

APPENDIX F: PROTECTING GROUNDWATER QUALITY IN MONTANA

F.1 INTRODUCTION

Montana's population relies heavily on groundwater. Groundwater is the primary source of drinking water for rural domestic water supply as well as public water systems (Department of Environmental Quality, 2016). Groundwater is also used for irrigating crops and for stock water. In many locations, groundwater also sustains flows for streams throughout much of the year.

This appendix gives an overview of the current groundwater plans, programs, and activities in Montana that are designed to protect groundwater quality. This represents an important component to the state's nonpoint source program given the inherent connectivity between groundwater and surface water. Nonpoint sources of pollution that enter groundwater may ultimately reach surface waters via a groundwater pathway, although it is important to note that not all pollutants that enter groundwater will ultimately reach surface water due to biodegradation, adsorption and other subsurface processes. Therefore, groundwater pollution does not always result in surface water pollution, or in some cases the amount of pollution entering groundwater may be significantly diminished when the groundwater interacts with interconnected surface water.

F.2 GROUNDWATER PLANNING DOCUMENTS

There are numerous Montana groundwater quality planning documents, often associated with one or more groundwater quality protection programs. Two important statewide groundwater planning documents that overlap many of the state groundwater programs are discussed below.

F 2.1 Montana Groundwater Plan

The *Montana Ground Water Plan* (Department of Natural Resources and Conservation, 1999) was developed in response to concerns identified by citizens at public scoping meetings and as a result of a recommendation of the *1992 State Water Plan Section: Integrated Water Quality and Quantity Management*. This effort also addressed a U.S. Environmental Protection Agency (EPA) recommendation for states to develop a comprehensive groundwater protection program.

The Groundwater Plan is divided into three subsections: Protection, Education and Remediation. Each of these subsections presents a series of issues and recommended options, generally for state agency implementation, identified through the plan development process. Several state agencies, including DEQ, address many of the issues and recommendations laid out in the 1999 Groundwater Plan within their existing water quality programs. This appendix discusses several of these programs that have a groundwater quality focus.

F 2.2 2015 Montana State Water Plan

Montana's priorities and strategy for obtaining more complete, timely and accurate water-availability information to support policy and decision-making is detailed in the 2015 Montana State Water Plan (Department of Natural Resource and Conservation, 2015), also referred to as the State Water Plan. During the 18-month long State Water Plan process, the Montana Department of Natural Resources and Conservation (DNRC) worked with four regional Basin Advisory Councils (BACs) to develop basin specific recommendations to address the issues of most concern within the planning basins. The results of this

effort, along with supporting data, are contained in four individual basin planning reports. Inherently the focus of each plan is on groundwater supply, although each planning report also includes groundwater quality considerations in recognition of the importance of groundwater quality for beneficial use and the interaction between groundwater and surface water.

Each of the four basin plans includes the following and serves as a standalone document for guiding the development and management of the basin's water resources:

- Inventory consumptive and non-consumptive uses of water
- Estimate the amount of water needed to satisfy new future demands
- Analysis of the effects of frequent drought and new or increased depletions on future water supplies
- Possible sources of water to meet the needs of the state
- Legislation necessary to address water resource concerns

The State Water Plan is a separate document from the individual basin plans that provides an overview of the state's water resources and recommendations for managing those resources from a water supply perspective over the next twenty years. DNRC has initiated several data collection initiatives in response to State Water Plan recommendations that may have application to groundwater quality investigations, including consumptive use characterization using Landsat satellite imagery and enhanced stream-flow gaging.

F.3 GROUNDWATER QUALITY CLASSIFICATION AND STANDARDS

The state's programs for the protection and remediation of groundwater are driven by the need to protect and support current and future beneficial water uses. Montana identifies water supply as the primary beneficial use of groundwater. Groundwater use classifications, water quality standards and criteria are defined in the Administrative Rules of Montana, Title 17, Chapter 30, Subchapter 10 and are summarized in **Table F-1**. The groundwater standards are generally based on Safe Drinking Water Standards for public water supply and are found in department circular, DEQ-7, Montana Numeric Water Quality Standards (April 2017).

Table F-1. Montana's Groundwater Classifications and Water Quality Standards*.

Classification	Description
Class I	Groundwater has a specific conductance less than 1,000 μ Siemens/cm at 25°C and is suitable for public and private water supplies, food processing, irrigation, drinking water for livestock and wildlife, and commercial and industrial purposes, with little or no treatment required.
Class II	Groundwater has a specific conductance range of 1,000 to 2,500 μ Siemens/cm at 25°C and may be used for public and private water supplies where better quality water is not available. The primary use of Class II groundwater is for irrigation, stock water, and industrial purposes.
Class III	Groundwater has a specific conductance range of 2,500 to 15,000 μ Siemens/cm at 25°C. Its primary use is for stock water and industrial purposes. It is also marginally suitable for some salt tolerant crops.
Class IV	Groundwater has a specific conductance greater than 15,000 μ Siemens/cm at 25°C. Class IV groundwater is used primarily for industrial purposes.

*Montana classifies its groundwater according to the actual quality and use as of October 1982.

Montana's nondegradation standards can also result in groundwater quality protection from new sources of nutrient loading to groundwater, such as subdivision septic systems, that can enter surface water.

F.4 GROUNDWATER QUALITY CHARACTERIZATION PROGRAMS

The Montana Bureau of Mines and Geology (MBMG) is a lead agency for the groundwater characterization programs, discussed below, that can address both groundwater quality and quantity.

F.4.1 Montana Groundwater Assessment Program

The 1991 Montana Legislature established the Groundwater Assessment Program at the MBMG to improve the understanding of Montana's groundwater resources by collecting, interpreting, and disseminating essential groundwater information.

There are three Program components:

- Groundwater Monitoring -- Produce and maintain long-term water-level and water-quality records from a statewide network of wells
- Groundwater Characterization -- Systematically assess and document the hydrogeology and quality of the state's major aquifers. Data have been used to compile maps and reports that describe specific aspects of Montana's aquifers, groundwater-flow systems, and groundwater quality
- Groundwater Information Center database -- Make groundwater information widely available. The Ground Water Information Center (GWIC) is Montana's official repository for groundwater information. Well logs, water-quality and water-level data, hydrographs, maps, and reports are stored in the database and can be accessed online

An interagency steering committee selects study areas, coordinates groundwater research among state, federal, and local government units, and oversees Assessment Program progress.

F.4.2 Montana Groundwater investigation Program

The 2009 Montana Legislature established the Ground Water Investigation Program (GWIP) at the MBMG. The Ground Water Investigation Program, in support of science based water management in Montana, answers site-specific water resource questions that are prioritized and assigned by the Ground Water Steering Committee. To meet this goal, GWIP conducts research on specific issues in areas that are ranked as the most urgent in the State, and provides final investigative reports and other products such as computer models.

Example water research questions addressed by GWIP include aquifer and stream response to changing land use from irrigated agriculture to residential development, and changes in water quality due to increasing subdivisions. GWIP has addressed or is currently addressing water resource issues in 17 areas throughout the State.

F.4.3 Ground Water Information Center

The Ground Water Information Center (GWIC) is Montana's official repository for groundwater information and is maintained by the MBMG. Well logs, water-quality and water-level data, hydrographs, maps, and reports are stored in the database and can be accessed online. New capabilities include a web mapping application that interactively delivers water-well and other information using a graphical user interface. As of 2016, the GWIC database contained information on 251,700 wells and

boreholes, scanned images for 230,210 well-log documents, results from 87,041 water-quality analyses for 18,876 sites, and 26.4 million water-level measurements.

F.5 GROUNDWATER QUALITY PROTECTION PROGRAMS

Below is information covering some of the primary programs for protecting groundwater quality.

F.5.1 Prevention of Agriculture Chemical Pollution

The Montana Department of Agriculture (MDA) Groundwater Protection Program has the responsibility of protecting groundwater and the environment from impairment or degradation due to the use or misuse of agricultural chemicals (pesticides and fertilizers) while allowing for their proper and correct use. The program includes education, monitoring and enforcement. Education involves training to agricultural chemical applicators, dealers and the public on groundwater protection, agricultural chemical use and the use of alternative agricultural methods. Monitoring involves permanent monitoring wells and wells in targeted locations for investigating current and new agricultural chemicals. The MDA is responsible for primary enforcement of the Montana Agriculture Chemical Ground Water Protection Act (MCA 80-15) and Montana Pesticide Act (MCA 80-8). MDA enforcement activities includes conducting statewide comprehensive inspections at agricultural chemical users, dealers, and manufacturers, collecting groundwater and soil samples, and investigating and monitoring incidents such as pesticide spills.

The MDA is also responsible for the General Management Plan. The GMP is an umbrella plan, the purpose of which is to provide guidance for the state to prevent groundwater impairment from agricultural chemicals (pesticides and fertilizers—including pesticide and fertilizer use that is not directly related to agriculture). When needed, MDA has authority to implement Specific Management Plans (SMPs) that are directed to a specific agricultural chemical and to a defined geographical area when the level of an agricultural chemical found in groundwater is at 50% or greater of the standard or interim numerical standard.

F.5.2 Ground Water Pollution Control Permits

A Montana Ground Water Pollution Control System (MGWPCS) permit from the DEQ is typically required to construct, modify, or operate a disposal system for discharge of sewage, industrial, or other wastes into groundwater that has a hydraulic capacity of 5,000 or more gallons per day. All point sources of wastewater discharge are required to obtain and comply with their discharge permits. The effluent limitations and other conditions contained in DEQ's discharge permits are based on meeting Montana's water quality standards. Each discharge permit issued is designed to protect the receiving water's quality at the end of an approved mixing zone.

F.5.3 Solid Waste Management

Solid wastes are also a concern for groundwater quality. Solid waste often contains hazardous substances, such as carcinogens, in addition to more common pollutants (e.g. sediment, nutrients, and metals). Land applied biosolids from wastewater in treatment plants and septic tanks, petroleum contaminated soils, and materials placed in licensed municipal landfills, and construction and demolition waste landfills are regulated by DEQ's Solid Waste Management Program. Licensed solid waste sites are subject to technical reviews, certification, and compliance monitoring. DEQ also provides technical assistance to solid waste professionals.

F.5.4 Subdivision Review

Under subdivision regulations, DEQ reviews divisions of land comprising less than 20 acres, as well as condominiums and recreational camping vehicle and mobile home parks, regardless of the size of the parcel where they are located. This review addresses sanitation facilities, including the water supply, sewage disposal, solid waste disposal, and storm drainage systems. Proper design and location of these facilities is necessary to protect the quality of water for public water supplies, domestic uses, and other beneficial uses, including uses related to agricultural, industry, recreation, and wildlife. The subdivision reviews involve application of the nutrient nondegradation standards identified in Section F 3.0.

F.5.5 Source Water Protection

Montana is required under provisions of the 1996 federal Safe Drinking Water Act to carry out a Source Water Assessment Program (SWAP). A SWAP provides technical assistance to Public Water Supplies (PWS). The EPA formally approved Montana's program in November 1999. Directing Montana's source water protection (SWP) is the responsibility of the SWP Section of DEQ.

Section 1453 of the Safe Drinking Water Act requires the state program to:

1. Identify the source(s) of water used by a PWS. This process delineates capture zones for wells or a stream buffer area for surface water sources called the source water protection area.
2. Identify and inventory potential contaminant sources.
3. Assess the susceptibility of the PWS to those identified potential contaminant sources.
4. Make the results of the delineation and assessment available to the public.

Implementation of SWP takes several forms in Montana, ranging from recognizing a PWS protection strategy to certification of a source water protection plan (SWPP). Source water protection efforts, such as taking action to reduce a susceptibility rating, emergency and contingency planning for contamination problems, are all voluntary for a PWS. DEQ provides technical assistance for a PWS that elects to develop a SWPP. These actions can lead to enhanced groundwater or surface water protection activities from nonpoint sources of pollution.

F.5.6 USDA - Natural Resources Conservation Service (NRCS)

The Natural Resources Conservation Service (NRCS) is the federal agency that works with private landowners to help them protect their natural resources.

NRCS, in partnership with local Conservation Districts, is involved with groundwater protection activities:

- They are a partner in carrying out technical assistance and educational efforts identified in State Pesticide Management Plans
- NRCS staff provide site information, evaluation, technical specifications and planning assistance for Best Management Practices (BMPs) that often protect both groundwater and surface waters.
- The Environmental Quality Incentive Program (EQIP) administered by NRCS can provide cost-share assistance for BMPS.
- NRCS has developed county based soil surveys that rank soil for groundwater contamination vulnerability assessments.

F.5.7 Local Water Quality Districts

Local Water Quality Districts (LWQD) are established to protect, preserve, and improve the quality of surface water and groundwater within the district. Currently there are four in Montana:

- Butte-Silver Bow County Water Quality Protection District
- Gallatin Local Water Quality District
- Lewis and Clark Water Quality Protection District
- Missoula Valley Water Quality District

F.6 GROUNDWATER QUALITY REMEDIATION PROGRAMS

Remediating contaminated groundwater involves several programs at the state and federal level.

F.6.1 DEQ Groundwater Remediation

The DEQ Waste Management and Remediation Division is responsible for overseeing and inspecting permitted facilities, overseeing investigation and cleanup activities at state and federal Superfund sites; reclaiming abandoned mine lands; implementing corrective actions at sites with leaking underground storage tanks or releases from landfills, hazardous waste operations, and other permitted facilities; and overseeing groundwater remediation at sites where agricultural and industrial chemicals have caused groundwater contamination. The purpose of these activities is to protect human health and the environment; to prevent exposure of potential human and ecological receptors to hazardous or deleterious substances that these site releases to air, soil, sediment, surface water, or groundwater; and to ensure compliance with applicable state and federal regulations.

The Groundwater Remediation Program regulates sites under the Montana Water Quality Act (WQA). The Petroleum Tank Cleanup Program regulates sites under the Montana Underground Storage Tank Act (MUSTA). The state superfund program regulates sites under the Montana Comprehensive Environmental Cleanup and Responsibility Act (CECRA). The Solid Waste Program regulates sites under the Montana Solid Waste Management Act, the Hazardous Waste Program regulates sites under the Montana Hazardous Waste Act, and the Asbestos Control Program regulates sites under the Montana Asbestos Control Act.

The Groundwater Remediation Program has overseen remediation at sites contaminated with petroleum, pesticides, metals, nutrients, and solvents. Sites range from small to large in scale. The program ranks sites as maximum, high, medium, or low priority sites, or as operation and maintenance sites. Historically, the Groundwater Remediation Program addresses an average of 80 sites at any given time. The Groundwater Remediation Program works cooperatively with the Department of Agriculture when pesticides affect groundwater.

F.6.2 Federal Superfund Program

EPA's Federal Superfund program is responsible for cleaning up some of the nation's most contaminated land and responding to environmental emergencies, oil spills and natural disasters. There are several superfund sites across Montana including historical mining areas around Butte, Deer Lodge, Libby, East Helena, Rimini, Superior, and Basin. Most superfund sites involve significant groundwater quality remediation as well as surface water restoration.

F.7 ADDITIONAL GROUNDWATER EDUCATION AND OUTREACH PROGRAMS

In addition to the education and outreach components of many of the above programs, there are also several other notable groundwater quality programs that include education and outreach. These programs include:

- **Montana Rural Water Systems:** This organization provides training and technical assistance to members running systems for: drinking water, wastewater, and solid waste.
- **Montana Salinity Control Association (MSCA):** MSCA provides groundwater investigation for saline soil and water reclamation and provides salinity control BMP education programs to agricultural producers, natural resources staff and other land-use management groups.
- **Montana State University Extension Water Quality Program:** The goal of this program is to protect or improve the quality of water resources in Montana, particularly in agriculturally managed watersheds. Areas of focus include coal bed methane (CBM), household water use, irrigation management, private well monitoring assistance, and formal education opportunities.
- **DEQ Training:** DEQ provides training to homeowners, local governments, realtors, septic system installers, and others on the operation and maintenance of septic systems and wells. DEQ also co-sponsors a week-long school held several times per year around the state for water and wastewater treatment plant operators and managers. Other sponsors include the Montana Environmental Training Center and the Montana University System Water Center at MSU.

F.8 EMERGING GROUNDWATER QUALITY MANAGEMENT CONCERNS

Groundwater is an important source for many drinking water supplies and sustains flow for streams throughout much of the year. Because contaminated groundwater is very difficult and expensive to clean up, and because contaminated groundwater can and often does negatively impact surface water, protecting groundwater quality is an important component of the nonpoint source program.

Emerging groundwater quality management concerns include:

1. Septic systems and other domestic on-site wastewater treatment systems are of particular concern in the rapidly developing areas of the state because of traditional pollutants such as nutrients, as well as emerging pollutants such as pharmaceuticals and personal care products, that can originate from these systems. Also there are limited programs in place to ensure proper maintenance and operation of private individual septic systems.
2. The increase in private, exempt well use can negatively impact surface water streamflows, particularly during late summer low flow conditions. This reduction in flow can negatively impact aquatic life due to reduced habitat and increased temperatures.

F.9 MONTANA'S 319 GROUNDWATER POLLUTION PREVENTION FUNDING STRATEGY

Given that TMDLs target surface water quality and that the majority of state water quality standards are enforceable for surface waters, 319 groundwater restoration projects must demonstrate the connection between ground and surface water quality within a proposed project area. Additionally, EPA 319 guidance requires that 319 project funding be directed to implementing watershed-based plans. Therefore, only groundwater projects that are addressing surface water concerns specifically linked to watershed restoration plan actions can be funded.

F.10 REFERENCES

Montana Department of Environmental Quality. 2016. Integrated 303(d)/305(b) Water Quality Report for Montana. <http://deq.mt.gov/Portals/112/Water/wqpb/cwaic/Reports/IRs/2016/Final2016IR.pdf>
DEQ, Water Division: Helena, MT

Montana Department of Natural Resources and Conservation. 1999. Montana Water Plan. Groundwater Section. http://dnrc.mt.gov/divisions/water/management/docs/state-water-plan/pre-2005-planning-documents/montana_groundwater_plan.pdf DNRC: Helena, MT

Montana Department of Natural Resources and Conservation. 2015. Montana's State Water Plan. <http://dnrc.mt.gov/divisions/water/management/state-water-plan>

DRAFT