GALATA COUNTY WATER DISTRICT
PUBLIC WATER SYSTEM

PWS ID No. MT0000009

DRAFT SOURCE WATER DELINEATION & ASSESSMENT REPORT

PREPARED BY:

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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.

The drinking water for the Galata County Water District is supplied by two wells approximately 20 miles north of Galata. The wells are located on the flank of Grassy Butte, on the southern edge of the Sweet Grass Hills. Based on the sanitary survey, well logs, and the depth of the wells, it appears that sands of the Eagle Sandstone and Telegraph Creek Formation provide water to the PWS's wells. In accordance with the Montana Source Water Protection Program criteria (1999), the aquifer (source water) is considered to have a low sensitivity to potential contaminant sources since it is consolidated sandstone bedrock. Sensitivity is defined as the relative ease that contaminants can migrate to source water through the natural materials.

As part of this assessment, three types of source water protection management areas were mapped for the Galata County Water District 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 sources of contamination were identified within the control zone. The goal of management in the control zone is to avoid introducing contaminants directly into the water supply's well or immediate surrounding areas. The control zone is delineated as a 100-foot radius around the wells and all sources of potential contaminants should be excluded in this region.
- The only potential contaminant sources identified within the inventory region are the Strawberry Creek road and surrounding agricultural land.

  The inventory region should be managed to prevent contaminants from reaching the well before natural processes reduce their concentrations. The inventory region includes the area upgradient (north) of the wells that is expected to supply groundwater recharge to the well over the next three years.
- Potential contaminant sources identified within the recharge region are limited to minor agricultural land and the Strawberry Creek road.

  The goal of management in the recharge region is to maintain and improve water quality over long periods of time or increased usage. Recharge to the wells is likely from infiltration of precipitation and surface water in the local area.

According to the criteria established under the Source Water Protection Program, the Galata County Water District public water supply has a low susceptibility to contamination from the Strawberry Creek road.

Low risk potential sources and potential sources located outside the inventory region, but within the recharge region 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 Galata County Water District. 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.

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1.0 INTRODUCTION

Eric Sivers, a hydrogeologist with the Montana Department of Environmental Quality (DEQ), completed the Galata County Water District (PWS ID No. MT0000009) Source Water Delineation and Assessment Report (SWDAR).

1.1 PURPOSE

This Source Water Delineation and Assessment Report is intended to meet the technical requirements for the completion of the delineation and assessment for the Galata County Water District (Galata) 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 (P.L. 104-182).

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

1.2 LIMITATIONS

This report was prepared to assess the susceptibility of the Galata PWS to significant potential contaminant sources, and is based on published information and information obtained from individuals familiar with the community. The terms "drinking water supply" or "drinking water source" refer specifically to the source of the Galata public water supply and not any other public or private water supply. Also, not every potential or existing source of groundwater or surface water contamination in the Galata area has been identified. Only potential sources of contamination in areas that contribute water to its drinking water source are considered.

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

2.0 BACKGROUND

The Town of Galata is located in Toole County, in north-central Montana (Figure 1). The nearest city is Shelby, approximately 30 miles to the west. According to the Census Bureau, the population of Toole County in 2000 was 5,267, with 210 people residing within the Galata ZIP code (59444).

The Galata PWS services a wide area, and the supply wells are located in a rural area approximately 20 miles north of the town of Galata.

2.1 PHYSICAL SETTING

2.1.1 Geography and Geology

The town of Galata is located on the glaciated plains of Montana, at an elevation of 3,100 feet above mean sea level. The town is on the eastern edge of the Willow Creek valley. Willow Creek is a tributary of the Marias River, which is impounded in the Tiber Reservoir just south

of Galata. The supply wells are located in the Willow Creek watershed (HUC10030204) of the Missouri River ground-water region (Heath, 1984).

The Galata County Water District supply wells are located on the plains east of the Rocky Mountains, at the southern edge of the Sweet Grass Hills. The wellhead elevation is approximately 3,700 feet above mean sea level (see Figure 1).

The supply wells are located on the western flank of Grassy Butte, a 700-foot butte capped by a resistant breccia. This area is underlain by sedimentary rocks of Cretaceous age, which were later intruded by the Tertiary-age igneous rocks that form the Sweet Grass Hills. Younger pediment gravels are present in some slopes in the area, and other young deposits, such as alluvium, colluvium and landslide deposits, are locally present. The geology of the supply well vicinity is provided in Figure 2.

The groundwater flow direction beneath the wells is likely towards the south, ultimately towards the Marias River.

2.1.2 Climate

Climate in the Galata area is semi-arid and is typical of the north-central Montana plains. Based on climate data from weather station 242550, the average maximum and minimum temperatures in this area are 83.0° F and 50.4° F in July and 25.8° F and 2.9° F in January. Annual total precipitation averages 11.22 inches. Rainfall occurs April through September with May and June being the wettest months. An annual average of 30.1 inches of snow is received in the area mainly November to April.

Information on climate in the Galata County Water District supply well area is based on the National Oceanic and Atmospheric Administration's (NOAA) Dunkirk 15 NNE climate station located 15 miles north-northeast of Dunkirk. See Table 1 for additional climate information.

Table 1. Monthly Climate Summary: Dunkirk 15 NNE Climate Station
Station 242550 Period of Record: 5/01/1912 to 6/30/2004

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Ave. Max. Temp. (F)	25.8	31.8	39.6	54.2	65.5	72.5	83.0	80.9	69.3	57.6	40.6	30.4	54.3
Ave. Min. Temp. (F)	2.9	8.6	16.3	27.4	37.5	45.3	50.4	48.2	38.7	29.0	16.5	8.0	27.4
Ave. Total Precip. (in.)	0.40	0.35	0.41	0.82	1.61	2.56	1.44	1.34	0.98	0.53	0.35	0.44	11.22
Ave. Total Snowfall (in.)	5.4	4.9	4.5	2.8	0.7	0.0	0.0	0.0	0.6	1.9	3.7	5.6	30.1

2.2 THE PUBLIC WATER SUPPLY

2.2.1 Water Supply System

The Galata water district system is classified as a community public water system (PWS) since it serves at least 25 of the same people every day. The system was constructed in the late 1970s. Two supply wells provide water to the system. The system serves 80 service connections via approximately 220 miles of PVC pipe. The distribution system includes four

booster pumps and six pressure reducing systems. According to a 1994 sanitary survey, each customer has a cistern of 3,000-4,000 gallon capacity.

Information on the water system was obtained from correspondence in the DEQ Public Water Supply Section files, including the most recent sanitary survey, completed in January 2003 (report dated February 2003 included as Appendix A).

2.2.2 Supply Well Information

Galata County Water District's drinking water is supplied by two wells located approximately 20 miles north of Galata, on the southern edge of the Sweet Grass Hills. One well (Well #2-west) was drilled in the 1970s; the other (Well #3-east) was drilled in 2002. A third well (Well #1), drilled in the 1970s, is inactive and was replaced by Well #3-east. Wells 1 and 2-west were completed to a depth of approximately 290 feet below grade. The wells were completed to a depth of about 290 feet. No construction details were included on the well logs for the two original wells, one of which is now inactive. No well log was identified for the third well, drilled in 2002. The static water levels measured at the time of drilling Wells 1 and 2 were 48 and 49 feet below surface, respectively. Copies of the well logs showing encountered stratigraphy are attached as Appendix A and are summarized in Table 2.

2.2.3 Source Water

Based on the lithology identified on the well logs for the Galata PWS, the wells appear to be installed in unconfined sands of the Eagle Sandstone and the Telegraph Creek Formation (Figure 2). According to the DEQ Source Water Protection Program (DEQ, 1999), the Galata PWS wells are considered to have **low** source water sensitivity to potential contaminant sources.

The original wells that supplied the Galata system were completed to 290 feet below grade. Although no record of Well #3-east's completion depth was identified, it is reasonable to assume that it was completed to at least that depth, based on the lithologies reported in the drillers logs for the earlier wells. The aquifer is unconfined and the groundwater flow direction in the vicinity of the wells is likely southward, from the topographic high of the Sweet Grass Hills, ultimately towards Willow Creek and the Marias River. Recharge to the wells is likely from infiltration of precipitation through the overlying materials.

An assessment of groundwater sources under the direct influence of surface water (GWUDISW) was completed in 2003, and the water is classified as groundwater.

Table 2. Public Water Supply Well Information

Well ID	Well #2-west	Well #3-east
DEQ Well Name/ Source Code	Well #2	Well #3
GWIC ID	46042	EQ-01-2610
DNRC Water Right		
Well Location	N 48.7768, W 111.353139	N 48.7768, W 111.353444
Well Elevation	Approx. 3,720 feet	Approx. 3,720 feet
Date Completed	02/16/1976	~2002
Total Depth (bgs)	290 feet	No record
Well Completion: Casing	8" steel from 0 to 150 feet; 6" steel from 150 to 265 feet.	No record
Well Completion: Screen	Not recorded	No record
Well Completion: Annular Seal	Cement from 0-16 feet.	No record
Static Water Level (at time of drilling)	49 feet	No record
Well Pump Test Data	Not recorded	No record

2.3 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, following the general protocols established by DEQ. These monitoring schedules are available for review at: <http://nris.state.mt.us/wis/swap/swapquery.asp>. The Galata County Water District PWS monitoring data from DEQ's database for the past five years was reviewed and is summarized in this section. The monitoring data is attached as Appendix B.

2.3.1 Public Water Supply Monitoring Results

Coliform bacteria have been detected during four sampling events in the last five years. Subsequent sampling following each detection has yielded negative results. No violations have been reported in the last five years.

Other compounds detected during Galata County Water District's water sampling over the past five years include nitrite + nitrate [3.43 mg/L (milligrams per liter, or ppm)] and sulfate (352 mg/L). 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. The sulfate concentration detected in the drinking water (352 mg/L) exceeds the SMCL of 250 mg/L.

2.3.2 Background Water Quality Monitoring Results

Groundwater analytical data characterizing untreated groundwater quality was not identified for the Galata County Water District wells. Background water quality sampling typically includes some general water quality parameters including major dissolved ions (calcium,

magnesium, sodium, potassium, iron, manganese, silica, bicarbonate, carbonate, chloride, sulfate, nitrate, fluoride and orthophosphate), trace elements, and metals.

3.0 MANAGEMENT AREA DELINEATION

This report delineates three source water management areas. The goal of source water management is protection of the source water by 1) controlling activities in the control zone, 2) managing significant potential contaminant sources in the inventory region, and 3) ensuring that major land use activities or other significant activities in the recharge region pose minimal threat to the source water.

3.1 CONCEPTUAL MODEL

Galata County Water District's production wells are located in the Willow Creek watershed (USGS Hydrologic Unit Code 10030204), which is located within Montana's Lower Missouri River watershed (Heath, 1984). As detailed above, Galata County Water District's drinking water source is interpreted to be unconfined sands of the Eagle Sandstone and the Telegraph Creek Formation. The aquifer is unconfined and the groundwater flow direction in the vicinity of the wells is likely southward, from the topographic high of the Sweet Grass Hills, ultimately towards Willow Creek and the Marias River. and recharge to the wells is primarily from infiltration of surface water and precipitation through the overlying materials.

As the aquifer is consolidated sandstone bedrock, 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).

3.2 DELINEATION

Methods and criteria for delineating source water protection areas are specified by 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 Galata County Water District's wells. All sources of potential contaminants should be excluded in this region.

Inventory Region – According to the DEQ's Source Water Protection Program criteria for an unconfined aquifer (DEQ, 1999), the inventory zone was delineated based on a 1,000-foot radius. All significant sources of potential contaminants are inventoried in this region.

Recharge Region –The recharge region for the Galata County Water District wells extends northward to a topographic divide in the Sweet Grass Hills. This area includes the alluvial, colluvial and landslide material upslope (north and northeast) of the PWS wells. An inventory for recharge regions focuses on general land uses and large industrial facilities. The goal of management in the recharge region is to maintain and improve the long-term quality of groundwater in the aquifer.

4.0 INVENTORY

Significant potential contaminant sources in the source water management areas were inventoried to assess the susceptibility of Galata County Water District's wells to contamination, and to provide a foundation for source water protection planning. The inventory for Galata County Water District 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.

4.1 INVENTORY METHOD

The inventory focus is slightly different in each of the delineated management areas. The inventory for the Galata County Water District focuses on all activities in the control zones for the wells; certain types of facilities and land uses in the inventory region; 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: 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 EPA's 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 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: A business phone directory was queried by Standard Industrial Classification (SIC) code to identify businesses that generate, use, or store chemicals in the management areas. Particular attention was paid to equipment manufacturing and/or repair facilities, printing or photographic shops, dry cleaners, farm chemical suppliers, and wholesale fuel suppliers.
- Step 5: 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 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
7. Cultivated cropland exceeding 20% of the inventory region.
8. Animal feeding operations.
9. Wastewater treatment facilities, sludge handling sites, or land application areas.

sites, state or federal Superfund sites, and leaking UST sites).
5. Underground injection well.
6. Major roads or rail transportation routes.
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

The control zone includes the wellhouse and storage tank.

No potential sources of contamination were identified within the control zone. No information was provided on the well logs to indicate that the wells are sealed or grouted between the borehole and the well casing, which may indicate that the wells are susceptible to water and other contaminants reaching the water table along the well casing. The PWS should be vigilant to ensure that potential sources of contamination are excluded from the control zone and that positive drainage away from each well casing is maintained

4.2.2 Inventory Region Results

The inventory results for Galata County Water District's source water are summarized in Table 3 and are shown on Figure 3. The inventory region includes the Strawberry Creek.

Land use within the inventory region is primarily undeveloped grasslands. Septic system density within the inventory region is low and is not considered a hazard to the PWS drinking water. Point sources of potential pollutants (such as businesses or facilities listed on regulatory databases) were not identified in the inventory region.

4.2.3 Recharge Region Inventory Results

According to the 1992 National Land Cover dataset, the primary land uses in the recharge region are grasslands, with minor agricultural land (small grains). Grasslands or forests are not considered potential sources of contamination unless there are significant grazing operations in the area. The percentage of agricultural land is low, and thus presents a low hazard to the PWS.

Septic system density within the watershed/recharge region is low and is not considered a risk to the PWS drinking water.

Point sources of potential pollutions (such as businesses or facilities listed on regulatory databases) were not identified in the recharge region.

4.3 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.

5.0 SUSCEPTIBILITY ASSESSMENT

5.1 INTRODUCTION TO 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 Galata County Water District 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.

5.2 DETERMINATION OF SUSCEPTIBILITY

Susceptibility is determined by considering the *hazard* rating for each potential contaminant source relative to any contaminant *barriers*. Proximity or density of significant potential contaminant sources and nature of contaminants determines hazard.

Barriers to contamination are anything that decreases the likelihood of contaminants reaching a spring or well. Barriers may 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.

5.3 RESULTS OF SUSCEPTIBILITY ASSESSMENT

A summary of the susceptibility assessment for the Galata County Water District production wells is provided in Table 5. This table only includes the potential contaminant sources (as identified in the inventory) 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.

Table 3. Susceptibility Assessment of Significant Potential Contaminant Sources

Potential Contaminant Source	Potential Contaminants	Hazard	Hazard	Barriers	Susceptibility	Management Recommendations
Inventory Region						
Agricultural Land: Cropland and grazing lands	NO_3 and SOCs from fertilizer, pesticides and herbicides. Pathogens (if grazing occurs)	Contaminants leaching into groundwater	Low	None	Low	Encourage best management practices (BMPs)
Transportation Routes: Highways and Railroad	Pesticides, fertilizers, VOCs, SOCs, other	Spills, routine spraying, storm water runoff, infiltration into groundwater	Low	None	Low	Encourage and support emergency planning, training of local emergency response personnel, levees and engineered drainage to divert spills and prevent infiltration, cooperation with railroad managers or MDOT to reduce herbicide use.
Recharge Region						
Agricultural Crop Land	NO_3 and SOCs from fertilizer, pesticides and herbicides. Pathogens (if grazing occurs)	Contaminants leaching into groundwater		None	Not assessed outside of the inventory region	Encourage use of BMPs in the recharge region

6.0 LIMITATIONS

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- This report was prepared to assess the susceptibility of the Galata PWS to significant potential contaminant sources, and is based on published information and information obtained from individuals familiar with the community. The terms "drinking water supply" or "drinking water source" refer specifically to the source of the Galata public water supply and not any other public or private water supply. Also, not every potential or existing source of groundwater or surface water contamination in the Galata area has been identified. Only potential sources of contamination in areas that contribute water to its drinking water source are considered
- Delineation of the source water protection areas for the Galata County Water District PWS wells is based on published reports and lithology indicated on the well logs. The interaction of surface water with the alluvial channel deposits is not completely 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.
- 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 use of multiple sources of information increases the likelihood that the major threats to the source water for Galata County Water District's public water supply have been identified. The inventory is not exhaustive. That a potential contaminant source is not identified 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. It is highly recommended that the PWS and community enhance or refine the identification of the potential contamination sources through further research and local input.

7.0 CONCLUSIONS

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.

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  The goal of management in the recharge region is to maintain and improve water quality over long periods of time or increased usage. Recharge to the wells is likely from infiltration of precipitation and surface water in the local area.

According to the criteria established under the Source Water Protection Program, the Galata County Water District public water supply has a low susceptibility to contamination from the Strawberry Creek road.

Low risk potential sources and potential sources located outside the inventory region, but within the recharge region 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 Galata County Water District. 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.

8.0 REFERENCES

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9.0 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. 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 wells 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.

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.

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 (TCLP). A test designed to determine whether a waste is hazardous or requires treatment to become less hazardous.

Toxic Release Inventory System (TRIS). 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.

FIGURES

APPENDIX A

PWS SANITARY SURVEY, SITE PLAN AND WELL LOGS

APPENDIX B

WATER QUALITY MONITORING DATA

APPENDIX C

SOURCE WATER MONITORING WAIVERS

MONITORING WAIVERS

Waiver Recommendation

The Galata County Water District PWS has a waiver for Phase 2 inorganics (which includes barium, cadmium, chromium, fluoride, mercury and selenium). The waiver allows the PWS to collect one sample round for these constituents every 9-year cycle (the standard is one sample round per 3-year cycle). In addition, the PWS was grandfathered under the radionuclide rule and is only required to sample once every 9-years. Based on past monitoring results and the susceptibility assessment, the Galata County Water District PWS may be eligible for other waivers as well, including Phase 5 inorganics and volatile organic compounds. Information on susceptibility and use waivers is provided in this section to give the PWS operators an opportunity to consider if waivers may be feasible.

Before a susceptibility or use wavier is requested, the PWS Operators are encouraged to carefully review the Monitoring Waiver Requirements, described below. If after reviewing this section it is determined that an additional waivers are feasible, the PWS should submit a letter to DEQ requesting the specific monitoring waivers. The PWS must be in compliance with monitoring requirements to be considered. If requested by DEQ, the PWS may also need to provide additional information regarding chemical use in the area within the Inventory Region. The table below shows how identified potential contaminant sources affect the eligibility for monitoring waivers.

Susceptibility Assessment as it relates to Waiver Eligibility

Source	Contaminant	Susceptibility	Waiver Eligibility
Transportation Corridors	VOCs, SOCs, petroleum products and other chemicals		Chemical use in right-of-way may preclude waivers for some chemicals. PWS should confirm chemical use history along the right-of-way. Waivers might be rescinded if a spill occurred.
Sewer System/ Wastewater Treatment	Nitrates, pathogens		Waivers are not available for pathogens and nitrate.
Agricultural Cropped Areas	Nitrates and SOCs		Chemical use may preclude waivers for some chemicals. The PWS should confirm chemical use/storage history by land parcel.

Monitoring Waiver Requirements

The 1986 Amendments to the Safe Drinking Water Act require that community and non-community PWSs sample drinking water sources for the presence of volatile organic chemicals (VOCs) and synthetic organic chemicals (SOCs). The US EPA has authorized states to issue monitoring waivers for organic chemicals to systems that have completed an approved waiver application and review process. All PWSs in the State of Montana are eligible for consideration of monitoring waivers for several organic chemicals. The chemicals diquat, endothall, glyphosate, dioxins, ethylene dibromide (EDB), dibromochloropropane (DBCP), and polychlorinated biphenyls (PCBs) are excluded from monitoring requirements by statewide waivers.

Use Waivers

A Use Waiver can be allowed if through a vulnerability assessment, it is determined that specific organic chemicals were not used, manufactured, or stored in the area of a water source (or source area). If certain organic chemicals have been used, or if the use is unknown, the system would be determined to be vulnerable to organic chemical contamination and ineligible for a Use Waiver for those particular contaminants.

Susceptibility Waivers

If a Use Waiver is not granted, a system may still be eligible for a Susceptibility Waiver, if through a vulnerability assessment 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 vulnerability assessment of a surface water source must consider the watershed area above the source, or a minimum fixed radius of 1.5 miles upgradient of the surface water intake. PWSs developed in unconfined aquifers should use a minimum fixed radius of one mile as an area of investigation for the use of organic chemicals. Vulnerability assessment of spring water sources should use a minimum fixed radius of one mile as an area of investigation for the use of organic chemicals. Surface water and shallow groundwater sources under the direct influence of surface water (GWUDISW) should assess the watershed area above the source, or a minimum fixed radius of one and one-half miles upgradient.

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 DEQ's Source Water Protection Program will conduct review of an organic chemical monitoring waiver application. Other state agencies may be asked for assistance.

Susceptibility Waiver for Unconfined Aquifers

Unconfined aquifers are the most common source of usable groundwater. Unconfined aquifers are not contained within impervious geologic strata. As a result, the upper groundwater surface, or water table, in an unconfined aquifer is not under the pressure that produces hydrostatic head common to confined aquifers.

Unconfined aquifers are usually locally recharged from surface water or precipitation. In general, groundwater flow gradients in unconfined aquifers reflect surface topography, and the residence time of water in the aquifer is generally shorter than for water in confined aquifers. Similar water chemistry often exists between unconfined groundwater and area surface water, and physical parameters and dissolved constituents can be an indicator of the hydraulic connection between groundwater and surface water. Consequently, unconfined aquifers can be susceptible to contamination by organic chemicals migrating from the ground surface to groundwater.

Properly assessing a susceptibility waiver application for an unconfined source aquifer requires: site-specific information pertaining to the location and construction of the source development, monitoring history of the source, geologic characteristics of the unsaturated soil and vadose zones, and chemical characteristics of the organic chemicals pertaining to their mobility and persistence in the environment. The zone of contribution of the unconfined groundwater source must be defined and plotted. This should describe the groundwater flow directions, gradients, and a 3-year time-of-travel. All surface water bodies within 1,000 feet of the PWS well(s) must be plotted. Analytical monitoring history of the PWS well and those nearby should be provided as well.

APPENDIX D

CONCURRENCE LETTER