

*Mountain Meadow Inn
Public Water Supply*

*Source Water Delineation and
Assessment Report (SWDAR)*

Montana Public Water Supply ID# MT0003468

September 2003

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INTRODUCTION

The Safe Drinking Water Act (SDWA) Amendments of 1996 require states to develop and implement Source Water Assessment Programs (SWAP) to analyze existing and potential threats to the quality of the public drinking water supplies throughout the state. The Montana SWAP was formally approved by the US Environmental Protection Agency (EPA) in November 1999. The Montana SWAP was developed from the former Wellhead Protection Program, but includes surface water sources and requires a more rigorous inventory of potential contaminant sources. For communities that have already developed wellhead protection plans, SWAP revises these plans to meet the expanded requirements. DEQ also works with other groups such as Montana Rural Water Systems, Inc., and Midwest Assistance Programs to implement the program.

SWAP addresses only public water systems (PWS) regulated according to the Federal Safe Drinking Water Act. A public water supply system is defined, according to Federal and Montana regulations, as a system that supplies water for human consumption. A public water supply system has at least 15 service connections or regularly provides water to at least 25 persons daily for a minimum of 60 days in a calendar year. There are three types of public water supply systems:

- Community water systems provide water on a year-round basis, and have a minimum of 15 service connections or regularly serve at least 25 residents. In addition to incorporated towns, community systems may serve smaller areas such as housing subdivisions or trailer courts.
- Non-transient non-community systems do not serve communities, but provide water regularly to a minimum of 25 of the same people for at least 6 months of a year. These systems serve public buildings such as schools and hospitals, where people are employed but do not reside.
- Transient non-community systems do not serve communities, and do not regularly serve a minimum of 25 of the same people for at least 6 months of the year. These systems are usually seasonal, and are located in areas such as campgrounds and parks. The Mountain Meadow Inn is classified as a transient non-community system.

Source water protection is a common sense approach to guarding public health by protecting drinking water supplies. In the past, water suppliers have used most of their resources to treat water from rivers, lakes, and underground sources before supplying it to the public as drinking water. Source water protection means preventing contamination and reducing the need for treatment of drinking water supplies. Source water protection also means taking positive steps to manage potential sources of contaminants and contingency planning for the future by determining alternate sources of drinking water. Protecting source water is an active step towards safe drinking water; a source water protection program (along with treatment, if necessary) is important for a community's drinking water supply. A community may decide to develop a source water protection program based on the results of a source water assessment, which includes the delineation of the area to be protected and an inventory of the potential contaminants within that area.

The Montana Source Water Protection Program is intended to be a practical and cost-effective approach to help public drinking water supplies protect their water source from contamination. The Montana Source Water Protection Program is responsible for completing delineation and assessment reports for all public water supplies in Montana. The Source Water Delineation and Assessment Report (SWDAR) compiles the appropriate data and other technical information about an area to allow communities to develop source water protection plans. Delineation is a process whereby areas that contribute water to aquifers or surface waters used for drinking water, called source water protection areas, are identified on a map. Geologic and hydrologic conditions are evaluated in order to delineate source water protection areas. Assessment involves identifying potential contaminant sources in delineated source water protection areas, and evaluating the potential for contamination of drinking water from these sources under "worst-case" conditions such as a flood, fire or human error. Although voluntary, source water protection plans are the ultimate focus of source water delineation and assessment. This delineation and assessment report is written to encourage and facilitate the area communities and public water supply operators develop source water protection plans that meets their specific needs.

Scope and Purpose

This report presents the source water delineation and assessments for the public water supply for the Mountain Meadow Inn located northeast of Helena, in Lewis and Clark County, Montana. This report is intended to meet the technical requirements for the completion of the delineation and assessment report for this PWS, as required by the Montana Source Water Protection Program (DEQ, 1999) and the federal Safe Drinking Water Act (SDWA) Amendments of 1996 (P.L. 104-182).

Acknowledgements

This report was prepared by James Swierc with the University of Montana – Helena (UM-Helena) as part of a cooperative agreement with the Lewis and Clark Water Quality Protection District, using funding provided by the Source Water Protection Program of the Montana Department of Environmental Quality. Kathy Moore with the Lewis and Clark Water Quality Protection District provided support to completion of the report and project. The Helena Source Water Project was designed to evaluate all of the public water supplies in the Helena area. Inventory data for the project was researched and compiled by UM-Helena project interns April Navarro, Scott Smith, Heather DeMangelaere and Marc Reeves, including completion of the “windshield” survey for the project.

Limitations

This report was prepared to assess threats to the Mountain Meadow Inn public water supply and is based on published information, and information obtained from local residents familiar with the community. The terms "drinking water supply" or "drinking water source" refer specifically to sources for regulated public water supplies, and not any other type of water supply. The inventory of potential contaminant sources focuses on the management areas delineated for the public water supplies in this report. As a result, other potential sources of contamination to surface and ground water in the area may not be identified.

BACKGROUND AND DELINEATION

The Mountain Meadow Inn is a transient, non community public water supply located approximately 3 miles northwest of downtown Helena, in the southeastern part of Lewis and Clark County. The Mountain Meadow Inn is located in the southwestern part of the Helena Valley, near Spring Meadow Lake State Park. The Mountain Meadow Inn and well is located at approximately 46.630° North latitude and 112.082° West longitude, in Section 14 of Township 10 North, Range 4 West. The location of the well and the Helena Valley is shown in [Figure 1](#). The Mountain Meadow Inn well provides water to the restaurant. The sanitary survey for the system (Appendix A) indicates an estimated population of 120 transient persons and 5 permanent residents are served by the PWS.

The public water supply uses one well (Source 002), installed to an approximate depth of 57 feet and was completed on August 27, 1976. Water enters the well through perforations in the casing, at a depth from 35 to 57 feet. The well log (Appendix B) reports a static water level of 15 feet, with a pumping water level at 50 feet after 3 hours pumping 20 gpm. The well has a MBMG-GWIC Classification number of 62586. The water right number for the well from DNRC files is C009721-00. There is no treatment of the water prior to use.

Source Water Protection Management Zones

The source water protection areas for the Mountain Meadow Inn PWS are identified based on the criteria for a transient non-community PWS as defined in the Montana Source Water Protection Program (DEQ, 1999). For the PWS source, two management areas are identified within the source water protection area; the control zone and the inventory region. The control zone, also known as the exclusion zone, is an area at least 100-foot radius around the well. The inventory region for the well is delineated as the area within a one-mile radius around the well. The inventory zone for the well is depicted in [Figure 2](#). Since the aquifer is unconfined and recharged by surface water, a Surface Water Buffer Zone is delineated around the Sevenmile Creek watershed. The Surface Water Buffer Zone is the area within one-half mile of the stream for a distance of ten miles upstream from the inventory zone.

Hydrogeologic Assessment

The evaluation of the hydrogeology of the area is based predominantly on assessments of the area performed by the United States Geological Survey (USGS) and Montana Bureau of Mines and Geology (MBMG). This includes a study of the Helena Valley alluvial aquifer presented in Briar and Madison (1992), and Bedrock Aquifers in the Helena Area presented in Thamke (2000). Ground water along the northeastern margin of the Helena Valley is present in an unconfined aquifer comprised of a thin layer of alluvium over a fractured bedrock system. This type of aquifer is classified as having a *high* source water sensitivity to contamination. The Helena Valley is a structural basin with bedrock present along each boundary. The central part of the valley is filled with up to 6,000 feet of sediments derived from the bedrock in the area. The valley is filled with a thick sequence of interlayered fine and coarse grained Tertiary sediments; which is overlain by up to 100 feet of Quaternary alluvium. The Tertiary beds and the alluvium are considered as a single aquifer in the area. Ground water in the study area flows generally to the south, towards Lake Helena. There are some local variations in this general flow

direction due to changes in local conditions. A generalized geologic map of the Helena Valley, with a potentiometric surface map showing the general direction for ground water flow in the area is presented in [Figure 3](#). Recharge to the aquifer occurs from stream loss, direct infiltration of precipitation, and from direct infiltration of water from bedrock aquifers in the subsurface. The depth to ground water in the area ranges from approximately 5 to 20 feet below the ground surface, and varies during the year.

Mountain Meadow Inn Sampling Results and Water Quality

Every PWS is required to perform monitoring for contamination to their water supply. The monitoring parameters for transient non-community systems typically include coliforms (as an indicator of pathogenic organisms), and nitrates as an acute health risk. A review of the DEQ PWS database of monitoring results for the Mountain Meadow Inn PWS indicates some recent problems from missed sampling for coliform bacteria. Regulatory compliance with the problem was achieved in June 2002 (Appendix A). There are no other significant violations of any drinking water quality standards (Appendix A). The detected level of nitrates has been consistently less than the drinking water standard of 10 mg/L.

INVENTORY

An inventory of potential sources of acute health hazards was conducted for the Mountain Meadow Inn PWS source within the control and inventory zones. The contaminants in this category represent nitrates and pathogens, as required by the Montana Source Water Protection Program (DEQ, 1999). Potential sources include areas with septic systems and agricultural areas where nitrogen fertilizers may be used. These are shown in [Figure 4](#) and [Figure 5](#). While additional sources of contamination may be present, this assessment only focuses on the above listed potential contaminants.

Inventory Results/Control Zone

The control zone represents the most critical point to protecting the integrity of a wellhead for ground water sources. The land around the control zone for the well includes the parking lot area and part of the Mountain Meadow Inn building. The control zone around the wellhead is not fenced or otherwise protected from access. The only potential contaminant sources identified are from any septic system drainfield for the building.

Inventory Results/Inventory Region

The inventory region represents the area near the source wells where any contamination spilled onto the ground or subsurface has the potential to migrate directly into the PWS source aquifer. Land use within the inventory region is classified as 100% agricultural in the area. The land around the Mountain Meadow Inn is classified as having a low density of septic systems. The treatment lagoons for the Fort Harrison military base are located northeast of the PWS within the inventory zone ([Figure 2](#)), hydraulically upgradient from the facility.

SUSCEPTIBILITY ASSESSMENT

Susceptibility is the potential for a public water supply to draw water contaminated by inventoried sources at concentrations that would pose concern. Susceptibility is assessed in order to prioritize potential pollutant sources for management actions by local entities, in this case the Mountain Meadow Inn PWS.

The goal of Source Water Management is to protect the source water by 1) controlling activities in the control zones, 2) managing significant potential contaminant sources in the Inventory Regions, and 3) ensuring that land use activities in the Recharge Region pose minimal threat to the source water. Management priorities in the Inventory Regions are determined by ranking the significant potential contaminant sources identified in the previous chapter according to susceptibility. Alternative management approaches that could be pursued by the Mountain Meadow Inn PWS to reduce susceptibility are recommended.

Susceptibility is determined by considering the hazard rating for each potential contaminant source and the existence of barriers that decrease the likelihood that contaminated water will flow to the Mountain Meadow Inn PWS source. Hazards are assigned based on the percent of land in the inventory zone for non-point sources, and the location for point sources. Susceptibility ratings are presented individually for each potential contaminant source.

After the relative hazard of a potential contaminant source is assigned, the relative susceptibility is determined based on the presence of barriers that may mitigate the potential for a contaminant source to impact a water source. Barriers may represent natural conditions, engineered barriers or management actions. Natural barriers include anything that can be demonstrated as effective in slowing the migration of any chemicals released at the surface. Engineered barriers represent man-made structures to contain chemicals if they are released. Management barriers are plans that prohibit or control potentially polluting activities, but only if there is a plan or approach that has been formally implemented. For the Mountain Meadow Inn PWS sources, no barriers were identified for the aquifer and well.

Susceptibility Assessment Results

The results of the susceptibility assessment for the Mountain Meadow Inn PWS are listed in Table 1. The primary threats identified are agricultural land use, areas with septic systems, and Head Lane. The summary information in Table 1 reviews the relative hazard, barriers and susceptibility ranking of each potential source. Management alternatives are recommended that can help reduce the relative susceptibility of each identified potential contaminant source to the PWS sources.

Table 1. Susceptibility assessment of significant potential contaminant sources.

Source	Contaminant	Hazard	Hazard Rating	Barriers	Susceptibility	Management
Control Zone						
Septic Systems	Pesticides/ Herbicides/ Nitrates and Pathogens	Infiltration and Runoff	High	None	Very High	Monitor system performance
Inventory Zone						
Agricultural Land	Pesticides/ Herbicides/ Nitrates and Pathogens	Infiltration and Runoff	High	None	Very High	Promote the use and development of agricultural BMPs for the area
Septic Systems	Pathogens and Nitrate	Infiltration and Runoff	Low	None	Moderate	Monitor system performance
Fort Harrison Sewage Treatment Ponds	Pathogens and Nitrate	Infiltration and Runoff	High	None	Very High	Monitor system performance
Head Lane	Various Chemicals	Spills	High	None	Very high	Develop emergency response plan

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