# Big Sky Colony

# Source Water Delineation and Assessment Report

***11/99***


***Big Sky Colony***
Public Water System
**PWSID # MT0001647**

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Montana Department of
Environmental Quality
Source
Water
Protection

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# List of Acronyms

BMP - Best Management Practices

CAFO - Confined Animal Feeding Operation

CECRA - Comprehensive Environmental Cleanup and Responsibility Act

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act

LUST - Leaking Underground Storage Tank

MCL - Maximum Contaminant Level

MBMG-GWIC - Montana Bureau of Mines and Geology – Ground Water Information Center

MPDES - Montana Pollutant Discharge Elimination System

NPDES - National Pollutant Discharge Elimination System

PWS - Public Water System.

RCRA - Resource Conservation and Recovery Act

SMCL - Secondary Maximum Contaminant Levels

SWDAR - Source Water Delineation and Assessment Report.

SWPP - Source Water Protection Plan

SWL - Static Water Level

SOC - Synthetic Organic Compounds

TMDL - Total Maximum Daily Load

UST - Underground Storage Tank

VOC - Volatile Organic Compounds

***See glossary at end of text for definitions of acronyms and other terms used in this report***

# INTRODUCTION

The Safe Drinking Water Act (SDWA) Amendments of 1996 requires 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.

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 a 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 Big Sky Colony in developing a source water protection plans that meets their specific needs.

**Scope and Purpose**

This report presents the source water delineation and assessments for the municipal public water supply for the Big Sky Colony public water supply. James Swierc, Hydrogeologist with the Montana Department of Environmental Quality, prepared this report. Assistance was provided by Daniel Wipf, operator of the public water supply for the colony.

The Big Sky Colony is located in the north-central part of the Blackfeet Reservation, in Glacier 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).

**Limitations**

This report was prepared to assess threats to the Big Sky Colony 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.

The term “contaminant” is used in this report to refer to any chemical or biologic constituent in water that are listed as regulated under state and federal regulations. Water constituents are generally regulated based on health effects that may occur when ingested at certain levels. Water quality standards are based on maximum contaminant level goals (MCLGs) for a compound, which represents a concentration where adverse health effects are not considered likely to occur when ingested. However, as natural waters contain many dissolved constituents and MCLGs are frequently not attainable with economically viable water treatment alternative, maximum concentration levels (MCLs) are used. MCLs represent concentrations that may result in chronic or acute health problems when ingested. MCLs are based on the relative risk, or likelihood that health problems may occur, and economics associated with a treatment technology for a specific constituent of water. In some cases, sources for constituents with Secondary MCLs are also evaluated in this report. Secondary MCLs are non-regulatory guidelines regarding cosmetic effects (such as tooth or skin discoloration) or aesthetic effects (such as taste, odor, or color) of drinking water.

# BACKGROUND

## The Community

The Big Sky Hutterite Colony is located in Glacier County, in north-central Montana, as shown in Figure 1. The colony is located within the external boundaries of the Blackfeet Indian Reservation. The nearest town with commercial services is Cut Bank (population 3,519), located approximately 24 miles southeast of the colony (approximately 33 miles driving). Browning (population 1,199), where the administrative offices of the Blackfeet Tribal government are located, is located approximately 23 miles southwest of the colony. There are approximately 75 residents at the colony. The economy of the colony relies on the production of a variety of agricultural products.

The Colony complex comprises several residential buildings, a kitchen building, and several other facilities that support the agricultural activities at the colony. A map showing the layout of the colony is included with Appendix A. The colony obtains water from two shallow wells located approximately one mile northwest of the main colony complex. Domestic wastewater and liquid animal waste from the barns are treated in adjacent lagoons located south of the main colony buildings. Liquid waste from the lagoons is disposedl by land application. Solid animal waste is disposed with the liquid waste by land application to cropland. The wastewater treatment cells are located south of the main colony complex (Appendix A).

## Geographic Setting

Big Sky Colony is located in the foothills east of the central part of the Rocky Mountain Front Range in Glacier National Park. The mountains in this area represent a significant feature with peaks that rise over 4,000 feet above the plains. The colony is located south of the Milk River in the headwaters to Little Rock Coulee, a tributary to Cut Bank Creek, the major drainage across the Blackfeet Reservation. The Cut Bank Creek watershed is part of the Marias River watershed of the Missouri River system in Montana.

The climate is typical of northern Montana, with a limited amount of precipitation averaging 11.8 inches a year as measured at the Cut Bank Airport. The wettest months are May and June averaging 1.9 and 2.7 inches a monthly, respectively. The driest months are October through March, with monthly averages ranging from 0.3 to 0.5 inches per month. The temperature ranges from an average high of 79.5°F in July (minimum July average of 49.9°F) to an average of 27.6°F in January (minimum January average of 6.7°F).

## General Description of the Source Water

The Big Sky Colony water system obtains water from two shallow wells located approximately one mile northwest of the main colony complex. Information is not available characterizing the aquifer, however, it is interpreted to be a combination of a bedrock aquifer in communication with a shallow unconfined alluvial aquifer. Recharge to the bedrock aquifer occurs regionally west of the colony. The alluvial aquifer is locally recharged by a small livestock pond approximately one-half mile upstream from the wells.

## The Public Water Supply

The PWS wells (Sources 002 and 003) are located northwest of the main colony complex as shown in Figure 1. Information on the PWS for Big Sky Colony is reviewed in a sanitary survey completed for the colony in June 8, 1990. The information reported on the PWS is obtained from this report, DEQ records, and from information gathered during a site visit by the author. A copy of the sanitary survey is included in Appendix A. The water system for Big Sky Colony serves the resident population of 70 people through 9 active service connections located in the colony residential and other buildings. DEQ records indicate that an estimated 2 additional service connections at the colony are present, but considered inactive at this time. The general layout of the colony buildings and distribution system is depicted in Appendix A.

The water from the wells is pumped from the two wells, through a pumphouse, to a 30,000 gallon glass lined concrete storage reservoir. Water from the reservoir is gravity fed into the distribution system for the colony. Water used for domestic consumption is softened within the colony, prior to distribution to the buildings. There is no disinfection or other treatment system for the water. The system operator estimates water usage averages approximately 15,000 gallons per day, or about 10.4 gallons per minute.

**Water Quality**

Every PWS is required to perform monitoring for contamination to their water supply. The monitoring constituents include coliforms (as an indicator of pathogenic organism), nitrates, metals and for multiple chemicals. The monitoring schedule depends on many factors such as the size and source water for a PWS, the number of sources (e.g. wells), and the population served. Each PWS has a specific monitoring program tailored to their system that follows the general protocols for operation of a PWS defined by DEQ. A review of the DEQ PWS database indicates that monitoring results for the Big Sky Colony PWS show no violations or exceedences of any drinking water quality standards. The only detected compound that is regulated is nitrate, which can occur naturally or from agricultural, human and animal waste. The health standard for nitrates, the MCL, is 10 mg/L. The monitoring results for the potable water supply indicate nitrate levels ranging from 2.42 mg/L to 5.72 mg/L over the last five years.

There is no readily available water quality data for ground water within the Big Sky Colony area.

# DELINEATION

The source water protection area, the land area that contributes water to Big Sky Colony is identified in this chapter. Three management areas are identified within the source water protection area. These three regions, the control zone, inventory region, and recharge region, are delineated for the wells. The control zone, also known as the exclusion zone, is an area at least 100-foot radius around each well. The inventory region for the unconfined aquifer is defined as the area upgradient from the wells which represents a three-year time of travel distance for water within the aquifer that may be pumped by the well. The recharge region represents the area where the source aquifer for the Big Sky Colony water system wells is replenished.

**Hydrogeologic Conditions**

There are no readily available documents on water quality and quantity in the Cut Bank Creek watershed, including the headwaters area where Big Sky Colony is located. Cannon (1996) presents an overview of water resources of the entire Blackfeet Indian Reservation, with no specific information on the area near Big Sky Colony. The following discussion of the hydrologic setting of the area reflects assumptions based on basic principles of surface water hydrology. A generalized geologic map of the area around Big Sky Colony is depicted in Figure 2. The PWS source is sandstone bedrock aquifer which is recharged both regionally and by shallow ground water in an unconfined aquifer.

The bedrock in the area around the PWS wells comprises the Horsethief Sandstone, overlying the Bearpaw Shale. The bedrock generally dips to the west towards the Rocky Mountain Front Range in Glacier National Park. The Big Sky Colony PWS wells are located in the valley of the upper reaches of Little Rock Coulee, a tributary to Cut Bank Creek. Based on the geologic map of the area, the Little Rock Coulee drainage has incised into the Horsethief Sandstone. The PWS well logs indicate that the wells are installed into sandstones and shales to an approximate depth of 40 and 45 feet below ground surface (Appendix A), with approximately 20 feet of overlying alluvium. The wells are interpreted to draw water from both the Horsethief Sandstone and the alluvium. The database at the Montana Bureau of Mines and Geology was queried for additional wells in the area. The only wells located within a three-mile radius belong to Big Sky Colony and Rimrock Ranch. There were no lithologies available with these well logs. This information is summarized in Appendix B.

The source aquifer is classified as unconfined in the area of the PWS wells. According to the operator of the Big Sky Colony PWS, the wells have maintained a consistent yield through drought periods of 1984-1985, 1988, and from 1997 to the time of preparation of this report (January 2002). The continuous yield of the wells infers that the water source for the wells is derived from a regional aquifer or aquifer system which includes the Horsethief sandstone. This aquifer discharges into the shallow alluvium in the area near Big Sky Colony where the modern drainage system has incised into the unit. This water mixes with the water in the shallow alluvial aquifer filling the base of the valley.

Recharge to the alluvial aquifer is interpreted to occur from surface water infiltration within the watershed area upgradient from the wells. A small stockwater pond is located in the base of the valley approximately one-half mile upstream from the wells. The surface water body at the base of the valley is interpreted to represent a recharge unit to the shallow aquifer that supplies water to the PWS wells. Shallow ground water is interpreted to flow only in the base of the valley, with the walls representing aquifer boundaries. The shallow ground water flows in a direction following topography, generally to the southeast to east following the trend of the drainage coulee. Recharge to the bedrock aquifer system occurs from surface water infiltration. The lack of data for the area limits identification of the specific recharge area; however, for purposes of this assessment, recharge is assumed to occur in the area west of Big Sky Colony, along the Rocky Mountain Front Range. In this area, surface water streams derived from snowmelt in the mountains flow over multiple faults which may provide conduits for surface water migration into the deeper bedrock aquifer.

## Conceptual Model and Assumptions

A conceptual hydrogeologic model is a simplified representation of the hydrogeologic system. For the Big Sky Colony, ground water occurs in a shallow unconfined alluvial aquifer. The aquifer is recharged locally by surface water infiltration from precipitation, from the small pond upstream from the PWS wells, and from discharge of a regional aquifer into the shallow ground water system. Ground water flows in the general direction of the streambed following topography.

Based on the hydrogeologic setting, the Big Sky Colony water source is an unconfined aquifer in a shallow sandstone bedrock and unconsolidated alluvium, which is considered to have a ***high*** source water sensitivity to contamination.

## Well Information

The locations of the wells for the Big Sky Colony are depicted in Figure 1. Information on these sources is summarized in Table 1. Copies of the driller construction logs for the wells are included with Appendix A.

***Table 1 - Source Well Information for Big Sky Colony.***

| Information | Well 1 | Well 2 |
|---|---|---|
| **PWS Source Code** | 002 | 003 |
| **Well Location (T, R, Sec)** | T36N, R9W Sec 28 ADD | T36N, R9W Sec 28 ADD |
| **Well Location (lat, long)** | 48.8498°N Lat -112.7809°W Long | 48.8499°N Lat -112.7800°W Long |
| **MBMG #** | 90002 | 90003 |
| **Water Right #** | *Not Reported* | *Not Reported* |
| **Date Well was Completed** | 1976 | 1982 |
| **Total Depth** | 40 feet | 45 feet |
| **Perforated Interval** | 20 – 40 feet | 25 – 45 feet |
| **Static Water Level** | 7 feet | 10 feet |
| **Pumping Water Level** | 8 feet | 25 feet |
| **Drawdown** | *Not Reported* | *Not Reported* |
| **Test Pumping Rate** | *Not Reported* | *Not Reported* |
| **Specific Capacity** | -- | -- |
| **Yield** | 12 gpm | 50 gpm |

## Delineation Methods and Criteria

The lack of any specific data on hydrologic characteristics of the area limits the ability to accurately estimate hydrologic flow rates. As a result, there is not sufficient data to estimate a three-year time of travel distance for the aquifer as required under the DEQ Source Water Protection program criteria for unconfined aquifers (DEQ, 1999). In order to establish an inventory zone that is protective of the water system at the Big Sky Colony, the

inventory zone is delineated as the limits of the aquifer in the valley upgradient from the location of the PWS wells. The recharge area is delineated as the upper reaches of the watershed where surface water would drain into the valley upstream from the PWS wells.

**Source Water Protection Management Zones**

The delineated management zones for the wells are depicted in Figure 3. The control zones comprise an area of a 100-foot radius around the wellheads. The inventory zone reflects an area in the valley upstream from the wells. The recharge area reflects the watershed area that drains into Little Rock Coulee.

**Limiting Factors**

The lack of site and regional hydrogeologic data represent the greatest potential source of error to accurate delineations of the management zones for the water sources at Big Sky Colony. The delineations presented in this report are considered accurate and protective of the drinking water source by using conservative assumptions for interpretations regarding the nature of the hydrologic system.

# INVENTORY

An inventory of potential sources of contamination was conducted for the Big Sky Colony PWS within the delineated source water protection management regions. Potential sources of all primary drinking water contaminants and Cryptosporidium were identified, however, only significant potential contaminant sources were selected for detailed inventory. The significant potential contaminants in the Big Sky Colony PWS management regions are nitrates, pathogens, herbicides/pesticides and fertilizer from agricultural land.

**Inventory Method**

The inventory for Big Sky Colony was obtained by visiting the colony, and discussing colony activities with representatives from the colony. Information on the PWS, land use, agricultural chemical storage and application, and waste disposal practices were identified at this time.

Urban and agricultural land uses were identified from the United State Geological Survey land use classification project (USGS, 2000). Major transportation routes through the area, including railroad lines, were also identified. This information is depicted in Figure 4.

As part of the standard inventory process, the information in available databases on environmental sites was reviewed. EPA's Envirofacts System was queried to identify EPA regulated facilities located in the Inventory Region. This system accesses facilities listed in the following databases: Resource Conservation and Recovery Information System (RCRIS), Biennial Reporting System (BRS), Toxic Release Inventory (TRI), Permit Compliance System (PCS) and Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS). DEQ Databases were queried to identify the following in the inventory region: Underground Storage Tanks (UST), hazardous waste contaminated sites (DEQ Hazardous Waste Cleanup Bureau), landfills, abandoned mines, and active mines including gravel pits. Any information on past releases and present compliance status was noted.

No facilities meeting these criteria were identified within any of the identified source water protection management zones.

**Inventory Results/Inventory and Control Zones**

The only potential contaminant source identified for the control and inventory zones for the PWS wells is agricultural land use. The potential contaminant sources are summarized in Table 2. The potential contaminant sources in the inventory zone include spilled fuels and other farm chemicals, and crop fertilizers and herbicides. The primary hazards are spills of animal wastes during transportation to the field for land application, excess application of herbicides and runoff from the cropped areas, direct infiltration of animal waste down the wellbores, and from the actual land application of animal wastes.

The control zones around the wellheads did not have any fencing or other protection at the time of the site visit. Fencing the control zone around the wellheads is strongly recommended as a method of protecting the integrity of the wells, and preventing any contamination from livestock waste from infiltrating into the well through the wellbore.

**Inventory Results/Watershed Region**

The watershed region is comprised of agricultural cropland, with some areas used for open range cattle grazing. Fertilizers, weed control herbicides and fuels for farm machinery are the primary contaminants of concern in the recharge region.

***Table 2 - Significant Potential Contaminant Sources.***

| Source | Hazard |
|---|---|
| ***Control and Inventory Zones*** | |
| Cropped Agricultural Land | Land Application of Animal Waste<br>Spills and Excess Application of Herbicides |
| ***Recharge Area*** | |
| Cropped Agricultural Land | Land Application of Animal Waste<br>Spills and Excess Application of Herbicides |

## Inventory Update

The certified operator should update the inventory every year for his records. Changes in land uses or potential contaminant sources should be noted and additions made as needed. The complete inventory should be submitted to DEQ every five years.

## Inventory Limitations

The potential sources of contaminants for Big Sky Colony are taken from data and reports that are readily available. Consequently, unregulated activities or unreported contaminant releases may have been missed. The use of multiple sources of data, however, should help assure that contaminant sources that are identified represent the major threats to the source water for Big Sky Colony.

# 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 Big Sky Colony PWS.

The goal of Source Water Management is to protect the source water by 1) controlling activities in the control zone, 2) managing significant potential contaminant sources in the Inventory Region, and 3) ensuring that land use activities in the Recharge Region pose minimal threat to the source water. Management priorities in the Inventory Region are determined by ranking the significant potential contaminant sources identified in the previous chapter according to susceptibility. Alternative management approaches are recommended as methods Big Sky Colony can implement to reduce susceptibility of the PWS to contamination.

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 Big Sky Colony PWS wells (Table 3). Hazard is rated by the proximity of the potential contaminant sources to the wells. Susceptibility ratings are presented individually for each significant potential contaminant source and each associated contaminant. The susceptibility of each well to each potential contaminant source is assessed separately, however, the proximity of the wells and limited number of potential contaminant sources results in both wells assessed together with the same threats.

***Table 3 - Relative Susceptibility Based on Hazards and Barriers***

| **Presence Of Barriers** | **Hazard** | | |
|---|---|---|---|
| | **High** | **Moderate** | **Low** |
| **No Barriers** | Very High Susceptibility | High Susceptibility | Moderate Susceptibility |
| **One Barrier** | High Susceptibility | Moderate Susceptibility | Low Susceptibility |
| **Multiple Barriers** | Moderate Susceptibility | Low Susceptibility | Very Low Susceptibility |

For point sources, the relative hazard of the significant potential contaminant sources listed in Table 5 reflects the location of the sites relative to the PWS wells, and how long ground water would take to travel from that site to the wells. Sites located within a time of travel distance of less than one year are assigned a hazard ranking of high. Sites within a time of travel distance of one to three years are assigned a hazard ranking of moderate. The remaining sites located in the recharge region are assigned a hazard ranking of low.

For non-point sources, hazard levels are assigned based the following table:

***Table 4 - Non-Point Source Hazard Table***

| ***Source Type*** | ***High Hazard*** | ***Moderate Hazard*** | ***Low Hazard*** |
|---|---|---|---|
| Septic Systems | > 300 per sq. mi. | 50 – 300 per sq. mi. | < 50 per sq. mi. |
| Municipal Sanitary Sewer (% Land Use) | > 50% of region | 20% – 50% of region | < 20% of region |
| Cropped Agricultural Land(% Land Use) | > 50% of region | 20% – 50% of region | < 20% of region |

For the Big Sky Colony PWS, there are no barriers identified for the agricultural activities that can reduce the susceptibility of the PWS wells to contamination under "worst-case" conditions. Implementation of best management practices, including fencing the control zones, can reduce the relative susceptibility of the system to contamination.

The results of the susceptibility assessment indicate that agricultural activities represent the only significant potential threat identified for the source water for the Big Sky Colony PWS. The results are listed in Table 5.

***Table 5 - Susceptibility Assessment of Significant Potential Contaminant Sources.***

| Source | Contaminant | Hazard | Hazard Rating | Barriers | Susceptibility | Management |
|---|---|---|---|---|---|---|
| ***Inventory Zone – Source 002 and 003*** | | | | | | |
| Cropped Agricultural Land | SOCs/Nitrates | Leaching and Runoff | Low | None | Moderate | Protect wellheads from livestock; develop best management practices for agricultural land use including the application of chemicals according to label instructions |
| ***Recharge Region*** | | | | | | |
| Cropped Agricultural Land | SOCs, Nitrates | Infiltration and Runoff | Moderate | None | High | Communicate with upgradient landowner, develop best management practices for agricultural land use including the application of chemicals according to label instructions |

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# GLOSSARY*

**Acute Health Effect.** A negative health effect in which symptoms develop rapidly.

**Alkalinity.** The capacity of water to neutralize acids.

**Aquifer.** A water-bearing layer of rock or sediment that will yield water in usable quantity to a well or spring.

**Barrier.** A physical feature or management plan that reduces the likelihood of contamination of a water source from a potential contaminant source

**Best Management Practices (BMPs).** Methods for various activities that have been determined to be the most effective, practical means of preventing or reducing pollution.

**Biennial Reporting System (BRS).** An EPA database that contains information on hazardous waste sites. The data can be accessed through the EPA Envirofacts website.

**Chronic Health Effect.** A negative health effect in which symptoms develop over an extended period of time.

**Class V Injection Well.** Any pit or conduit into the subsurface for disposal of waste waters. The receiving unit for an injection well typically represents the aquifer, or water bearing interval.

**Coliform Bacteria.** A general type of bacteria found in the intestinal tracts of animals and humans, and also in soils, vegetation and water. Their presence in water is used as an indicator of pollution and possible contamination by pathogens.

**Community.** A town, neighborhood or area where people live and prosper.

**Confined Animal Feeding Operation (CAFO).** Any agricultural operation that feeds animals within specific areas, not on rangeland. Certain CAFOs require permits for operation.

**Confined Aquifer.** A fully saturated aquifer overlain by a confining unit such as a clay layer. The static water level in a well in a confined aquifer is at an elevation that is equal to or higher than the base of the overlying confining unit.

**Confining Unit.** A geologic formation present above a confined aquifer that does not allow the flow of water, maintaining the pressure of the ground water in the aquifer. The physical properties of a confining unit may range from a five-feet thick clay layer to a shale that is hundreds of feet thick.

**Comprehensive Environmental Cleanup and Responsibility Act (CECRA).** Passed in 1989 by the Montana State Legislature, CECRA provides the mechanism and responsibility to clean up hazardous waste sites in Montana.

**Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).** Enacted in 1980. CERCLA provides a Federal "Superfund" to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. Through the Act, EPA was given power to seek out those parties responsible for any release and assure their cooperation in the cleanup. The Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) provides information about specific sites through the EPA Envirofacts website.

**Delineation.** The process of determining and mapping source water protection areas.

**Geographic Information Systems (GIS).** A computerized database management and mapping system that allows for analysis and presentation of geographic data.

**Hardness.** Characteristic of water caused by presence of various calcium and magnesium salts. Hard water may interfere with some industrial processes and prevent soap from lathering.

**Hazard.** A relative measure of the potential of a contaminant from a facility or associated with a land use to reach the water source for a public water supply. The location, quantity and toxicity of significant potential contaminant sources determine hazard.

**Hydraulic Conductivity.** A constant number, or coefficient of proportionality, that describes the rate water can move through an aquifer material.

**Hydrology.** The study of water and how it flows in the ground and on the surface.

**Hydrogeology.** The study of geologic formations and how they effect ground water flow systems.

**Inventory Region.** A source water management area for ground water systems that encompasses the area expected to contribute water to a public water supply within a fixed distance or a specified three year ground water travel time.

**Leaking Underground Storage Tank (LUST).** A release from a UST and/or associated piping into the subsurface.

**Maximum Contaminant Level (MCL).** Maximum concentration of a substance in water that is permitted to be delivered to the users of a public water supply. Set by EPA under authority of the Safe Drinking Water Act to establish concentrations of contaminants in drinking water that are protective of human health.

**Montana Bureau of Mines and Geology – Ground Water Information Center (MBMG/GWIC).** The database of information on all wells drilled in Montana, including stratigraphic data and well construction data, when available.

**Montana Pollutant Discharge Elimination System (MPDES).** Database system to track entities that discharge wastewater of any type into waters of the State of Montana.

**National Pollutant Discharge Elimination System (NPDES).** A national database system to track entities that discharge wastewater.

**Nitrate.** An important plant nutrient and type of inorganic fertilizer that can be a potential contaminant in water at high concentrations. In water the major sources of nitrates are wastewater treatment effluent, septic tanks, feed lots and fertilizers.

**Nonpoint-Source Pollution.** Pollution sources that are diffuse and do not have a single point of origin or are not introduced into a receiving stream from a specific outlet. Nonpoint sources of pollution, such as the use of herbicides, can concentrate low levels of chemicals into surface and/or ground waters at increased levels that may exceed MCLs.

**Pathogens.** A microorganism typically found in the intestinal tracts of mammals, capable of producing disease.

**Point-Source.** A stationary location or fixed facility from which pollutants are discharged.

**Potentiometric Surface.** The imaginary water table surface of a confined aquifer, above the base of the confining unit above the aquifer. May be above the surface for a flowing artesian well.

**Permit Compliance System (PCS).** An EPA database that provides information on the status of required permits for specific activities for specific facilities. The data can be accessed through the EPA Envirofacts website.

**Public Water System**. A system that provides water for human consumption through at least 15 service connections or regularly serves 25 individuals.

**Pumping Water Level.** Water level elevation in a well when the pump is operating.

**Recharge Region.** A source water management region that is generally the entire area that could contribute water to an aquifer used by a public water supply. Includes areas that could contribute water over long time periods or under different water usage patterns.

**Resource Conservation and Recovery Act (RCRA).** Enacted by Congress in 1976. RCRA's primary goals are to protect human health and the environment from the potential hazards of waste disposal, to conserve energy and natural resources, to reduce the amount of waste generated, and to ensure that wastes are managed in an environmentally sound manner. The Resource Conservation and Recovery Information System (RCRIS) provides information about specific sites through the EPA Envirofacts website.

**Secondary Maximum Contaminant Levels (SMCL).** The maximum concentration of a substance in water that is recommended to be delivered to users of a public water supply, based on aesthetic qualities. SMCLs are non-enforceable guidelines for public water supplies, set by EPA under authority of the Safe Drinking Water Act. Compounds with SMCLs may occur naturally in certain areas, limiting the ability of the public water supply to treat for them.

**Section Seven Tracking System (SSTS).** SSTS is an automated system EPA uses to track pesticide producing establishments and the amount of pesticides they produce.

**Source Water.** Any surface water, spring, or ground water source that provides water to a public water supply.

**Source Water Assessment Report.** A report for a public water supply that delineates source water protection areas, performs an inventory of potential contaminant sources within the delineated areas, and evaluates the relative susceptibility of the source water to contamination from the potential contaminant sources under "worst-case" conditions.

**Source Water Protection Areas.** For surface water sources, the land and surface drainage network that contributes water to a stream or reservoir used by a public water supply. For ground water sources, the area within a fixed radius or three-year travel time from a well, and the land area where the aquifer is recharged.

**Spill Response Region.** A source water management area for surface water systems that encompasses the area expected to contribute water to a public water supply within a fixed distance or a specified four-hour water travel time in a stream or river.

**Static Water Level (SWL).** Water level elevation in a well when the pump is not operating.

**Susceptibility (of a PWS).** The relative potential for a PWS to draw water contaminated at concentrations that would pose concern. Susceptibility is evaluated at the point immediately preceding treatment or, if no treatment is provided, at the entry point to the distribution system.

**Synthetic Organic Compounds (SOC).** Man made organic chemical compounds (e.g. herbicides and pesticides).

**Total Dissolved Solids (TDS).** The dissolved solids collected after a sample of a known volume of water is passed through a very fine mesh filter.

**Total Maximum Daily Load (TMDL).** The total amount of contaminants that a water body in a watershed can receive without resulting in impacts to the health of the ecosystem.

**Toxic Release Inventory (TRI).** An EPA database that compiles information about permitted industrial releases of chemicals to air and water. Information about specific sites can be obtained through the EPA Envirofacts website.

**Transmissivity.** A number that describes the ability of an aquifer to transmit water. The transmissivity is determined by multiplying the hydraulic conductivity time the aquifer thickness.

**Unconfined Aquifer.** An aquifer containing water that is not under pressure. The water table is the top surface of an unconfined aquifer.

**Underground Storage Tanks (UST).** A tank located at least partially underground and designed to hold gasoline or other petroleum products or chemicals, and the associated plumbing system.

**Volatile Organic Compounds (VOC).** Chemicals such as petroleum hydrocarbons and solvents or other organic chemicals which evaporates readily to the atmosphere.

**Water Table.** The top of the water surface in an unconfined aquifer.

* Definitions adapted from EPA's Glossary of Selected Terms and Abbreviations (http://www.epa.gov/ceisweb1/ceishome/ceisdocs/glossary/glossary.html)