

THOMSON MOBILE HOME PARK PUBLIC WATER SUPPLY

PWS ID No. MT0000037

SOURCE WATER DELINEATION & ASSESSMENT REPORT

PREPARED BY:

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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 Thomson Mobile Home Park's drinking water is supplied by two wells. The water source is groundwater. According to the Source Water Protection Program (DEQ, 1999) the source aquifer for the wells is considered to have **high sensitivity** to potential contamination, since the aquifer is unconfined Quaternary alluvial sand and gravel.

As part of this assessment, three types of source water protection management areas were mapped for the Thomson Mobile Home Park public water system. They are: the control zone, the inventory region, and the recharge region. Control zones (sometimes called exclusion zones) are 100-foot radius circles around the wellheads. 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 corresponds to an estimated three-year capture zone. The recharge region represents the area that will contribute water to the wells over long periods of time. This is mapped as the upgradient extent of unconsolidated deposits, to the foot of the Gallatin Range. Potential sources of contamination were examined within the control zone and inventory region and the results are as follows:

- No potential sources of contamination were identified within the control zones. The control zones are delineated as circles of 100-foot radius around the wellheads.
- No UST/LUST facilities were identified in the inventory region. The Thomson Mobile Home Park includes a sanitary sewer system. Several gravel pits are present in the inventory region. The portion of the inventory region closest to the PWS is mapped as moderate septic system density. Greater than 20% of the inventory region is agricultural land. Of the identified potential contaminant sources, the Source Water Protection Program has determined that significant potential contaminant sources include septic systems, the agricultural land, and the gravel pits.

Contaminant sources are not inventoried within the recharge region. Land use patterns are identified and evaluated. The recharge area includes much of the Bozeman micropolitan area. This includes residential subdivisions, agricultural land, and commercial and industrial land uses. The density of residential land use is expected to increase.

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, however. 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.

Mitigating and managing potential sources of contamination identified within the inventory region are often beyond the scope of what an operator of a relatively small PWS may accomplish. The SWP section

recommends that whenever possible, the operator should illustrate to residents the potential hazards associated with the onsite septic systems, and the need for regular maintenance.

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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- Appendix B – Water Quality Analytical Results
- Appendix C – Groundwater Time-of-Travel Estimates
- Appendix D – Monitoring Waiver Recommendations
- Appendix E – Concurrence Letter

1.0 INTRODUCTION

The primary purpose of this source water delineation and assessment report (SWDAR) is to provide information that helps the Thomson Mobile Home Park 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 Thomson Mobile Home Park PWS is classified as a community PWS, as it serves more than 25 year-round residents.

Eric Sivers, a hydrogeologist with the Montana Department of Environmental Quality (DEQ) Source Water Protection Section, completed the Thomson Mobile Home Park SWDAR. Information on the PWS was obtained from the most recent sanitary survey (2001) and other DEQ files. Additional references are detailed at the end of this report.

2.0 BACKGROUND

The Thomson Mobile Home Park is located in Gallatin County in southwestern Montana, approximately 1½ miles southeast of Belgrade ([Figure 1](#)). According to the Census Bureau, the population of Gallatin County in 2000 was 67,831. Approximately 70 persons reside in the Thomson Mobile Home Park.

2.1 PHYSICAL SETTING

2.1.1 Geography and Geology

The PWS lies in the middle of the Gallatin Valley, near the town of Belgrade. The elevation is approximately 4,500 feet above mean sea level.

The Gallatin Valley extends over roughly 520 square miles of southwestern Montana. The valley is bounded by the Horseshoe Hills to the north, the Gallatin and Madison ranges to the south, the Bridger range to the east, and the Western Three Forks Valley to the west (Kendy and Tresch, 1996). The valley is drained by the Gallatin River and its tributaries.

The valley is an east-tilted graben (a downdropped fault block). Precambrian rocks probably floor the valley, but the majority of the basin is filled with Tertiary sedimentary rocks, over which Quaternary alluvium was deposited. The mountains surrounding the basin are composed of metamorphic, sedimentary and igneous bedrock. The bedrock is generally less permeable than the unconsolidated basin sediments, although fractures or carbonate dissolution features create significant local flow conduits.

The subdivision is situated on alluvial deposits of the Belgrade braid plain. These sediments were deposited by the Gallatin River during the last glacial period. At this time, the river was significantly larger than at present, and was a braided river carrying a very large sediment load, spread over a wide plain. The alluvial deposits are bouldery gravel and sand, up to 800 feet thick in the Belgrade area. This unit provides the source material for the gravel pits around Belgrade (Lonn and English, 2002).

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 intermontane valleys in southwestern Montana. The climate summary is based upon data from the Belgrade climate station, which is located at a lower elevation than the PWS. Annual total precipitation is 14.1 inches, and is most abundant in May and June. The area receives an annual average of 47 inches of snow, mainly from

October to May. 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: Belgrade Climate Station (240622)

Period of Record: 01/02/1941 to 12/31/2005

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Ave. Max. Temp (F)	29.3	35.1	42.5	54.7	64.3	73.0	84.1	82.8	70.4	58.6	41.6	32.4	55.7
Ave. Min. Temp. (F)	5.3	11.6	18.3	28.7	37.0	43.9	48.8	47.5	38.5	29.3	17.8	9.1	28.0
Ave Tot. Precip. (in.)	0.61	0.46	0.93	1.31	2.24	2.56	1.15	1.13	1.36	1.04	0.76	0.57	14.11
Ave. Tot. Snowfall (in.)	8.5	5.6	9.1	6.0	2.3	0.0	0.0	0.0	0.6	2.3	5.6	7.2	47.1
Ave Snow Depth (in.)	4	3	2	0	0	0	0	0	0	0	1	2	1

2.1.3 Source Water

The hydrogeology of the Gallatin Valley is broadly described in Hackett *et al.*, (1960), and is summarized in this discussion. According to Hackett, within the Gallatin Valley are two primary aquifer systems: a shallow Quaternary alluvial system, and underlying Tertiary deposits. The Quaternary alluvial system fills a valley eroded into the Tertiary beds during pre-modern times. The total thickness of the Tertiary strata in the Gallatin Valley may exceed 4,000 feet, based on exploratory drilling for oil (Hackett *et al.*, 1960). The Quaternary alluvial aquifer includes relatively coarse sand and gravel deposited in the floodplain of the Gallatin River and its tributaries, including the East Gallatin River. This aquifer is unconfined and in direct communication with the surface waters in the Gallatin River drainage system. The aquifer system within the Tertiary strata is considered semi-confined due to the thick clay sequences present in some areas. Tertiary sediments are exposed in the Camp Creek Hills that separate the Madison and Gallatin drainages.

Recent geologic mapping (summarized in Lonn and English, 2002) has shown that the importance and relative abundance of the Quaternary deposits was overstated. The Quaternary is better characterized as a time of downcutting and minimal deposition, compared to significant deposition that occurred within the Tertiary Period. One of the major reinterpretations of the Gallatin Valley geology is that the 'Bozeman fan' is actually an erosional surface cut into Tertiary sediments, rather than a depositional surface of Quaternary alluvial fan deposits.

The PWS wells are developed in alluvial deposits of the Belgrade braid plain (Qab). As described above, these deposits consist of bouldery gravel and sand, and are a significant local aquifer, as well as a commercial source of sand and gravel. This aquifer is unconfined.

2.2 THE PUBLIC WATER SUPPLY

2.2.1 Water Supply System

Two wells provide groundwater to the system. The locations of these sources are indicated on [Figure 1](#) and [Figure 2](#). The PWS distributes water through 29 service connections. The wells transmit water to the distribution system without treatment. The Thomson Mobile Home Park PWS is classified as a community public water supply since it serves more than 25 year-round residents. Estimating that each resident uses 100 gallons per day, the estimated daily demand is 7,000 gallons per day.

2.2.2 Supply Well Information

The North Well was drilled in 1973, and is 81 feet deep. The well is reportedly screened from 49 to 56 feet below grade, or ftbg). The well is 8 inches in diameter. The well is grouted with cement to 15 ftbg. Well 1 yields 70 gallons per minute (gpm).

The South Well was drilled in 1983, and is 91 feet deep. The well is screened from 76 to 86 ftbg. The well is grouted with cement to 36 ftbg. Well 2 has a static water level of 34.1 ftbg, and yields 155 gpm. After 24 hours of pumping at this rate, the pumping water level was reported to be 34.7 ftbg.

Construction details for the wells are provided on the well logs. The log for the North Well is illegible, and details were taken from sanitary survey forms, which are 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 Thomson Mobile Home Park 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 Thomson Mobile Home Park PWS water on several occasions within the past five years, although neither *E. coli* nor fecal coliform have been detected. Nitrate levels are below 1 mg/L, with the maximum reported concentration in the period reviewed of 0.74 mg/L, from the South Well. Dissolved solids are low, with low levels of barium (0.1 mg/L) and fluoride (0.13 mg/L) reported. Radionuclides (gross alpha and radium) were not detected. In general, the water quality appears to be high.

The water quality analysis summary reports 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. The inorganic results reported above are generally suggestive of the 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 each of the sources. Ideally, all sources of potential contaminants would be excluded from these areas, and they would be isolated from passers-by, traffic, pets, livestock and wildlife. Weed control and other gardening activities should be carefully evaluated to limit impact to the wellheads. Surface drainage should be directed away from the wellheads.

Inventory Region – The inventory region is generally the area that is expected to contribute water to the water supply over three years; this is sometimes referred to as a three-year capture zone. All potentially significant contaminant sources are inventoried in these regions. The time-of-travel distance was estimated according to DEQ protocol for the limited data provided on well logs. Using the information available for the South Well, the three-year time-of-travel distance is over 50 miles. This value is meaningless for practical protection purposes, and it extends beyond the limits of the aquifer. Therefore, the inventory region is delineated using data from a nearby PWS with wells completed in the same aquifer (Qab). The estimated three-year time-of-travel distance for that PWS is 7,300 feet (Appendix C). The calculations involve numerous assumptions and estimates, and the actual capture zone may be larger or smaller than the delineated inventory region.

Recharge Region – The recharge area is the full upgradient extent of the aquifer from which the PWS draws water. It is delineated as the extent of Tertiary and Quaternary deposits between the PWS and the foot of the Gallatin Range ([Figure 3](#)).

4.0 INVENTORY

Significant potential contaminant sources in the source water management areas were inventoried to assess the susceptibility of the Thomson Mobile Home Park 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://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

No significant potential sources of contamination were identified within the 100-foot radius control zones.

4.2.2 Inventory Region Results

Point Sources: No USTs, LUSTs, spills or other point sources were identified within the inventory region. Information on the wastewater system serving the trailer park is unavailable. It is either one or more large capacity septic systems serving multiple trailers, or individual tanks and drainfields at each trailer. The former is more likely; such septic systems are considered point sources.

Nonpoint Sources: The portion of the inventory region closest to the PWS is mapped as an area of moderate septic system density. Irrigated agricultural land is present over greater than 20% of the inventory region. Multiple gravel pits are present within the inventory region. Some of the pits are active operations while others are inactive and closed. Some of the inactive gravel pits fill with water seasonally or permanently showing the pits have intercepted the water table or the top of a shallow unconfined aquifer. These pits are areas where ground water flows out of the aquifer and is exposed at the land surface before flowing back into the aquifer. The concern with gravel pits is that they often become sites for illegal dumping and waste disposal. Hazardous material stored or illegally dumped into the pits can be transported into the aquifer as the water flows through the pit, and as a consequence, the gravel pits can under some circumstances pose a serious threat to a shallow aquifer and to the source water. Additionally, stripping overburden from the gravel deposits removes fine-grained and organic soil that would attenuate or slow infiltration of spilled materials.

Of the identified potential contaminant sources, the Source Water Protection Program has determined that significant potential contaminant sources are limited to the sanitary sewer lines and the cropped 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

Contaminant sources are not inventoried within the recharge region. However, land use patterns are identified and evaluated. The recharge area includes much of the Bozeman

micropolitan area. This includes suburban and exurban subdivisions, agricultural land, and commercial and industrial land uses. The density of residential land use is expected to increase.

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. No barriers are identified for the PWS.

Inventory results and management recommendations for the Thomson Mobile Home Park PWS are provided in Table 2. In some cases the management recommendations are fairly site-specific and can be implemented by the public water supply. However, other management options can only be implemented by federal, state, county or local governmental entities. When the latter options are mentioned, it is not implied or suggested that this public water supply should lead or spearhead the effort to implement the management option. It is assumed that representatives from this public water supply would participate in the public process sponsored by various governmental entities to develop and implement any of these management options.

Table 2. Susceptibility Assessment of Significant Potential Contaminant Sources

Potential Contaminant Source	Potential Contaminants	Hazard	Hazard	Barriers	Susceptibility	Management Recommendations
<i>Inventory Region</i>						
Septic systems	Pathogens, nitrate (NO ₃)	System failure could result in discharge of untreated effluent	Moderate	None	High	Encourage septic system owners in PWS community to properly maintain their septic systems. Participate as a stakeholder in local water quality discussions.
Irrigated agricultural land	Nitrate (NO ₃), VOCs, SOCs	Nitrate loading of aquifer, spills of chemicals or fuels	Moderate	None	High	Participate as a stakeholder in local water quality discussions.
Gravel pits	Pathogens, VOCs, SOCs	Illegal dumping or surface runoff introducing contamination to groundwater	Low	None	Moderate	Be aware of the potential for contamination, and encourage local vigilance against illegal dumping. Participate as a stakeholder in local water quality discussions.
<i>Other potential contaminant sources, not considered significant</i>						
Roads	VOCs, SOCs	Spills, wrecks	Very low	None	Low	Have local emergency responder contact information readily available.

These ratings are derived from the procedures established by the DEQ Source Water Protection Program (DEQ, 1999). The 'high' susceptibility ratings are probably conservative, particularly in light of the low nitrate concentrations. The aquifer is highly transmissive, and considerable dilution of contaminants is likely to occur in the event of a release. The susceptibility rating is not a prediction of contamination. Instead, it identifies the most likely sources of contaminants, so that these may be managed and problems may be prevented.

6.0 LIMITATIONS

This Source Water Delineation and Assessment Report is intended to meet the technical requirements for delineation and assessment of the Thomson Mobile Home Park 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 contamination in the Thomson Mobile Home Park 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 online databases and available overhead and map imagery. Field surveys and inspections of the inventory region were not conducted. It is highly recommended that the operator or other persons knowledgeable about the community review the inventory, and revise it as necessary.
- The inventory region was delineated on the basis of a basic groundwater time-of-travel estimate. The calculation required estimating a number of hydrogeologic parameters, and the margin of error is significant.
- 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 Thomson Mobile Home Park's drinking water is supplied by two wells. The water source is groundwater. According to the Source Water Protection Program (DEQ, 1999) the source aquifer for the wells is considered to have **high sensitivity** to potential contamination, since the aquifer is unconfined Quaternary alluvial sand and gravel.

As part of this assessment, three types of source water protection management areas were mapped for the Thomson Mobile Home Park public water system. They are: the control zone, the inventory region, and the recharge region. Control zones (sometimes called exclusion zones) are 100-foot radius circles around the wellheads. 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 corresponds to an estimated three-year capture zone. The recharge region represents the area that will contribute water to the wells over long periods of time. This is mapped as the upgradient extent of unconsolidated deposits, to the foot of the Gallatin Range. Potential sources of contamination were examined within the control zone and inventory region and the results are as follows:

- No potential sources of contamination were identified within the control zones. The control zones are delineated as circles of 100-foot radius around the wellheads.
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Mitigating and managing potential sources of contamination identified within the inventory region are often beyond the scope of what an operator of a relatively small PWS may accomplish. The SWP section recommends that whenever possible, the operator should illustrate to residents the potential hazards associated with the onsite septic systems, and the need for regular maintenance.

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 LOGS & PWS SANITARY SURVEY

APPENDIX B

WATER QUALITY ANALYTICAL RESULTS

APPENDIX C

GROUNDWATER TIME-OF-TRAVEL ESTIMATES

APPENDIX D

MONITORING WAIVER RECOMMENDATIONS

MONITORING WAIVERS

Waiver Recommendation

The PWS currently has a waiver for Phase II inorganic (barium, cadmium, chromium, fluoride, mercury and selenium), in addition to those granted to all PWSs statewide. Diquat, endothall, glyphosate, dioxins, ethylene dibromide (EDB), dibromochloropropane (DBCP), polychlorinated biphenyls (PCBs), cyanide and asbestos (at the source) are excluded from monitoring requirements by statewide waivers.

The monitoring history suggests the PWS may be eligible for a Phase V inorganic (antimony, thallium, beryllium and nickel) waiver. Under these waivers, the monitoring schedule for these parameters is reduced to every nine years, rather than every three years. VOC and SOC waivers are not appropriate in this setting.

The PWS must be in compliance with monitoring requirements to be considered. Written waiver requests must be sent to DEQ at the address below:

Greg Butts
Montana DEQ, PWS Section
109 Cooperative Way
Suite 105
Kalispell, MT 59901

Upon receipt of a waiver request, DEQ will review the system's compliance history, historical monitoring results and source water setting. If waivers are considered appropriate, DEQ will provide the operator with application forms, guidance and technical assistance. If requested by DEQ, the PWS may also need to provide additional information regarding chemical use in the area within the Inventory Region. A site visit will be required to further investigate VOC and SOC use within the inventory region.

Monitoring Waiver Requirements

Use Waivers

A Use Waiver may be granted if it is determined that target organic chemicals were/are not used, manufactured, or stored in the area of a water source. The residential and industrial landuses and roads within the inventory region preclude use waivers for VOCs and SOCs

Susceptibility Waivers

If a Use Waiver is not granted, a system may be eligible for a Susceptibility Waiver, if it is demonstrated that the water source would not be susceptible to contamination. The purpose of the vulnerability assessment procedures outlined in this section is to determine which of the organic chemical contaminants are in the area of investigation. The area of investigation corresponds to the inventory region.

Given the wide range of landforms, land uses, and the diversity of groundwater and surface water sources across the state, additional information is often required during the review of a waiver application. Additional information may include well logs, pump test data, water quality monitoring data from surrounding public water systems, delineation of zones of influence and contribution to a well; time-of-travel or attenuation studies; vulnerability mapping; and the use of computerized groundwater flow and transport models. DEQ's PWS Section and Source Water Protection Program will conduct review of an organic chemical monitoring waiver application. Other state agencies may be asked for assistance.

APPENDIX E

CONCURRENCE LETTER