Seville Colony

Source Water Delineation and Assessment Report

11/99

Seville Colony
Public Water System

PWSID # MT0002974

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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

This Delineation and Assessment Report was completed by James Swierc with the Source Water Protection Program at the Department of Environmental Quality with the assistance of George G. Waldner with Seville Colony. This Source Water Delineation and Assessment Report was prepared for the Seville Hutterite Colony Public Water Supply, PWS ID# 2974, located in Glacier County. Seville Colony is located within the external boundaries of the Blackfeet Indian Reservation.

Purpose

This report is intended to meet the technical requirements for the completion of the delineation and assessment report for the Seville Colony 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).

The Montana Source Water Protection Program is intended to be a practical and cost-effective approach to protect public drinking water supplies from contamination. A major component of the Montana Source Water Protection Program is "delineation and assessment". Delineation is a process of mapping source water protection areas, which contribute water used for drinking. Assessment involves identifying locations or regions in source water protection areas where contaminants may be generated, stored, or transported, and then determining the relative potential for contamination of drinking water by these sources. The primary purpose of this source water delineation and assessment report is to provide information that helps the Seville Colony PWS complete a source water protection plan to protect its drinking water source.

Limitations

This report was prepared to assess threats to the Seville 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 the source of the Seville Colony public water supply and not any other public or private water supply. Also, not all potential or existing sources of groundwater or surface water contamination in the area of the Seville Colony public water supply are identified. Only potential sources of contamination in areas that contribute water to its drinking water source are considered.

The term "contaminant" is used in this report to refer to constituents for which maximum concentration levels (MCLs) have been specified under the national primary drinking water standards, and to certain constituents that do not have MCLs but are considered to be potentially represent health threats.

CHAPTER 1
BACKGROUND

The Community

The Seville 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 12,121), located approximately 13 miles southeast of the colony. There are approximately 110 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 Cut Bank Creek, approximately 1.5 miles south of the main colony complex.

Domestic wastewater and liquid animal waste from the barns are treated in adjacent lagoons located north of the main colony buildings. Liquid waste from the lagoons disposal by land application. Solid animal waste is disposed with the liquid waste by land application to cropland. The wastewater treatment cells are located northeast of the main colony complex.

Geographic Setting

Seville Colony is located in the foothills to the east of the central part of the Rocky Mountain Front Range (see Figure 1). The mountains in this area represent a significant feature with peaks that rise over 4,000 feet above the plains. The colony is located north of Cut Bank Creek, the closest drainage to the colony. Cut Bank Creek flows east in a valley approximately one mile south of the colony. The Cut Bank Creek watershed is part of the Marias River watershed of the Missouri River system in Montana. The headwaters to Cut Bank Creek are located in Glacier National Park, located west of the colony.

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 Seville Colony water system obtains water from an infiltration gallery installed into the alluvium beneath Cut Bank Creek. The infiltration gallery is located approximately 1.5 miles southeast of the colony (Figure 1). The Cut Bank Creek watershed (USGS Hydrologic Unit Code 10030202) is located within Marias River Watershed, part of the Lower Missouri River Watershed Management Region for Montana.

The Public Water Supply

The PWS intake (Source 002) is located approximately 1.5 miles southeast of the main colony complex. Information on the PWS for Seville Colony is reviewed in a sanitary survey completed for the colony in April 1999. 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 Seville Colony serves the resident population of 110 people through 8 active service connections located in the colony residential and other buildings. DEQ records indicate that an estimated 17 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 intake for the PWS in Cut Bank Creek comprises three six-inch and two ten-inch perforated pipe laterals buried five feet below the bottom of the creek. The laterals collect water into a 48-inch upright culvert, which connects to a 36-inch horizontal culvert that directs water to a 100 gpm pump. Water from the collection system is pumped through approximately 8,000 feet of four-inch PVC piping to a 67,000 gallon raw water cistern located beneath the building which houses the treatment system. The cistern was constructed in 1984, while the treatment system was built in 1997. The water treatment building is located on the south side of the colony complex.

Algae growth in the cistern during warm periods is controlled using Potassium Permanganate. Soda Ash is added for corrosion control, with alum and a cationic polymer added for coagulation and flocculation during the filtering process. The filter system is a 25 gpm turnkey system which includes both sedimentation and rapid-sand filtration. After filtration, water is pumped through a 4,000 gallon backwash tank. Disinfection is performed by adding sodium hypochlorite, and proper contact time is provided with a 12,000 gallon baffled clearwell. From the clearwell, the water is pumped past two captive air tanks that help maintain pressure in the distribution system, and softened using two con-air water softening units.

The system operator estimates water usage averages approximately 18,000 gallons per day, or about 12.5 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 Seville 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 below detectable concentrations up to 0.67 mg/L over the last five years.

Local Water Quality and the TMDL Process

There have been several studies on water quality and related issues near and adjacent to Cut Bank Creek. Water quality in the Cut Bank Creek Watershed area is generally of good quality suitable for all uses. Paulson and Zimmerman (1965) evaluated the hydrology and water resources of the Seville Bench, with Cut Bank Creek representing the northern border to their study area. Their study included an extensive sampling program designed to evaluate the impacts to water quality in Cut Bank Creek from irrigation runoff from the Seville Bench. The results of this sampling program indicate that only minimal impacts occur to Cut Bank Creek from irrigation runoff, seen as slight increases in concentrations of dissolved chloride and sulfates. The data results from a sample collected near the current Seville Colony collection system are included in Table 1. More recently, Cannon (1997) evaluated the hydrology and water resources of a buried glacial aquifer system near Browning. This study included sampling Cut Bank Creek approximately 21 miles west of Seville Colony (Table 1).

The data listed in Table 1 is considered representative of background conditions for water quality in Cut Bank Creek. While the sample results show some minor differences in water quality, both reflect good water quality meeting all regulatory requirements at this time. The most recent data is considered the most representative as this sample was collected and analyzed following modern standardized methods.

Table 1 – Background Water Quality in Cut Bank Creek, Seville Colony Area

Sample Date	Location	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	HCO_3 mg/L	SO_4 mg/L	Cl mg/L	F mg/L	SiO_2 mg/L	NO_3 mg/L	TDS mg/L	Specific Conduct µS/cm
Near Seville Colony Intake													
8/3/55	34-8-25-a	--	--	9.2	1.0	140	19	0.5	0.0	4.2	0.2	147	271
Near Browning, Upgradient from Seville Colony													
6/16/92	33-11-15-abc	20	7.9	1.9	0.40	100	4.8	0.40	<0.1	4.1	--	89	167

Locations are listed with Township, Range and Section, with section location based on BLM system
Analytes are: Ca – Calcium; Mg – Magnesium; Na – Sodium; K - Potassium; HCO_3 – Bicarbonate; SO_4 – Sulfate; Cl – Chloride; F – Fluoride; SiO_2 – Silica; NO_3 – Nitrate as Nitrogen; TDS – Total Dissolved Solids
1955 data from Paulson and Zimmerman (1965). 1992 data from Cannon (1997)

All of the surface water streams in the study area, including Cut Bank Creek and its tributaries upgradient from Seville Colony, are classified as B-1 waters using the State of Montana stream classification system for beneficial uses. These types of waters are suitable for drinking, culinary and food processing purposes after conventional treatment. Additional uses include bathing, swimming and recreation, growth and propogation of salmonid fishes and associated aquatic life, waterfowl and furbearers, and agricultural and industrial water supply. The Total Maximum Daily Loading (TMDL) assessment for the surface waters in the area will identify threats to the listed potential uses for the surface waters in the area. The TMDL assessment will evaluate the ability of the surface waters to buffer various types of discharges to the waters, including both natural and human caused sources, and the impact to the overall health of the water bodies. These include wastewater treatment plant discharges, surface water runoff and non-point source pollution. After the TMDL assessment is complete, the results will be presented to area and community leaders to help identify and plan methods to meet the goals of the TMDL assessment in preserving and improving surface water quality in the area. The Cut Bank Creek Watershed is classified by the State of Montana as a low priority watershed for TMDL development. The development of the final TMDL for the area will be completed by either a Natural Resource Program of the Tribal Government of the Blackfeet Indian Reservation or the TMDL Program for the State of Montana; or as a cooperative effort between both groups.

This report addresses threats to drinking water sources, and identifies many of the same threat that will be identified in the TMDL assessment. In this area, the SWDAR focuses on ground water quality. Communities and PWS operators are encouraged to use the results of the SWDAR to develop Source Water Protection Plans that outline steps to help preserve and protect the integrity of their water source. However, long-term planning to protect water resources across the watershed and study area should consider the results of both this SWDAR and the TMDL assessment for the area, when completed.

CHAPTER 2
DELINEATION

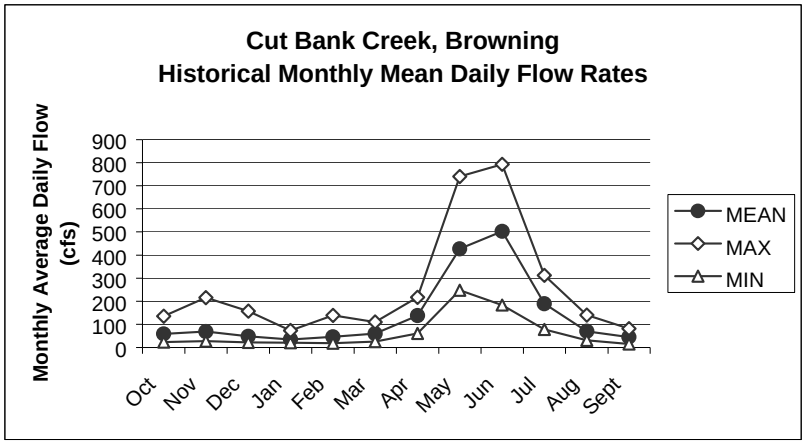
The source water protection area, the land area that contributes water to Seville Colony is identified in this chapter. The source water protection areas comprise a Spill Response Region and the Watershed Region. The Spill Response Region represents a one-half mile wide buffer on each side of the surface water source, Cut Bank Creek and tributaries, for a distance of 10 miles upstream from the public water supply intake. The Watershed Region is a much larger area that includes the entire watershed of the surface water source, upgradient from the intake, where water collects into the drainage system.

Hydrogeologic Conditions

There are not any readily available documents on water quality and quantity in the Cut Bank Creek watershed. The hydrogeology of the area south of Cut Bank Creek and Seville Colony is reviewed in Paulson and Zimmerman (1965). This document focuses on the hydrogeology of the Two Medicine Irrigation District, and evaluates the nature and interaction of surface water with shallow ground water in the Seville Flats. Cannon (1996) presents an overview of water resources of the entire Blackfeet Indian Reservation. The following discussion of the hydrologic setting of the area is based on Paulson and Zimmerman (1965), Cannon (1996 and 1997) and assumptions based on basic principles of surface water hydrology. A generalized geologic map of the Cut Bank Creek Watershed and the area around Seville Colony is depicted in Figure 2. Since the PWS source is from surface water, the PWS source is classified as having a ***high*** source water sensitivity to contamination.

The Cut Bank Creek watershed upstream from the Seville Colony PWS intake covers an approximate area of 530 square miles. The upper reaches of the watershed are located adjacent to the continental divide in Glacier National Park, located west of the Blackfeet Reservation. The channel for upper Cut Bank Creek originated as a meltwater channel on the north side of the Two Medicine Glacier which flowed east from the mountains onto the plains (Cannon, 1996). The valley was cut into the underlying shale and sandstone bedrock, and was subsequently filled with coarse grained alluvium derived from the mountains. The water in Cut Bank Creek is in communication with the alluvial aquifer, as the creek gains flow in the upper reaches including the area near Browning. The nature of the interaction of surface and ground water is not known at the location of the PWS intake east of Browning where data is not available. In general, the stream is considered likely to lose flow to the alluvial aquifer during dry periods, and gain flow during wet periods.

The average daily flow just north of Browning for each month for Cut Bank Creek is shown in the adjacent graph. Flow rates generally increase between April and May with peak flows in May and June, followed by a steady decrease in flow rates during late summer. The data in the graph was obtained from the USGS, and reflects data obtained during the period from 1990 to 2001. Flow within Cut Bank Creek is perennial with no observed periods without flow.



Delineation Methods and Results

Source water protection areas for surface water sources are delineated using the criteria in the Montana Source Water Protection Program (DEQ, 1999). The Spill Response Region and the Watershed for Cut Bank Creek above the Seville Colony PWS intake are delineated in Figure 3.

Limiting Factors

The lack of more detailed data on flow in Cut Bank Creek limits the understanding of the interaction of surface and ground water in the area near the Seville Colony PWS intake. However, 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.

CHAPTER 3
INVENTORY

An inventory of potential sources of contamination was conducted for the Seville Colony PWS within the spill response and watershed 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 Seville Colony PWS spill response region are nitrates, pathogens, herbicides/pesticides and fertilizer from cropped agricultural land.

The inventory for Seville Colony PWS focuses on all activities in the spill response zone, and general land uses and large facilities in the watershed region.

Inventory Method

The inventory for Seville 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, 1999). 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 the spill response zone; however, several are presented within the watershed region. The location of these are shown in Figure 5. This includes approximately 11 USTs, several landfills, the Browning Wastewater Treatment Plant, and two CECRA sites in Browning (Blackfeet Pencil Factory and Blackfeet Post and Pole). This information is summarized in Table 2.

Inventory Results/Spill Response Region

The spill response region for the PWS source includes agricultural areas and a gravel pit. The potential contaminant sources are summarized in Table 2. The potential contaminant sources in the spill response 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, and from the actual land application of animal wastes.

Inventory Results/Watershed Region

The watershed region is comprised primarily of agricultural cropland, with some areas used for open range cattle grazing. The inventory identified approximately 11 USTs, several landfills, the Browning Wastewater Treatment Plant, and two CECRA sites in Browning (Blackfeet Pencil Factory and Blackfeet Post and Pole) in this region, as shown in Figure 5 and summarized in Table 2.

Fertilizers, weed control herbicides and fuels for farm machinery are the primary contaminants of concern in the recharge region. Additional potential contaminants may include contamination from the CECRA sites, or impacts from septic systems and/or the wastewater treatment plant. The location of all of these sites away from the surface water bodies minimizes the potential impact that may occur from related contamination.

Table 2. Significant potential contaminant sources.

Source	Hazard
Spill Response Zone	
Cropped Agricultural Land	Land Application of Animal Waste Spills and Excess Application of Herbicides
Bridges over Cut Bank Creek	Accidental spill of chemicals
Gravel Pit	Provides direct conduit for contamination into ground water, which may then flow into Cut Bank Creek with ground water recharge to the stream
Recharge Area	
County Roads and Highways	Spill or Accident from Transported Chemicals or Fuels
Browning Wastewater Treatment Plant	Release of nitrates and pathogens that may migrate into Cut Bank Creek
Septic Systems	Release of nitrates and pathogens that may migrate into Cut Bank Creek
UST/LUST Sites	Infiltration of fuel VOCs into Cut Bank Creek
CECRA Sites	Infiltration of fuel VOCs into Cut Bank Creek
Gravel Pits and other Mines	Provides direct conduit for contamination into ground water, which may then flow into Cut Bank Creek with ground water recharge to the stream
Cropped Agricultural Land	Land Application of Animal Waste 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 Seville 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 Seville Colony.

CHAPTER 4
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 Seville Colony PWS.

The goal of Source Water Management is to protect the source water by 1) identifying and proposing management strategies for significant potential contaminant sources in the Spill Response Region, and 2) working to help ensure that land use activities in the Watershed Region pose minimal threat to the source water. Management priorities in the Spill Response Region 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 Seville Colony 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 Seville Colony PWS intake (Table 3). Hazard is rated by the proximity of a potential contaminant source to the PWS intake. Susceptibility ratings are presented individually for each significant potential contaminant source and each associated contaminant.

Table 3. Relative susceptibility to specific contaminant sources based on hazard 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

Relative hazards for point sources are assigned based on the potential for contaminants to discharge directly into Cut Bank Creek. A relative hazard level of high is assigned if there is a potential for direct discharge of any nitrate or microbes, or a large amount of other contaminants into the surface water. A moderate hazard is assigned to sources where microbes or nitrates may be discharge into ground water in communication with surface water, or to any other source that has a potential to discharge a small quantity into the source water. A low hazard is assigned to any potential source of microbes or nitrates in the watershed region, and for other sources that may potentially discharge into waters hydraulically connected with the surface water body.

When the location of septic systems are known, they are treated as point sources, with hazards assigned based on the above criteria. For non-point sources, the relative hazard is assigned based on the relative concentration of the sources within the spill response region, based on the criteria in Table 4.

Table 4. Relative Hazard for Potential Non-Point Contaminant Sources

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

There are no barriers identified for any of the potential contaminant sources identified in the spill response region. The results of the susceptibility assessment are summarized in Table 5, with recommended management actions. The results indicate that cropped agricultural land and related activities represent the greatest relative hazard for contamination to the PWS source. The location of the PWS intake away from the central part of the colony provides a measure of protection against potential impacts to water quality from the colony activities.

Table 5. Susceptibility assessment of significant potential contaminant sources.

Source	Contaminant	Hazard	Hazard Rating	Barriers	Susceptibility	Management
Spill Response Zone – Source 002						
County Roads and Highways (Bridge Crossings	Various	Spills	High	None	Very High	Develop emergency response plan for PWS system
Gravel Pit	Various	Direct Conduit to subsurface	Moderate	None	High	Monitor use of chemicals near gravel pit
Cropped Agricultural Land	SOCs/Nitrates	Leaching and Runoff	High	None	Very High	Communicate with upgradient landowner, apply chemicals according to label instructions
Watershed Region						
Septic Systems	Nitrates and Pathogens	Infiltration	Low	None	Moderate	Very low density in watershed area
Browning WWTP	Nitrates and pathogens	Infiltration	Low	None	Moderate	Discharge to ground water away from surface water bodies
Cropped Agricultural Land	SOCs, Nitrates	Infiltration and Runoff	Moderate	None	High	Communicate with upgradient landowner, apply 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.

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.

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.

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