

# *Source Water Delineation and Assessment Report*

11/99

***Deerfield Colony***  
**Public Water System**  
**PWSID # 00431**

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# Table of Contents

<b>Chapter 1 - Introduction</b>	<b>1</b>
<b>Chapter 2 - Background</b>	<b>3</b>
<b>Chapter 3 - Delineation</b>	<b>5</b>
<b>Chapter 4 - Inventory</b>	<b>10</b>
<b>Chapter 5 - Susceptibility Assessment</b>	<b>14</b>
<b>References</b>	<b>17</b>
<b>Glossary</b>	
<b>Figures</b>	
<a href="#">Figure 1</a> – Location Map	4
<a href="#">Figure 2</a> – Geologic Map of Study Area	
<a href="#">Figure 3</a> – Source Water Protection Aquifer Recharge Area	
<a href="#">Figure 4</a> – Source Water Protection Management Zones	9
<a href="#">Figure 5</a> – Land Use Classification in Inventory Zone	12
<a href="#">Figure 6</a> – Land Use Classification in Watershed and Recharge Areas	13
<a href="#">Figure 7</a> – Inventory Results	16
<b>Tables</b>	
Table 1 – Source Well Information for Deerfield Colony	7
Table 2 – Significant Potential Contaminant Sources	11
Table 3 – Relative Susceptibility Based on Hazards and Barriers	14
Table 4 – Non-Point Source Hazard Table	15
Table 5 – Susceptibility Assessment of Significant Potential Contaminant Sources	15
<b>Appendices</b>	
APPENDIX A – PWS Sanitary Survey with System Layout	
APPENDIX B – PWS and Area Well Logs from MBMG/GWIC	
APPENDIX C – Checklist	
APPENDIX D – Concurrence Letter	

## **List of Acronyms**

BMP - Best Management Practices

CAFO - Confined Animal Feeding Operation

CECRA - Comprehensive Environmental Cleanup and Responsibility Act

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act

LUST - Leaking Underground Storage Tank

MCL - Maximum Contaminant Level

MBMG-GWIC - Montana Bureau of Mines and Geology – Ground Water Information Center

MPDES - Montana Pollutant Discharge Elimination System

NPDES - National Pollutant Discharge Elimination System

PWS - Public Water System.

RCRA - Resource Conservation and Recovery Act

SMCL - Secondary Maximum Contaminant Levels

SWDAR - Source Water Delineation and Assessment Report.

SWPP - Source Water Protection Plan

SWL - Static Water Level

SOC - Synthetic Organic Compounds

TMDL - Total Maximum Daily Load

UST - Underground Storage Tank

VOC - Volatile Organic Compounds

*See glossary at end of text for definitions of acronyms and other terms used in this report*

## 1.0 INTRODUCTION

The Safe Drinking Water Act (SDWA) Amendments of 1996 requires states to develop and implement Source Water Assessment Programs (SWAP) to analyze existing and potential threats to the quality of the public drinking water supplies throughout the state. The Montana SWAP was formally approved by the US Environmental Protection Agency (EPA) in November 1999. The Montana SWAP was developed from the former Wellhead Protection Program, but includes surface water sources and requires a more rigorous inventory of potential contaminant sources. For communities that have already developed wellhead protection plans, SWAP revises these plans to meet the expanded requirements. DEQ also works with other groups such as Montana Rural Water Systems, Inc., and Midwest Assistance Programs to implement the program.

SWAP addresses only public water systems (PWS) regulated according to the Federal Safe Drinking Water Act. A public water supply system is defined, according to Federal and Montana regulations, as a system that supplies water for human consumption. A public water supply system has at least 15 service connections or regularly provides water to at least 25 persons daily for a minimum of 60 days in a calendar year. There are three types of public water supply systems:

- Community water systems provide water on a year-round basis, and have a minimum of 15 service connections or regularly serve at least 25 residents. In addition to incorporated towns, community systems may serve smaller areas such as housing subdivisions or trailer courts.
- Non-transient non-community systems do not serve communities, but provide water regularly to a minimum of 25 of the same people for at least 6 months of a year. These systems serve public buildings such as schools and hospitals, where people are employed but do not reside.
- Transient non-community systems do not serve communities, and do not regularly serve a minimum of 25 of the same people for at least 6 months of the year. These systems are usually seasonal, and are located in areas such as campgrounds and parks.

Source water protection is a common sense approach to guarding public health by protecting drinking water supplies. In the past, water suppliers have used most of their resources to treat water from rivers, lakes, and underground sources before supplying it to the public as drinking water. Source water protection means preventing contamination and reducing the need for treatment of drinking water supplies. Source water protection also means taking positive steps to manage potential sources of contaminants and contingency planning for the future by determining alternate sources of drinking water. Protecting source water is an active step towards safe drinking water; a source water protection program (along with treatment, if necessary) is important for a community's drinking water supply. A community may decide to develop a source water protection program based on the results of a source water assessment, which includes the delineation of the area to be protected and an inventory of the potential contaminants within that area.

The Montana Source Water Protection Program is intended to be a practical and cost-effective approach to help public drinking water supplies protect their water source from contamination. The Montana Source Water Protection Program is responsible for completing delineation and assessment reports for all public water supplies in Montana. The Source Water Delineation and Assessment Report (SWDAR) compiles the appropriate data and other technical information about an area to allow communities to develop a source water protection plans. Delineation is a process whereby areas that contribute water to aquifers or surface waters used for drinking water, called source water protection areas, are identified on a map. Geologic and hydrologic conditions are evaluated in order to delineate source water protection areas. Assessment involves identifying potential contaminant sources in delineated source water protection areas, and evaluating the potential for contamination of drinking water from these sources under “worst-case” conditions such as a flood, fire or

human error. Although voluntary, source water protection plans are the ultimate focus of source water delineation and assessment. This delineation and assessment report is written to encourage and facilitate Deerfield Colony in developing a source water protection plans that meets their specific needs.

### **Scope and Purpose**

This report presents the source water delineation and assessments for the municipal public water supply for the Deerfield Colony public water supply. James Swierc, Hydrogeologist with the Montana Department of Environmental Quality, prepared this report. Assistance was provided by Edward Stahl, operator of the public water supply for the colony.

The Deerfield Colony is located northeast of Lewistown, in the west-central part of Fergus County, Montana. This report is intended to meet the technical requirements for the completion of the delineation and assessment report for this 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).

### **Limitations**

This report was prepared to assess threats to the Deerfield 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 sources for regulated public water supplies, and not any other type of water supply. The inventory of potential contaminant sources focuses on the management areas delineated for the public water supplies in this report. As a result, other potential sources of contamination to surface and ground water in the area may not be identified.

The term “contaminant” is used in this report to refer to any chemical or biologic constituent in water that are listed as regulated under state and federal regulations. Water constituents are generally regulated based on health effects that may occur when ingested at certain levels. Water quality standards are based on maximum contaminant level goals (MCLGs) for a compound, which represents a concentration where adverse health effects are not considered likely to occur when ingested. However, as natural waters contain many dissolved constituents and MCLGs are frequently not attainable with economically viable water treatment alternative, maximum concentration levels (MCLs) are used. MCLs represent concentrations that may result in chronic or acute health problems when ingested. MCLs are based on the relative risk, or likelihood that health problems may occur, and economics associated with a treatment technology for a specific constituent of water. In some cases, sources for constituents with Secondary MCLs are also evaluated in this report. Secondary MCLs are non-regulatory guidelines regarding cosmetic effects (such as tooth or skin discoloration) or aesthetic effects (such as taste, odor, or color) of drinking water.

## 2.0 BACKGROUND

### The Community

The Deerfield Hutterite Colony is located in Fergus County, in central Montana, as shown in [Figure 1](#). The nearest town with commercial services is Lewistown (population 5,813), located approximately 30 miles southeast of the colony. There are approximately 44 residents at the colony. The economy of the colony relies on the production of a variety of agricultural products.

The Colony complex comprises several residential buildings, a kitchen building, and several other facilities that support the agricultural activities at the colony. A map showing the layout of the colony is included with Appendix A. The colony obtains water from an artesian well located in the southeast part of the main colony complex.

Domestic wastewater is treated in lagoons located north of the main colony buildings, downgradient from the colony. Animal waste from the barns is collected into storage tanks beneath the barns. Both the liquid and solid animal waste is disposed by land application to cropland.

### Geographic Setting

Deerfield Colony is located west of the Moccasin Mountains, part of series of small ranges comprising the Judith Mountains in central Montana. The mountains in this area represent a significant feature with peaks that rise over 2,000 feet above the plains. The north flowing Judith River is located west of the main colony complex ([Figure 1](#)). The Judith River watershed (HUC 10040130) is part of the Lower Missouri River system in Montana.

The climate is typical of central Montana, with a limited amount of precipitation averaging 18.50 inches a year as measured in Lewistown. The wettest months are May and June averaging 2.94 and 3.60 inches a month, respectively. The driest months are November through February, with monthly averages ranging from 0.71 to 0.83 inches per month. The temperature ranges from an average high of 81.2°F in July (minimum July average of 49.4°F) to an average of 32.4°F in January (minimum January average of 9.9°F).

### General Description of the Source Water

The Deerfield Colony water system obtains water from a flowing artesian well located within the main colony complex. The well is installed to an approximate depth of 1,877 feet below ground surface into a sandstone in the lower part of the Cretaceous Kootenai Formation. Based on the information in the well logs, the source aquifer is interpreted to be a confined bedrock aquifer recharged in the Big Snowy and Little Belt Mountains. Recharge occurs from surface water infiltration into surface outcrops of the Kootenai Formation.

### The Public Water Supply

The PWS well (Source 002) is located in the southeast part of the main colony complex. Information on the PWS for Deerfield Colony is reviewed in a sanitary survey completed for the colony in September 14, 1993. The information reported on the PWS is obtained from this report, DEQ records, and from information gathered during a site visit by the author. A copy of the sanitary survey is included in Appendix A. The water system for Deerfield Colony serves the resident population of 44 people through 12 active service connections located in the colony residential and other buildings. The general layout of the colony buildings and distribution system is depicted in Appendix A.

The water from the well is pumped directly into the distribution system. There is no disinfection or other treatment system for the water. The artesian pressure from the aquifer pressurizes the distribution system.

[Figure 1](#) – *Location Map*

**Water Quality**

Every PWS is required to perform monitoring for contamination to their water supply. The monitoring constituents include coliforms (as an indicator of pathogenic organism), nitrates, metals and for multiple chemicals. The monitoring schedule depends on many factors such as the size and source water for a PWS, the number of sources (e.g. wells), and the population served. Each PWS has a specific monitoring program tailored to their system that follows the general protocols for operation of a PWS defined by DEQ. A review of the DEQ PWS database indicates that monitoring results for the Deerfield Colony PWS show no violations or exceedences of any drinking water quality standards. This includes nitrate, which is typically the only regulated compound detected in PWS across Montana. During the last five years, the monitoring results for the water supply indicate no detectable concentration of nitrate in the water.

There is no readily available water quality data for ground water within the Kootenai Formation in the Deerfield Colony area.

### 3.0 DELINEATION

The source water protection area, the land area that contributes water to Deerfield Colony is identified in this chapter. Three management areas are identified within the source water protection area. These three regions, the control zone, inventory region, and recharge region, are delineated for the well. The control zone, also known as the exclusion zone, is an area of at least a 100-foot radius around the well. The inventory region for the confined aquifer is defined as the area within a 1,000-foot radius of the well. The recharge region represents the area where the source aquifer for the Deerfield Colony water system well is replenished.

#### Hydrogeologic Conditions

There are no readily available current documents on water quality and quantity in the area where Deerfield Colony is located. Perry (1932) presents an overview of water resources of the entire Judith Basin, with no specific information on the area near Deerfield Colony. Miller (1959) reviews the geology of the South Moccasin Mountains east of the colony, without reviewing ground water conditions. The following discussion of the hydrologic setting of the area reflects assumptions based on basic principles of ground and surface water hydrology. [Figure 2](#) depicts a generalized geologic map of the area around Deerfield Colony. The PWS source is interpreted to be from ground water in a confined bedrock aquifer.

The bedrock in the area around Deerfield Colony comprises the Lower Cretaceous Colorado Shale. Older rocks are exposed in the Moccasin Mountains to the east, and the Little Belt and Big Snowy Mountains to the south. The entire area is covered by gravels overlying the bedrock. The gravels are believed by Perry (1932) to represent the Flaxville Gravels mapped by Alden (1932) with his study of the glacial geology of eastern Montana. Deerfield Colony is present on a gravel terrace, with the Judith River located west of the colony. The Colorado Shale is exposed in the hillsides of the Judith River Valley. There is only limited shallow ground water present in the area, occurring at the base of the terrace gravels or in small, discontinuous coarser grained beds which may be present within the Colorado Shale. Water wells in the Judith Basin area including the area around Deerfield Colony are typically deep artesian wells with some flowing at the surface.

The database at the Montana Bureau of Mines and Geology was queried for additional wells in the area. There are several wells located within a three-mile radius of Deerfield Colony. However, none of these wells include lithologic well logs that identify the geologic units in the area. The only available well log for the area is for the Deerfield Colony PWS well (Appendix B). The well log indicates 15 feet of terrace gravels, overlying 1,525 feet of the Colorado Shale. The Kootenai Formation is present at a depth of 1,540 feet below ground surface to the bottom of the well at 1,877 feet below ground surface. The well is constructed with an open hole over the bottom two hundred feet, in the Sandstones of the lower Kootenai Formation. The depth to the aquifer and is consistent with the conclusions of Perry (1932) for the depth to ground water in the Kootenai Formation for the area near Danvers, a small town several miles southwest of Deerfield Colony.

Recharge to the Kootenai Formation bedrock aquifer occurs in surface outcrops of the formation in the mountains south and west of the Judith Basin (Perry, 1932). The aquifer flows generally to the north in the basin, confined by the shales and bentonites in the Colorado Shale. This information is depicted in [Figure 3](#).

#### Conceptual Model and Assumptions

A conceptual hydrogeologic model is a simplified representation of the hydrogeologic system. For the Deerfield Colony, ground water occurs in a confined bedrock aquifer. The aquifer is recharged by surface water infiltration from precipitation where it is exposed at the surface. Ground water flows in a general northward direction.

Based on the hydrogeologic setting, the Deerfield Colony water source is a confined aquifer in consolidated bedrock, which is considered to have a *low* source water sensitivity to contamination.

[Figure 2](#) – *Geologic Map of Study Area*

**Well Information**

The location of the well for the Deerfield Colony is depicted in [Figure 4](#). Information on the well is summarized in Table 1. A copy of the driller construction log for the well, obtained from MBMG-GWIC, is included with Appendix B.

*Table 1 - Source Well Information for Deerfield Colony.*

Information	Well
PWS Source Code	002
Well Location (T, R, Sec)	T17N, R16E Sec 3 CCCD
Well Location (lat, long)	47.2590°N 109.6765°W
MBMG #	29790
Water Right #	P069407
Date Well was Completed	20 Sept 1988
Total Depth	1,877 feet
Perforated Interval	Open hole from 1,670 – 1,870 feet
Static Water Level	Flowing artesian
Pumping Water Level	n/a
Drawdown	n/a
Test Pumping Rate	n/a
Specific Capacity	n/a
Yield	150 gpm

**Delineation Methods and Criteria**

The source water protection management areas were defined for a confined aquifer in accordance with the requirements of the DEQ Source Water Protection program (DEQ, 1999). In order to support source water protection planning efforts, an informal recharge zone is delineated based on a one-mile radius around the PWS

well. The complete recharge area is considered to be the exposures of the Kootenai Formation and parts of the Judith River watershed area upgradient from the surface exposures of the aquifer ([Figure 3](#)).

### **Source Water Protection Management Zones**

The delineated management zones for the well are depicted in [Figure 3](#) and [Figure 4](#). The control zone comprises an area of a 100-foot radius around the wellhead. The inventory zone reflects an area with a 1,000-foot radius around the wellhead. The recharge area reflects the area to the upper limits of the Judith River watershed where the Kootenai Formation is exposed, and the upgradient areas where surface water may flow onto the exposed outcrops of the aquifer. A one-mile radius buffer area around the colony is also depicted to help with assessing susceptibility and management options.

### **Limiting Factors**

The lack of site and regional hydrogeologic data represent the greatest potential source of error to accurate delineations of the management zones for the water sources at Deerfield Colony.

Figure 3 – *Source Water Protection Aquifer Recharge Area*

Figure 4 – *Source Water Protection Management Zones*

## 4.0 INVENTORY

An inventory of potential sources of contamination was conducted for the Deerfield Colony PWS within the delineated source water protection management regions. Potential sources of all primary drinking water contaminants and *Cryptosporidium* were identified, however, only significant potential contaminant sources were selected for detailed inventory. The significant potential contaminants in the Deerfield Colony PWS management regions are nitrates, pathogens, herbicides/pesticides and fertilizer from agricultural land.

### Inventory Method

The inventory for Deerfield Colony was obtained by visiting the colony, and discussing colony activities with representatives from the colony. Information on the PWS, land use, agricultural chemical storage and application, and waste disposal practices were identified at this time.

Urban and agricultural land uses were identified from the United State Geological Survey land use classification project (USGS, 2000). Major transportation routes through the area, including railroad lines, were also identified. This information is depicted in [Figure 5](#) and [Figure 6](#).

As part of the standard inventory process, the information in available databases on environmental sites was reviewed. EPA's Envirofacts System was queried to identify EPA regulated facilities located in the Inventory Region. This system accesses facilities listed in 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). DEQ Databases were queried to identify the following in the inventory region: Underground Storage Tanks (UST), hazardous waste contaminated sites (DEQ Hazardous Waste Cleanup Bureau), landfills, abandoned mines, and active mines including gravel pits. Any information on past releases and present compliance status was noted.

No facilities meeting these criteria were identified within any of the identified source water protection management zones.

### Inventory Results/Inventory and Control Zones

The potential contaminant sources identified for the control and inventory zones for the PWS well reflects the utilities and livestock activities within the main colony complex, and agricultural land use in the area around the colony. The potential contaminant sources are summarized in Table 2. The potential contaminant sources in the inventory zone include the colony sewer system, animal barns and waste storage pits, spilled fuels and other farm chemicals, and crop fertilizers and herbicides. The primary hazards are leakage from the domestic sewer system or animal waste pits, spills of farm fuels or chemicals in their storage areas, spills of animal wastes during transportation to the field for land application, excess application of herbicides and runoff from the cropped areas, direct infiltration of animal waste down the wellbore, and from the actual land application of animal wastes.

The control zone around the wellhead did not have any fencing or other protection at the time of the site visit. Fencing the control zone around the wellhead is strongly recommended as a method of protecting the integrity of the well, and preventing any contamination from surface water runoff that may infiltrate into the well through the wellbore.

## Inventory Results/Recharge Region

The recharge region is comprised of the higher elevations of the Big Snowy, Little Belt and Moccasin Mountains that are the headwaters to the Judith River Watershed. All of these areas have sustained some amount of mining for precious metals. The lower areas sustain limited agricultural use, with some cropland and some areas used for cattle grazing. Mining and the use of fertilizers, weed control herbicides and fuels for farm machinery are the primary contaminants of concern in the recharge region.

**Table 2 - Significant Potential Contaminant Sources.**

Source	Hazard
<b>Control and Inventory Zones</b>	
Cropped Agricultural Land	Land Application of Animal Waste Spills and Excess Application of Herbicides
Fuel/Chemical Storage	Spills or Leakage of Stored Chemicals
Sewer Lines (from Housing)	Leaking Sewer Lines or Waste Collection System
Animal Barns and Waste Tanks	Leaking Sewer Lines or Waste Collection System
Farm Chemical Storage and Mixing Area	Waste Chemical spills
Colony Access Roads	Spill or Accident from Transported Chemicals or Fuels
<b>Recharge Area – One-Mile Radius</b>	
Cropped Agricultural Land	Land Application of Animal Waste Spills and Excess Application of Herbicides
County Roads	Spill or Accident from Transported Chemicals or Fuels
<b>Recharge Area</b>	
Mining Activities	Release of waste chemicals; effects of Acid Rock Drainage
Cropped Agricultural Land	Land Application of Animal Waste Spills and Excess Application of Herbicides

## Inventory Update

The certified operator should update the inventory every year for his records. Changes in land uses or potential contaminant sources should be noted and additions made as needed. The complete inventory should be submitted to DEQ every five years.

## Inventory Limitations

The potential sources of contaminants for Deerfield Colony are taken from data and reports that are readily available. Consequently, unregulated activities or unreported contaminant releases may have been missed. The use of multiple sources of data, however, should help assure that contaminant sources that are identified represent the major threats to the source water for Deerfield Colony.

**Figure 5 – Land Use Classification in Inventory Zone**

Figure 6 – *Land Use Classification in Watershed and Recharge Areas*

## 5.0 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 the Deerfield Colony PWS.

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 are recommended as methods Deerfield Colony can implement to reduce susceptibility of the PWS to contamination.

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 Deerfield Colony PWS well (Table 3). Hazard is rated by the proximity of the potential contaminant sources to the well. Susceptibility ratings are presented individually for each significant potential contaminant source and each associated contaminant. The susceptibility of the well to each potential contaminant source is assessed separately.

*Table 3 - Relative Susceptibility Based on Hazards and Barriers*

Presence Of Barriers	Hazard		
	High	Moderate	Low
<b>No Barriers</b>	Very High Susceptibility	High Susceptibility	Moderate Susceptibility
<b>One Barrier</b>	High Susceptibility	Moderate Susceptibility	Low Susceptibility
<b>Multiple Barriers</b>	Moderate Susceptibility	Low Susceptibility	Very Low Susceptibility

For confined aquifers, hazards for point sources are assigned based on the presence of other wells in the inventory zone, and how the PWS well and other wells in the area are constructed. If the PWS well is not sealed through the confining layer, than the relative hazard for any potential contaminant source within the 1,000-foot inventory area is assigned a relative hazard of high, and those within the one-mile buffer zone are assigned a relative hazard of moderate. If the PWS well has a seal through the confining layer, but other wells are present in the 1,000-foot inventory zone that do not have a seal, then the relative hazard is moderate for point sources in this area and low for potential sources within the remainder of the buffer zone. If all wells in the inventory region have effective seals through the confining layer, then the relative hazard is considered low for point sources within the 1,000-foot inventory area, and very low for other sources within the buffer zone.

The well for Deerfield Colony is properly constructed, based on the age and the information from the well log. According to MBMG/GWIC records (Appendix B), Deerfield Colony has another flowing artesian well that was replaced by the current PWS well. The disposition of this well is unknown at this time; however, for purposes of this assessment, it is assumed to be properly sealed to prevent the well from flowing at the surface. There are no other wells present within a 1,000 foot radius of the colony. Based on this information, all points sources are given a relative hazard of low.

For non-point sources, hazard levels are assigned based the percent of land in the inventory zone that meets the

criteria listed in Table 4.

**Table 4 - Non-Point Source Hazard Table**

<b>Source Type</b>	<b>High Hazard</b>	<b>Moderate Hazard</b>	<b>Low Hazard</b>
Septic Systems	> 300 per sq. mi.	50 – 300 per sq. mi.	< 50 per sq. mi.
Municipal Sanitary Sewer (% Land Use)	> 50% of region	20% – 50% of region	< 20% of region
Cropped Agricultural Land(% Land Use)	> 50% of region	20% – 50% of region	< 20% of region

For the Deerfield Colony PWS, the use of best management practices for handling of agricultural and other chemicals is considered a management barrier that can reduce the susceptibility of the PWS well to contamination under “worst-case” conditions. In addition, since the well is a surface flowing artesian well, this is considered a natural barrier reflecting a positive vertical gradient. Since the deep aquifer is under pressure, contaminants released to the surface could not migrate into the aquifer due to the elevated pressure head. These barriers do not apply to the recharge area located away from the colony.

The results of the susceptibility assessment indicate that the colony sewer system and agricultural activities represent the only significant potential threat identified for the source water for the Deerfield Colony PWS. The results are listed in Table 5.

**Table 5 - Susceptibility Assessment of Significant Potential Contaminant Sources.**

<b>Source</b>	<b>Contaminant</b>	<b>Hazard</b>	<b>Hazard Rating</b>	<b>Barriers</b>	<b>Susceptibility</b>	<b>Management</b>
<b>Control and Inventory Zones</b>						
Cropped Agricultural Land	SOCs/Nitrates	Leaching and Runoff	High	Positive Vertical Gradient, BMPs for Handling	Moderate	Apply Chemicals According to Label Instructions
Fuel Storage	VOCs, SOC	Spills	Low	Positive Vertical Gradient, BMPs for Handling	Very Low	Recycle / Dispose of Waste Chemicals Properly
Sewer Lines (from Housing)	Pathogens and Nitrate	Leakage from sewage lines	Moderate	Positive Vertical Gradient	Moderate	Monitor integrity of sewer lines
Animal Barns and Waste Tanks	Pathogens and Nitrates	Spills, Infiltration	Low	Positive Vertical Gradient	Low	Dispose of Waste Outside Inventory Region
Chemical Storage and Mixing	VOCs, SOC	Spills	Low	Positive Vertical Gradient, BMPs for Handling	Very Low	Recycle / Dispose of Waste Chemicals Properly
Colony Access Road	VOCs, Pathogens and Nitrate	Spills	Low	Positive Vertical Gradient	Low	Develop emergency response plan
<b>Recharge Area</b>						
Mining	VOCs, Metals and Nitrate	Infiltration and runoff	Very Low	None	Low	Monitor cleanup of mining activities in recharge area
Cropped Agricultural Land	SOCs, Nitrates	Infiltration and Runoff	Very Low	None	Low	Communicate with landowner, apply chemicals according to label instructions

*Figure 7 – Inventory Results*

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