagle River Council	FY 89	FY 89-92	BLM, 319, 201g
Red Wash Moffat and Rio Blanco Counties (COLORADO RIVER BASIN)	agriculture	BLM, SCS	FY 91	FY 94	BLM, PL566
Little Snake Moffat County and State of Wyoming (COLORADO RIVER BASIN)	agriculture	State Land Board, Big Country RC&D, Colorado First SCD, State of Wyoming, BLM	FY 92	FY 92-95	319, ACP, SLB
Lower Gunnison Montrose and Delta Counties (COLORADO RIVER BASIN)	agriculture	USDA/BOR, SCD, ASCS County Committee	Complete	Ongoing	Colo. River Salinity Control Program
McElmo Creek Montezuma County (COLORADO RIVER BASIN)	agriculture	USDA/BOR, SCD, ASCS County Committee	Complete	Ongoing	Colo. River Salinity Control Program

* This is a list of watersheds which are recommended for action to address agricultural and silvicultural nonpoint source problems. The list covers anticipated actions over the next four fiscal years (FY 90 - 94) and includes both planning, implementation and educational needs. This list is highly dependent upon the availability of 319 and other federal funding sources.

Priority Watersheds/Projects for Agricultural/Silvicultural Nonpoint Source Activities*

Project/Watershed	Category	Responsible Agency	PIP Completion	Project Implementation	Source of Funding
Willow Creek Tributaries Grand County (COLORADO RIVER BASIN)	silviculture agriculture (Range)	USFS, BLM	FY 91	FY 92	USFS, BLM
Colorado River Salinity Colorado River Basin (COLORADO RIVER BASIN)	agriculture	USDA/USDI, Local SCD, ASCS County Committee	Ongoing	Ongoing	Colo. River Salinity Control Program
Grand Valley Mesa County (COLORADO RIVER BASIN)	agriculture	USDA/BOR, SCD, BLM ASCS County Committee	Complete	Ongoing	Colo. River Salinity Control Program
Rio Blanco Lake Rio Blanco County (COLORADO RIVER BASIN)	agriculture	DOW, SCS, County	FY 91	FY 91-95	319, USDA
Strawberry Creek Rio Blanco County (COLORADO RIVER BASIN)	agriculture	SCS, SCD	FY 92	FY 92-96	319, USDA

* This is a list of watersheds which are recommended for action to address agricultural and silvicultural nonpoint source problems. The list covers anticipated actions over the next four fiscal years (FY 90 - 94) and includes both planning, implementation and educational needs. This list is highly dependent upon the availability of 319 and other federal funding sources.

Priority Watersheds/Projects for Agricultural/Silvicultural Nonpoint Source Activities*

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Project/Watershed	Category	Responsible Agency	PIP Completion	Source Implementation	of Funding
Piceance Creek Rio Blanco County (COLORADO RIVER BASIN)	agriculture	SCS, SCD	FY 93	FY 93-97	319, USDA
Loutzenhiser Tributary Montrose County (COLORADO RIVER BASIN)	agricultural	SCS, CE, ASCS	FY 91	FY 91-94	319, USDA
Crystal River Coal Creek, Dutch Creek (COLORADO RIVER BASIN)	silviculture	DOW,MLRD USFS	FY 91	FY 91-92	319, USDA 201(g)

* This is a list of watersheds which are recommended for action to address agricultural and silvicultural nonpoint source problems. The list covers anticipated actions over the next four fiscal years (FY 90-94) and includes both planning, implementation and educational needs. This list is highly dependent upon the availability of 319 and other federal funding sources.

Best Management Practices Agriculture/Silviculture

Best Management Practices (BMP's) for this management program are defined as:

> "A practice or combination of practices that is determined by a responsible group after examination of alternative practices and appropriate public participation to be the most effective, practicable means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water/stream quality goals".

They include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures.

A two tier system of BMP's is recommended in this management program. The first tier is a list of recommended statewide BMP's. These are intended to serve as a general reference of accepted practices to improve water quality impacted by the various subcategories of agricultural and silvicultural nonpoint pollution. The second tier of BMP's relate to the application of the recommended statewide practices to an effected site. This second tier then calls for a specific tailoring of the recommended statewide practice to fit a watershed problem.

The statewide recommended BMP's are a composite of practices which have been implemented by a number of agencies. These practices are general in nature, but do provide a general specification to reduce nonpoint contributions to waterbodies.

The recommendation of BMP's is a complex issue due to the interaction between various natural resources. A watershed as a whole must be taken into consideration. The implementation of a BMP at one point may create or increase a problem elsewhere in a watershed. Specific BMP's may need to be recommended or developed for each problem identified within a watershed.

The selection of specific BMP's will require the involvement and coordination of many parties and interests. Previous to BMP installation, a decision will need to be made as to the level of management to be established as the goal after treatment. BMP's may not control all the nonpoint loading, but will be installed as necessary to reduce nonpoint loading to the desired level. Costs must be considered with each proposed application of BMP's but will not be used as a basis to prohibit use of BMP's in a particular location.

The Water Quality Control Division will be responsible for the maintenance and updating of the statewide list of recommended BMP's as part of this management program. Education and personal committment are necessary to insure that the BMP's are understood by the public and other users. Monitoring of the BMP's will be a continuing process to insure that the practices are serving their original intent. Modifications and improvements of recommended BMP's will be the result of this process. The list of statewide BMP's is not exclusive; deletions and/or additions may be made as needed based on an annual evaluation report, emerging technologies, and requests for special practices.

Procedures For Establishing Best Management Practices

Nonpoint source pollution by its nature tends to be caused by numerous sources within a watershed rather than just a few specific sites. This is especially true of nonpoint source pollution caused by agricultural/silvicultural uses. For this reason the control of nonpoint source pollution through BMP's must begin first with preparation of a project implementation plan by local sponsors which describes conditions in a watershed and, how water quality improvements will be achieved. Implementation of projects and installation of BMP's are recommended to be voluntary, nonregulatory actions for agriculture and silviculture.

A project implementation plan is intended to provide a comprehensive analysis of a watershed. This plan should examine the number of landowners willing to participate in an improvement project and shall set goals on the level of improvement that will be achieved in the effected waterbody. The plan shall outline the BMP's that are compatible with the conditions that exist in the watershed and tailor those BMP's to achieve the water quality goal for the river or stream. The plan shall include a timeline describing when BMP's will be constructed and water quality improvements obtained. The timeline should include intermediate water quality goals for each year showing steady progress to obtain the optimal water quality goal.

Once the project has been implemented, monitoring and annual evaluations of the success of the implemented BMP's shall be conducted by local sponsors. If water quality goals are not met, changes in management practices may be examined and implemented.

In watersheds which include significant federal lands, the land management agencies which control the land will be responsible for preparing watershed implementation plans in cooperation with private landowners.

During the preparation of the project implementation plan public meetings should be held. The meetings should not only educate the public on the need to improve water quality, and a means to achieve these improvements through the use of BMP's, but also receive input on which management practices should be implemented to improve water quality in the watershed.

Projects considered for funding through Section 319 for implementation of BMP's should have the following goals:

1. improvement in water quality

2. reasonable costs in achieving improved water quality

3. committment to improved water quality by the entity requesting funds.

The BMP's recommended in this management program are a compilation of the recommended best practices available at this time. Efforts of the EPA, SCS, USFS, and other agencies to prepare BMP's which are intended for water quality improvement require that new or revised BMP's be included in this program as they become available. Therefore, this management program recommends an updating of the program to include these recommended BMP's as necessary.

Implementation of BMP's to correct nonpoint source water quality problems, where such BMP's are identified solely as part of the state Section 319 program, is voluntary in Colorado. Thus, in the absence of independent statutory or regulatory authority, reference in other state and federal enactments to Colorado's Section 319 program, including BMP's developed thereunder, shall not establish an enforceable requirement that BMP's be implemented other than voluntarily.

Each agricultural BMP contains a specifications guide of possible conservation practices. Most of these specifications are practices found in each Soil Conservation Service Field Office Technical Guide. The intent of the BMP's specification guide is to allow for the combination of practices into a strategy that will assure nonpoint sources of pollution are controlled to a level compatible with water/stream quality goals. In the case of rangeland BMP's it has been agreed by the responsible agencies that the BMP specifications are applicable to both public and private lands.

The specifications for the BMP's listed on the following pages are found in Appendix A of this document.

Definition:

Grazing at a proper rate of timing and intensity that will maintain enough cover to protect the soil and maintain or improve the quantity and quality of desirable vegetation.

Purposes

To:

1) increase the vigor and reproduction of key plant communities;

2) accumulate litter and mulch necessary to reduce erosion and sedimentation and improve water quality;

3) improve or maintain the condition of vegetation;

4) increase forage production;

5) maintain natural beauty; and

6) reduce the hazard of wildfire; and

7) maintain soil fertility.

Condition Where Practice Applies:

On all rangeland, native pasture, grazed wildlife land, and grazeable forestland.

Specification Guides:

Management specification includes but is not limited to:

Livestock Water Development (Wells, Tanks, Springs, etc) (SCS codes 574, 614, 642)

Range Seeding (SCS code 550)

Proper Grazing Use (SCS code 528)

Brush Management/Prescribed Burning* (SCS codes 314, 338)

Fencing (SCS code 382)

Livestock Exclusion/Total Rest (SCS code 472)

Grazing Land Mechanical Treatment (SCS code 548)

Wildlife Upland Habitat Management (SCS code 645)

Wildlife Wetland Habitat Management (SCS code 644)

Planned Grazing Systems (SCS code 556)

Deferred Rotation (SCS code 352)

Rest Rotation (SCS code 528)

Salting

* Biological control and/or prescribed burning should be considered over mechanical treatment.

<u>References:</u>

Resource Management Systems Guide Sheet for Rangelands (SCS) 4/88

SOIL STABILIZATION ON RANGELANDS

Definition:

Soil stabilization practices on grasslands help reduce soil erosion and prevent sediments, organic debris, and applied chemicals and fertilizer from entering surface and groundwater. The best practices for stabilizing soils are the utilization of vegetation or artificial soil covers to reduce erosion.

Purposes

To:

1) prevent excessive soil and water loss and improve water quality;

2) produce optimum forage for grazing or browsing animals on rangeland or land converted to range from other uses; and

3) improve the visual quality of grazing land.

Conditions Where Practice Applies:

On rangeland, native pastures, grazeable forestland and grazing wildlife land.

Specification Guides:

Management specification includes but is not limited to:

Planned Grazing System (SCS code 556)

Proper Grazing Use (SCS code 528)

Critical Area Treatment (SCS 342)

Stream Channel Stabilization (SCS 584)

Grade Stabilization Structures (SCS code 410)

Streambank Protection (SCS code 580)

Sediment Basin (SCS code 350)

Diversions (SCS code 348)

Grazing Land Mechanical Treatment (SCS code 548)

Range Seeding (SCS code 550)

Brush Control (SCS code 314)

References:

Resource Management Systems Guide Sheet for Rangelands (SCS) 4/88

RIPARIAN AREA STABILIZATION

Definition:

Using vegetation and/or structures to stabilize and protect banks of streams or excavated channels against scour and erosion. Also a high level of management is needed to maintain the condition of these fragile, sensitive areas to protect the water quality.

Purposes

This standard applies to measures necessary to stabilize and protect the aggregation or degradation in a stream channel and streambank for one or more of the following purposes:

1) to prevent the loss of land or damage to utilities, roads, buildings, or other facilities adjacent to the channel banks;

2) to control channel meander that may adversely affect onsite and downstream facilities;

3) to reduce sediment loads causing downstream damages and pollution;

4) to improve the stream for recreation or as a habitat for fish and/or wildlife and;

5) to minimize the impacts within riparian, sensitive and wet areas.

Conditions Where Practice Applies:

This practice applies to natural or excavated channels undergoing damaging aggradation or degradation due to the activities of man.

Specification Guides:

Management specifications include but are not limited to:

Access Road (SCS Code 560)

Critical Area Planting (SCS Code 342)

Grade Stabilization Structure (SCS Code 410)

Route Selection - USFS Existing Road Restoration, Rehabilitation and Maintenance.

Road Construction - USFS Existing Road Restoration, Rehabilitation and Maintenance.

Forestwide Standards and Guidelines - Riparian Area Management - USFS - May 1990 (Draft)

Planned Grazing System (SCS Code 556)

Wildlife Upland Habitat Management (SCS Code 648)

Deferred Grazing (SCS Code 352)

Stream Channel Stabilization (SCS Code 584)

Streambank Protection (SCS Code 580)

Livestock Exclusion/Total Rest (SCS Code 472)

Fencing (SCS Code 386)

Filter Strips (SCS Code 393)

Heavy Use Protection (SCS Code 561)

References:

SCS Standards and Specification Codes
560, 342, 410, 556, 648, 352, 584, 580, 472, 386, 393, and 561; "Building Water Pollution Control into Small Private Forest and Ranchland Roads" SCS and USFS 1981; USFS R-1, R-4 Soil and Water Conservation Practices Handbook - May, 1988. Soil and Water Conservation Practices for Grazing (BLM) (Draft); Resource Management Systems Guide Sheet for Rangelands (SCS) 4/88; BLM Technical Reference 1737-4 Riparian Area Management; and BLM Technical Reference 1737-3

CONSERVATION COVER

Definition:

Developing and maintaining residue or establishing a Permanent Cover Crop to increase the infiltration of water and protect soil from erosion.

Purposes

To:

1) improve or maintain good physical, chemical, and biological conditions of the soil;

2) reduce erosion;

3) improve water use efficiency and water quality;

4) improve wildlife habitat; and

5) break reproduction cycles of plant pests.

Conditions Where Practice Applies:

On all cropland or other lands where agricultural crops are grown.

Specifications Guides:

The management specification includes but is not limited to:

Conservation Cropping Systems (SCS code 328)

Cover and Green Manure Crop (SCS code 340)

Conservation Tillage Systems (SCS 329)

Grasses and Legumes in Rotation (SCS code 411)

Crop Residue Use (SCS code 344)

Critical Area Planting (SCS Code 342)

Pasure/Hayland Planting (SCS Code 512)

Range Seeding (SCS Code 550)

Reference:

SCS Standards and Specifications Codes 328, 329, 340, 342, 344, 411, 512, and 550.

Code 449

Definition:

Determining and controlling the rate, amount, and timing of irrigation water in a planned and efficient manner.

Purposes

To:

1) effectively use available irrigation water supply in managing and controlling the moisture environment of crops to promote the desired crop response;

2) minimize soil erosion and loss of plant nutrients;

3) control undesirable water loss; and

4) protect water quality both surface and subsurface; and

5) reduce degradation due to salinity

Conditions Where Practice Applies:

This practice is suited to all areas that are suitable for irrigation and that have a water supply of suitable quality and quantity.

Specification Guides:

The Management specification includes but is not limited to:

Irrigation Canal Construction and Lining (SCS code 428)

Irrigation Water Conveyance (SCS code 428)

Irrigation Field Ditch Construction (SCS code 388)

Irrigation Pipeline Installation (SCS code 430)

Irrigation Land Leveling (SCS code 464)

Irrigation Water Management, including cablegation, surge, and sprinkler systems (SCS code 449)

Tailwater Recovery (SCS code 447)

Structure for Water Control (Headgates) (SCS code 587)

Reference:

SCS Standards and Specifications Codes 320, 388, 464, 447, 428, 430, 449, and 587

Definition:

High grade slopes in the field can often increase erosion due to runoff and result in sediments and other pollutants washing out in the surface and subsurface waters.

Purpose:

To prevent sediment and other pollutants from entering the surface and subsurface waters.

Conditions Where Practice Applies:

On all the agricultural lands where the slope grade is significant due to local soil and precipitation conditions.

Specification Guides:

Management specifications for this practice includes but is not limited to:

Grade Stabilization (SCS code 410)

Diversion (SCS 362)

Sediment Basin (SCS 350)

Terrace (SCS code 600)

Crop Residue Use (SCS code 344)

Countour Farming (SCS code 330)

Field Stripcropping (SCS code 586)

Critical Area Planting (SCS code 342)

Grass Buffer Strips (SCS code 586)

Reference:

SCS Standards and Specifications Codes 410, 362, 328, 329, 330, 340, 342, 344, 411, 350, 586 and 600

Definition:

Fertilizer rates should be based closely on crop needs taking into account the present an past amount of fertilizer (such as Nitrogen) in the soil. If all these components are considered in a fertilizer budget, a fair estimation of fertilizer need can be made. Manure and manure handling systems directly affect the nutrient content of wastes, and therefore munurial nutrient content should be estimated before developing a land application schedule.

Purpose:

To reduce fertilizer and manure loss to the ground and surface water.

Condition Where Practice Applies:

On all cropland or on other lands where fertilizers are applied.

Specification Guides:

The following are some specific management which are usually implemented in agricultural lands:

Cover and Green Manure Crop (SCS code 340)
Grasses and Legumes in Rotation (SCS code 411)
Nutrient Management (SCS code 680)

References:

BMP 15 - Fertilizer Management (SCS/RCWP) SCS Standards and Specification Codes 340, 411, and 680.

Definition:

Pesticides are an integral part of most agricultural enterprises. However, due to the adverse effects these chemicals may have on the aquatic environment, implementation of management practices to keep these chemicals from entering the surface and subsurface waters is necessary. The term pesticide refers to all insecticides, herbicides and fungicides.

Purpose:

To reduce pesticide loss to the ground and surface waters.

Condition Where Practice Applies:

On all cropland or on other lands where pesticides are applied (e.g. rangeland, holding ponds, wetlands).

Specification Guides:

Pest control actions include the monitoring of pest increase, the judicious use of a pesticide, or the effective communication that no action is necessary. Agricultural pest management should ensure the protection of man and his domestic animals, and the maintenance of a suitable environment in which they may live. The following are some specific management tools which are usually implemented on agricultural lands:

Pest Management (SCS code 685)

Reference:

SCS Standard and Specification 685.

Non-chemical Alternatives for Managing Selected Plant Species in the Western United States. CSU, Department of Range Science

Definition:

Managing forest lands at an intensity that will maintain or improve the quality and quantity of desirable forest vegetation to insure protection of soil and water resources.

Purposes:

1) increase the vigor and reproduction of forest vegetation;

2) accumulate litter and mulch necessary to reduce erosion and sedimentation and improve water quality;

3) maintain natural beauty and visual quality;

4) provide opportunities for multiple use management where appropriate;

5) reduce hazardous wildfires;

6) maintain or improve habitat conditions of fish and wildlife; and

7) reduce amount of snow held in crowns of forest vegetation.

Conditions Where Practice Applies:

On any forest land managed for any purpose which includes, but is not limited to, the pinon-juniper, oakbrush, aspen, mixed conifer, ponderosa pine and spruce-fir vegetation types.

Specification Guides:

Management specification includes but is not limited to:

Woodland Improved Harvesting (SCS Code 654)

Woodland Improvement (SCS Code 666)

Woodland Pruning (SCS Code 660)

Woodland Site Preparation (SCS Code 490)

Forestwide Standards and Guidelines - Soil, Water and Fisheries - USFS - May 1990 (Draft)

References:

SCS Standards and Specifications Codes 490, 654, 660, and 666; USFS R-1, R-4 Soil and Water Conservation Practices Handbook - May 1988

SOIL STABILIZATION ON FOREST LANDS

Definition:

Soil stabilization practices on forest lands, including sensitive areas, to reduce soil erosion and prevent sediments, organic debris, and applied chemicals (fertilizers and pesticides) from entering ground and/or surface water.

Purposes:

1) minimize soil loss and degradation of water quality;

2) rehabilitate areas where an unacceptable level of erosion and/or stream/lake sedimentation is already occurring;

3) restore and maintain fisheries that have been damaged or destroyed by sedimentation.

4) to maintain the quality and integrity of sensitive areas such as, but not limited to, research, natural, scenic, and unstable geologic areas.

Conditions Where Practice Applies:

On any forest land where there is, or is likely to be, an accelerated level of erosion and/or sedimentation due to the activity of man, and in or near any area within forestlands considered to contain sensitive and important values that require a higher than normal level of management attention and protection.

Specification Guides:

Management specification includes but is not limited to:

Route Selection (SCS code 560, 342, 410, USFS Existing Road Restoration, Rehabilitation and Maintenance)

Road Construction (SCS code 560, 342, 410, USFS Existing Road Restoration, Rehabilitation and Maintenance)

Access Road (SCS code 560)

Critical Area Planting (SCS code 342)

Grade Stabilization Structure (SCS code 410)

Forestwide Standards and Guidelines - Soil, Water and Fisheries - USFS - May 1990 (Draft)

Woodland Improved Harvesting (SCS code 654)

Woodland Site Preparation (SCS code 490)

References:

SCS Standards and Specification Code 342, 410, 490, 654, 660, and 666 560-Access Road; "Building Water Pollution Control into Small Private Forest and Ranchland Roads". (SCS USFS-1981), USFS R-1, R-4, SWCP Handbook Sections 15.03, 15.21 - 15.25, May 1988; "Forestwide Standards and Guidelines - Riparian Area Management USFS - May 1990 - (Draft); Gully Development and Control - USFS Research Paper Rm.-169-May 1976

Chapter V

Urban and Construction Runoff Management Program

Impacts of Urban and Construction Runoff in Colorado

This urban and construction runoff management program is prepared, by the urban and construction runoff subcommittee of the Colorado Nonpoint Source Task Force, to fulfill the requirements of Section 319 of the Clean Water Act.

Uncontrolled runoff from construction sites pose a threat to Colorado's waters. Construction runoff occurs when lands are cleared of their natural vegetative cover and are made susceptible to erosion. Sediments and nutrients are the pollutants of concern from construction areas.

Runoff from developed urban areas can contain nutrients, pesticides, metals, organic materials and suspended sediments. These have the potential of adversely impacting beneficial uses of the receiving waters. However, such impacts have yet to be clearly isolated and quantified. Depending on land uses and impervious coverings (i.e. streets and rooftops), the movement of these constituents to waterways is accelerated. As a result, storm runoff from urban areas and construction sites is of concern.

Construction runoff can impact beneficial uses of water and also present an aesthetically unpleasing effect. Construction runoff affects aquatic life and recreational uses of waters by depositing fine sediments on fish habitat and recreational areas. Sediment also causes a murky appearance in water further reducing its appeal for recreation. Fine sediments that settles in rivers, creeks and lakes can prevent or reduce fish propagation. Also, nutrients associated with construction runoff, such as phosphorus, may stimulate the growth of algae or weeds in aquatic environments. This situation can be serious in some lakes and reservoirs where nutrients can accumulate and lead to changes in trophic status.

Runoff from stable urban areas can also contain fine sediments, but in much smaller concentrations than in runoff from construction sites. These sediments act as carriers of petroleum products, heavy metals, pesticides and nutrients. Fortunately, because these constituents are attached to sediments, they appear to have little toxicity to aquatic life. Some of these same constituents are dissolved in water, this dissolved fraction has potential toxic effects. Considerable research is needed to clarify and quantify the net effect of the constituents found in urban stormwater runoff on aquatic life.

Except for some specific studies on lakes and reservoirs, information on the impacts of urban and construction runoff in receiving waters is inconclusive and appears to have little toxicological impact on rivers and streams.

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Findings of the Colorado Nonpoint Assessment Report in Regard to Urban and Construction Runoff

The Colorado Nonpoint Assessment Report preliminarily identifies urban and construction runoff as affecting streams, lakes and reservoirs. The streams identified in the report fall into three categories. First, streams affected by urban runoff located near major population centers, these include Cherry Creek, the South Platte River, Boulder Creek and Fountain Creek. Second, streams affected by urban and construction runoff located near recreational communities these include, the Florida River, the Fraser River, Soda Creek, Gore Creek, and the Yampa River. Third, streams affected by highway construction the only waterbody so identified currently is Straight Creek. The report was unable to be specific as to the effects on streams by urban runoff with the exception of streambank erosion.

The reservoirs identified in the report are mostly impacted by construction runoff. The reservoirs are located in either the Denver Metropolitan area (Cherry Creek, Chatfield, Bear Creek) or near major recreational developments (Dillon, Green Mountain). The loading of sediments and phosphorus and the effects of the loading on recreation and aquatic life are the chief concerns in these reservoirs.

The Assessment Report identifies most of the urban and construction problems as being of medium severity. The information and data analysis indicates that all of the reservoirs impacted either were identified through monitored data, or that efforts are currently underway to determine inlake quality. Most of the reservoirs were studied under EPA Clean Lakes grants. The result of these studies are adopted standards for phosphorus in three of the reservoirs (Cherry Creek, Chatfield, Dillon). The other two reservoirs (Green Mountain, Bear Creek Lake) will be considered for standards adoption and control programs once the studies are completed.

The information available on stream segments identified as impacted by urban and construction runoff is, for the most part, ambient water quality data. These data often times do not provide storm event information when the effects of urban runoff may be most acute. Gathering additional water quality information on these segments would help in determining the potential impacts related to urban and construction runoff. However ambient water quality data by itself may not reveal the severity of the problem unless it is viewed in the context of the "form" of the constituents that are present and the frequency and duration of their occurrence. Quality data have been gathered in some of the tributary areas of several of the impacted reservoirs.

Priority Watersheds and Areas of Concern for Urban and Construction Runoff

In determining projects for consideration of funding prioritization for urban and construction runoff improvements several factors must be considered. First of all the implementability of proposed projects, water quality needs, potential for improvement, and research needs must be weighed. Additionally, the installation of on ground projects must be compared with statewide programmatic needs such as educational or regulatory programs. The result of weighing these considerations should provide a balance of water quality improvements, research, and statewide programmatic priorities.

In reviewing the Colorado Nonpoint Assessment Report two deductions in relation to urban and construction runoff can be drawn. First of all, the information relating urban and construction runoff impacts to lakes and reservoirs is more conclusive than the information relating urban storm water runoff impacts to streams. Standards have been established in several reservoirs to protect beneficial uses which are threatened by nonpoint contributions. Related to this first deduction is the conclusion that additional study of many of the streams which are listed as impacted by urban runoff is necessary prior to proposing improvement projects.

In addressing urban and construction runoff priorities, the regulatory program which the Environmental Protection Agency has proposed for stormwater discharges also weighs heavily. Implementation of these regulations in the 1990's will move urban runoff to a point source rather than nonpoint source concern. Due to this regulatory change and the availability of data relating impacts to reservoirs, a statewide program which considers both of these areas is necessary. A mix of programs which emphasize education, erosion control, demonstration of nutrient removal BMP's and further study of urban runoff impacts on receiving waters is necessary.

The statewide program for urban and construction runoff in the coming year involves the urban and construction runoff subcommittee of the Colorado Nonpoint Source Task Force tracking the progress of the stormwater discharge permit program. The subcommittees input of information to that proposed program from a nonpoint source perspective and tracking the progress of BMP installations in Colorado and the surface and groundwater impacts of such structures is important in the future of urban and construction runoff control efforts. Another item of statewide interest for the subcommittee to be involved in is the potential for creating a statewide education program for erosion control from construction sites.

Statewide program milestones for the urban and construction runoff subcommittee include:

1) To initiate projects for demonstration of BMP's in Frisco, Boulder Creek, and Soda Creek during FY90 and an educational program for control of construction runoff during FY90 and 91. The WQCD, Town of Frisco, City of Boulder, and Summit County will be the lead agencies for these projects.

2) To initiate, as monies are available, additional demonstrations of BMP's during both 1991 thru 1994. The subcommittee shall review and recommend such projects to the Task Force, WQCD, and WQCC.

3) The Denver Regional Council of Governments working through its Water Resources Division shall work with its various Management Associations to undertake basin by basin nonpoint source control strategies in the metropolitan Denver region. These strategies will be prepared basin by basin with the goal of preparing one basin strategy each year for the next five years.

4) To provide a review and update of the information for the Colorado Nonpoint Assessment Report as necessary.

5) To review and evaluate the BMP's proposed for urban and construction runoff by October 1994. Such evaluation will include any changes to control technologies which have proved necessary through the above mentioned demonstration projects.

The list on the following pages reflects projects and watersheds which the urban and construction runoff subcommittee has selected for implementation in the coming four Federal fiscal years (FY 89-92). Progress in these watersheds is highly dependent upon local, state and federal funding efforts. This list will be updated annually to reflect progress and additional knowledge of urban and construction runoff problems and projects. The order of projects on this list does not necessarily reflect a priority order in terms of importance to water quality, all projects however may substantially improve water quality.

This list may be amended by the Nonpoint Source Task Force through the recommendations of the agriculture/silviculture subcommittee. Such an amendment may occur previous to an official update of the management program by the Water Quality Control Commission. Such amendment shall be noted by the Nonpoint Source Task Force and included in the next update of the management program. Any party disagreeing with the determination of the Nonpoint Source Task Force to amend the list, may appeal the determination to the Water Quality Control Commission.

The following list explains the anacronyms used in the source of funds column on the list. Chapter III provides an explanation of the programs listed herein:

319 - Section 319 of the Clean Water Act Funds
201(g) - Wastewater Construction Grant Funds of the Clean Water Act converted to nonpoint purposes
314 - Section 314 (Clean Lakes) funding of the Clean Water Act

Priority Watersheds and Projects for

Urban and Construction Runoff Nonpoint Source

Management Program FY 90 - 94

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Project/Watershed	County	Category	Responsible Agency	PIP Completion	Project Implementation	Source of Funds
Cherry Creek Reservoir (PLATTE RIVER BASIN)	Douglas	Urban Construct-ion Runoff	Cherry Creek Basin Authority	FY 91	FY 92-94	319, 201(g)1, local funds
Cottonwood Creek	Douglas	Urban Construct-ion Runoff	Cherry Creek Basin Authority	FY 91	FY 92-94	319, 201(g)1, local funds
Sloan Lake (PLATTE RIVER BASIN)	Denver	Urban Runoff	City of Denver	FY 89	FY 90-92	314
Bear Creek Reservoir (PLATTE RIVER BASIN)	Jefferson	Urban Construct-ion Runoff	City of Lakewood	FY 90	FY 91-92	319, 314, 201(g)1, local funds
Chatfield Reservoir (PLATTE RIVER BASIN)	Douglas Jefferson	Urban Construct-ion Runoff	Chatfield Basin Association	FY 92	FY 95	local funds
Boulder Creek (PLATTE RIVER BASIN)	Boulder	Urban Runoff Agriculture	City of Boulder	Complete	FY 89-95	319, 201(g)1 local funds
Barr Lake (PLATTE RIVER BASIN)	Adams	Urban Construct-Runoff	Adams County, Division of Wildlife	FY 92	FY 93-94	319, 201(g)1, local funds
Standley Lake (PLATTE RIVER BASIN)	Adams Jefferson	Urban Construct-ion Runoff	Westminster, Arvada Adams and Jefferson Counties	FY 92	FY 93-94	319, 201(g)1, local funds

Priority Watersheds and Projects for

Urban and Construction Runoff Nonpoint Source

Management Program FY 89 - 92

Project/Watershed	County	Category	Responsible Agency	PIP Completion	Project Implementation	Source of Funds
Box Elder Creek (PLATTE RIVER BASIN)	Larimer	Urban Runoff	Larimer County	FY 93	FY 94	319, 201(g)1, local funds
Fountain Creek (ARKANSAS RIVER BASIN)	El Paso Pueblo	Urban Runoff Construct-ion Runoff Agriculture Mining	Memorandum of Agreement among many agencies and Districts expected in FY 89	FY 91-92	FY 93-94	319, 201(g)1 local funds
Dillon Reservoir (COLORADO RIVER BASIN)						
Soda Creek	Summit	Urban Runoff	Summit County	FY 90	FY 91	319, 201(g)1, local funds
Frisco Alleyway	Summit	Urban Runoff	Town of Frisco	FY 90	FY 90-91	319, 201(g)1, local funds
Straight Creek (COLORADO RIVER BASIN)	Summit	Urban Runoff Construct-ion Runoff	Summit County, Town of Silverthorne U.S.F.S. Colorado Dept. of Highways	FY 91	FY 92-94	319, 201(g)1
Seven Castles Creek (COLORADO RIVER BASIN)	Eagle	Construct-ion Runoff	Eagle County	FY 93	FY 94	319, 201(g)1, local funds
Lake San Cristobal (COLORADO RIVER BASIN)	Hinsdale	Construct-ion Runoff	Hinsdale County BLM, Department of Highways	FY 92	FY 93	319, 201(g)1, local funds

The Best Management Practices (BMP's) suggested in this management program fall into two categories. First are erosion control BMP's which are intended to provide improved water quality from construction areas. Second, longer term or urban BMP's which are intended to reduce elements such as phosphorus and nitrate which stimulate aquatic weeds and algae. This second category of BMP's are cautionly recommended to supplement existing urban flood control/detention practices. It is the intent of these recommended practices to improve existing detention design from a water quality enhancement perspective.

In addition to the recommended BMP's, a model ordinance for erosion control is included in the appendix to this chapter. This model ordinance is intended to provide guidance to communities which may want to adopt such an ordinance, or update their existing ordinance. The model ordinance was developed by the Denver Regional Council of Governments in concert with many local municipalities in the Denver region.

As demonstration projects prove the merit, or conversely prove the flaws of the various recommended BMP's, the recommended BMP list will require changes. Additionally, emerging technologies may require inclusion in this management program. For these reasons it is recommended that this management program and the BMP's listed in this program be reviewed from time to time. The impact of the recommended BMP's to groundwater is an item which requires research in consideration.

The urban or long term practices recommended in this management program are generally untested in Colorado. A concern about the impact of these practices, particularly the structural practices, to groundwater has been noted by many agencies. It is therefore imperative that any demonstration of these practices take into consideration design features and monitoring programs, to determine groundwater impacts of the recommended practices. This information, as it is generated, may then be used to update the structural practices as necessary.

Implementation of BMP's to correct nonpoint source water quality problems, where such BMP's are identified solely as part of the state Section 319 program, is voluntary in Colorado. Thus, in the absence of independent statutory or regulatory authority, reference in other state and federal enactments to Colorado's Section 319 program, including BMP's developed thereunder, shall not establish an enforceable requirement that BMP's be implemented other than voluntarily.

BMP's require careful planning, design, and construction as well as a long term financial commitment to operation, maintenance and replacement. A planning process which insures selection of the proper BMP's is also essential. Recognition of the financial commitment involved not only in construction, but also in the long term operation, maintenance and replacement is critical. Without a commitment to the long term operation and maintenance requirements of BMP's, the initial capital investment and resulting water quality improvements will be lost. After all, these are water quality treatment facilities and all facilities need to be properly operated and maintained to perform properly. Therefore, it is important that agencies or municipalities which are ongoing and have the ability to raise funds are involved in the long term maintenance for BMP's.

The following list outlines the BMP's which are summarized on the following pages. The design guidance for these BMP's is found in Appendix B, Best Management Practices for Urban and Construction Runoff:

I. Construction or short term practices

A. Erosion control

1. Revegetation
2. Sediment barriers
3. Velocity control
4. Slope stabilization

B. Erosion control - Road and Highway Construction

II. Urban or long term practices

A. Structural

1. Surface infiltration facilities
2. Percolation/infiltration trenches
3. Retention/wet ponds
4. Extended detention basins
5. Wetlands

B. Nonstructural

1. Vegetative practices

2. Education programs

Definition:

The reestablishment of vegetative cover on lands cleared for construction activity.

Purpose:

To prevent the movement of disturbed soils to waterways.

Application:

To areas where construction activity has been completed and surface cover is required to prevent erosion previous to natural cover reestablishing a natural level of protection.

Specification Guidance

All of the references listed below contain specification guidance and information for the following:

Seeding

Mulching

Timing of Construction Activity

Fertilization

Slope Stabilization

References:

Colorado Department of Highways, "Erosion Control Manual", 1978.
Arapahoe County, "Erosion Control Standards", April, 1988.
Summit Water Quality Committee, "Guide to Water Quality Protection and Erosion".
City of Aurora, "Preliminary Surface Drainage Water Quality Criteria", June, 1987.
Colorado Stormwater Task Force, "BMP Practice Assessment for the Development of Colorado's Stormwater Management Program" - 1990.

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Description:

Slope stabilization as defined in this section refers to non-vegetative practices utilized to increase the stability of a slope. By the use of these practices soil is typically held in place thus limiting erosion of the disturbed slope.

Application:

Slope stabilization practices are often utilized in conjunction with revegetation practices. In high altitude areas where growing seasons are very short and soil erosion potential is high, slope stabilization may be used to limit erosion until revegetation efforts succeed. However, many of the BMP's described in this section may be applied independently of revegetation for the purpose of limiting the amount of erosion that will occur on the slope.

Specification Guides

All of the references listed below contain specification guidance and information for the following:

Netting

Surface Roughing

Mulching

Retaining Walls

Riprapping

Maintenance:

Inspection

Repair

References:

Colorado Department of Highways, "Erosion Control Manual", 1978.
Arapahoe County, Erosion Control Standards", April, 1988.
Summit Water Quality Committee, "Guide to Water Quality Protection and Erosion".
City of Aurora, Preliminary Surface Drainage Water Quality Criteria", June, 1987.
Colorado Stormwater Task Force, "BMP Practice Assessment for the Development of Colorado's Stormwater Management Program" - 1990.

Description:

Velocity control includes a variety of practices which are utilized to either convey runoff at non-erosive velocities or to protect soils from runoff that is erosive because of its velocity or potential energy.

Application:

Velocity control is a component of many erosion control practices. Various forms of velocity control are typically applied whenever it is necessary to convey runoff down unprotected slopes. These practices may also be utilized in drainage channels to slow flow velocities.

Specification Guide

All of the references listed below contain specification guidance and information for the following:

Slope Drains

Spreaders

Slope Criteria

Energy Dissipaters

Check Dams

Drop Structures

Diversion Berms

Maintenance:

Inspection

Sediment Removal

Repair

References:

Colorado Department of Highways, "Erosion Control Manual", 1978.
Arapahoe County, Erosion Control Standards", April, 1988.
Summit Water Quality Committee, "Guide to Water Quality Protection and Erosion".
City of Aurora, Preliminary Surface Drainage Water Quality Criteria", June, 1987.
Colorado Stormwater Task Force, "BMP Practice Assessment for the Development of Colorado's Stormwater Management Program" - 1990.

Description:

Sediment barriers are erosion control practices that slow runoff to trap sediment or prevent it from leaving a site. These practices typically function by reducing the velocity of runoff to allow deposition of sediment. Straining or filtration mechanisms may also contribute to sediment removal for some practices.

Application:

Sediment barriers are typically used below disturbed area such as at the base of exposed slopes. These practices are particularly useful to prevent or reduce sediment transport onto streets or off of a construction site. Sediment barriers can be used as a last line of defense to prevent or reduce the amounts of sediment entering drainage systems at drop inlets, curb inlets or culverts.

Specification Guides

All of the references listed below contain specification guidance and information for the following:

Straw Bales

Filter Fence

Inlet Protection

Siltation Berms

Siltation Traps

Maintenance:

Replacement/Repair

Sediment Removal

Inspection

References:

Colorado Department of Highways, "Erosion Control Manual", 1978.
Arapahoe County, Erosion Control Standards", April, 1988.
Summit Water Quality Committee, "Guide to Water Quality Protection and Erosion".
City of Aurora, Preliminary Surface Drainage Water Quality Criteria", June, 1987.
Colorado Stormwater Task Force, "BMP Practice Assessment for the Development of Colorado's Stormwater Management Program" - 1990.

Description:

Construction of permanent roads or highways for public or private use. The practices described herein cover the full period of construction.

Purpose:

To prevent erosion and resultant water quality problems during and after road or highway construction.

Application:

To all permanent roads planned for construction, other than road construction described in the agriculture/silviculture management program.

Specification Guides

All of the specification guides listed below are found in the Colorado Department of Highways Erosion Control Manual.

Intercepting Ditch or Barrier

Temporary Diversions

Flexible Pipe

Plastic Filter Cloth

Erosion Bales

Check Dams

Silt Fence

Sandbags

Temporary Berms

Slope Drains

Sediment Trap

Chemical Treatment

Pumping

Slope Treatment

Wood Flumes

References:

Erosion Control Manual, Colorado Department of Highways - 1978
Colorado Stormwater Task Force, "BMP Practice Assessment for the Development of Colorado's Stormwater Management Program" - 1990.

Description:

Retention ponds are a structural means of providing both stormwater flow management and pollutant removal. A permanent pool of water is retained in wet pond and is displaced by the first flush of storm runoff, to be stored until the next storm event. Pollutant removal within a wet pond is provided by biological uptake and by sedimentation. In general, a retention pond with a permanent pool provides better nutrient removal than a dry detention basin.

Application:

Residential or commercial developments, particularly at the time when the site is being developed or constructed. In some cases it may be possible to retrofit existing flood control detention facilities to provide enhancement of water quality as well. Wet ponds require sufficient tributary drainage area to insure that the permanent pool will be maintained and replenished with adequate base flows.

Specification Guides:

The specification guides listed below have been prepared by the Urban and Construction Subcommittee of the Colorado Nonpoint Source Task Force. The guides were prepared based upon information found in the references listed below:

Permanent pool storage volume -

impervious area of contributing watershed

size of storm

nutrient removal requirements

Pond shape

Pond depth

Aquatic vegetation

Side slopes

Inlet/outlet configuration

Soil type/infiltration rate

Land availability

Maintenance Requirements:

Sediment removal

Structural repairs

Debris removal

Mowing

Inspections

Nuisance control

References:

Douglas County, "Storm Drainage Design and Technical Criteria Manual," 1986.
Schueler, Thomas, Metropolitan Washington Council of Governments, "Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMP's," July, 1987.
Urbonas, B. and Roesner, L.A. editors, "Urban Runoff Quality - Impact and Quality Enhancement Technology," American Society of Civil Engineers, June 1986.
Colorado Stormwater Task Force, "BMP Practice Assessment for the Development of Colorado's Stormwater Management Program" - 1990.

EXTENDED DETENTION BASINS

Definition:

Detention basins are primarily used to reduce peak stormwater flows by the holding water for a relatively short period of time and ultimately discharging it to surface waters. Extended detention (24 hours or longer) provides good removal of particulate pollutants and may slightly reduce levels of soluble phosphorous and nitrogen. Settling is the primary pollutant removal mechanism. Detention may be combined with other BMP's, for additional treatment.

Application:

Residential or commercial developments, ranging from small (less than 10 acres) to large size. Detention basins for water quality enhancement are best applied when a site is being developed or constructed. In some cases, existing flood control basins may be retrofitted to provide water quality control as well. These controls are most effective in areas of medium to course textured soils.

Specification Guides

The specification guides listed below have been prepared by the Urban and Construction Subcommittee of the Colorado Nonpoint Source Task Force. The guides were prepared based upon information found in the references listed below:

Detention time

Quantity detained

Pond shape

Side slopes

Pilot channels

Inlet/outlet configuration

Soil type/infiltration rate

Land availability

Maintenance Requirements:

Sediment removal

Structural repairs

Debris removal

Mowing

Inspections

Nuisance Control

References:

Douglas County, "Storm Drainage Design and Technical Criteria Manual," 1986.
Schueler, Thomas, Metropolitan Washington Council of Governments, "Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMP's," July, 1987.
Urbonas, B. and Roesner, L.A. editors, "Urban Runoff Quality - Impact and Quality Enhancement Technology," American Society of Civil Engineers, June 1986.
Colorado Stormwater Task Force, "BMP Practice Assessment for the Development of Colorado's Stormwater Management Program" - 1990.

VEGETATIVE PRACTICES

Description:

Various forms of vegetation may be used to enhance pollutant removal from stormwater runoff. Vegetative practices are particularly suitable for use with other BMP's to improve overall performance. In general, vegetative BMP's can help to remove particulates, but are not very effective in removing soluble nutrients. Vegetative practices include: grassed swales, buffers strips, and basin landscaping.

Application:

New and existing residential or commercial developments. Should be included as part of site plans, wherever possible. Not intended to stand alone as a water quality control, but should be used to enhance other best management practices. Particularly effective in conjunction with infiltration facilities.

Specification Guides

The specification guides listed below have been prepared by the Urban and Construction Subcommittee of the Colorado Nonpoint Source Task Force. The guides were prepared based upon information found in the references listed below:

Plant types

Slope

Peak stormwater discharges

Soils

Maintenance Requirements:

Mowing

Watering

Weeding

References:

Schueler, Thomas, Metropolitan Washington Council of Governments, "Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMP's," July, 1987.
Urbonas, B. and Roesner, L.A. editors, "Urban Runoff Quality - Impact and Quality Enhancement Technology," American Society of Civil Engineers, June 1986.
Colorado Stormwater Task Force, "BMP Practice Assessment for the Development of Colorado's Stormwater Management Program" - 1990.

Description:

Infiltration basins are effective in removing both soluble and very fine particulate pollutants borne in urban runoff. Pollutants larger than very fine grain should be removed before they enter a basin. Depending on the degree of storage/exfiltration achieved in the basin, groundwater recharge, low flow augmentation, and localized streambank erosion control can be achieved.

Application:

Basins are a feasible option where soils are very permeable and the water table and bedrock are situated well below the soil surface. Although construction costs and maintenance requirements for basins are similar to those for conventional detention basin, land costs will generally be much greater. Infiltration basins need to be inspected regularly to check for standing water. Experience to date indicates that infiltration basins have one of the higher failure rates of any BMP. Once failure occurs, these basins can be very difficult to restore to a functioning state.

Advantages of infiltration basins are that they have the potential to preserve the natural water balance of the site and can serve medium size developments. Disadvantages of infiltration basins include a fairly high rate of failure due to inappropriate siting, unsuitable soils, the need for frequent maintenance, possible nuisances (e.g., odors, mosquitoes, soggy ground), and some practical design problems.

Specification Guides

The specification guides listed below have been prepared by the Urban and Construction Subcommittee of the Colorado Nonpoint Source Task Force. The guides were prepared based upon information found in the references listed below:

Surface area of basin floor

Tilling

Incoming Water velocities

Basin slopes

Establishing vegetation

Maximum/minimum draining time

Sediment forebays

Maintenance Requirements:

Inspection

Mowing

Debris and litter removal

Erosion control

Tilling

Structural replacement/repairs

Restoration of infiltration capacity

Sediment removal

References:

Urbonas, B. and Roesner, L.A., "Urban Runoff Quality - Impact and Quality Enhancement Technology" American Society of Civil Engineers, June 1986.
Camp Dresser & McKee Inc., An Assessment of Stormwater Management Programs, the Florida Department of Environmental Regulations, December, 1985.
Schueler, Thomas, Metropolitan Washington Council of Governments, "Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMP's". July, 1987.
Environmental Protection Agency; The Lake and Reservoir Restoration Guidance Manual; EPA: 440/5-88-002; February, 1988.
Environmental Protection Agency; Wetland Identification and Delineation Manual, Volume I, Volume II; April 1988.
Colorado Stormwater Task Force, "BMP Practice Assessment for the Development of Colorado's Stormwater Management Program" - 1990.

Description:

Infiltration trenches are an adaptable BMP that effectively remove both soluble and particulate pollutants. As with other infiltration systems, trenches are not intended to trap medium sized coarse sediments. Grass buffers (for surface trenches) or special inlets (for underground trenches) must be installed to capture sediment before runoff enters the trench. Depending on the degree of storage/exfiltration achieved, trenches can provide groundwater recharge, and low flow augmentation. Individual trenches are primarily an on-site control and are seldom practical or economical on sites larger than 5 or 10 acres. These structure have experienced failures, but at a lesser rate than infiltration basins.

Application:

Trenches are only feasible when soils are permeable and the high seasonal watertable and bedrock are situated well below the bottom of the trench. Aside from regular inspections and more rigorous sediment and erosion control in the tributary watershed, trenches have limited routine maintenance requirements. However, trenches will prematurely clog if sediment is not kept out before, during and after construction of a site. When a trench does become severely clogged, partial or complete replacement of the structure may be required. Failure of these systems may cause the need for selection of a new site since the failed site may not provide adequate soils.

Advantages of infiltration trenches are that they can at times preserve the natural groundwater recharge capabilities of the site, are relatively easy to fit into the margins, perimeters and other unutilized areas of a development site, and can be used to provide pollutant removal on small sites or infill developments.

The disadvantages associated with infiltration trenches include practical difficulties in keeping sediment out of the structure during site construction (particularly if development occurs in phases), the need for careful construction of the trench and regular maintenance thereafter, the possible risk of groundwater contamination, and difficulty to restore to an operational state when failure eventually occurs.

Specification Guides

The specification guides listed below have been prepared by the Urban and Construction Subcommittee of the Colorado Nonpoint Source Task Force. The guides were prepared based upon information found in the references listed below:

Surface are of the trench bottom

Soil type

Maximum/minimum draining time

Maintenance Requirements:

Inspection

Buffer maintenance

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References:

Urbonas, B. and Roesner, L.A., "Urban Runoff Quality - Impact and Quality Enhancement Technology" American Society of Civil Engineers, June 1986.
Camp Dresser & McKee Inc., An Assessment of Stormwater Management Programs, the Florida Department of Environmental Regulations, December, 1985.
Schueler, Thomas, Metropolitan Washington Council of Governments, "Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMP's". July, 1987.
Environmental Protection Agency; The Lake and Reservoir Restoration Guidance Manual; EPA: 440/5-88-002; February, 1988.
Environmental Protection Agency; Wetland Identification and Delineation Manual, Volume I, Volume II; April 1988.
Colorado Stormwater Task Force, "BMP Practice Assessment for the Development of Colorado's Stormwater Management Program" - 1990.

Definition:

These systems combine designed ponds for settling, man made or natural wetlands for treatment, and include a means of controlling flow in the system. Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal conditions do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

Application:

This practice is applicable to any land use where a wetland storm water basin is appropriate.

Specification Guides

The specification guides listed below have been prepared by the Urban and Construction Subcommittee of the Colorado Nonpoint Source Task Force. The guides were prepared based upon information found in the references listed below:

Site selection

Extended detention time

Adequate water depth

Spreader berms/tricide drains

Outlet structure

Grading or diking the basin before planting

Fill material

Suspended sediment load

Wind speed

Appropriateness of wetland plant species

Number of species to plant

References:

Urbonas, B. and Roesner, L.A., "Urban Runoff Quality - Impact and Quality Enhancement Technology" American Society of Civil Engineers, June 1986.

Camp Dresser & McKee Inc., An Assessment of Stormwater Management Programs, the Florida Department of Environmental Regulations, December, 1985.

Schoeler, Thomas, Metropolitan Washington Council of Governments, "Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMP's". July, 1987.

Environmental Protection Agency; The Lake and Reservoir Restoration Guidance Manual; EPA: 440/5-88-002; February, 1988.

Environmental Protection Agency; Wetland Identification and Delineation Manual, Volume I, Volume II; April 1988.

Colorado Stormwater Task Force, "BMP Practice Assessment for the Development of Colorado's Stormwater Management Program" - 1990.

Chapter VI

Management Program for Nonpoint Source Mining Impacts

Introduction

This management program is prepared, by the mining subcommittee of the Colorado Nonpoint Source Task Force, to fulfill the requirements of Section 319 of the Federal Clean Water Act. The intent of the program is to identify priorities and means for control of abandoned and inactive nonpoint source water quality mining impacts. This management program describes not only specific priority watersheds based upon beneficial uses restoration, but also more general educational and research needs. The management programs proposed herein are voluntary in nature and are intended to advance the state of knowledge in regard to improving waters impacted by mining nonpoint sources in Colorado.

Impacts of Abandoned/Inactive Mines to Water Quality in Colorado

The Colorado Nonpoint Assessment Report, identifies nearly 1,300 miles of Colorado streams as being affected by abandoned/inactive mines. Heavy metals and acids are the pollutants of concern from these sites. Sources contributing these pollutants from these sites include draining mine adits, mill tailings, mine spoils, smelter sites, and impoundments. These sites are found in the "mineral belt" of the Colorado Rocky Mountains.

Heavy metals such as lead, zinc, copper, cadmium, mercury and silver can be chronically or acutely toxic to aquatic life. Many streams in Colorado are affected by these metals, due to the impacts from abandoned or inactive mining activities, and natural processes of mineralization. Since the Rocky Mountains of Colorado are heavily mineralized, it can be difficult to distinguish between man-induced and natural conditions. The "hardness" or natural buffering capabilities of streams is also important in considering the concentrations of heavy metals and their impacts upon aquatic life.

Acid formation is also a water quality problem associated with mining activities. Pyrite, a mineral commonly associated with valuable mineral deposits, oxidizes when exposed to water and air and leads to a process which yields acid concentrations. These acid concentrations can impact surface waters and depress instream pH levels which can create chronic or toxic conditions for aquatic life.

The process for identifying abandoned/inactive mining problem areas, and severity of those problems, involved an extensive review of water quality standards and ambient water quality data, special studies performed on selected stream segments, and less scientific "evaluative" (best professional judgement) information. While this approach has been helpful in identifying problem streams segments, additional study may be necessary to delineate the nature of problems at various sites. As a result, previous to proposing management practices and controls for abandoned/inactive sites, indepth studies analyzing water quality impacts from specific sites and sources, and the potential for improving instream aquatic life is necessary.

Priority Activities, Projects and Watersheds for Mining

The objective of the management program for mining is to achieve improvement in water quality and its beneficial uses such as recreation, water supply, and aquatic life. At this time management practices for control of mine drainage are still experimental in nature. Therefore, a variety of treatment techniques require demonstration status to determine performance, maintenance, and economic feasilities. The demonstration of techniques is intended to lead to criteria which will have wide applicability for use in Colorado watersheds impacted by inactive/abandoned mining.

The statewide program for mining consists of the mining subcommittee of the nonpoint source task force monitoring progress of demonstration projects, updating the assessment report, management program and BMP's, reviewing proposed projects, providing technology transfer as necessary and serving as point of public input and public education in regard to abandoned/inactive mining issues. The mining subcommittee is comprised of agencies and interest groups involved in mining. The following is a list of the members of the subcommittee and the roles and responsibilities the members have in regard to the nonpoint source mining program:

Colorado Mined Land Reclamation Division (MLRD) - serves as chair of the committee and provides technological and BMP expertise for the subcommittee. The MLRD also serves as primary project proponent during at least the early stages of the mining program.

Colorado Water Quality Control Division (WQCD) - serves to coordinate the activities of the subcommittee with the task force, WQCD and WQCC. Update of the Assessment Report and Management Program fall to the WQCD as lead agency for the state nonpoint source program. Regulatory water quality programs which impact the mining subcommittee such as stream standards, classifications, control regulations, discharge permits, and approval of passive treatment of mine drainage (PTMD) are promulgated by the WQCC and administered by the WQCD.

Colorado Division of Wildlife (DOW) - serves as expert to the subcommittee in regard to aquatic resource issues. Included in these responsibilities are expertise in aquatic biology and habitat. The DOW may also serve as a project proponent in some cases.

Colorado Mining Association(CMA) - serves to oversee the nonpoint source mining program from an industry perspective. The CMA participates through site identification, assisting in finding cooperator for projects, identification of regulatory roadblocks which may prevent nonpoint solutions, and technical review of program and project BMP's.

Environmental Protection Agency(EPA) - serves as an advisor to the subcommittee. EPA appraises the subcommittee of Federal policy in regard to the nonpoint source program, and also reviews project proposals and provides information from other states nonpoint source programs which may assist Colorado.

Park County Environmental Council - serves on the subcommittee as interested party for review of nonpoint mining projects in Colorado.

Trout Unlimited - serves on the subcommittee as interested party for review of nonpoint mining projects in Colorado.

Bureau of Mines - serves on the subcommittee as interested party for review of nonpoint mining projects in Colorado.

Bureau of Reclamation - serves on the subcommittee as interested party for review of nonpoint mining projects in Colorado.

Colorado Environmental Coalition (CEC) - serves as a review agency for actions in regard to all nonpoint source mining issues in Colorado.

These members serve as a core group for the mining subcommittee. Any other agencies, interest groups or individuals are invited to participate in the subcommittee.

Statewide program milestones for the mining subcommittee include:

1) To initiate projects for demonstration of BMP's on Peru Creek and Gamble Gulch during 1989. MLRD and WQCD will be lead agencies for these actions;

2) To initiate, as monies are available, at least two additional BMP demonstrations in each year between 1990 and 1994. The subcommittee shall review and recommend such projects to the Task Force, WQCD, and WQCC;

3) To have demonstrated a variety of BMP's for abandoned mining purposes by 1994. The subcommittee shall review projects to ensure that demonstrations achieve such a variety and are intended to improve water quality.

4) To conduct additional field studies to support the demonstration of additional demonstration projects. The DOW and WQCD shall serve as lead agencies on these field studies;

5) To review and evaluate the BMP's proposed for mining by October 1994. Such evaluation will include any changes to control technologies which have proved necessary through the above mentioned demonstrations.

6) To initiate studies of the Upper Animas River and its tributaries by 1991, and propose implementation projects as appropriate by 1992.

Many miles of streams identified as impacted by abandoned/inactive mining activities in the Colorado Nonpoint Assessment Report, are currently involved in cleanup action authorized under CERCLA (Comprehensive Environmental Response Compensation and Liability Act). These sites are not listed in this management program since clean up is being pursued by legal authorities outside of Section 319 of the Clean Water Act. Nonetheless, this management program encourages the cleanup of these sites. The impact from these areas are of a severe magnitude and will do much to alleviate many of the miles of streams impacted by mining.

The list found on the following page represents demonstration projects which this management program supports for implementation or further study in the coming four Federal fiscal years. The intent of these projects is to further advance the state of knowledge of not only BMP's for control of mining nonpoint sources, but also the extent of pollution from many of these listed sources and the development of plans to correct these problems.

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Implementation of the demonstration projects found in the list will be dependent upon the availability of Abandoned Mined Land and 319 funds for construction of improvements. These projects will also require the completion of Project Implementation Plans. These plans will document the water quality impacts at the various sites, and also recommend specific BMP's for correction of the identified problems.

The list will be updated annually to reflect the status of implementation and ongoing project planning. The order of projects on this list does not necessarily reflect an order of priority for water quality improvements. All projects may substantially improve water quality and beneficial uses.

This list may be amended by the Nonpoint Source Task Force through the recommendations of the mining subcommittee. Such an amendment may occur previous to an official update of the management program by the Water Quality Control Commission. Such amendment shall be noted by the Nonpoint Source Task Force included in the next update of the management program. Any party disagreeing with the determination of the Nonpoint Source Task Force to amend the list, may appeal the determination to the Water Quality Control Commission.

The following is a list of funding anacronyms found on the following pages. Chapter III provides information on each of these funding programs:

319 -	Section 319 of the Clean Water Act funds
201(g) -	Wastewater Construction Grant Funds of the Clean Water Act converted to nonpoint purposes
AML -	Abandoned Mine Land funds administered by the Mined Land Reclamation Division
USFS -	U.S. Forest Service land improvement and Federal Facility funds.

Priority Watersheds and Projects for

Mining Nonpoint Source

Management Program FY 90 - 94

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Project/Watershed	County	Category	Responsible Agency	PIP Completion	Implementation	Source of Funds
Gamble Creek (PLATTE RIVER BASIN)	Gilpin	Mining	MLRD	FY 89	FY 90	AML, 319, 201(g)
S. Mosquito Creek (PLATTE RIVER BASIN)	Park	Mining	MLRD, WQCD	FY 90	FY 90-91	AML, 319, 201(g) local funds
Mosquito Creek (PLATTE RIVER BASIN)	Park	Mining	MLRD, WQCD	FY 91	FY 92	AML, 319, 201(g) local funds
N. Fork So. Platte River (PLATTE RIVER BASIN)	Park	Mining	MLRD, WQCD	FY 92	FY 92-94	AML, 319, 201(g) local funds
James/Little James Cr (PLATTE RIVER BASIN)	Boulder	Mining	MLRD, WQCD	FY 91	FY 92-93	AML, 319, 201(g) local funds
Chalk Creek (ARKANSAS RIVER BASIN)	Chaffee	Mining	MLRD, DOW, USFS	FY 90	FY 90-91	AML, 319, DOW, 201(g)
Slate River/Peanut Mill (COLORADO RIVER BASIN)	Gunnison	Mining	MLRD, WQCD	FY 93	FY 94	AML, 319, 201(g)
Howards Fork of the San Miguel River (COLORADO RIVER BASIN)	San Miguel	Mining	MLRD, WQCD	FY 93	FY 94	AML, 319, 201(g)
Peru Creek (COLORADO RIVER BASIN)	Summit	Mining	MLRD, WQCD, USFS	FY 88	FY 90	AML, USFS 319, 201(g)

Priority Watersheds and Projects for

Mining Nonpoint Source

Management Program FY 90 - 94

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Project/Watershed	County	Category	Responsible Agency	PIP Completion	Implementation	Source of Funds
Upper Dolores River (COLORADO RIVER BASIN)	Dolores	Mining	MLRD, WQCD, BOR	FY 92	FY 93	AML, 319, 201(g)
Upper Animas & Tributaries (COLORADO RIVER BASIN)	San Juan	Mining	MLRD, WQCD, BOR	FY 92	FY 93-94	AML, 319, 201(g)
French Gulch (COLORADO RIVER BASIN)	Summit	Mining	MLRD, WQCD	FY 90	FY 91	AML, 319, 201(g)
E. Fork La Plata River (COLORADO RIVER BASIN)	La Plata	Mining	MLRD, WQCD,USFS	FY 92	FY 92	AML, 319, 201(g)
Upper Snake River (COLORADO RIVER BASIN)	Summitt	Mining	MLRD, WQCD	FY 93	FY 94	AML, 319, 201(g) local funds
W. Fork Willow Creek (RIO GRANDE RIVER BASIN)	Mineral	Mining	MLRD	FY 91	FY 92	AML, 319, 201(g)
E. Fork Willow Creek (RIO GRANDE RIVER BASIN)	Mineral	Mining	MLRD	FY 90	FY 91	AML, 319, 201(g)
Kerber Creek (RIO GRANDE RIVER BASIN)	Saguache	Mining	USFS	FY 93	FY 94	AML, 319, 201(g) local funds

The goal of management practices for mining nonpoint source pollution is to restore and maintain beneficial uses and to achieve water quality improvements in a cost effective manner. Very few of the management practices described herein could be used in isolation to completely address a nonpoint source solution problem. Management practices must be used in combination as part of a overall strategy to achieve improvements of water quality throughout a watershed. This overall strategy should include promulgation of appropriate water quality standards, enforcement of discharge permits, cooperative arrangements between local, state and federal agencies with institutional capability to provide water quality improvements, and perhaps most importantly, establishment of local water quality management entities to provide local stewardship of the resource and to insure improvements are properly maintained.

The management practices described in this manual are necessarily general and intended to describe the arrays of common sense solutions to commonly encountered mining nonpoint source problems. It is not a goal of this manual to serve as the basis for a set of regulatory practices imposed indiscriminately for nonpoint sources across the state. Nonpoint source control for inactive and abandoned mining sites should be employed only when studies show such sources cause material degradation of water quality.

Implementation of BMP's to correct nonpoint source water quality problems, where such BMP's are identified solely as part of the state Section 319 program, is voluntary in Colorado. Thus, in the absence of independent statutory or regulatory authority, reference in other state and federal enactments to Colorado's Section 319 program, including BMP's developed hereunder, shall not establish an enforceable requirement that BMP's be implemented other than voluntarily.

The general format used to present each of the management practices is as follows:

Heading	Context
PRACTICE	Includes a brief title of the management practice. The numbering of the activities does not have any intended significance.
PURPOSE	Describes the desired results of the practice as it relates to environmental protection.
PLANNING AND DESIGN CONSIDERATION	Further defines the practice and expresses how the practice is applied. Describes criteria, designs parameters or standards to be considered prior to implementation.
CONSTRUCTION CONSIDERATION	Describes how the practice is applied, who is responsible for its application and specifically what is involved inconstructing the management practice.

MAINTENANCE AND MONITORING	Discusses the types of maintenance and monitoring issues which must be addressed in conjunction with a particular management practice.
EFFECTIVENESS	Describes the probable likelihood of success at achieving water quality protection, restoration of beneficial uses or improvements in uses.
REFERENCES	Identifies the source of detailed information about the management practice or other references where the practice is further documented.

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The management practices are grouped in three categories. The first category addresses preventative measures and hydrologic controls which are aimed at preventing the contamination of water in mining areas. Preventative measures to control drainage and seepage from mine waste include; diversions to redirect run-on water away from mine water recharge areas or waste piles, infiltration barriers to prevent water from entering mine workings or waste piles, runoff controls such as terracing and contouring of mine waste, and removal operations for railings and waste piles near water courses and atop alluvial floodplains. Bulk head seals and other types of mine seals are additional measures which may reduce or eliminate mine drainage impacts and provide surge control and flow equalization in conjunction with treatment.

The second major category of management practices may be described as passive mine drainage and mine waste treatment techniques. The term passive mine drainage treatment (PMDT) refers to mine drainage impact abatement activities which accomplish the goals of metal removal, removal of dissolved solids and neutralization of mineral acidity using low cost material and construction techniques which do not require frequent maintenance operations. PMDT systems must be designed on a site-by-site basis and adapted to local environmental conditions. Site-specific treatments are required to compensate for unique problems related to access, elevation, surface hydrology, specific pollutants, type of mining and legal restrictions such as water rights and land use controls. A major goal of PMDT approaches is to minimize the need for ongoing operation and maintenance activities.

The third category of management practices is active treatment systems for mine waste and mine drainage. Active treatment systems include physical chemical treatment plants, activated biological treatment systems, electrostatic and electrochemical systems, osmotic membrane systems and combinations of such systems. While there are hybrid systems which are inexpensive to build and uncomplicated to operate, active treatment systems informally involve closed conduits and pumps, automated metering systems for chemical additives and strict operational and maintenance requirements. Accordingly, active systems require near constant operation and maintenance activities. It is unlikely that such systems will be employed under the nonpoint source program except in special circumstances.

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The management practices suggested in this management program represent the best knowledge of agencies and individuals at this time (January, 1989). The need to review these practices after demonstration of their ability to treat mine drainage is a necessity. Emerging technology and refinements of the existing methods require that an annual updating of these practices be accomplished by the Nonpoint Source Mining Subcommittee.

These BMP's listed on the following pages are described in detail in Appendix C of this document.

Measures Using Hydrologic Controls to Prevent Water Contamination

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Definition:

These measures prevent pollution of waters through controls which eliminate or minimize contact of water with mining areas.

Purpose:

1) To intercept and reroute uncontaminated water away from contaminated areas.

2) To prevent uncontaminated water from commgling with mine waste or mineralized areas.

3) To reduce the erosion of mine waste.

4) to remove or relocate mining waste to prevent contamination of water.

5) To stabilize stream channels and direct flows away from contaminated materials.

6) To prevent a release of mine water and restore geohydrologic conditions.

7) To prevent acidification of waters exposed to mine waste.

8) To stabilize mining waste areas to prevent release of materials to streams.

Condition Where Practice Applies:

In all abandoned or inactive mining areas where contamination of water may be prevented through hydrologic control.

Specification Guides:

Run-on Controls

Bulkhead Seals

Infiltration Barriers

Air Seals/Mine Atmosphere Control

Run-off Controls/Erosion Controls

Protection of Unstable Areas

Mine Waste Removal

Drainage Stabilization

References:

Management Practicers for Nonpoint Source Pollution Related to Mine Waste and Mine Drainage - Colorado Mine Land Reclamation Division

Passive Mine Drainage Treatment Techniques

Definition:

Mine drainage impact abatement activities which accomplish the goals of metal removal, removal of dissolved solids, and neutralization of mineral acidity using low cost material and construction techniques which do not require frequent maintenance operations.

Purpose:

1) To reduce the concentration of carbonic acid, and increase pH in waters.

2) To remove mineral acidity by increasing alkalinity in waters.

3) To allow chemically created compounds to settle out of waters.

4) To allenuate acidity and remove metals through plant uptake, filtration, absorption, and acrobic and anaerobic precipitation.

Condition Where Practice Applies:

In areas of abandoned or inactive mining where adequate soils and site conditions allow construction of such systems.

Specification Guides:

Aeration

pH Modulation/Neutralization

Biological Treatment

Wetlands

References:

Management Practices for Nonpoint Source Pollution Related to Mine Waste and Mine Drainage - Colorado Mined Land Reclamation Division

Active Treatment of Mine Drainage

Definition:

Active treatment systems include physical chemical, activated biological, electrostatic, elechemical, osmotic membrane and combinations of these types of systems. Active treatment systems normally involve closed conduits and pumps, automated metering systems for chemical additives, and strict operational and maintenance requirements.

Purpose:

1) To provide instantaneous neutralization, heavy metal precipitate concentration, and filtration of mine drainage.

2) To absorb heavy metals from solution through algal species.

3) To provide chemical coprecipitation for removal of heavy metals and neutralization of waters.

Specification Guides:

Continuous Concentrators

Algal Ponds

Coprecipitation/Filtration Process

High Density Sludge Process

References:

Management Practices for Nonpoint Source Pollution Related to Mine Waste and Mine Drainage - Colorado Mined Land Reclamation Division

Chapter VIII

Hydrologic Modification Program

The hydrologic modification subcommittee of the Nonpoint Source Task Force is currently working on a management program for control of this source in Colorado. As identified on pages 13 and 14 of this program, the subcommittee is comprised of a cross section of agencies and interest groups involved in water issues.

The subcommittee has the following milestones which will be used for structuring the efforts of the group:

By November 1990, propose as appropriate, draft best management practices for control hydrologic modification nonpoint source impacts.

By January 1991, submit a program for control of hydrologic modification nonpoint source impacts.