Whispering Pines Trailer Court
Public Water System
(PWS # MT 0001851)

Source Water Assessment

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EXECUTIVE SUMMARY

This Source Water Delineation and Assessment Report (SWDAR) was prepared under the requirements and guidance of the Federal Safe Drinking Water Act and the US Environmental Protection Agency, as well as a detailed Source Water Assessment Plan developed by a statewide citizen's advisory committee here in Montana. The Department of Environmental Quality (DEQ) is conducting these assessments for all public water systems in Montana. The purpose is to provide information so that the public water system staff/operator, consumers, and community citizens can begin developing strategies to protect your source of drinking water. The information that is provided includes the identification of the area most critical to maintaining safe drinking water, i.e., the Inventory Region, an inventory of potential sources of contamination within this area, and an assessment of the relative threat that these potential sources pose to the water system.

As part of this assessment, three types of source water protection management areas were mapped for the Whispering Pines Trailer Court public water system. They are: the control zone, the inventory region, and the recharge region. Potential sources of contamination were identified within each of these three regions and the results are as follows:

- No potential contaminant sources were located in the control zone. The control zone is delineated as a 100-foot radius around the wells and all sources of significant potential contaminants should be excluded in this region.
- Significant potential contaminant sources identified within the inventory region include: septic lines and drainfields. The inventory region should be managed to prevent contaminants from reaching the well before natural processes reduce their concentrations. The inventory region was delineated based on a 1,000 foot radius around the wellhead.
- Potential contaminant sources identified within the recharge region include: a St. Regis sewer, and private and large capacity septic systems. The goal of management in the recharge region is to maintain and improve water quality over long periods of time or increased usage.

The Whispering Pines Trailer Court public water supply has a high susceptibility to the following potential contaminant sources: onsite septic systems and moderate risk from the sewer lines and other septic systems. Low risk potential sources and potential sources located outside the Inventory Region, but within the Recharge Region such as the wrecking yard may still pose a threat over time, but are not discussed in detail in this assessment. This provides a quick look at the existing potential sources of contamination that could, if improperly managed or released, impact the source water for Whispering Pines Trailer Court. The susceptibility analysis provides the community and the public water system with information on where the greatest risk occurs and where to focus resources for protection of this valuable drinking water resource.

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.

INTRODUCTION

This Source Water Delineation and Assessment Report (SWDAR) was prepared for the Whispering Pines Trailer Court Public Water Supply (PWS) located in Mineral County. It was completed by Jeff McCleary with assistance from Joe Meek of the Source Water Protection Program at the Department of Environmental Quality (DEQ) and intern Bethany Haines. Much of the technical aspects of the report are based on work completed for the Cougar Meadows and St. Regis School Source Water Protection Plan.

PURPOSE

The primary purpose of this source water delineation and assessment report is to provide information that helps the Whispering Pines Trailer Court protect its drinking water sources. A major component of the Montana Source Water Protection Program is '*delineation and assessment*'. Delineation is the process of identifying areas that contribute water to aquifers or surface water bodies used as drinking water supplies. The delineated areas are referred to as source water protection areas. Assessment involves identifying and inventorying potential sources of contamination within the source water protection areas, and then determining the potential for contamination of drinking water by these sources. This report is intended to meet the technical requirements for the completion of a source water delineation and assessment report for the Whispering Pines Trailer Court 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 (Public Law 104-182). The Montana Source Water Protection Program is intended to be a practical and cost-effective approach to protect public drinking water supplies from contamination.

LIMITATIONS

This report was prepared to assess threats to Whispering Pines Trailer Court's public water supply, and is based on published information and information obtained from local residents familiar with the community. The terms '*drinking water supply'* or '*drinking water source'* refer specifically to the source of the Whispering Pines Trailer Court public water supply, and not to any other public or private water supply. Also, not all potential or existing sources of groundwater or surface water contamination in the vicinity of the Whispering Pines Trailer Court public water supply are identified. Potential sources of contamination are considered only in areas that contribute water to the source of the public water supply.

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

CHAPTER 1
BACKGROUND

THE COMMUNITY

Whispering Pines Trailer Court is located approximately 1 mile north of St. Regis, Montana, and west of the Clark Fork River. The Whispering Pines Trailer Court public water supply provides water for 16 service connections that serve homes for 22 persons. The economic base of Mineral County is supported largely by private businesses, which account for over half of the total revenue generated in the county. Manufacturing industries and federal, state, and local government are also major revenue contributors. Wastewater from Whispering Pines Trailer Court is handled by a large capacity septic system.

GEOGRAPHIC SETTING

Whispering Pines Trailer Court is located in western Montana near the Idaho border. It is situated in the Clark Fork River Valley, west of the river and southeast of the town of St. Regis (Figure 1). The Clark Fork River runs through a northwest trending intermontane basin, which is one of several parallel valleys in this part of Montana. The Clark Fork River Valley around Whispering Pines Trailer Court appears to be bounded by the Bitterroot Mountains to the west and the Coeur d'Alene Mountains to the east. The Clark Fork River drains a large watershed that receives water from the Flathead River, Saint Regis River, Beaverhead River, Bitterroot River, and Blackfoot River drainages.

CLIMATE

The climate in this area is a modified Pacific maritime climate that is typical of low elevation intermontane basins found in the Northern Rocky Mountains west of the continental divide. Generally, the area experiences warm summers and cool, humid winters. Historic climatic data for the Saint Regis Ranger Station is presented in Table 1 below. Average annual precipitation is approximately 20.22 inches and average annual snowfall is 55.7 inches.

Table 1. Period of Record Monthly Climate Summary

Saint Regis Ranger Station (247318) 10/21/1960 to 12/31/2003

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	33.5	40.3	49.3	59.1	68.6	77.0	85.8	86.1	74.7	59.4	41.7	33.2	59.1
Average Min. Temperature (F)	18.1	21.0	25.0	30.4	36.0	42.9	45.3	44.1	37.2	30.3	25.1	19.4	31.3
Average Total Precipitation (in.)	2.39	1.74	1.54	1.46	1.69	1.77	1.05	1.17	1.30	1.60	2.20	2.32	20.22
Average Total Snow Fall (in.)	11.0	10.3	7.5	0.4	0.0	0.0	0.0	0.0	0.0	0.1	9.1	17.3	55.7
Average Snow Depth (in.)	7	6	2	0	0	0	0	0	0	0	1	4	2

Taken from Western Regional Climate Center, wrcc@dri.edu

GEOLOGIC AND HYDROGEOLOGIC SETTING

This section provides an overview of the geology and hydrology of the Whispering Pines Trailer Court area and is based on a primarily on a geologic map of the area by Lonn and McFaddan (1999) and the well logs for the Whispering Pines Trailer Court PWS well and well log available from the Montana Bureau of Mines and Geology (MBMG) Ground-Water Information Center (GWIC). A regional geologic map is provided in Figure 2. The geology of the area can be used to determine the locations, boundaries, and hydraulic properties of local aquifers. An understanding of hydrogeologic conditions also provides an explanation for the sensitivity of local aquifers to potential contaminant sources.

The land surface is gently sloping to the southeast. The lateral extent of the aquifer is defined by the bedrock valley walls comprised of faulted Proterozoic sedimentary rocks of the Belt super-group (Ywl, Yr) juxtaposed against Tertiary (Tgc) sedimentary deposits (Lonn 1999, Figure 2). Recharge to the deeper aquifer occurs through the fractured bedrock and Tertiary sediments that border the alluvial slope and through leakage from the overlying sediments (MBMG, 1999).

The Whispering Pines Trailer Court ’s wells are completed in deep sand and gravels that are separated from the water table aquifer by two separate clay units. The deep aquifer has been characterized as semi-confined to leaky confined, but for the purposes of this report considered confined. The aquifer has artesian pressure that results in an upward gradient of groundwater flow from the deep aquifer to the shallow sand and gravel above the confining units of clay. The exact stratigraphy of the well is unclear because the driller grouped clay, sand and gravel as one unit (MBMG, 1999).

The surficial alluvial deposits (Qal) on the lower portion of the alluvial slope range in thickness from 50 to 90 feet. They lay uncomformably on Glacial Lake Missoula Flood deposits (Qgl). The thickness of the Glacial Lake Missoula deposits is unknown as most wells only on the east side of the Clark Fork River indicate a thickness of the deposits between 300 to 400 feet. Geologic mapping by Lonn (1999) has identified faulted Proterozoic Belt rocks and Tertiary sands and gravels comprising the hills that surround the area. Many faults are present in the area, but the main structure, which cuts through the St. Regis area, is the Boyd Mountain Fault illustrated in Figure 2. Movement along the Boyd Mountain fault created a basin that was infilled with Tertiary sediments. This fault is connected with a larger network of regional structures, including the Osbourne Fault, that were responsible for the faulting and deformation that created the mountain\landscape surrounding St. Regis (MBMG, 1999).

GENERAL DESCRIPTION OF THE SOURCE WATER

Whispering Pines Trailer Court is located in the Clark Fork river Valley. The primary aquifers in the Clark Fork River Valley are found within the following groups of materials: metasedimentary rocks of the Middle Proterozoic Belt Supergroup, which surround the area and make up the bedrock of the mountains; undifferentiated Tertiary valley fill sediments that probably underlie a portion of the basin (beneath the younger Quaternary alluvial sediments); stratified Quaternary glacial lake Missoula lakebed sediments; and younger Quaternary alluvium and glacial outwash deposits. Figure 2 is a geologic map depicting the distribution of surficial geologic units around Cougar Meadows. Domestic wells in the area almost exclusively draw water from the Clark Fork River Valley sediments or from the sediments that line the larger stream valleys. The shallow alluvial sediments along the river in the Clark Fork River Valley often contain a shallow water table aquifer (unconfined aquifer). This shallow unconfined aquifer exchanges water with the river and is subject to seasonal and yearly water level fluctuations. Taken together, fine-grained low conductivity layers appear to act as confining units, and these confining units are present above and interspersed between numerous water bearing layers. The confining units appear in area well logs anywhere from a few feet to 60 feet bgs. Specific stratigraphic unit(s) or water bearing zones that were laterally continuous across the area could not be clearly identified, but the aquifer beneath Whispering Pines Trailer Court acts confined. So, for the purposes of this SWDAR, the lower aquifer will be considered to be under confined conditions.

PUBLIC WATER SUPPLY

The Whispering Pines Water Supply serves 16 service connections with 22 year-round residents. The Whispering Pines Trailer Court is classified as a community public water supply because they serve 25 or more persons per day year-round or has 15 or more service connections. Water demand is approximately 2,200 gallons per day assuming 100 gallons per day per residnet (EPA, 1991). The well is located inside the pump house near the entrance of the trailer court.

The well log for the well describes the well as being drilled to a depth of 91 feet and has a six inch steel casing that extends to the depth of the well with an open bottom. The static water level for this well is 65 below ground surface and the pumping water level is 68 below ground surface. No annular seal information is available for this well. The lithology of the well describes layers of sand, gravel and clay alluvial material typical of the area. Groundwater flow direction is most likely downhill toward and generally following the flow of the Clark Fork River.

WATER QUALITY

Every PWS is required to perform regular sampling of their water supply to detect any contamination. The analytical parameters include: coliform bacteria and other pathogenic organisms, nitrates, metals, petroleum hydrocarbons, and other organic chemicals. The monitoring schedule depends on factors such as the size and source water of a PWS, the number of supplies (e.g. wells), and the population served. Each PWS has a specific monitoring program tailored to their system that follows the general protocols defined by DEQ for operation of a PWS. PWS monitoring schedules are available at: <http://nris.state.mt.us/wis/swap/swapquery.asp>.

The system has had no health violations in the last five years. Health based violations are issued when the amount of contaminant in the treated drinking water exceeds the safety standard (maximum

contaminant level or MCL), or water was not treated properly. The system does have several monitoring violations for not sampling on schedule.

Other compounds detected during Two Rivers Mobile Park's water sampling over the past five years include nitrite + nitrate (0.17 to 0.23 mg/L (milligrams per liter)). The compounds detected are all below established EPA primary maximum contaminant levels (MCLs). National secondary drinking water standards (SMCLs) are non-enforceable guidelines that may affect the aesthetic quality of water (i.e. odor, color, etc.) and are not health standards.

CHAPTER 2
DELINEATION

This report delineates three source water management areas. The goal of source water management is protecting 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.

CONCEPTUAL MODEL AND ASSUMPTIONS

Whispering Pines Trailer Court's production wells are located in the Lower Clark Fork watershed (USGS Hydrologic Unit Code 17010204), which is located within Montana's West Slope watershed (Heath, 1984). As detailed above, Whispering Pines Trailer Court's drinking water source is interpreted to be from an aquifer in Glacial Lake Missoula Flood deposits. The direction of groundwater flow beneath the site is presumed to be toward the Clark Fork River (MBMG, 1999). The aquifer is semi-confined to confined (varies with location) and recharge to the wells is primarily from infiltration of surface water and precipitation through the overlying sand and gravel.

As the aquifer is confined in the Whispering Pines Trailer Court area, it is considered to have **Low Source Water Sensitivity** to contamination. Sensitivity is defined as the degree of ease with which contaminants may migrate to the source water aquifer. This determination is according to the DEQ Source Water Protection Program criteria for ranking aquifer sensitivity (DEQ 1999).

DELINEATION

Methods and criteria for delineating source water protection areas are specified in the Montana Source Water Protection Program (DEQ, 1999). The delineated management zones for the wells are shown on Figure 3.

Control Zone – A 100-foot radius control zone is delineated for Whispering Pines Trailer Court's wells. All sources of potential significant contaminants should be excluded in this region.

Inventory Region – The method was modified from DEQ's Source Water Protection Program criteria for community water systems PWS (DEQ, 1999); the inventory zone was delineated based on a one thousand foot radius circle around the wells. This method was used due to the uncertain nature of ground water flow in the semi-confined to leaky confined aquifer and the relatively rural nature of the setting. A more definitive delineation could not be completed with available information and a larger inventory region would not likely be more protective of public health. All sources of potential contaminants are inventoried in this region.

Recharge Region –The recharge region for the Whispering Pines Trailer Court wells includes Clark Fork Valley material upgradient (southeast) of the PWS wells. In general, the materials mapped by Lonn and Berg (1999) as shown in Figure 2. The upgradient extent of the recharge region was limited to approximately the peaks of the nearby mountains. The goal of management in the recharge region is to maintain and improve the long-term quality of groundwater in the aquifer.

LIMITING FACTORS

Delineation of the source water protection areas for the Whispering Pines Trailer Court PWS wells is based on a simplified approach. The interaction of surface water (especially the canal) with the bedrock

aquifer is not understood and the changes in the flow regime under seasonal conditions are not known. The delineation was completed using conservative assumptions to help ensure that the inventory zone reflects the actual area where contamination to the system may occur.

CHAPTER 3
INVENTORY

INVENTORY METHOD

Significant potential contaminant sources in the source water management areas were inventoried to assess the susceptibility of Whispering Pines Trailer Court's proposed well to contamination, and to provide a foundation for source water protection planning. The inventory for Whispering Pines Trailer Court 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 sites and areas 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 used and managed.

The inventory focus is slightly different in each of the delineated management areas. The inventory for Whispering Pines Trailer Court focuses on all activities in the control zones for the wells; certain types of facilities and land uses in the inventory region; potential sources of nitrates and pathogens in the surface water buffer; and general land uses and large facilities in the Recharge Region. Information on facilities and land uses that are potential sources of regulated contaminants was obtained from a number of databases, described below. The process for completing the inventory included several steps, which are summarized as follows:

Step 1: Urban and agricultural land uses were identified from the U.S. Geological Survey's (USGS) Geographic Information Retrieval and Analysis System <http://nris.state.mt.us/gis/datalist.html>. Sewered and unsewered residential land uses were identified from boundaries of sewer coverage obtained from municipal wastewater utilities.

Step 2: 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 (TRI), 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 3: 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.

Step 4: Major road and rail transportation routes were identified throughout the inventory region: <http://nris.state.mt.us/gis/gisdatalib/gisDataList.aspx>.

Potential contaminant sources are designated to be 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

CONTROL ZONE INVENTORY RESULTS

The control zone includes the Whispering Pines Trailer Court pump house, and entry road. The PWS should be vigilant to ensure that potential sources of contamination are excluded from the control zone and that positive drainage away from the well casing is maintained.

INVENTORY REGION RESULTS

The inventory results for Whispering Pines Trailer Court's source water are summarized in Table 2 and are shown on Figure 3. Whispering Pines Trailer Court utilizes at least one large capacity septic system for waste disposal. The septic system is considered large capacity septic system since they serve 20 or more people per day. The septic lines, tanks, and drainfields are a potential source of contamination if a break or leak were to occur.

Land uses within the inventory region include primarily undeveloped forest and grassland. Septic system density within the inventory region is low and is not considered a risk to the PWS drinking water at this time. Additional point sources of potential pollutants (such as businesses or facilities listed on regulatory databases) were not identified in the inventory region.

Table 2. Summary of Potential Contaminant Sources in the Inventory Region

Source Type	*Potential Contaminants*	*Description/Concern*
Land Use Cover (Step 1)		
Large Capacity Septic System	Ongoing or catastrophic leakage of sewage into groundwater	If not properly designed, installed, and maintained, septic lines can be a point source of residential and commercial effluent in groundwater.
EPA Envirofacts Sites (Step 2)		
None Identified		
DEQ Databases (Step 3)		
None Identified		
Miscellaneous Others, including Step 4		
None Identified		

Notes: Individual sites identified are evaluated in Chapter 4.

RECHARGE REGION INVENTORY RESULTS

According to the 1992 National Land Cover dataset, the primary land uses in the recharge region are forest, grassland, residential, and agricultural. The percentage of agricultural land is considered a low risk to the drinking water supply. Grasslands or forests are not considered potential sources of contamination unless there are significant grazing operations in the area. The St. Regis sewer, private and large capacity septic systems all are considered potential sources of contamination if a accident were to occur. Additional sources of potential pollutions (such as businesses or facilities listed on regulatory databases) were not identified in the recharge region.

INVENTORY UPDATE

To make this SWDAR a useful document for the years to come, the certified water system operator should review the inventory every year. Changes in land uses or potential contaminant sources should be noted and additions made as appropriate. The complete inventory should be submitted to DEQ every five years to ensure the source water delineation and assessment remains current.

INVENTORY LIMITATIONS

This Source Water Delineation and Assessment Report is intended to meet the technical requirements for delineation and assessment 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 source of contamination to the PWS well has been identified. Consideration was limited to potential sources of contamination within the inventory region. Additionally, sources of contaminants that are not regulated for were not inventoried or assessed.
- No site inspection was performed, and the inventory was developed from available sources of information, including DEQ files and NRIS.
- The potential contaminant sources described in the inventory are identified from readily available information. Consequently, unregulated activities or unreported contaminant releases may have been overlooked. The inventory is not exhaustive.
- Some 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.

CHAPTER 4
SUSCEPTIBILITY ASSESSMENT

HAZARD DETERMINATION

The threat of contamination is referred to as *hazard*. The degree of hazard is determined either by the proximity of a potential contaminant source to a spring or well intake, potential contaminant migration pathways, or by the density of potential non-point contaminant sources.

DISCUSSION OF SUSCEPTIBILITY

Susceptibility is the degree of likelihood for a public water supply to be impacted by inventoried contaminant sources, at concentrations that would pose a concern. Susceptibility is assessed to prioritize potential pollutant sources for local management, in this case the Whispering Pines Trailer Court PWS managers and operators. Alternative management approaches that could be used by the PWS managers and operators to reduce susceptibility are recommended in this chapter.

Susceptibility is determined by considering the hazard rating for each potential contaminant source relative to any contaminant barriers. Barriers to contamination are anything that decreases the likelihood that contaminants will reach a spring or well. Barriers can be engineered structures, management actions, or natural conditions. Examples of engineered barriers include spill catchment structures and leak detection for underground storage tanks. Emergency planning and best management practices (BMPs) are considered management barriers. Thick clay-rich soils, a deep water table or a thick unsaturated zone above the well intake are examples of natural barriers. Barriers identified for the wells are clay layer, and thick unsaturated zone.

A summary of the susceptibility assessment for Whispering Pines Trailer Court production well is provided in Table 4. This table only includes the potential contaminant sources (identified in Chapter 3) that were determined to present a significant potential risk to the drinking water supply. Therefore, this list is not exhaustive, and it is highly recommended that the PWS operator and community members familiar with the nature of businesses and land use in the area enhance the inventory through further research and local input.

MANAGEMENT RECOMMENDATIONS

It should be noted that even small releases of some chemicals in close proximity to a public water supply well can have significant negative impact on water quality, and therefore are a significant threat to the public water supply. Steps can be taken to reduce the likelihood of releases in the source water for the PWS or in the vicinity of the sources. Management recommendations for protecting the Whispering Pines Trailer Court drinking water supply are detailed in the susceptibility table (Table 3). If these, and other, management recommendations are implemented; they may be considered additional barriers that will reduce the susceptibility of the intake to specific sources and contaminants.

Table 3. Susceptibility Assessment of Significant Potential Contaminant Sources

Potential Contaminant Source	Potential Contaminants	Hazard	Hazard Rating	Barriers	Susceptibility	Management Recommendations
Inventory Region.						
Whispering Pines Trailer Court's Large Capacity Septic System	Pathogens, nitrates	Ongoing discharge or catastrophic leakage of sewage	***High***	Clay layers overlie the aquifer Thick Unsaturated Layer	***Moderate***	Properly operate and maintain the on-site septic system and distribution lines. (For large capacity septic systems, see attached Fact Sheet – Appendix B).
Recharge Region						
St. Regis Sewer, private and large capacity septic systems	Pathogens, nitrates	Ongoing discharge or catastrophic leakage of sewage	***Moderate***	Clay layers overlie the aquifer Thick unsaturated Layer	***Low***	Ensure proper operation and maintenance of onsite wells especially sampling schedule.

Notes: VOCs - Volatile organic compounds (i.e. solvents, fuel components) SOCs - Synthetic Organic Compounds (i.e. pesticides, herbicides, plasticizers)
UST - Underground Storage Tank LUST - Leaking Underground Storage Tank
BMPs - Best Management Practices DEQ- Montana Department of Environmental Quality
RR – Recharge Region

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Western Regional Climate Center Montana Climate Summaries. wrcc@dri.edu

GLOSSARY

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

Alkalinity. The capacity of water to neutralize acids.

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

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

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

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

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

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

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

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

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

Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS). A database that provides information about specific sites through the EPA Envirofacts website.

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.

Glacial. Of or relating to the presence and activities of ice or glaciers. Also, pertaining to distinctive features and materials produced by or derived from glaciers.

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

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

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

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

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

Hydrogeology. The study of geologic formations and how they effect groundwater flow systems.

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.

Lacustrine. Pertaining to, produced by, or formed in a lake or lakes.

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

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

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

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

Montana Pollutant Discharge Elimination System (MPDES). A permitting system that utilizes a database to track entities that discharge wastewater of any type into waters of the State of Montana.

National Pollutant Discharge Elimination System (NPDES). A national permitting system that utilizes a database to track entities that discharge wastewater into waters of the United States.

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.

Phase II (and IIb) Rules. EPA updated or created legal limits on 38 contaminants. The rules became effective July 30, 1992 and January 1, 1993. Some of these contaminants are frequently-applied agricultural chemicals such as nitrate and others are industrial solvents.

Phase V Rule. EPA set standards for 23 contaminants in addition to those addressed by the Phase II Rules. The Phase V Rule became effective January 17, 1994. Some of these contaminants include inorganic chemicals such as cyanide and other Phase V contaminants are pesticides that enter water supplies through run-off from fields where farmers have applied them or by leaching through the soil into groundwater. Six are probable cancer-causing agents. Others can cause liver and kidney damage, or problems of the nervous system and brain.

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).

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

Public Water System (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 elevation in a well when the pump is operating.

Recharge Region. An area in which water is absorbed that eventually reaches the zone of saturation in one or more aquifers. As a source water management region, the term generally describes the entire area that could contribute water to an aquifer used by a public water supply. Includes areas that could contribute water over long time periods or under different water usage patterns.

Resource Conservation and Recovery Act (RCRA). Enacted by Congress in 1976. RCRA's primary goals are to protect human health and the environment from the potential hazards of waste disposal, to conserve energy and natural resources, to reduce the amount of waste generated, and to ensure that wastes are managed in an environmentally sound manner.

Resource Conservation and Recovery Information System (RCRIS). Is a database that provides information about specific sites through the EPA Envirofacts website.

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

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

Source Water. Any surface water, spring, or 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.

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

Standard Industrial Classification (SIC) Code. A method of grouping industries with similar products or services and assigning codes to these groups.

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

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

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

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

Total Maximum Daily Load (TMDL). The total pollutant load to a surface water body from point, nonpoint, and natural sources. The TMDL program was established by section 303(d) of the Clean Water Act to help states implement water quality standards.

Toxicity. The quality or degree of being poisonous or harmful to plants, animals, or humans.

Toxicity Characteristic Leachate Procedure. A test designed to determine whether a waste is hazardous or requires treatment to become less hazardous.

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

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

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.

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

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

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

* With the exception of the definitions for Lacustrine, Phase II and Phase V Rules, and Standard Industrial Classification Code, definitions were adapted from EPA's Term References System (formerly known as Glossary of Selected Terms and Abbreviations) which can be found at: http://www.epa.gov/trs/index.htm . The definitions of glacial and lacustrine were taken from the Glossary of Geology by Robert L. Bates and Julia A. Jackson.

The definitions for Phase II and Phase V Rules were adapted from:
http://www.epa.gov/OGWDW/source/therule.html#PhaseII
http://www.epa.gov/OGWDW/source/therule.html#PhaseV

The definition for Standard Industrial Classification Code was adapted from:

Appendix A
Well Log

Montana Bureau of Mines and Geology
Ground-Water Information Center Site Report
WHISPERING PINES TRAILER COURT

Plot this site on a topographic map

Location Information

GWIC Id:	73625	Source of Data:	LOG
Location (TRS):	18N 27W 19 BADC	Latitude (dd):	47.3102
County (MT):	MINERAL	Longitude (dd):	-115.0842
DNRC Water Right:		Geomethod:	MAP
PWS Id:	01851002	Datum:	NAD27
Block:		Altitude (feet):	
Lot:		Certificate of Survey:	
Addition:		Type of Site:	WELL

Well Construction and Performance Data

Total Depth (ft):	91.00	How Drilled:	CHURN
Static Water Level (ft):	65.00	Driller's Name:	KANE
Pumping Water Level (ft):	68.00	Driller License:	WWC023
Yield (gpm):	30.00	Completion Date (m/d/y):	9/9/1971
Test Type:	BAIL/PUMP	Special Conditions:	
Test Duration:	3.00	Is Well Flowing?:	
Drill Stem Setting (ft):		Shut-In Pressure:	
Recovery Water Level (ft):		Geology/Aquifer:	112ALVM
Recovery Time (hrs):		Well/Water Use:	PUBLIC WATER SUPPLY
Well Notes:			

Hole Diameter Information

From	To	Diameter
0.0	91.0	6.0

Casing Information[1]

From	To	Dia	Wall Thickness	Pressure Rating	Joint	Type
0.0	91.0	6.0				

Annular Seal Information

No Seal Records currently in GWIC.

Completion Information[1]

From	To	Dia	# of Openings	Size of Openings	Description
91.0	91.0	6.0			OPEN BOTTOM *

Lithology Information

From	To	Description
0.0	55.0	GRAVEL & CLAY
55.0	65.0	BROWN CLAY
65.0	80.0	BROWN CLAY WATER
80.0	91.0	GRAVEL SAND WATER

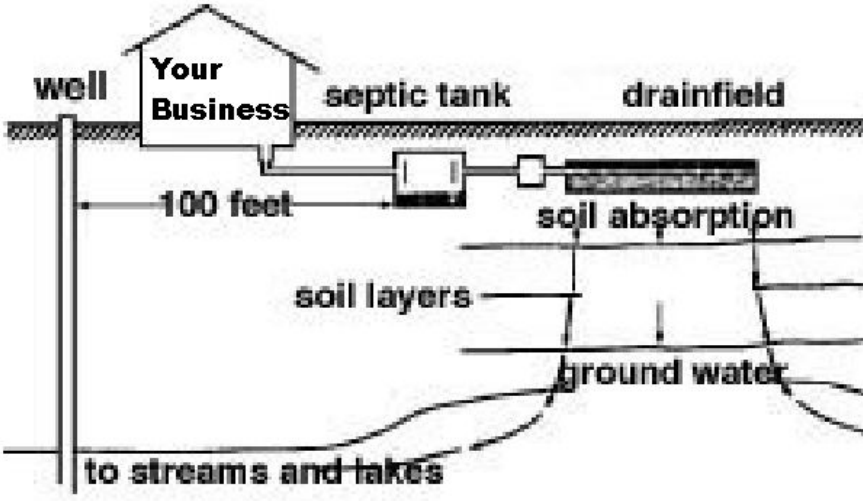
[1] - All diameters reported are **inside** diameter of the casing.

Appendix B
Fact Sheet

Large Capacity Septic System Operation and Maintenance

FACT SHEET SWP-105

Basic information on proper operation and maintenance of residential scale septic systems is available through various sources in the state (see Resources near the end of this publication). For some commercial establishments, the sources and characteristics of wastewater may be quite similar to those of residential wastewater. For other businesses and institutions, however, wastewater may be very different: for example, it may contain harsh industrial-strength cleaners or high concentrations of oils, or it may derive from processes (e.g., small-scale manufacturing) that introduce chemicals and other substances not found in residential wastewater. Accordingly, many large capacity septic system owners face a couple of special considerations in operating and maintaining their systems. If improperly used or operated, septic systems can be a significant source of ground water contamination that can lead to waterborne disease outbreaks and other adverse health effects. This fact sheet is provided to address some of those considerations and to help owners of large capacity septic systems protect their source of drinking water.



Large capacity septic systems fall under the EPA designation of "Class V Injection Wells" and are regulated by Underground Injection Control (UIC) programs set up by the EPA. In broad terms, this means commercial systems are subject to more stringent oversight than residential systems--out of heightened concern for contamination of groundwater by various types of Class V wells and shallow disposal systems. Of particular concern are systems receiving wastewater from industries and automotive service stations.

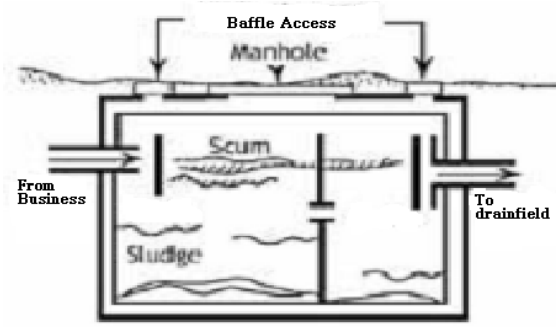
Tank Pumping Frequency

As with residential systems, regular, scheduled pumping of the septic tank is arguably the most essential element of large capacity septic system maintenance. The key difference lies in the frequency of pumping: commercial septic tanks typically require (much) more frequent pumping than their residential counterparts. There are several reasons for this:

- Faster rate of wastewater flow, resulting in greater likelihood of solids carry-over to drainfield

- Greater strength of wastewater (higher "organic load," that is, higher concentrations of solids and fats, oils and grease), resulting in faster accumulation of solids in septic tank
- Presence of higher strength cleaners and other chemicals not normally found in household wastewater, potentially resulting in harm to bacteria that breakdown wastewater in the septic tank
- Varied and changeable group of system users (employees and customers), resulting in somewhat lessened ability to control/enforce good maintenance practices (as compared to household)

How frequently you will need to have your particular tank pumped depends on a number of factors, including:



- Type and size of your establishment
- Size of your septic tank
- Volume and rate of wastewater flows
- Amount of organic matter (e.g., waste solids, food scraps, fats/oils/grease) in your establishment's wastewater

The first two factors are essentially fixed. If, however, your septic tank is undersized, you may need to replace it with a larger tank to improve the quality of wastewater treatment. The second two factors can be significantly influenced by your operational practices.

Here are some things you can do to avoid overstressing your septic system over the long term and using pumping (which will always be necessary, whatever your maintenance habits) as a substitute for good operational basics:

- *In restrooms*: make sure plumbing fixtures don't leak; install automatic shut-off faucets;
- *In kitchens*: divert kitchen wastewater to grease trap; scrape plates into the garbage, not the sink; install drain covers and sink baskets/strainers to prevent solids (food scraps, fats, oils and grease) from entering your system; avoid use of garbage disposal; use water-saving dishwasher cycle; use mild detergents, not harsh industrial cleaners; use paper towels rather than rags to mop up grease from counters, grills, etc.
- *In laundry facilities*: avoid use of harsh detergents; space out laundry over the course of the week rather than doing establishment's washing all at once

An inspection of your septic system by a licensed septic inspector (which should be an annual event) can help you determine the pumping frequency your tank requires. You should schedule pumpings with a licensed pumper based on your required frequency (e.g., every three months, twice a year). This same pumper can also pump out your grease trap. Note, however, that grease traps will almost always require more frequent pumping than your septic tank to function effectively.

Fats, Oils and Grease

The most serious problem that plagues large capacity septic systems is the carry-over of fats, oils and grease (sometimes referred to as FOG) into the drainfield (leachfield). When carry-over occurs, these materials reduce the absorption capacity of the drainfield and can lead to system overflows (i.e., breakout), at which point, depending on the extent of damage, the drainfield will need to be repaired, extended or even replaced.

The drainfield of a well-designed and maintained system can handle small amounts of FOG, such as natural body oils carried over from a household's shower water. However, drainfields or alternative treatment systems cannot accommodate significant concentrations of FOG,

such as that produced by restaurants, bakeries, cafeterias and camps (and even households that are heavy garbage disposal users and regularly pour cooking grease down their drains).

For this reason, many counties and states require the use of grease traps (also called grease interceptors) by restaurants and similar commercial establishments. Grease traps are holding tanks; modified septic tanks that receive kitchen wastewater prior to the passage of that wastewater to the main septic tank. In the grease trap, wastewater is slowed and allowed to cool somewhat, giving fats, oils and grease a chance to settle out before the effluent passes to the septic tank, where further settling occurs. Grease traps generally range in size from one to three times the average daily flow that will be discharged into it. As with the main septic tank, proper sizing of the grease trap is critical to its ability to fulfill its function.

Operation and Maintenance

Good operation and maintenance practices enable the grease trap and septic tank to work effectively in reducing grease and oil. Restaurants and other establishments should:

- Scrape food scraps and congealed fats into the garbage
- Use drain covers and sink baskets and strainers to prevent solids from entering the flow of wastewater
- Eliminate the use of a garbage disposal
- Avoid pouring cooking oil and grease should down the drain
- Not rely on septic system additives that claim to reduce oils and grease. Although these additives do indeed dissolve oils and grease, this only increases the likelihood that these materials will be carried over to the drainfield rather than remaining in the grease trap and septic tank where they can be slowly broken down and pumped out at regular intervals.

Perhaps above all else, the key to the grease trap's effectiveness is regular, frequent pumpings. Depending on the size of the grease trap and the strength and flow of wastewater at a given commercial establishment, required pumping frequency may range from twice per month to once every three or six months. A proper pumping does not just remove the liquid in the grease trap but scours the grease trap and the associated lines to eliminate caked-on substances and oily residue. Pumping should be done by a licensed solid waste hauler who will dispose of grease and oils properly (e.g., in designated landfill areas).

Resources: Where can you get help?

For local assistance, check your phone directory for the following telephone numbers:

- County Environmental Health Department or Sanitarian’s Office under *County Government* listings.
- *Septic tanks and Systems Cleaning and pump-and-haul contractors* in the yellow pages.

DEQ can provide information about state and federal requirements for:

Safe alternatives for industrial chemicals
Hazardous waste technical assistance
Pollution prevention and planning
Drinking water protection planning Underground injection control
Shallow disposal systems
Air and water quality compliance assistance
Discharge permits
Septic or other waste disposal systems
Underground storage tanks
Solid waste management and disposal

Call DEQ at (406) 444-6697 for assistance. You can also access DEQ's Internet Page at http://www.deq.state.mt.us/. If you would like more information on drinking water protection, please contact DEQ's Source Water Protection Program – Joe Meek 406-444-4806.

Montana State University Extension Service has several publications on septic systems and other topics available (406) 994-3273 or on the Internet at www.montana.edu/publications.

Contact EPA in Denver to learn about federal regulations pertaining to large capacity septic systems by calling (303) 312-6276 or visit EPA on the Internet at http://www.epa.gov/region8/water/uic/

The bottom line for a large capacity septic systems is:

- **Have a knowledgeable septic professional determine how frequently your tank and grease trap requires pumping,**
- **Set a maintenance schedule based on that and stick to it!**

Reference: Septic Information and Resources On-Line. Retrieved September 2003 from the World Wide Web: www.Septic-Info.com

Appendix C
Concurrence Letter