

Springdale Hutterite Colony Public Water System

PWSID # MT0000134

SOURCE WATER DELINEATION AND ASSESSMENT REPORT

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EXECUTIVE SUMMARY

Drinking water for the Springdale Hutterite Colony Public Water System (PWS) is supplied by one well located in Section 7, Township 8 North, Range 6 East. This Source Water Delineation and Assessment Report 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 ensure strategies are in to protect the 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. It should also be noted that a Source Water Protection Plan was drafted by Montana Rural Water Systems and is included in Appendix A for informational purposes.

Based on the Springdale Hutterite Colony PWS well log and other area well logs it appears that the source of water for the colony is intermittent sand and gravel lenses interbedded in shale. Based on the amount of clay and shale within the aquifer, the static water level, and pumping level the aquifer appears to be confined. In accordance with the Montana Source Water Protection Program criteria (1999), groundwater within this type of aquifer is considered to have a low sensitivity to potential contaminant sources. Sensitivity is defined as the relative ease that contaminants can migrate to source water through the natural materials.

Three source water protection management regions were identified for the Springdale Hutterite Colony PWS as part of this assessment. They are the control zone, inventory region, and the recharge region. Potential contaminant sources were identified, where present, within each of these three regions and the results are as follows:

- 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. No significant potential contaminant sources were identified within the control zones.
- 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 of land overlying the aquifer that supplies drinking water to the well. A 1000-foot fixed radius inventory region was delineated around the Springdale Hutterite Colony PWS well.

The most significant potential contaminant sources identified within the inventory region include: the large capacity on-site sewage disposal system, cultivated cropland, and animal feeding areas, barns, and corrals.

- The goal of management in the recharge region is to maintain and improve water quality over long periods of time or increased usage. Hydrogeologic mapping was used to delineate the recharge region for the PWS wells. Recharge to the well is most likely from infiltration of

precipitation into overlying sediments, losses from area streams, and upward flow of groundwater from underlying beds. Groundwater flow appears to be to the west. No additional potential contaminant sources were identified in the recharge region

Susceptibility is the potential for a public water supply to draw water contaminated by inventoried sources at concentrations that would pose concern. Susceptibility is determined by considering the hazard rating for each potential contaminant source and the existence of barriers that decrease the likelihood that contaminated water will flow to the public water supply well. The Springdale Hutterite Colony PWS has a moderate susceptibility from cultivated cropland and animal feeding areas. Low risk potential contaminant 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 the Springdale Hutterite Colony PWS. The susceptibility analysis provides the Springdale Hutterite Colony PWS operator and residents with information concerning where the greatest risk occurs and where to focus resources for protection of their valuable drinking water resource.

The costs associated with contaminated drinking water are high. Developing an approach to protect that resource will reduce the risks of a contamination event occurring. The local geology and well construction issues have been summarized in this report as they pertain to the quality of your drinking water source. The area that is believed to be most critical to preserving your water quality (the Inventory Region) has been identified and within that area the potential contaminant sources have also been identified. In addition, recommendations are provided, i.e., Best Management Practices (BMPs), regarding the proper use and practices associated with the potential contaminant source. The information provided in this report will help increase awareness about the relationship between land use activities and drinking water quality.

INTRODUCTION

Carolyn DeMartino, a Water Quality Specialist with the Montana Department of Environmental Quality (DEQ) and Aubrey Smartt, a DEQ intern, completed the Springdale Hutterite Colony (PWSID#00134) Source Water Delineation and Assessment Report (SWDAR) Elias Wipf (#4263) and Joseph Hofer (#3591), at (406) 547-3449 are the certified operators for the Springdale Hutterite Colony Public Water System (PWS).

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 Springdale Hutterite Colony Public Water Supply System (PWSS) 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 Springdale Hutterite Colony complete a source water protection plan to protect its drinking water source.

Limitations

This report was prepared to assess impacts from potential contaminant sources to the Springdale Hutterite Colony 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 Springdale Hutterite Colony 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 Springdale Hutterite Colony 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 that have maximum concentration levels (MCLs) 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.

CHAPTER 1 BACKGROUND

The Community

Springdale Hutterite Colony is located about 8 miles southwest of White Sulphur Springs (Figure 1). White Sulphur Springs is located in and is the county seat of Meagher County in central Montana. The legal location of Springdale Hutterite Colony is Section 7, Township 8 North, and Range 6 East (Figure 2). See Figure 3 for an aerial photograph of the Springdale Hutterite Colony vicinity. According to the Census Bureau the population of Meagher County in 2000 was at 1,932 individuals. Approximately 150 residents live at Springdale Hutterite Colony.

The economy in the White Sulphur Springs area is primarily based on farming and ranching. Major transportation routes in the Springdale Hutterite Colony area are US Route 89 and U.S. Route 12.

Springdale Hutterite Colony is served by a large capacity on-site sewage disposal system.

Climate

The climate in the vicinity of the Springdale Hutterite Colony is typical of higher-elevation intermountain basins of the Northern Rocky Mountains east of the Continental Divide. Based on Western Regional Climatic Center data for the period of record, annual precipitation averages 12.97 inches. Monthly average precipitation ranges from 0.40 inches in February to 2.38 inches in June. Summer thunderstorms and winter snows provide a majority of the precipitation in the area. The annual mean snowfall in the White Sulphur Springs area is 38.3 inches. Periodic drought cycles (as defined by moving annual precipitation averages less than 10 inches) occur in the region at approximately 12 year intervals. A summary of the available climatic data for the White Sulphur Springs area is presented on Table 1 below.

Table 1. Climatic Summary

White Sulphur Springs 2, Montana (248930)

Period of Record: 12/1/1978 to 12/31/2003

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	32.5	36.4	43.8	54.0	63.6	71.7	80.9	81.0	69.3	57.1	40.5	32.5	55.3
Average Min. Temperature (F)	12.2	14.3	20.7	28.0	35.6	42.9	48.2	47.0	38.2	29.9	20.0	12.1	29.1
Average Total Precipitation (in.)	0.45	0.40	0.76	1.24	2.13	2.38	1.64	1.13	1.12	0.83	0.43	0.47	12.97
Average Total Snow Fall (in.)	5.6	7.0	7.6	3.0	1.0	0.0	0.0	0.0	1.1	2.2	3.2	7.4	38.3
Average Snow Depth (in.)	1	1	1	0	0	0	0	0	0	0	1	1	0

Percent of possible observations for period of record.

Max. Temp.: 91.1% Min. Temp.: 91.4% Precipitation: 93% Snowfall: 84.8% Snow Depth: 71.6%

Source: Western Regional Climate Center, wrcc@dri.edu

Geographic Setting

This section provides an overview of the geographic setting in the vicinity of the Springdale Hutterite Colony. 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 contamination sources.

Springdale Hutterite Colony is located in the Smith River Valley of southwestern Montana in Section 7 Township 8 North, Range 6 East (Figure 3). Major streams in the White Sulphur Springs vicinity include the Smith River, Lone Willow Creek, and Willow Creek. The three mountain ranges that surround the Springdale Hutterite Colony include the Little Belt Mountains to the northeast, the Castle Mountains to the southeast, and the Big Belt Mountains to the southwest. The elevation at the colony is approximately 5,130 feet.

The Public Water Supply

The Springdale Hutterite Colony PWS is classified as a community system under the Federal Safe Drinking Water Act, because the system serves at least 25 year-round residents through at least 15 service connections. The Springdale Hutterite Colony PWS serves around 150 residents via 9 active service connections.

The Springdale Hutterite Colony obtains its water through a 4-inch PVC well drilled in 1989 to a total depth of 990 feet (WL002). At the time of drilling it had a yield of 25 gallons per minute. The well is east of the pumphouse (see Figure 3B). The well supplies water to a large cistern, which has the pumphouse built over the top of it. Two pumps are used to pump water from the cistern and deliver it to the colony. A copy of the well log is located in Appendix A.

There are two distribution lines that leave the pumphouse. One line supplies softened water to each house and the other line provides hard water. Four large pressure tanks provide adequate pressure for the colony and each can be separated in case of replacement. Water flow through the system and components are described by the 2010 sanitary survey as follows:

WATER IS PUMPED FROM WL002 TO THE 38,000 GALLON STORAGE TANK BENEATH THE PUMPHOUSE. THERE IS A CHLORINATOR PRIOR TO THE STORAGE TANK BUT IT IS NOT ROUTINELY USED. WATER IS THEN PUMPED FROM THE STORAGE TANK AND SPLIT: PART GOES DIRECTLY TO THE HARD-WATER DISTRIBUTION SYSTEM FOR DRINKING WATER; PART GOES TO THE WATER SOFTENING TREATMENT (TP002) AND THEN GOES TO THE SOFT-WATER DISTRIBUTION SYSTEM FOR SHOWERS, LAUANDRY, ETC. TWO PUMPS ARE USED TO MOVE WATER FROM THE STORAGE TANK TO THE DISTRIBUTION SYSTEM (PC002). THE 2 HP PUMP RUNS CONTINUOUSLY AND THE 5 HP PUMP ACTIVATES DURING HIGH WATER DEMAND PERIODS. FOUR 40 GALLON CAPTIVE AIR TANKS CONTROL PUMP CYCLING AND DISTRIBUTION PRESSURE (PC001).

A copy of the PWS layout is located in Appendix B.

Water Quality

Public water systems must conduct routine monitoring for contaminants in accordance with Federal Safe Drinking Water Act requirements. Parameters such as coliform bacteria, lead, copper, nitrate, nitrite, volatile organic chemicals (including hydrocarbons and chlorinated solvents), inorganic chemicals (including metals), synthetic organic chemicals (including pesticides), and radiological contaminants must be sampled in community PWSs and non-community, non-transient PWSs in accordance with schedules specified in the Administrative Rules of Montana. All contaminants detected must comply with numeric maximum contaminant levels (MCLs) specified in the Federal Safe Drinking Water Act.

Figure 1. Springdale Hutterite Colony Vicinity Map

Figure 1. Springdale Hutterite Colony Vicinity Map

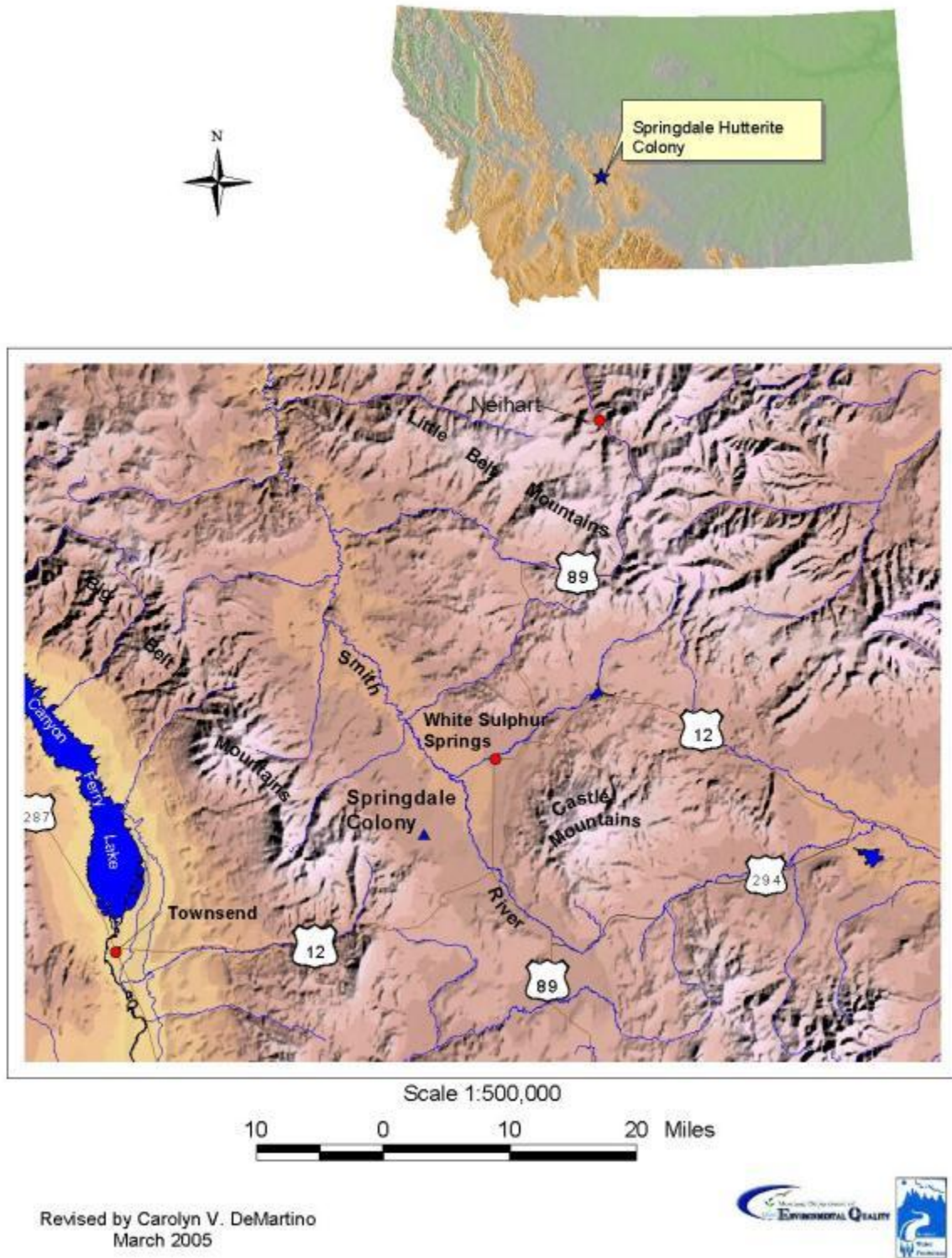
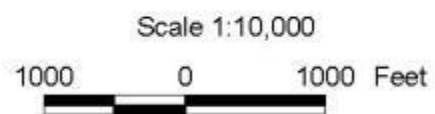
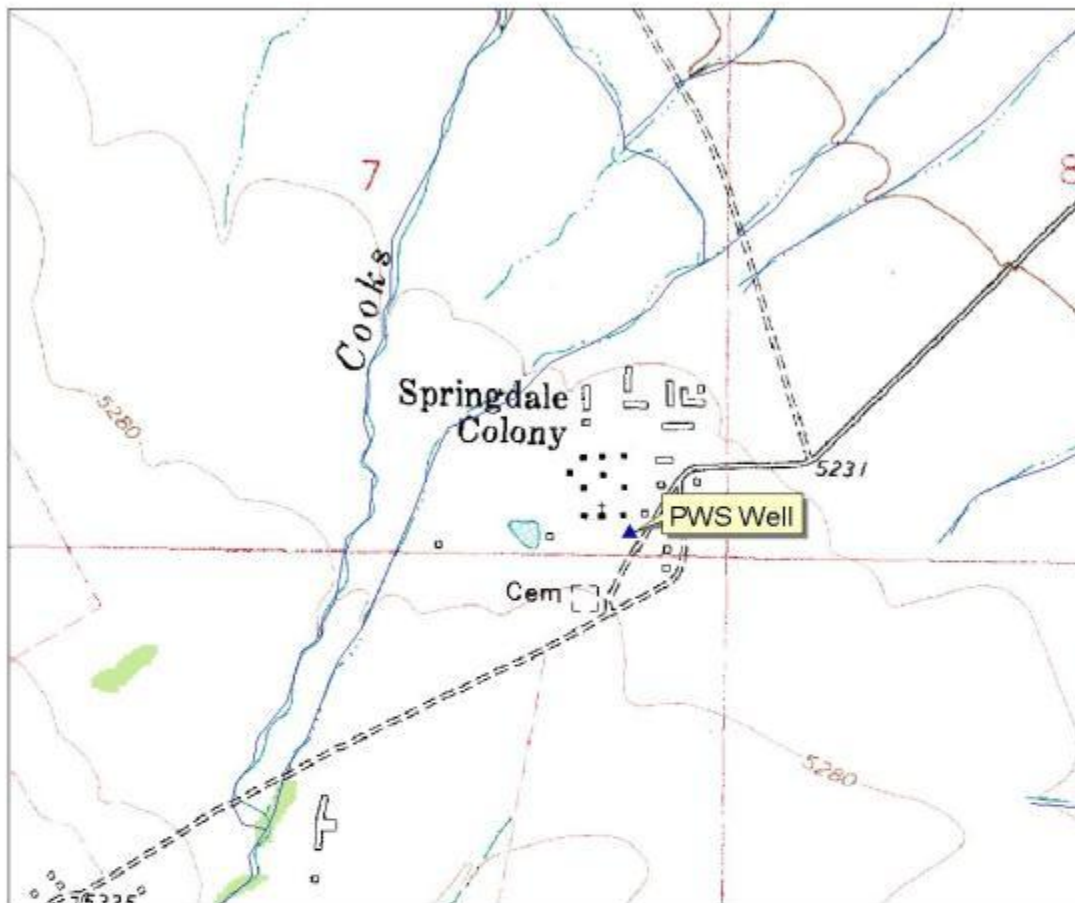


Figure 2. Springdale Hutterite Colony Location Map

Figure 2. Springdale Hutterite Colony Location Map



Legend

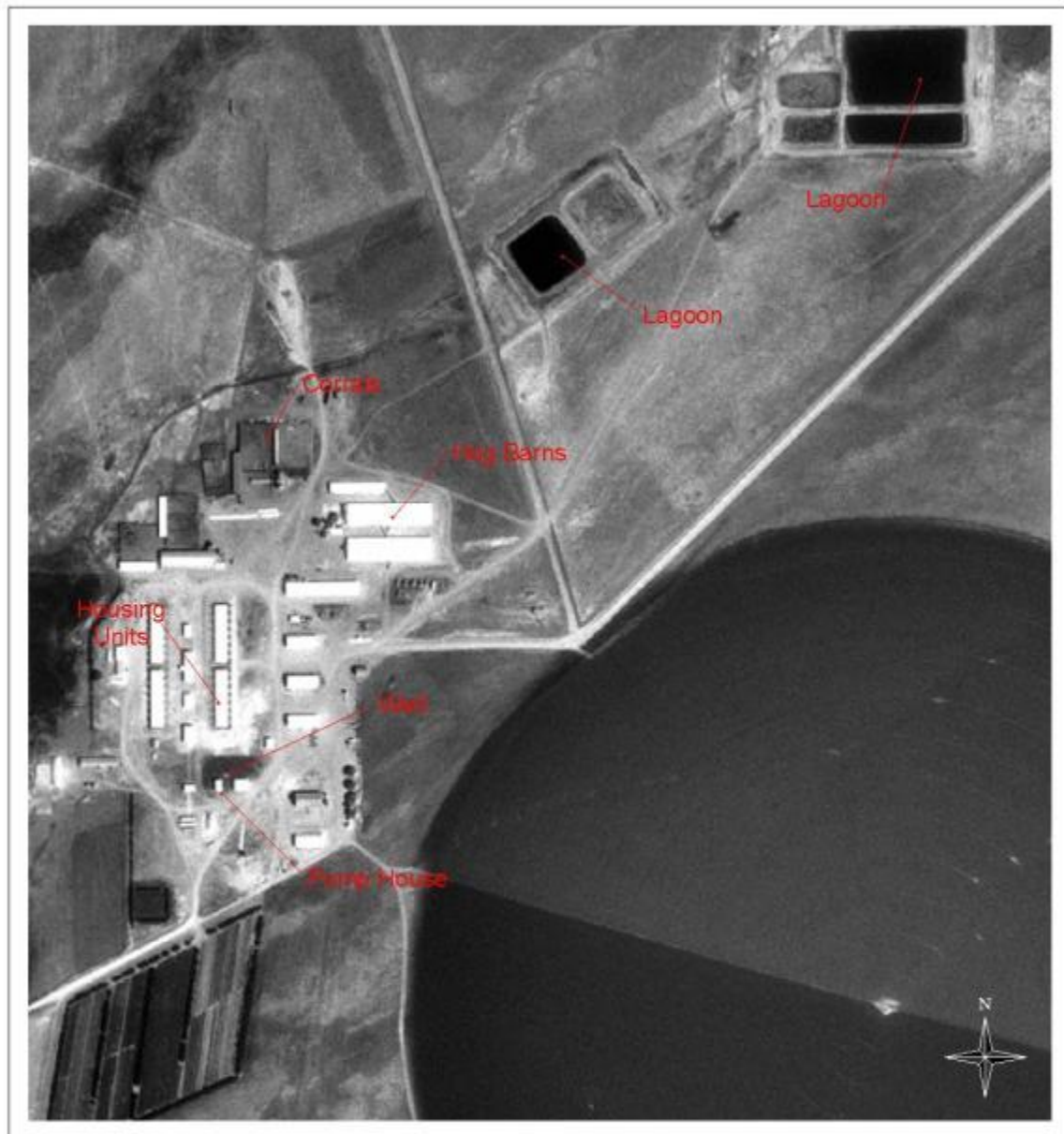
- ▲ Springdale Colony PWS Well
- ∧ Streams

Revised by Carolyn V. DeMartino
March 2005



Figure 3A. Aerial Photo of the Springdale Hutterite Colony Vicinity

Figure 3. Aerial Photograph of the Springdale Hutterite Colony Vicinity

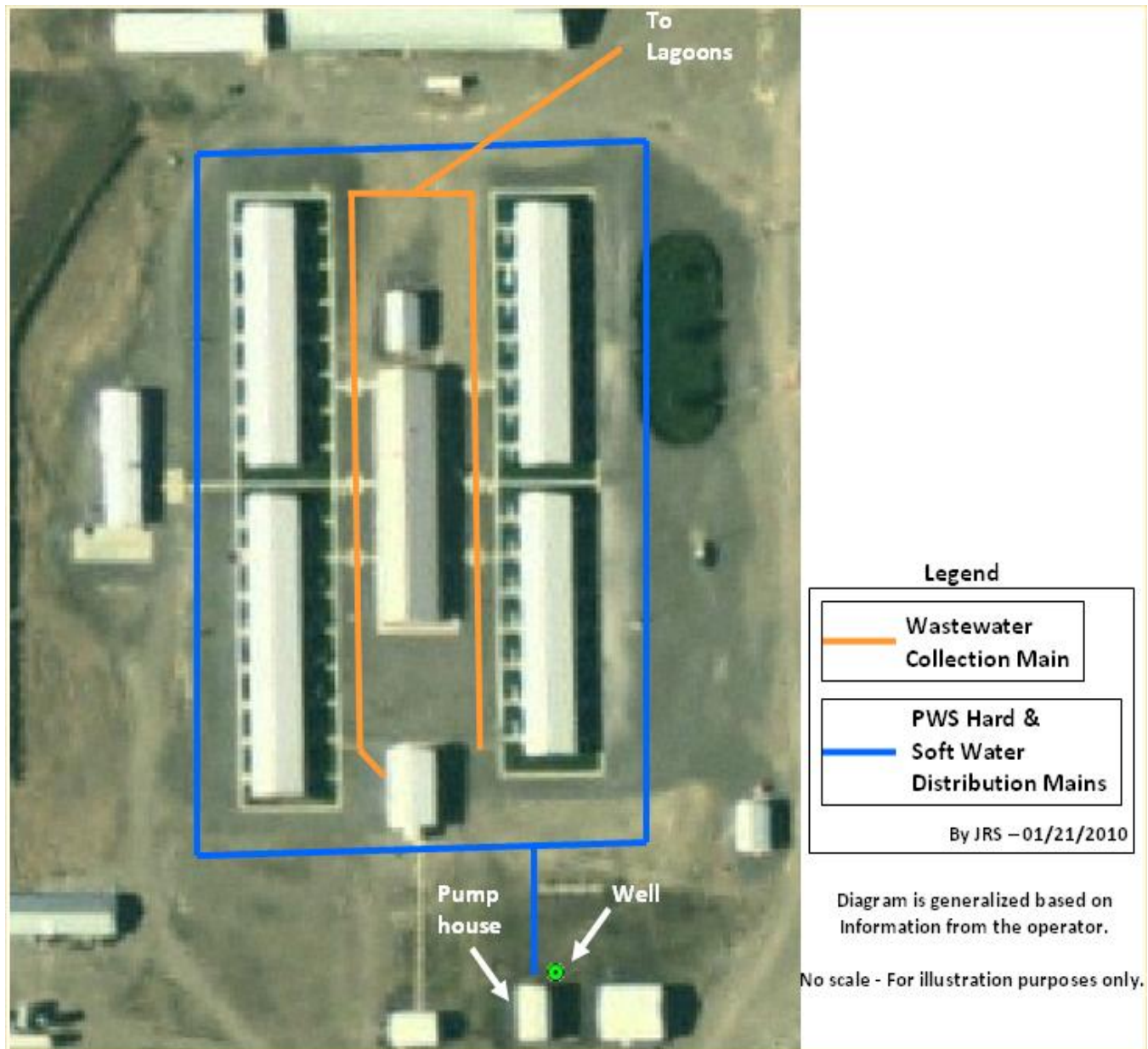


Scale 1:5,000
500 0 500 Feet

Aubrey Smartt
June 2004



Figure 3B. Aerial Photo of the Springdale Hutterite Colony Wellhead Area



Springdale Hutterite Colony Water Quality

The Springdale Hutterite Colony's water quality is routinely monitored for compliance with drinking water standards. Bacteriological monitoring is conducted monthly. Compliance with other drinking water standards is based on additional sampling on a variety of schedules. Within the past five years there has been one coliform bacteria detection (8/9/2000) in Springdale Hutterite Colony's PWS. Nitrate plus nitrite as nitrogen ranging from 0.47 milligrams per liter (mg/L) to 0.63 mg/L has been detected in Springdale Hutterite Colony's water within the past five years but remains well below the maximum contaminant level of 10 mg/L (DEQ SDWIS database).

CHAPTER 2 DELINEATION

The source water protection area, the land area that contributes water to Springdale Hutterite Colony's PWS well, is identified in this chapter. Management areas identified within the source water protection area include the control zone, inventory region, and recharge region. The control zone is an area at least 100-foot radius around the well. The management goal of the control zone, also known as the exclusion zone, is to protect against the direct introduction of contaminants into the well or in the immediate area surrounding each well.

The inventory region represents the zone of contribution of the well, which is an area at least 1000 foot radius around the well. The management goal of the inventory region is to focus on pollution prevention activities at potential contaminant sources where it is likely that contaminated water would flow into the well within a relatively short time frame.

The recharge region represents the entire portion of the aquifer that contributes water to the Springdale Hutterite Colony water system. Management in the recharge region should focus on maintaining and improving the quality of groundwater that could reach each well over longer timeframes or with increased water usage.

Hydrogeologic Conditions

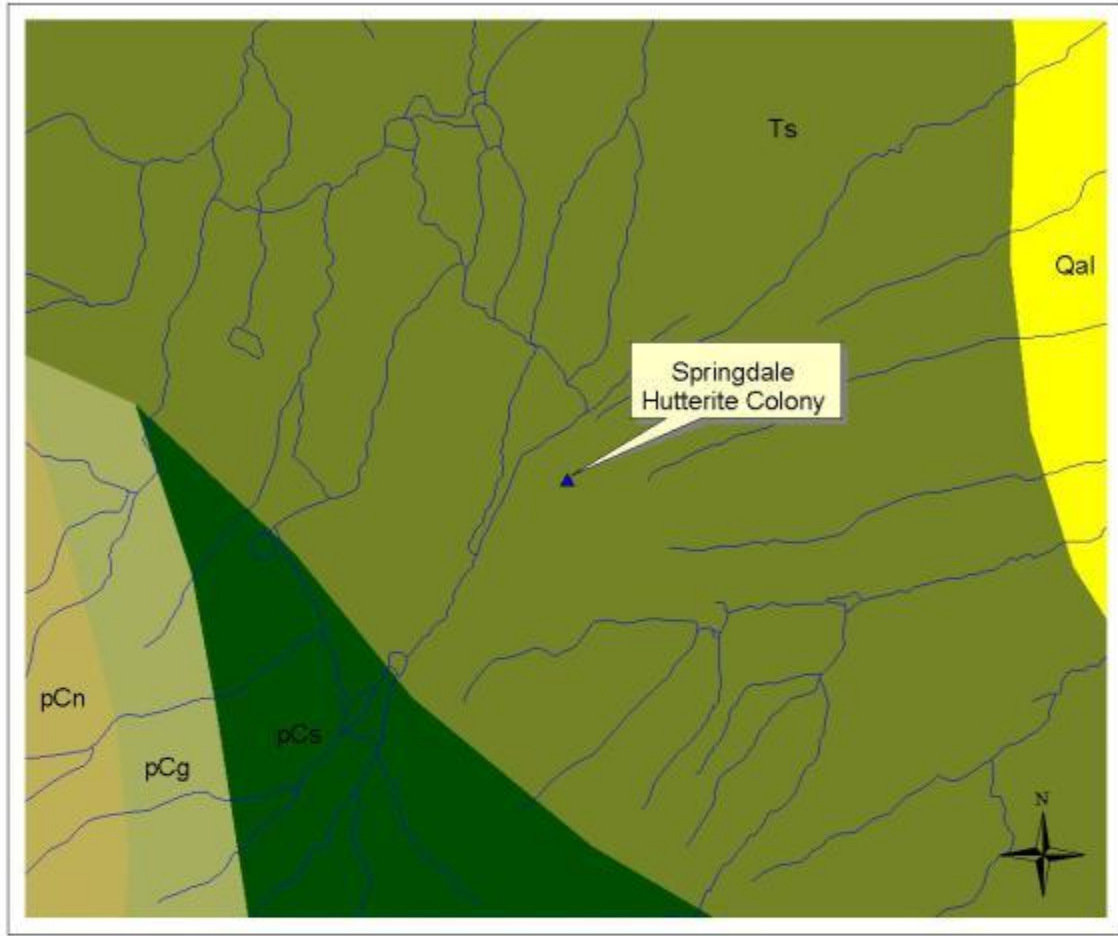
Based on the Springdale Hutterite Colony area well logs and geologic map, the well appears to be installed in shale overlain by five feet of clay (Figure 4). This confined aquifer is classified as having a low sensitivity to potential contaminant sources in accordance with SWPP source water sensitivity criteria (DEQ, 1999)

Table 2. Source Water Sensitivity Criteria



Source Water Sensitivity
<p>High Source Water Sensitivity Surface water and GWUDISW Unconsolidated Alluvium (unconfined) Fluvial-Glacial Gravel Terrace and Pediment Gravel Shallow Fractured or Carbonate Bedrock</p>
<p>Moderate Source Water Sensitivity Semi-consolidated Valley Fill sediments Unconsolidated Alluvium (semi-confined)</p>
<p>Low Source Water Sensitivity Consolidated Sandstone Bedrock Deep Fractured or Carbonate Bedrock Semi-consolidated Valley Fill Sediments (confined)</p>

Figure 4. Springdale Hutterite Colony Area Geology

Figure 4. Springdale Hutterite Colony Area Geology



Geology

-  Quaternary Alluvium (Qal)
-  Tertiary Sediments (Ts)
-  PreCambrian Grayson Shale (pCg)
-  PreCambrian Newland Limestone (pCn)
-  PreCambrian Spokane Shale (pCs)
-  Minor Streams

Aubrey Smartt
July 2004



Conceptual Model and Assumptions

Deep fractured shale is the source of groundwater for the Springdale Hutterite Colony well. Recharge to the aquifer is most likely from infiltration of precipitation, losses into more permeable areas of the overlying clay layer, and losses from area streams.

Well Information

Well information for the Springdale Hutterite Colony well is presented on Table 3.

Table 3. **Source well information for the Springdale Hutterite Colony PWS.**

Information	Well #1
PWS Source Code	002
Well Location (Township, Range, Section, quarter sections)	T.8 N., R. 6 E., Section 7 SE ¹ / ₄ SE ¹ / ₄ SE ¹ / ₄ (DDD)
Latitude/ Longitude	46.4606 / 111.0167
MBMG #	122547
Water Right #	
Well Completion Date	01/30/1989
Total Depth (feet)	90'
Perforated Intervals (feet)	50'-90'
Static Water Level (feet)	
Pumping Water Level (feet)	
Drawdown (feet)	
Test Pumping Rate (gpm)	25

Methods and Criteria

DEQ's Source Water Protection Program specifies methods and criteria used to delineate subregions of the source water protection area for Springdale Hutterite Colony's well. A control zone, an inventory region, and a recharge region have been delineated for this well.

Delineation Results

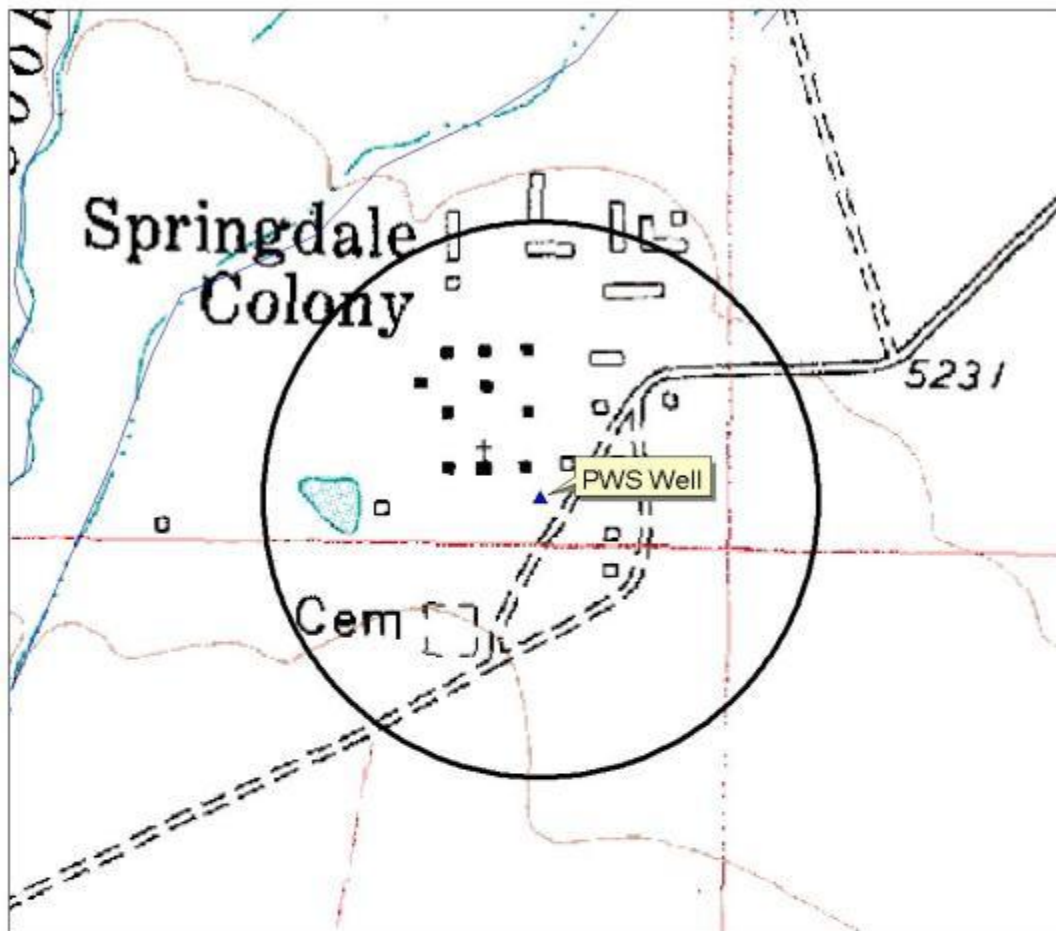
A 100-foot radius control zone, a 1000-foot radius inventory region (Figure 5), and a recharge region (Figure 6) were delineated for the Springdale Hutterite Colony well.

Limiting Factors

This delineation is based on estimated groundwater flow, pumping conditions, and hydrogeological mapping. Delineation of the modified 1000-foot fixed radius inventory region for the Springdale Hutterite Colony PWS well assumes that the aquifer is homogeneous and of infinite aerial extent. Aquifer materials are seldom homogeneous and groundwater flow within an aquifer is generally not uniform or strictly two-dimensional. Additionally, the total amount of recharge to the aquifer system from precipitation and area streams is unknown and can vary seasonally.

Figure 5. Springdale Hutterite Colony Inventory Region

Figure 5. Springdale Hutterite Colony Inventory Region



Scale 1:5,000

500 0 500 Feet



Legend

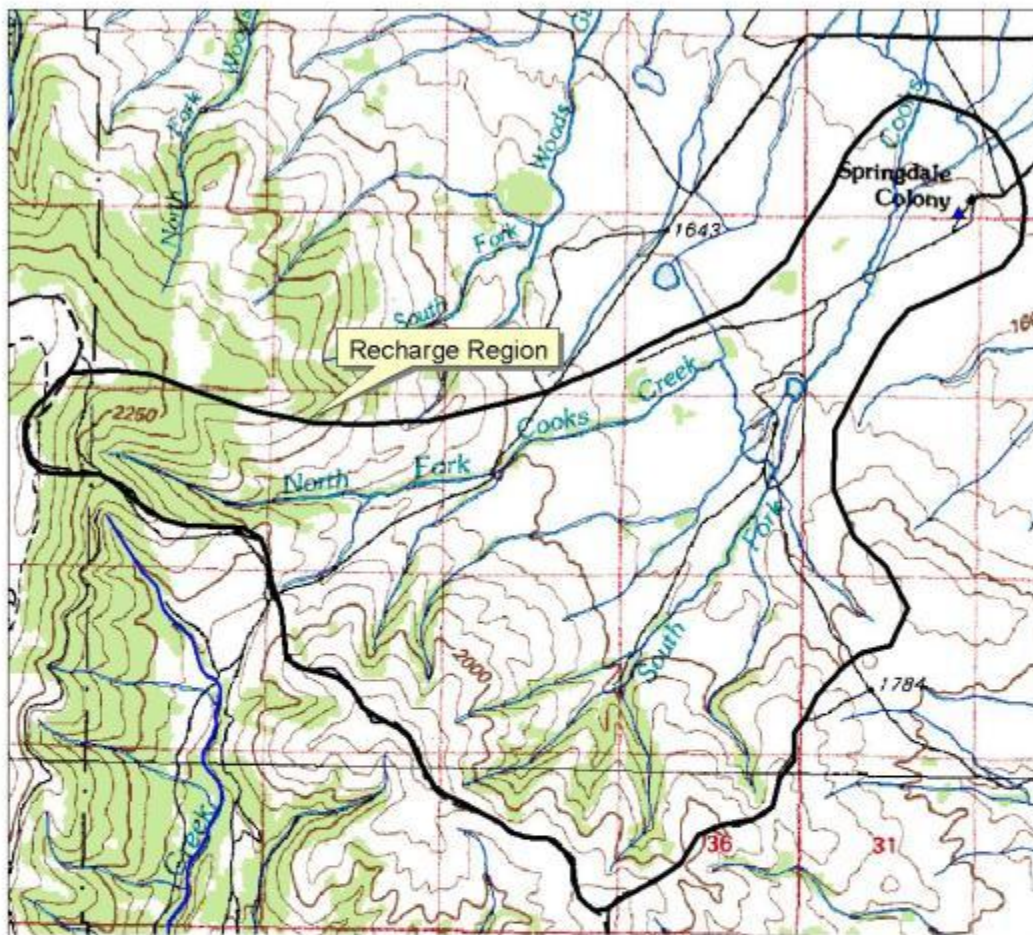
- ▲ Springdale Colony PWS Well
- ◻ Springdale Colony Inventory Region
- ∩ Streams



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March 2005

Figure 6. Springdale Hutterite Colony Recharge Region

Figure 6. Springdale Hutterite Colony Recharge Region



Scale 1:40,000

0.5 0 0.5 1 Miles



Legend

- ▲ Springdale Colony Well
- ▭ Recharge Region
- ~ Streams

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March 2005



CHAPTER 3 INVENTORY

An inventory of potential contaminant sources was conducted within the Springdale Hutterite Colony PWS well control zone, inventory region, and recharge region. Potential sources of all primary drinking water contaminants and *Cryptosporidium* were identified, however, only significant potential contaminant sources were selected for the detailed inventory. Significant potential contaminants in the Springdale Hutterite Colony inventory region include nitrate, pathogens, fuels, solvents, agricultural chemicals, and metals.

The potential contaminant source inventory for Springdale Hutterite Colony focuses on all activities in the control zone, certain sites or land use activities in the inventory region, and general land uses and large facilities in the recharge region.

Inventory Method

Available databases were initially searched to identify businesses and land uses that are potential sources of regulated contaminants in the inventory region. The following steps were followed:

Step 1: Land cover is identified from the National Land Cover Dataset compiled by the U.S. Geological Survey and U.S. Environmental Protection Agency (U.S.G.S., 2000). Land cover types in this dataset were mapped from satellite imagery at 30-meter resolution using a variety of supporting information.

Step 2: EPA's Envirofacts System was queried to identify EPA regulated facilities. This system accesses the following databases: Resource Conservation and Recovery Information System (RCRIS), Biennial Reporting System (BRS), Toxic Release Inventory (TRI), Permit Compliance System (PCS), and Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS). The available reports were browsed for facility information including the Handler/Facility Classification to be used in assessing whether a facility is a significant potential contaminant source.

Step 3: DEQ databases were queried to identify Underground Storage Tanks (UST), hazardous waste contaminated sites, landfills, and abandoned mines.

Step 4: A business phone directory was consulted to identify businesses that generate, use, or store chemicals in the inventory region. Equipment manufacturing and/or repair facilities, printing or photographic shops, dry cleaners, farm chemical suppliers, and wholesale fuel suppliers were targeted by Standard Industrial Codes.

Step 5: Major road and rail transportation routes were identified.

Step 6. All significant potential contaminant sources were identified in the inventory region and land uses and facilities that generate, store, transport, or dispose large quantities of hazardous materials were identified within the recharge region.

Potential contaminant sources are designated as significant if they fall into one of the following categories:

- | | |
|--|---|
| 1) Large quantity hazardous waste generators | 8) Wastewater lagoons or spray irrigation |
| 2) Landfills | 9) Septic systems |
| 3) Hazardous waste contaminated sites | 10) Sewered residential areas |
| 4) Underground storage tanks | 11) Storm sewer outflows |
| 5) Major roads or rail transportation routes | 12) Floor drains, sumps, or dry wells |
| 6) Cultivated cropland | 13) Abandoned or active mines |
| 7) Animal feeding operations | |

Inventory Results/Control Zone

Land use in the 100-foot control zone consists of the pump house. No significant potential contaminant sources were identified in the control zone.

Inventory Results/Inventory Region

Land cover within the inventory region consists primarily of 68% cultivated cropland including small grains at 66% and fallow land at 2% (Figure 7). Other types of land cover in the inventory region and their percentages are also identified on Figure 7. Community sewer mains underlie approximately 25% of the inventory region. The sewer mains drain to a sewage treatment and disposal lagoon located northeast of the colony. Significant potential contaminant sources in the inventory region are listed in Table 4.

Table 4. Significant potential contaminant sources in the Springdale Hutterite Colony PWS Inventory Region

Potential Source	Map Figure	Potential Contaminants	Hazard
Cultivated Cropland	Figure 6	SOCs, nitrates, pathogens	Over-application or improper handling of pesticides or fertilizers may impact area groundwater. Excessive irrigation may cause agricultural chemicals to migrate into area groundwater used for drinking water
Equipment Maintenance Shop	Figure 3	VOCs and other chemicals used for automotive and equipment repair	Spills, leaks, or improper handling of fluids, solvents, and repair materials during transportation, use, storage and disposal may impact area groundwater used for drinking water

Table 4. Significant potential contaminant sources in the Springdale Hutterite Colony PWS Inventory Region

Potential Source	Map Figure	Potential Contaminants	Hazard
Cultivated Cropland	Figures 3 and 7	SOCs, nitrates, pathogens	Over-application or improper handling of pesticides or fertilizers may impact area groundwater. Excessive irrigation may cause agricultural chemicals to migrate into area groundwater used for drinking water
Equipment Maintenance Shop	Figure 3	VOCs and other chemicals used for automotive and equipment repair	Spills, leaks, or improper handling of fluids, solvents, and repair materials during transportation, use, storage and disposal may impact area groundwater used for drinking water
Animal Feeding Areas/Barns/Corrals	Figure 3	Nitrates and pathogens	Improper storage and management of animal wastes and wastewater may impact area groundwater used for drinking water
Community Sewer Mains	-----	Nitrates and pathogens	If not properly maintained, leaks from ruptured pipes will allow untreated effluent to impact the area drinking water supply

Cultivated Cropland – Agricultural chemicals used on cropland could potentially migrate into area groundwater if they are applied improperly. Excessive irrigation could also cause agricultural chemicals to leach into area groundwater that is used for drinking water.

Equipment Maintenance Shop – Spills, leaks, or improper handling of fluids, solvents, and repair materials during transportation, use, storage and disposal may impact the area groundwater that is used for drinking water.

Animal Feeding Areas/Barns/Corrals – Nitrates and pathogens could potentially leach from these areas into area groundwater if animal wastes and wastewater are not properly managed.

Community Sewer Mains – Nitrates and pathogens could leach from the community sewer mains and into area groundwater if they are not properly maintained.

Inventory Results/Recharge Region

Land cover within the recharge region consists primarily of grassland at 66% (Figure 8). Other types of land cover in the recharge region and their percentages are also identified on Figure 8. Overall, there is low septic density within the recharge region has a low septic density (NRIS SWAP Mapper). No additional potential contaminant sources were identified in the recharge region.

Inventory Limitations

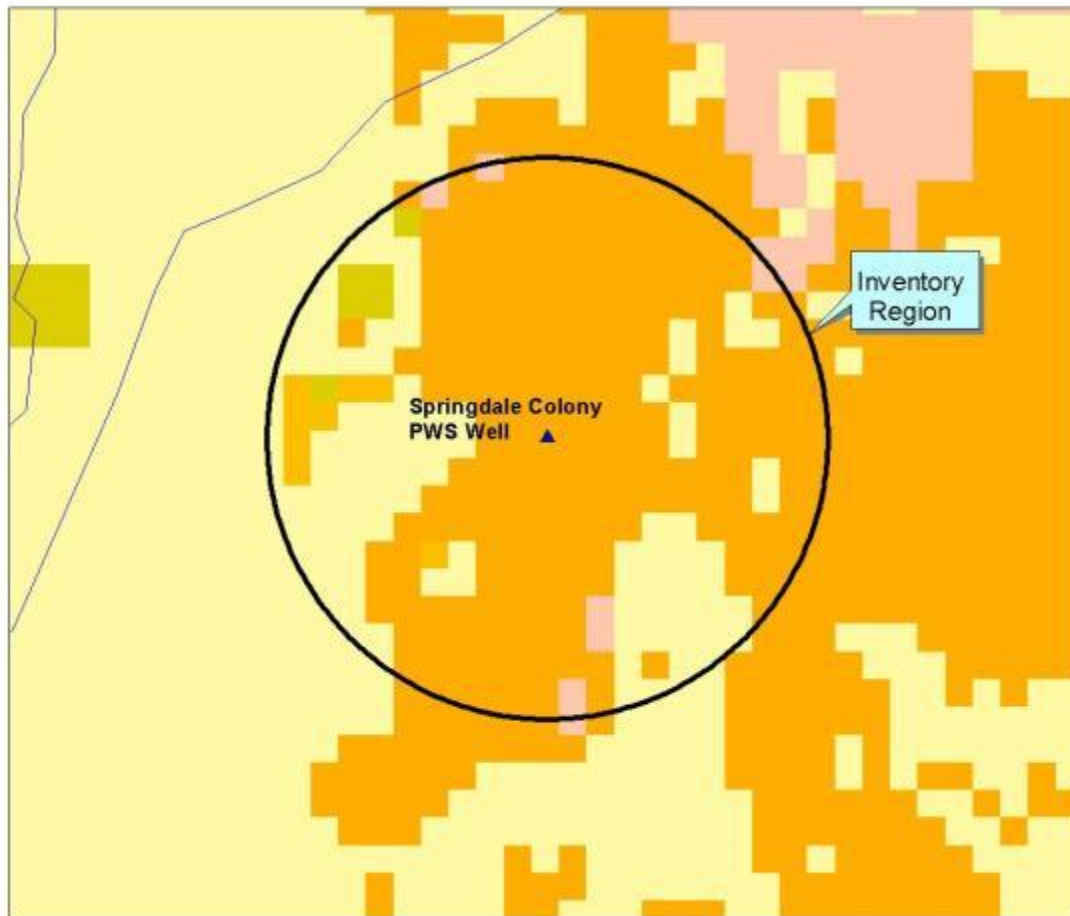
The potential contaminant inventory was conducted using various databases to acquire readily available information. Information was also obtained where possible, from individuals familiar with the Springdale Hutterite Colony. Consequently, unregulated activities or unreported contaminant releases may have been overlooked. The use of multiple sources of information, however, should ensure that the major threats to the Springdale Hutterite Colony PWS well have been identified.

Inventory Update

To make this SWDAR a useful document in the years to come, the owners and the certified water system operator(s) for the Springdale Hutterite Colony PWS for the should update the inventory for their records every year. Changes in land uses or potential contaminant sources should be noted and additions made as needed. The complete inventory should be submitted to DEQ at least every 5 years to ensure that this report stays current in the public record.

Figure 7. Land Cover in the Springdale Hutterite Colony Inventory Region

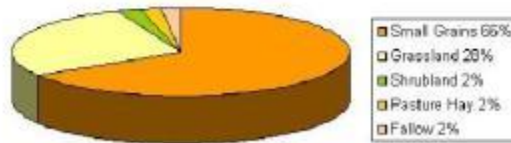
Figure 7. Land Cover Within the Springdale Hutterite Colony Inventory Region



Scale 1:5,000
500 0 500 Feet



Land Cover Type & Percentage

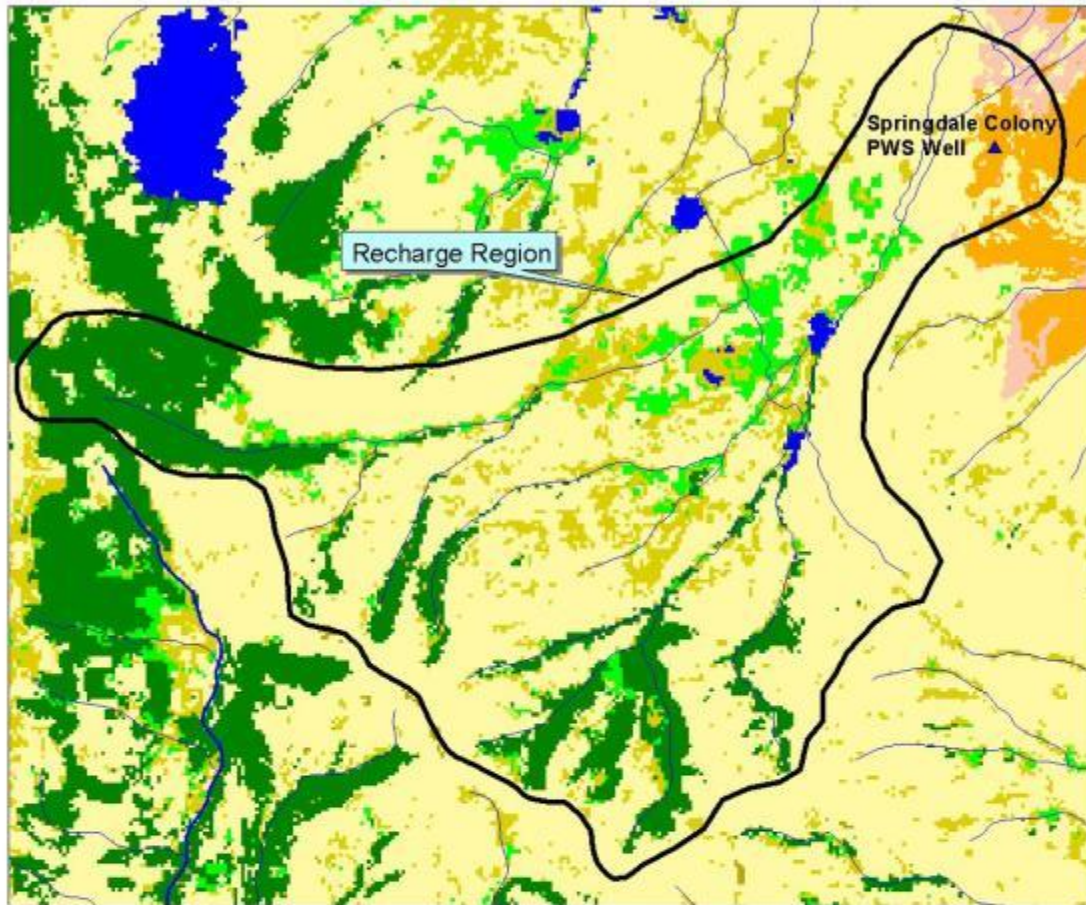


Revised by Carolyn V. DeMartino
March 2005



Figure 8. Land Cover in the Springdale Hutterite Colony Recharge Region

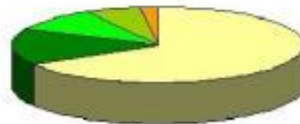
Figure 8. Land Cover Within the Springdale Hutterite Colony Recharge Region



Scale 1:40,000
1 0 1 Miles



Land Cover Percentage & Type



Grassland	86%
Evergreen Forest	16%
Shrubland	10%
Deciduous Forest	6%
Small grains	2%

Revised by Carolyn V. DeMartino
March 2005



CHAPTER 4 SUSCEPTIBILITY ASSESSMENT

Susceptibility is the potential for a public water supply to draw water contaminated by inventoried sources at concentrations that would pose concern. Susceptibility is assessed in order to prioritize potential pollutant sources for management actions by local entities, in this case Springdale Hutterite Colony.

The goal of Source Water Management is to protect 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 land use activities in the Recharge Region pose minimal threat to the source water. Management priorities in the Inventory Region are determined by ranking the significant potential contaminant sources identified in the previous chapter according to susceptibility. Alternative management approaches that could be pursued by Springdale Hutterite Colony to reduce susceptibility are recommended.

Susceptibility is determined by considering the hazard rating for each potential contaminant source. Hazard for confined wells is based on the criteria identified in Table 5.

Table 5. Determination of Hazard of Potential Contaminant Sources For Confined Wells

Potential Contaminant Sources	High Hazard Rating	Moderate Hazard Rating	Low Hazard Rating
Point Sources of All Contaminants	PWS well is not sealed through the confining layer	Area wells are not sealed through the confining layer	All wells are sealed through the confining layer
Septic Systems (density)	More than 300 per sq. mi.	50 – 300 per sq. mi.	Less than 50 per sq. mi.
Municipal Sanitary Sewer (percent land use)	More than 50 percent of region	20 to 50 percent of region	Less than 20 percent of region
Cropped Agricultural Land (percent land use)	More than 50 percent of region	20 to 50 percent of region	Less than 20 percent of region

The existence of barriers that decrease the likelihood that contaminated water will flow to Springdale Hutterite Colony’s well also determines susceptibility (Table 6). Barriers to contamination can be 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 are spill catchment structures for industrial facilities and leak detection for underground storage tanks. Emergency planning and best management practices are considered management barriers. Thick clay-rich soils, a deep water table or a thick saturated zone above the well intake can be natural barriers.

Table 6. Relative Susceptibility to Specific Contaminant Sources as Determined by Hazard and the Presence of Barriers

	High Hazard Rating	Moderate Hazard Rating	Low Hazard Rating
No Barriers	Very High Susceptibility	High Susceptibility	Moderate Susceptibility
One Barrier	High Susceptibility	Moderate Susceptibility	Low Susceptibility
Multiple Barriers	Moderate Susceptibility	Low Susceptibility	Very Low Susceptibility

Significant potential contaminant sources in the Springdale Hutterite Colony well control zone and inventory region are identified in Table 7 along with their hazard ratings.

Table 7. Significant potential contaminant sources in the Springdale Hutterite Colony PWS Control Zone and Inventory Region

Source	Map Figure	Potential Contaminants	Hazard	Hazard Rating
Cultivated Cropland (68%)	Figure 3 and 7	SOCs, nitrates, pathogens	Over-application or improper handling of pesticides or fertilizers may impact area groundwater. Excessive irrigation may cause agricultural chemicals to migrate into area groundwater used for drinking water	High
Equipment Maintenance Shop	Figure 3	VOCs and other chemicals used for automotive and equipment repair	Spills, leaks, or improper handling of fluids, solvents, and repair materials during transportation, use, storage and disposal may impact area groundwater used for drinking water	High
Animal Feeding Areas	Figure 3	Nitrates and pathogens	Improper storage and management of animal wastes and wastewater may impact area groundwater used for drinking water	High
Community Sewer Mains (25%)	-----	Nitrates and pathogens	If not properly maintained, leaks from ruptured pipes will allow untreated effluent to impact the area drinking water supply	Moderate

The susceptibility of the Springdale Hutterite Colony well to each potential contaminant source is assessed separately. The susceptibility ratings for each significant potential contaminant source and each associated contaminant are presented in Table 8. Management recommendations indicating how significant potential contaminant sources could be better managed to prevent impacts to the Springdale Hutterite Colony well are also provided in Table 8.

Table 8. Susceptibility Assessment for Significant Potential Contaminant Sources in the Springdale Hutterite Colony PWS Control and Inventory Regions

Source	Map Figure	Contaminant	Hazard	Hazard Rating	Barriers	Susceptibility	Management Recommendations
Cultivated Cropland (68%)	Figure 6	SOCs, nitrates, pathogens	Over-application or improper handling of pesticides or fertilizers may impact area groundwater. Excessive irrigation may cause agricultural chemicals to migrate into area groundwater used for drinking water	High	Clay and shale layers; Well intake depth	Moderate	Use Best Management Practices (BMPs) for cultivated cropland
Equipment Maintenance Shop	Figure 3	VOCs and other chemicals used for automotive and equipment repair	Spills, leaks, or improper handling of fluids, solvents, and repair materials during transportation, use, storage and disposal may impact area groundwater used for drinking water	High	Clay and shale layers; Well intake depth	Moderate	Develop and implement an emergency spill response plan to deal with hazardous chemical spills
Animal Feeding Areas	Figure 3	Nitrates and pathogens	Improper storage and management of animal wastes and wastewater may impact area groundwater used for drinking water	High	Clay and shale layers; Well intake depth	Moderate	Use BMPs for proper animal waste management
Community Sewer Mains (25%)	-----	Nitrates and pathogens	If not properly maintained, leaks from ruptured pipes will allow untreated effluent to impact the area drinking water supply	Moderate	Clay and shale layers; Well intake depth	Low	Schedule periodic inspections to insure proper operation and maintenance

Susceptibility Assessment Results

The susceptibility assessment results for each significant potential contaminant source identified are described below:

Cultivated Cropland – Hazard is ranked high because the percentage of cultivated cropland (68%) in the inventory region is greater than 50 percent. The overall susceptibility of the well is ranked moderate, as multiple barriers to contamination were identified.

Equipment Maintenance Shop – Hazard is ranked high, as an equipment maintenance shop is located within the inventory region. The overall susceptibility of the well is ranked moderate, as there are clay and shale confining units and the well intake is greater than 50 feet below the water table elevation.

Animal Feeding Areas – Hazard is ranked high because the corrals and barns are located in the inventory region. The overall susceptibility of the well is ranked moderate, as multiple barriers to contamination were identified.

Community Sewer Mains – Hazard is ranked moderate because sewer mains underlie approximately 25% of the inventory region. The overall susceptibility of the well is ranked low, as multiple barriers to contamination were identified.

Management Recommendations

The Springdale Hutterite Colony Source Water Delineation and Assessment Report was prepared to assist the Springdale Hutterite Colony PWS operator and residents to protect their PWS well. The report provides information concerning the aquifer that supplies water to the Springdale Hutterite Colony well, identifies the control zone, inventory region, and recharge region, and within each of these protection areas identifies the significant potential contaminants that may impact the PWS well. If the management recommendations included in Table 8 are implemented by the Springdale Hutterite Colony PWS, they may be considered additional barriers that will reduce the susceptibility of Springdale Hutterite Colony's well to specific potential contaminant sources and their associated contaminants.

Management recommendations fall into the following categories:

- Education
- Sewage disposal system maintenance and leak detection
- Stormwater management
- Agricultural best management practices
- Emergency Response Plan
- Source Water Protection Plan

Education - Educational workshops provided to the colony residents by the county or state promote safe handling and proper storage, transport, use, and disposal of hazardous materials. Ongoing training provided to designated emergency personnel such as the Springdale Hutterite Colony PWS operator

will promote the efficiency and effectiveness of emergency responses to hazardous material spills that may occur in the vicinity of the well. Likewise, educational workshops provided to other rural homeowners will promote the proper maintenance and replacement of residential septic systems. The EPA and the State of Montana can provide educational materials on these topics.

Sewage Disposal System Maintenance and Leak Detection – Proper maintenance of the community sewer mains and piping leading to the lagoon will reduce the susceptibility of Springdale Hutterite Colony’s well to contamination from this potential contaminant source.

Stormwater Management – Stormwater planning should address source and drainage control. Source control can be accomplished through educational programs focusing on residential and commercial chemical use, disposal, and recycling. Drainage control and pollutant removal can be accomplished through the use of vegetated detention basins at outfall locations. The construction of storm runoff wetlands can go a long way to reducing the amount of non-point pollutants.

Agricultural and Silvicultural Best Management Practices (BMPs) – BMPs that address application and mixing of fertilizer and pesticides are a viable alternative to prohibition of their use. BMPs may also be utilized to minimize surface runoff and soil erosion on cultivated fields.

Emergency Response Plan – The usefulness and effectiveness of an emergency response plan are maximized if the plan contains a clear listing of all emergency contacts, emergency numbers, and resources available within the City of White Sulphur Springs and Meagher County to respond to an emergency situation, such as a hazardous material spill, at Springdale Hutterite Colony. An emergency response plan would be of significant benefit to the Springdale Hutterite Colony operator and residents.

Source Water Protection Plan – Continue to develop and implement a Source Water Protection Plan. To realize the maximum benefits, the Source Water Protection Plan should clearly identify: 1) strategies to reduce the likelihood of contaminant releases within the inventory region, 2) the procedures to follow (emergency response plan) in the event that the Springdale Hutterite Colony well becomes threatened by regulated contaminants, and 3) identify alternate sources of drinking water.

CHAPTER 5 MONITORING WAIVERS

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 the 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 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.

Waiver Recommendation

Currently, the Springdale Hutterite Colony PWS well has a waiver for Phase II inorganics. Based on the susceptibility assessment it does not appear that the Springdale Hutterite Colony would be eligible for additional use waivers.

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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.

Community. A town, neighborhood or area where people live and prosper.

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 ground water 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 ground water flow systems.

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

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

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 – Ground Water 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 ground waters at increased levels that may exceed MCLs.

Pathogens. A microorganism typically found in the intestinal tracts of mammals, capable of producing disease.

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.

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 ground water. 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).

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. A source water management region that is generally 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 ground water 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 ground water 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 which evaporate readily to the atmosphere.

Watershed. The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common delivery point.

* 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:

[EPA/Office of Enforcement and Compliance Assurance: Guide to Environmental Issues: Glossary of Terms & Acronyms *Term Detail*](#))

APPENDICES

APPENDIX A: Springdale Colony Source Water Protection Plan

APPENDIX B: Well Log

MONTANA WELL LOG REPORT

Other Options

[Plot this site on a topographic map](#)
[View scanned well log \(6/29/2009 11:22:15 AM\)](#)

Site Name: SPRINGDALE COLONY, INC
GWIC Id: 20730
DNRC Water Right: C30071563

Section 7: Well Test Data

Total Depth: 90
 Static Water Level: 37
 Water Temperature:

Section 1: Well Owner

Owner Name

SPRINGDALE COLONY, INC

Mailing Address

770 BIRKY ROAD

City

WHITE SULPHUR SPRINGS

State

MT

Zip Code

59645

Pump Test *

Depth pump set for test 80 feet.
25 gpm pump rate with 46 feet of drawdown after 2 hours of pumping.
 Time of recovery 0.5 hours.
 Recovery water level 37 feet.
 Pumping water level feet.

Section 2: Location

Township	Range	Section	Quarter Sections	
08N	06E	7	SE¼ SE¼	
County			Geocode	
MEAGHER				
Latitude	Longitude	Geomethod	Datum	
46.462364	111.017822	TRS-SEC	NAD83	
Ground Surface Altitude		Method	Datum	Date
Addition	Block		Lot	

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 3: Proposed Use of Water

STOCKWATER (1)

Section 4: Type of Work

Drilling Method: FORWARD ROTARY

Section 5: Well Completion Date

Date well completed: Monday, January 30, 1989

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	90	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	40	6	0.25			STEEL
30	90	4				PVC

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
50	90	4		.025	FACTORY SLOTTED

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
20	20	BENTONITE	Y

Section 8: Remarks

Section 9: Well Log Geologic Source

Unassigned

From	To	Description
0	35	GRAVEL
35	90	BROKEN SHALE AND CLAY MIX

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: KEVIN HAGGERTY
Company: HAGGERTY DRILLING
License No: WWC-353
Date: 1/30/1989
Completed:

APPENDIX C: Pumphouse Layout

