TOWN OF MEDICINE LAKE

PUBLIC WATER SYSTEM

PWS ID No. MT0000289

SOURCE WATER DELINEATION & ASSESSMENT REPORT

PREPARED BY:

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Montana Department of Environmental Quality

Source Water Protection

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 Town of Medicine Lake's drinking water is now supplied by the newly constructed regional water system. However, the DEQ's Source Water Protection Section decided that it would be prudent to prepare a SWDAR for the former Medicine Lake PWS sources, in the event they are maintained on a contingency basis. This report, therefore, refers to the groundwater source (Well 4) that the PWS used prior to connecting to the regional water system.

According to the Source Water Protection Program (DEQ, 1999) the source water aquifer is considered to have **low sensitivity** to potential contamination, since the source aquifer is confined and relatively deep.

As part of this assessment, three types of source water protection management areas were identified for the Town of Medicine Lake public water system. They are: the control zone, the inventory region, and the recharge region. The inventory region was delineated as a 1,000-foot fixed radius circle, due to the deep and confined nature of the source aquifer. Potential sources of contamination were inventoried within these three regions and the results are as follows:

- No potential sources of contamination were identified within the control zones. 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 control zones are delineated as circles of 100-foot radius around the wellheads. All sources of potential contaminants should be excluded from the control zones.
- The majority of the inventory region includes an in-town residential neighborhood. One underground storage tanks (UST) and leaking UST (LUST) site was identified in the inventory region (Herman Oil, Inc.). The DEQ Petroleum Release Section database reports that this site is currently active. More than 50% of the inventory region is sewered. Greater than 40% of the inventory region is cropped agricultural land.
- The recharge region is sparsely populated. Septic system density away from the town is low. The dominant agricultural uses in the recharge region are crop-fallow and irrigated cropland.

Coliform bacteria have not been detected in the Town of Medicine Lake PWS water within the past five years. Nitrate has been detected at concentrations well below the MCL of 10 mg/L. Fluoride has been detected at 1.55 mg/L, below the MCL of 4 mg/L. Sulfate has been detected at a low concentration of 4 mg/L. Combined radium has been detected at 2.6 pCi/L (picoCuries per liter), below the regulatory limit of 5 pCi/L. Arsenic was detected at 0.009 mg/L in June 2004. This is just under the soon-to-be enacted MCL of 10 mg/L (rather than 50 mg/L).

A number of disinfection byproducts (DBPs) were detected in the 2003 and 2004 sampling events (bromodichloromethane, bromoform, chlorodibromomethane, chloroform and trihalomethanes). The

MCL for total trihalomethanes (0.08 mg/L) was slightly exceeded in the June 2004 sample (85 µg/L, equivalent to 0.085 mg/L). MCLs are not established for the other detected DBPs.

The DEQ's Source Water Protection Section recognizes the following potentially significant contaminant sources within the Well 4 inventory region: municipal sanitary sewers, irrigated cropland, and the UST/LUST site. Low risk potential sources and potential sources located outside the inventory region, but within the region that contributes recharge to the aquifer may still pose a threat over time, but are not considered in this assessment. The susceptibility analysis is intended to provide the operator with information on where the greatest risk occurs.

The costs associated with contaminated drinking water are high, and prevention is preferable to treatment. Public awareness is a powerful tool for protecting drinking water. The information in this report will 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 Town of Medicine Lake 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 Town of Medicine Lake PWS is classified as a community PWS, as it serves more than 25 year-round residents. This report addresses the groundwater sources that the Medicine Lake PWS utilized prior to connecting to the regional water system, in anticipation that they may be maintained as contingency sources.

This Source Water Delineation and Assessment Report is intended to meet the technical requirements for delineation and assessment of the Town of Medicine Lake 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 Town of Medicine Lake (PWS ID No. MT0000289) Source Water Delineation and Assessment Report. Information on the PWS was obtained from the most recent sanitary survey (April 2003). Additional references are detailed at the end of this report.

2.0 BACKGROUND

The Town of Medicine Lake is located in Sheridan County in northeastern Montana, approximately 25 miles south of Plentywood, and east of the Fort Peck Indian Reservation. The location is illustrated in Figure 1. According to the Census Bureau, the population of Sheridan County in 2000 was 4,105. Approximately 357 persons reside in Medicine Lake.

2.1 PHYSICAL SETTING

2.1.1 Geography and Geology

The PWS sits on the glaciated plains of northern Montana. Medicine Lake is at the northern edge of the Big Snowy Mountains. The community is located east of Interstate 90, and south of Bridger Creek.

The PWS sits on Tertiary stream sediments of the Fort Union Formation, ranging from sand to silt and clay. These sediments are mantled by Quaternary glacial till.

2.1.2 Climate

Climate in the area is typical of northeastern Montana. Annual total precipitation is 13.3 inches, and occurs in April through September. The area receives an annual average of 26 inches of snow, mainly from November to April. The climate summary for the Medicine Lake PWS is based upon records from the climate station at Hobson, approximately 10 miles west of Medicine Lake. 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: Medicine Lake Climate Station (245572)
Period of Record: 01/01/1911 to 12/31/2004

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Ave. Max. Temp (F)	19.5	26.2	37.7	56.0	68.6	76.8	84.3	83.7	71.7	58.5	38.4	25.9	54.0
Ave. Min. Temp. (F)	-3.1	2.9	14.4	29.3	40.7	49.8	54.2	52.2	41.8	30.8	16.3	4.3	27.8
Ave Tot. Precip. (in.)	0.37	0.31	0.44	1.00	1.76	3.03	2.20	1.45	1.26	0.72	0.39	0.34	13.29
Ave. Tot. Snowfall (in.)	5.7	4.1	4.5	2.7	0.2	0.0	0.0	0.0	0.1	0.9	3.5	4.8	26.4
Ave Snow Depth (in.)	6	6	4	0	0	0	0	0	0	0	1	2	2

2.1.3 Source Water

According to the well log, the well derives water from a confined sand and gravel layer. This aquifer is confined by the overlying shales and siltstones of the Tertiary Fort Union Formation. The aquifer is most likely recharged through regional infiltration of precipitation and some stream loss from surface waters. Medicine Lake probably provides additional recharge that may compensate for pumping at the supply wells.

According to the Source Water Protection Program (DEQ, 1999) the source water aquifer for the wells is considered to have **low sensitivity** to potential contamination, since the source aquifer is confined and relatively deep.

2.2 THE PUBLIC WATER SUPPLY

2.2.1 Water Supply System

One well (Well 4) provides groundwater to the system, and one other well (Well 3 Emergency) is maintained as an emergency backup. Additionally, two inactive wells are recorded for the PWS. If these wells have not been properly abandoned, it is highly recommended that this be done. The PWS distributes water through 165 service connections. An above ground storage tank provides approximately one day of reserve supply. The Town of Medicine Lake PWS is classified as a community public water system since it serves more than 25 year-round residents.

2.2.2 Supply Well Information

One well (Well 4) provides water to the PWS. The well was drilled in 1997. Well 4 is 216 feet deep and yields 325 gallons per minute. The well is grouted with cement from grade to 190 feet below grade, and is cased from grade to 204 feet below grade. The well is screened in coarse sand and gravel and 'rocks' from 204 to 214 feet below grade. A two-foot section of casing provides a sump from 214 to 216 feet below grade. The static water level is reported to be 25 feet below grade, with a pumping water level of 57 feet below grade. Well 3 Emergency provides a backup supply, but no details were available.

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, and synthetic organic chemicals. The monitoring schedule depends on factors such as the type of PWS, type of source water, the number of supplies (e.g. wells or springs), 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 Town of Medicine Lake 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 (µg/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

This summary is limited to water quality data from prior to September 2004, when the PWS was connected to the regional water system.

Coliform bacteria have not been detected in the Town of Medicine Lake PWS water within the past five years. Nitrate has been detected at concentrations well below the MCL of 10 mg/L. Fluoride has been detected at 1.55 mg/L, below the MCL of 4 mg/L. Sulfate has been detected at a low concentration of 4 mg/L. Combined radium has been detected at 2.6 pCi/L (picoCuries per liter), below the regulatory limit of 5 pCi/L. Arsenic was detected at 0.009 mg/L in June 2004. This is just under the soon-to-be enacted MCL of 10 mg/L (compared to the expiring MCL of 50 mg/L).

A number of disinfection byproducts (DBPs) were detected in the 2003 and 2004 sampling events (bromodichloromethane, bromoform, chlorodibromomethane, chloroform and trihalomethanes). The MCL for total trihalomethanes (0.08 mg/L) was slightly exceeded in the June 2004 sample (85 µg/L, equivalent to 0.085 mg/L). MCLs are not established for the other detected DBPs.

The water quality results are 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.

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, 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 each of the wellheads. Ideally, all sources of potential contaminants would be excluded from these areas.

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. All potentially signification contaminant sources are inventoried in these regions. In this case, the inventory region for the wells is delineated as a 1,000-foot fixed-radius circle around each wellhead.

This method was chosen due to the confined nature of the source aquifer. The delineated inventory region is illustrated on Figure 2.

Recharge Region – The recharge region is the area that contributes water to the source aquifers. The recharge region for the Town of Medicine Lake PWS is likely to roughly correspond to the upgradient areas of the plains. Recharge to the aquifer is probably from infiltration of rain and snowmelt, augmented by stream loss.

4.0 INVENTORY

Significant potential contaminant sources in the source water management areas were inventoried to assess the susceptibility of the Town of Medicine Lake PWS source water to contamination, and to provide a foundation for source water protection planning. The inventory for the PWS focuses on facilities or features that generate, use, store, or transport potential contaminants, as well as certain land uses in the inventory and recharge regions. 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) <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://nris.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.
7. Cultivated cropland exceeding 20% of

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.

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

No significant potential sources of contamination were identified within the 100-foot radius control zones. As a blanket statement, the control zone should be isolated from traffic and passers-by, and drainage should be maintained away from the wellheads.

4.2.2 Inventory Region Results

One active UST/LUST facility was identified in the inventory region (Appendix C). Greater than 50% of the inventory region is mapped as sewered. A moderate percentage of the inventory region is irrigated agricultural land. Some commercial and industrial development is present in the inventory region, including the UST facilities mentioned above. This may include other types of businesses that use, generate, transport or store regulated or hazardous materials. A state highway passes through the inventory region.

Of the identified potential contaminant sources, the Source Water Protection Program has determined that **significant** potential contaminant sources are limited to: the sanitary sewers, the UST/LUST site and the irrigated agricultural land. The PWS' susceptibility to these potential contaminants will be assessed in Section 5, and presented in Table 2.

4.2.3 Recharge Region Results

The recharge region inventory is limited to certain land uses; PWS susceptibility to these uses is not assessed. Agriculture is prevalent in the recharge region, both irrigated and crop-fallow. Septic system density is low.

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 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. The Medicine Lake PWS is credited with two natural barriers: depth to the aquifer, and thick confining layers.

Inventory results and management recommendations for the Town of Medicine Lake well are provided in Table 2.

Table 2. Susceptibility Assessment of Significant Potential Contaminant Sources

Potential Contaminant Source	Potential Contaminants	Hazard	Hazard	Barriers	Susceptibility	Management Recommendations
Inventory Region						
Municipal Sewer Lines	Pathogens, nitrate (NO_3)	Ongoing or catastrophic leakage of sewage	Very high	Depth to aquifer Confining layers	Moderate	Ongoing inspection and maintenance with rehabilitation or replacement of existing sewer mains if necessary. Use sewer main liners. Develop rapid response plan for leaks or ruptures.
Agricultural Land: Cropland and grazing lands	NO_3 and SOCs from fertilizer, pesticides and herbicides. Pathogens from pastures.	Contaminants leaching into groundwater	Very high	Depth to aquifer Confining layers	Moderate	Encourage awareness of how human activities may impact source water. Encourage BMPs.
USTs and LUSTs	VOCs	Release of petroleum hydrocarbons to soil and groundwater	Moderate	Depth to aquifer Confining layers 1998 upgrades, site cleanup, groundwater monitoring	Very low	Review permit status; ensure proper operation and maintenance, emergency planning, training of local emergency response personnel, spill prevention, and BMPs. Properly abandon and remove tanks if out-of-service. Encourage soil testing to evaluate potential impact from historic spills or leaks.
Septic Systems	Pathogens, nitrate (NO_3)	System failure could result in discharge of untreated effluent	Low	Depth to aquifer Confining layers	Very low	Encourage septic system owners to periodically inspect their septic systems.
Other Potential Contaminant Sources, not rated significant						
Commercial or industrial users, transporters, and generators of hazardous materials	Petroleum products, maintenance products, VOCs, SOCs and others	Spills or leaks of chemicals used	Very low	Depth to aquifer Confining layers	Very low	Protect areas from fuel or other chemical spills. Maintain sealed concrete floors. Ensure proper chemical and waste use, storage, and disposal/recycling. Ensure good housekeeping.
Transportation corridors	Fuels, chemicals, VOCs, SOCs	Spills, spraying	Very low	Depth to aquifer Confining layers	Very low	Become acquainted with emergency response procedures. Encourage agencies to reduce weed spraying along corridors.
Recharge Region						
Agricultural Land: Cropland and grazing lands	NO_3 and SOCs from fertilizer, pesticides and herbicides. Pathogens from pastures.	Contaminants leaching into groundwater	Not assessed	Not assessed	Not assessed	Encourage BMPs.

6.0 LIMITATIONS

This Source Water Delineation and Assessment Report is intended to meet the technical requirements for delineation and assessment of the Town of Medicine Lake 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 groundwater or surface water contamination in the Town of Medicine Lake 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.
- The inventory region was delineated on a 1,000-foot fixed radius of the wellheads. This is unlikely to coincide with a three-year capture zone for the wells. However, given their reduced sensitivity to potential contaminant sources, this delineation method has been determined to be appropriate for confined aquifers.
- 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.

7.0 CONCLUSIONS

The Town of Medicine Lake's drinking water is now supplied by the newly constructed regional water system. However, the DEQ's Source Water Protection Section decided that it would be prudent to prepare a SWDAR for the former Medicine Lake PWS sources, in the event they are maintained on a contingency basis. This report, therefore, refers to the groundwater source (Well 4) that the PWS used prior to connecting to the regional water system.

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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

PWS SANITARY SURVEY & WELL LOG

Montana Bureau of Mines and Geology
Ground-Water Information Center Site Report
MEDICINE LAKE CITY

Plot this site on a topographic map

Location Information

GWIC Id:	170354	Source of Data:	LOG
Location (TRS):	32N 55E 25 ADC	Latitude (dd):	48.4977
County (MT):	SHERIDAN	Longitude (dd):	-104.5021
DNRC Water Right:		Geomethod:	TRS-TWN
PWS Id:		Datum:	NAD27
Block:	7X	Altitude (feet):	
Lot:	5	Certificate of Survey:	
Addition:	CITY MEDICINE LAKE	Type of Site:	WELL

Well Construction and Performance Data

Total Depth (ft):	216.00	How Drilled:	ROTARY
Static Water Level (ft):	25.00	Driller's Name:	AGRI
Pumping Water Level (ft):	57.60	Driller License:	WWC537
Yield (gpm):	325.00	Completion Date (m/d/y):	6/17/1997
Test Type:		Special Conditions:	
Test Duration:	24.00	Is Well Flowing?:	
Drill Stem Setting (ft):		Shut-In Pressure:	
Recovery Water Level (ft):		Geology/Aquifer:	Not Reported
Recovery Time (hrs):	0.00	Well/Water Use:	PUBLIC WATER SUPPLY
Well Notes:			

Hole Diameter Information

From	To	Diameter
0.0	216.0	12.0

Casing Information[1]

From	To	Dia	Wall Thickness	Pressure Rating	Joint	Type
-2.0	204.0	8.0				STEEL
214.0	216.0	8.0				STEEL

Annular Seal Information

From	To	Description
0.0	190.0	CEMENT

Completion Information[1]

From	To	Dia	# of Openings	Size of Openings	Description
204.0	214.0	8.0			STAINLESS STEEL SCREEN

Lithology Information

From	To	Description
0.0	21.0	TILL YELLOW SILTY
21.0	53.0	SAND FINE MED
53.0	102.0	CLAY GRAY SILTY SAND
102.0	120.0	SAND MED FINE CLAY LENSES
120.0	174.0	CLAY GRAY SILTY
174.0	198.0	TILL GRAY
198.0	204.0	SAND MED FINE
204.0	213.0	SAND & GRAVEL COARSE
213.0	214.0	ROCKS
214.0	218.0	CLAY STONE GRAY
218.0	229.0	LIGNITE
229.0	240.0	SANDSTONE GRAY

[1] - All diameters reported are **inside** diameter of the casing.

APPENDIX B

WATER QUALITY ANALYTICAL RESULTS

APPENDIX C

UST / LUST DATABASE SEARCH RESULTS

APPENDIX D

CONCURRENCE LETTER