

**LORING COLONY
PUBLIC WATER SYSTEM**

PWS ID No. MT0003524

**SOURCE WATER DELINEATION & ASSESSMENT
REPORT**

PREPARED BY:

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY
SOURCE WATER PROTECTION PROGRAM

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July 2005



EXECUTIVE SUMMARY

This Source Water Delineation and Assessment Report (SWDAR) was prepared as required by the Federal Safe Drinking Water Act, according to a detailed Source Water Assessment Plan developed by a statewide Montana citizens' advisory committee, and approved by the US Environmental Protection Agency. The Department of Environmental Quality (DEQ) is completing assessment and delineation reports for all public water systems in Montana. These reports are intended to provide information so that the public water system staff/operator, consumers, and community citizens can develop strategies to protect drinking water sources. The information provided includes the delineation of the area most critical to maintaining safe drinking water (the inventory region), an inventory of significant potential sources of contamination within this area, and an assessment of the relative threat that these sources pose to the water system.

The Loring Colony's drinking water is supplied by one well. The water source is groundwater. According to the Source Water Protection Program (DEQ, 1999) the source aquifer for the well is considered to have **low sensitivity** to potential contamination, since the aquifer is confined and comprised of consolidated sandstone bedrock.

Three source water protection management areas were mapped for the Loring Colony public water system. They are: the control zone, the inventory region, and the recharge region. The control zone (sometimes called the exclusion zone) is a 100-foot radius circle around the wellhead. The goal of management in the control zone is to avoid introducing contaminants directly into the water supply's well or immediate surrounding areas. The inventory region for a well completed in a confined aquifer is a 1,000-foot radius circle. The recharge region represents the area that will contribute water to the wells over long periods of time. The recharge region is mapped as the Little Cottonwood Creek watershed. Potential sources of contamination were inventoried within the control zone and inventory region, and the results are as follows:

- The colony shops and associated aboveground storage tanks (ASTs) are within the control zone.
- One wastewater lagoon, sewer lines, runoff retention basin, slaughterhouse, poultry barn, kitchen, residences, garden and agricultural land are all located within the inventory region. No irrigated agricultural land was mapped within the inventory region. No other potential contaminant sources were identified in available databases.

Of the identified potential contaminant sources, the Source Water Protection Program has determined that significant potential contaminant sources include the shops and ASTs, lagoon, sewage lines and retention pond, the poultry barn, the slaughterhouse, and other farm buildings.

Contaminant sources are not inventoried within the recharge region. Land use is identified and evaluated. Much of the recharge area is sparsely populated. The recharge region is dominated by agricultural land.

The PWS should contact the driller to obtain a log for the PWS well.

The colony shops and associated ASTs are within the control zone. Secondary containment should be provided for the ASTs, and the tanks should be inspected periodically. Spill prevention planning and countermeasures should be emplaced to prevent discharge to the ground during filling and fueling activities. Vehicle and machine shops are commonly sources of potential contaminants such as fuels, solvents, pesticides, herbicides, and other chemicals. If any of these or other contaminants are used, handled or stored in these areas, great care should be taken to prevent spills or leaks. Secondary containment, such as spill pallets or concrete berms, should be used. Any floor drains in these shops should be sealed and properly abandoned, and the floors should be sealed and maintained in good

condition. Despite the depth to the well intake and the thick confining layers, the hazard posed by the ASTs and shop activities is real, and should be recognized as such.

Low risk potential sources and potential sources located outside the inventory region, but within the recharge region, may still pose a threat over time. These are not considered in this assessment. The susceptibility analysis is intended to provide the operator with information on where the greatest risk occurs. To this end, the assessment is focused on potential contaminant sources that the Source Water Protection Section has determined to be significant. These are detailed in Chapter 4.

The costs associated with contaminated drinking water are high, and prevention is vastly preferable to treatment. Public awareness is a powerful tool for protecting drinking water. The information in this report is intended to help increase public awareness about the relationship between land use activities and drinking water quality.

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1.0 INTRODUCTION

The primary purpose of this source water delineation and assessment report (SWDAR) is to provide information that helps the Loring Colony public water supply (PWS) protect its drinking water sources. The Montana Source Water Protection Program is intended to be a practical and cost-effective approach to protect public drinking water supplies. The Loring Colony PWS is classified as a community PWS, as it serves more than 25 year-round residents.

This Source Water Delineation and Assessment Report is intended to meet the technical requirements for delineation and assessment of the Loring Colony Public Water System as required by the Montana Source Water Protection Program (DEQ, 1999) and the federal Safe Drinking Water Act (SDWA) Amendments of 1996 [U.S. Code Title 42, Chapter 6A, Subchapter XII, Part E, § 300j-13-(a) Source Water Assessment].

Eric Sivers, a hydrogeologist with the Montana Department of Environmental Quality (DEQ) Source Water Protection Section, completed the Loring Colony (PWS ID No. MT0003524) Source Water Delineation and Assessment Report. This report was derived from a draft SWDAR prepared by Bill O'Connell of Montana Rural Water Systems, Inc. (MRWS). This report is attached as Appendix C. Further information on the PWS was obtained from the most recent sanitary survey (August 2002). Additional references are detailed at the end of this report.

2.0 BACKGROUND

The Loring Colony PWS is located in Phillips County in north-central Montana, approximately five miles west of Loring ([Figure 1](#)). According to the Census Bureau, the population of Phillips County in 2000 was 4,601. Approximately 39 persons reside at the Loring Colony.

2.1 PHYSICAL SETTING

2.1.1 Geography and Geology

The PWS lies on the glaciated northern Great Plains, approximately 15 miles south of the Canadian border. This part of Montana is characterized by subdued topography that has been lightly incised by streams since the last glacial maximum. The colony is located in the Milk River watershed, in the Little Cottonwood Creek subbasin. The elevation is approximately 2,485 feet above mean sea level.

Glacial deposits of varying thickness mantle the area. Mapped bedrock in the area consists of two Cretaceous units: the Judith River Formation and the Bearpaw Shale. The Judith River Formation consists of fluvial and marginal-marine deposits of sand, siltstone, mudstone, shale and coal (Condon, 2000). These units were laid down in rivers, estuaries and shorelines that extended across the plains as the Cretaceous Interior Seaway retreated to the east. The Judith River Formation is overlain by the Cretaceous Bearpaw Shale, a shale with minor sandstone beds. The Bearpaw Shale was deposited in a marine environment created when the Cretaceous Interior Seaway transgressed and flooded the former shoreline and plains. These rocks have been uplifted and eroded, and the contact between the Judith River Formation and the Bearpaw Shale is mapped slightly to the west of the colony.

More detailed information on the hydrogeology of the study area is provided in Section 2.1.3.

2.1.2 Climate

Climate in the area is typical of the northern plains of Montana. Annual total precipitation is less than 12 inches, and is most abundant in April through August. The area receives an annual average of 24.5 inches of snow, mainly from October to April. The climate summary for the Loring PWS is based upon records from the climate station 10 miles north of Loring. Climate data is provided by the Western Regional Climate Center, operated by the Desert Research Institute of Reno, Nevada. See Table 1 for additional climate information.

Table 1. Monthly Climate Summary: Loring 10 N Climate Station (245191)

Period of Record: 06/01/1951 to 07/31/1975

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Ave. Max. Temp (F)	17.7	26.7	36.0	53.3	66.9	76.0	83.7	84.2	70.6	59.9	40.0	25.0	53.3
Ave. Min. Temp. (F)	-5.2	3.7	12.5	27.3	37.5	46.2	50.1	48.4	37.9	28.5	14.9	1.8	25.3
Ave Tot. Precip. (in.)	0.37	0.32	0.32	1.04	1.66	2.79	1.86	1.26	0.87	0.53	0.40	0.26	11.67
Ave. Tot. Snowfall (in.)	6.8	4.5	2.9	2.2	0.4	0.0	0.0	0.0	0.0	1.3	2.8	3.5	24.5
Ave Snow Depth (in.)	5	5	4	0	0	0	0	0	0	0	0	1	1

2.1.3 Source Water

No log is available for the PWS well, which was drilled in approximately 2002. This well is reportedly completed in the same interval as the former well, which has since been disconnected from the system. The description of the source water necessarily relies on this assumption and the information provided in the log for the former well, which was obtained through the Montana Bureau of Mines and Geology (MBMG) website.

The well appears to be completed in basal sand deposits of the Cretaceous Judith River Formation. The log suggests that the (former) well is artesian, as the static water level is reported to be at 200 feet below the surface, and the driller reported first water at 408 feet. The well appears to behave as though the aquifer is confined by low-permeability units (siltstone and shale), and therefore the source aquifer is considered to be confined consolidated sandstone bedrock.

2.2 THE PUBLIC WATER SUPPLY

2.2.1 Water Supply System

One well provides groundwater to the system. The well is indicated on [Figure 1](#) and [Figure 2](#). The well transmits water to the distribution system without treatment. The PWS distributes water through six service connections, serving an estimated population of 39. The system includes storage in two 6,100-gallon tanks. The Loring Colony PWS is classified as a community public water system since it serves more than 25 year-round residents.

2.2.2 Supply Well Information

No log was identified for the PWS well. Without this information, it is not possible to determine whether the well is properly sealed to prevent contamination at the wellhead. The most recent sanitary survey reported that the new (~2002) well is completed similar to the former well. A log for the former well is on file with the MBMG, and available through the Ground Water Information Center (GWIC) web site. That well is completed to 480 feet, with slots from 400 to 480 feet. Based on comparisons with available geologic references for the

area (Section 2.1.1), the well is probably completed in the Cretaceous Judith River Formation. The log for the former well is attached as Appendix A.

2.3 WATER QUALITY

Each PWS performs regular sampling of its water supply to detect contamination. The analytical parameters for a community PWS include: coliform bacteria, nitrates, metals, petroleum hydrocarbons, synthetic organic chemicals, and radionuclides. The monitoring schedule depends on factors such as the type of PWS, type of source water (surface water or groundwater), the number of supplies (e.g. wells, springs or intakes), and the population served. Monitoring programs are tailored to each system, following the general protocols defined by DEQ and the US EPA. Monitoring schedules are available online at: <http://nris.state.mt.us/wis/swap/swapquery.asp>. The Loring Colony PWS monitoring data from DEQ's database for the past five years was reviewed and is summarized in this section. Analytical results are reported in units of milligrams per liter (mg/L, equivalent to one part per million) or micrograms per liter ($\mu\text{g/L}$, equivalent to one part per billion). The results are compared to quality standards established by the US EPA. Maximum Contaminant Levels (MCLs) are enforceable standards limiting the amount of a contaminant in drinking water. National Secondary Drinking Water Standards (known as SMCLs) are non-enforceable guidelines regarding contaminants that may cause aesthetic (color, odor, taste) or cosmetic (staining, skin/tooth discoloration) issues.

2.3.1 Public Water Supply Monitoring Results

Coliform bacteria have been detected in the Loring Colony PWS water on three occasions within the past five years (September 2004, August 2001 and February 2001). Nitrate levels have been extremely low, generally below the method detection level (MDL) of 0.05 mg/L. By comparison, the EPA maximum contaminant level (MCL) is 10 mg/L. Dissolved solids are low, with low levels of fluoride (0.26 mg/L). Low levels of radionuclides were detected (gross alpha concentration of 4.5 picoCuries per liter or pCi/L).

The water quality analysis summary report is attached as Appendix B.

2.3.2 Background Water Quality Monitoring Results

Background water quality data was not identified for the subject PWS. Background water quality typically includes general water quality parameters: major dissolved ions (calcium, magnesium, sodium, potassium, iron, manganese, silica, bicarbonate, carbonate, chloride, sulfate, nitrate, fluoride and orthophosphate), trace elements, and metals. Since the PWS does not treat the water, the scheduled monitoring is generally indicative of background water quality.

3.0 MANAGEMENT AREA DELINEATION

This report delineates three source water management areas. The goal of source water management is protection of the source water by 1) controlling activities in the control zone(s), 2) managing significant potential contaminant sources in the inventory region, and 3) ensuring that major land use activities or other significant activities in the recharge region pose minimal threat to the source water. Methods and criteria for delineating source water protection areas for public water supplies are specified in the Montana Source Water Protection Program (DEQ, 1999).

3.1 DELINEATION

Control Zone – A 100-foot radius control zone is delineated around the wellhead.

Inventory Region – The inventory region is generally the area that is expected to contribute to the water supply over three years; this is sometimes referred to as a three-year capture zone. As the aquifer is considered confined, the inventory region is delineated as a 1,000-foot radius circle around the wellhead (DEQ, 1999). This area includes the bulk of the colony facility.

Recharge Region – The recharge area is delineated as the Little Cottonwood Creek watershed. This is considered reasonable for the purposes of this report. However, it should be noted that the deep, confined aquifer is probably regional, and likely extends well beyond the boundaries of the local surface water drainage.

4.0 INVENTORY

Prior to assessing PWS susceptibility to contamination, an inventory of potential contaminant sources must be created. To this end, potential contaminant sources in the control zone and inventory region were inventoried. The inventory focuses on facilities or features that generate, use, store, or transport potential contaminants, as well as certain land uses. The methods and data sources used in the inventory process are explained below. It is important to remember that the sources identified in this section are only potential sources of contamination to the drinking water. Contamination of drinking water sources is less likely when potential contaminants are properly managed.

4.1 INVENTORY METHOD

Information on facilities and land uses that are potential sources of regulated contaminants was obtained from a number of databases. The process for completing the inventory includes the following:

- Step 1: The Montana State Library Natural Resources Information System (NRIS) GIS database was queried to identify septic land application sites, wastewater treatment plants, animal feeding operations, septic system density, sewer systems, and agricultural land uses.
- Step 2: The DEQ PWS files were reviewed to identify agricultural activities or wastewater treatment in the vicinity of the PWS.
- Step 3: The US Environmental Protection Agency's (EPA) Envirofacts System <<http://www.epa.gov/enviro/>> was queried to identify EPA-regulated facilities located in the management areas. This system accesses facilities listed in the following databases: Resource Conservation and Recovery Information System (RCRIS), Biennial Reporting System (BRS), Toxic Release Inventory System (TRIS), and Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) and the Permit Compliance System (PCS - for Concentrated Animal Feeding Operations with MPDES permits). The available reports were browsed for facility information including the Handler/Facility Classification to be used in assessing whether a facility should be classified as a significant potential contaminant source.
- Step 4: Montana DEQ databases were queried to identify any of the following in the management areas:

Underground storage tanks (USTs) and leaking underground storage tanks (LUSTs) <<http://www.deq.state.mt.us/UST/USTDownloads.asp>>

Hazardous waste contaminated sites, above ground storage tanks (ASTs), landfills, and abandoned and active mines, including gravel pits <<http://nr.is.state.mt.us/gis/bundler/>>

Any information on past releases and present compliance status was noted.

Potential contaminant sources are considered significant if they fall into one or more of the following categories:

1. Large quantity hazardous waste generators.
2. Landfills.
3. Underground storage tanks.
4. Known groundwater contamination (including open or closed hazardous waste sites, state or federal Superfund sites, and leaking UST sites).
5. Underground injection well.
6. Major roads or rail transportation routes.
7. Cultivated cropland exceeding 20% of the inventory region.
8. Animal feeding operations.
9. Wastewater treatment facilities, sludge handling sites, or land application areas.
10. Septic systems.
11. Sewer mains.
12. Storm sewer outflows.
13. Abandoned or active mines

4.2 INVENTORY RESULTS

4.2.1 Control Zone Inventory Results

Bill O'Connell noted that the colony shops and the associated ASTs are within the control zone. Vehicle and machine shops are commonly sources of potential contaminants such as fuels, solvents, pesticides, herbicides, and other chemicals.

4.2.2 Inventory Region Results

Point Sources: No point sources were identified in the databases. The inventory was completed using the MRWS report, the most recent sanitary survey, and available aerial photographs. Identified point sources of contaminants include three aboveground storage tanks (gasoline, diesel and farm diesel) located next to the shop buildings, the sewage lagoon, the poultry barn, the dairy stockyard and associated retention pond, the slaughterhouse, and other farm buildings.

Nonpoint Sources: The colony gardens and surrounding crop-fallow farmland are considered nonpoint sources of potential contaminants.

These features were not indicated on [Figure 2](#), as the operator and the colony community is intimately familiar with the facility. The PWS' susceptibility to these potential contaminant sources will be assessed in Section 5, and presented in Table 2.

4.2.3 Recharge Region Results

Contaminant sources are not inventoried within the recharge region. However, land use patterns are identified and evaluated. Land use within the recharge region is dominated by crop-fallow agriculture and grazing land.

5.0 SUSCEPTIBILITY ASSESSMENT

Susceptibility is the degree of likelihood for a public water supply to be impacted by inventoried contaminant sources. Susceptibility is determined in accordance with the DEQ Source Water Protection Program (DEQ, 1999). This guidance document is available on the DEQ Source Water Protection website (see the Reference section), or by request.

Susceptibility is determined by considering the *hazard* that a significant potential contaminant source presents to the PWS source water, relative to any *barriers* to the contaminant. Hazard is determined

by the proximity or density of significant potential contaminant sources, according to a formula laid out in the Source Water Protection Program (DEQ, 1999). Barriers to contamination are anything that decreases the likelihood of contaminants reaching a water source. Two natural barriers are identified for the PWS: depth to the well intake and thick confining layers.

Inventory results and management recommendations for the Loring Colony PWS are provided in Table 2. As the Loring Colony facility comprises the entire inventory region, the colony is in the fortunate position of being able to manage all identified potential contaminant sources.

Table 2. Susceptibility Assessment of Significant Potential Contaminant Sources

Potential Contaminant Source	Potential Contaminants	Exposure Pathway	Hazard	Barriers	Susceptibility	Management Recommendations
<i>Control Zone</i>						
Shop Buildings	VOCs, SOCs	Spills or leaks of fuels, solvents, pesticides, or herbicides	High	Depth to intake, confining layers	Moderate	Secondary containment, such as spill pallets or concrete berms, should be used. Any floor drains in these shops should be sealed and properly abandoned, and the floors should be sealed and maintained in good condition
<i>Inventory Region</i>						
ASTs	VOCs	Release of petroleum hydrocarbons to soil and groundwater	High	Depth to intake, confining layers	Moderate	Secondary containment should be used. Spill prevention planning and countermeasures should be used to prevent discharge of fuel to ground while filling and discharging from tanks. Tanks should be periodically inspected for evidence of leaks.
Shops and farm equipment buildings	VOCs, SOCs	Release of petroleum hydrocarbons and organic chemicals to soil and groundwater	High	Depth to intake, confining layers	Moderate	Secondary containment, such as spill pallets or concrete berms, should be used. Any floor drains in these shops should be sealed and properly abandoned, and the floors should be sealed and maintained in good condition
Wastewater lagoon, sewer lines, dairy runoff retention pond	Pathogens, nitrate (NO ₃)	Nitrate and pathogens leaching into groundwater	Moderate	Depth to intake, confining layers	Low	Lagoons and retention ponds should be properly lined to prevent infiltration. Sewer lines should be periodically tested to maintain integrity.
Animal confinement and processing areas: poultry barn, dairy stockyard, slaughterhouse	Pathogens, nitrate (NO ₃)	Nitrate and pathogens leaching into groundwater	Moderate	Depth to intake, confining layers	Low	Floors and other surfaces should be sealed to prevent infiltration of animal wastes and blood. Runoff from washing these areas should not be allowed to infiltrate.
<i>Other Potential Contaminant Sources, not rated significant</i>						
Garden, agricultural land	Nitrate (NO ₃), SOCs	Nitrate loading of groundwater, pesticides, herbicides leaching to groundwater	Low	Depth to intake, confining layers	Very Low	Apply all fertilizers and pesticides sparingly and according to manufacturers' instructions.

6.0 LIMITATIONS

This Source Water Delineation and Assessment Report is intended to meet the technical requirements for delineation and assessment of the Loring Colony Public Water System (PWS) as required by the Montana Source Water Protection Program (DEQ, 1999) and the federal Safe Drinking Water Act (SDWA) Amendments of 1996 [U.S. Code Title 42, Chapter 6A, Subchapter XII, Part E, § 300j-13-(a) Source Water Assessment]. The following limitations should be noted:

- Not every potential or existing source of contamination in the Loring Colony area has been identified. Consideration was limited to potential sources of contamination that are within the inventory region and of a type determined by the DEQ to be significant.
- Potential sources of contamination were identified using available databases, reports and overhead and map imagery. The author did not conduct field surveys and inspections of the inventory region. It is highly recommended that the operator or other persons knowledgeable about the colony review the inventory, and revise it as necessary.
- The inventory region was delineated on the basis of a 1,000-foot radius circle. The Source Water Protection Program has determined that this is an appropriate inventory region for a PWS tapping a confined aquifer. This is intended to provide a starting point for the purposes of source water assessment, and detailed field investigations would be beyond the scope of this report.
- The potential contaminant sources described in the inventory are identified from readily available information, as described in Chapter 4. Consequently, unregulated activities or unreported contaminant releases may have been overlooked. Multiple data sources are used to increase the likelihood that major threats to the source water are identified. The inventory is not exhaustive. Absence of a potential contaminant in the inventory or susceptibility assessment of this report does not mean that the potential for contamination does not exist, or that there is no threat.
- This report is not, and should not be construed as, a guarantee, warranty or certification that the PWS will not be impacted by potential contaminant sources given a low or moderate susceptibility.

7.0 CONCLUSIONS

The Loring Colony's drinking water is supplied by one well. The water source is groundwater. According to the Source Water Protection Program (DEQ, 1999) the source aquifer for the well is considered to have **low sensitivity** to potential contamination, since the aquifer is confined and comprised of consolidated sandstone bedrock.

Three source water protection management areas were mapped for the Loring Colony public water system. They are: the control zone, the inventory region, and the recharge region. The control zone (sometimes called the exclusion zone) is a 100-foot radius circle around the wellhead. The goal of management in the control zone is to avoid introducing contaminants directly into the water supply's well or immediate surrounding areas. The inventory region for a well completed in a confined aquifer is a 1,000-foot radius circle. The recharge region represents the area that will contribute water to the wells over long periods of time. The recharge region is mapped as the Little Cottonwood Creek watershed. Potential sources of contamination were inventoried within the control zone and inventory region, and the results are as follows:

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Contaminant sources are not inventoried within the recharge region. Land use is identified and evaluated. Much of the recharge area is sparsely populated. The recharge region is dominated by agricultural land.

The PWS should contact the driller to obtain a log for the new well.

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The costs associated with contaminated drinking water are high, and prevention is vastly preferable to treatment. Public awareness is a powerful tool for protecting drinking water. The information in this report is intended to help increase public awareness about the relationship between land use activities and drinking water quality.

8.0 REFERENCES

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9.0 GLOSSARY

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 non-point source pollution.

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.

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 inhibits the flow of water and maintains the pressure of the groundwater in the aquifer. The physical properties of a confining unit may range from a five-foot thick clay layer to shale that is hundreds of feet thick.

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.

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

Large Capacity Septic System. Defined by Underground Injection Control regulations as an on-site septic system serving 20 or more persons.

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

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. Examples of nonpoint- source pollution include agriculture, forestry, and run-off from city streets. Nonpoint sources of pollution, such as the use of herbicides, can

concentrate low levels of these chemicals into surface and/or groundwaters 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 a fixed facility from which pollutants are discharged. This includes any single identifiable source of pollution, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fracture, container, rolling stock (tanker truck), or vessel or other floating craft, from which pollutants are or may be discharged.

Pollutant. Generally, any substance introduced into the environment that adversely affects the usefulness of a resource (e.g. groundwater used for drinking water).

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

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

Sensitivity. The relative ease with which contaminants can migrate to source water through the natural materials

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

Source Water Delineation and Assessment Report (SWDAR). A report for a public water supply that delineates source water protection areas, provides 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 groundwater sources, the area within a fixed radius or three-year travel time from a well, and the land area where the aquifer is recharged.

Static Water Level (SWL). Water level 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.

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.

Turbidity. The cloudy appearance of water caused by the presence of suspended matter.

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

Watershed. The region drained by, or contributing water to, a stream, lake, or other water body of water.

FIGURES

APPENDIX A

WELL LOG & PWS SANITARY SURVEY

APPENDIX B

WATER QUALITY ANALYTICAL RESULTS

APPENDIX C

MRWS DRAFT SWDAR

APPENDIX D

CONCURRENCE LETTER