

Spring Creek Colony
Public Water System
PWSID # MT0000433

Source Water Delineation and Assessment Report

11/99

Ken Walter
Certified Operator

P.O. Box 518
Lewistown, Montana 59457
phone: (406) 538-3575

Date of Report: March 2002



Table of Contents

LIST OF ACRONYMS	1
INTRODUCTION	2
Scope and Purpose.....	3
Limitations.....	3
BACKGROUND	4
The Community.....	4
Geographic Setting	4
General Description of the Source Water.....	4
The Public Water Supply.....	5
Water Quality	5
Local Water Quality and the TMDL Process	5
DELINEATION	6
Hydrogeologic Conditions.....	6
Conceptual Model and Assumptions.....	6
Well Information	7
Delineation Methods and Criteria.....	7
Source Water Protection Management Zones	7
Limiting Factors	8
INVENTORY	9
Inventory Method	9
Inventory Results/Inventory and Control Zones	9
Inventory Results/Recharge Region.....	10
Inventory Update.....	10
Inventory Limitations.....	10
SUSCEPTIBILITY ASSESSMENT	11
REFERENCES	14
GLOSSARY*	15
APPENDICES	19
APPENDIX A – PWS Sanitary Survey with System Layout	
APPENDIX B – Checklist	
APPENDIX C – Concurrence Letter	

FIGURES:

[FIGURE 1. LOCATION MAP](#)

[FIGURE 2. GEOLOGIC MAP OF STUDY AREA](#)

[FIGURE 3. SOURCE WATER PROTECTION MANAGEMENT ZONES](#)

[FIGURE 4. BIG SPRING CREEK WATERSHED SOURCE WATER PROTECTION AREAS](#)

[FIGURE 5. SPRING CREEK COLONY AREA LAND USE CLASSIFICATION](#)
[FIGURE 6. BIG SPRING CREEK WATERSHED LAND USE CLASSIFICATION](#)
[FIGURE 7. BIG SPRING CREEK WATERSHED AREA INVENTORY RESULTS](#)
[FIGURE 8. INVENTORY RESULTS](#)

TABLES:

Table 1 - Source Well Information for Spring Creek Colony.	7
Table 2 - Significant Potential Contaminant Sources.	10
Table 3 - Relative Susceptibility Based on Hazards and Barriers	11
Table 4 - Non-Point Source Hazard Table	12
Table 5 - Susceptibility Assessment of Significant Potential Contaminant Sources.....	13

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

CHAPTER 1

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 Big Sky 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 Spring Creek Colony public water supply. James Swierc, Hydrogeologist with the Montana Department of Environmental Quality, prepared this report.

The Spring Creek Colony is located northeast of Lewistown, in 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 Spring Creek 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.

CHAPTER 2 BACKGROUND

The Community

The Spring Creek 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 15 miles southeast of the colony. There are approximately 46 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 two wells located within the main colony complex.

Domestic wastewater is treated by septic system located within the main colony complex. 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

Spring Creek Colony is located southwest of the South 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. Big Spring Creek flows northward through the colony, with the colony located in the valley of the stream. The Big Spring Creek watershed (HUC 1004013050) is part of the Judith River watershed (HUC 10040130) 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 Spring Creek Colony water system obtains water from two wells located within the main colony complex. Published information is not available characterizing the aquifer. The wells are installed to depths of 380 feet and 400 feet below ground surface. The MBMG-GWIC database for wells in Montana does not include any well lithology logs for the area. In addition, there is no information available on how the wells at Spring Creek Colony were constructed. Many wells in Montana constructed prior to the establishment of the existing well rules were not constructed with proper seals since they were not required. The seals are needed in order to protect wells from surface water infiltration, which can easily contaminate a well. Since there is no information available to establish that proper seals were installed at the time the wells were constructed, the PWS wells are considered to not have proper seals.

Based on the geologic setting of the colony and the depth of the wells, the source is interpreted to be a confined bedrock aquifer recharged regionally by surface water infiltration. However, due to the age of the wells and the proximity to Big Spring Creek, the wells may receive recharge from shallow ground water directly down the well bore. Therefore, the alluvium of Big Spring Creek are considered as a second source aquifer, present in unconfined conditions and in communication with surface water.

The Public Water Supply

The PWS wells (Sources 002 and 003) are located within the main colony complex. Information on the PWS for Spring Creek Colony is reviewed in a sanitary survey completed for the colony in September 15, 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 Spring Creek Colony serves the resident population of 46 people through 9 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 wells is pumped directly into the distribution system for the colony. Hydropneumatic tanks maintain water pressure for the distribution system. There is no disinfection or other treatment system for the water.

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 Spring Creek Colony PWS show no violations or exceedences of any drinking water quality standards. The only detected compound that is regulated is nitrate, which can occur naturally or from agricultural, human and animal waste. The health standard for nitrates, the MCL, is 10 mg/L. A single sample from 1994 indicated 1.6 mg/L; however, subsequent sampling did not yield any detectable concentrations. During the last five years, the monitoring results for the potable water supply did not indicate any detectable levels of nitrate.

There is no readily available water quality data for ground water within the Spring Creek Colony area.

Local Water Quality and the TMDL Process

All of the surface water streams in the Big Creek Watershed are classified as B-1 waters using the State of Montana stream classification system for beneficial uses. These types of waters are suitable for drinking, culinary and food processing purposes after conventional treatment. Additional uses include bathing, swimming and recreation, growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers, and agricultural and industrial water supply.

The Total Maximum Daily Loading (TMDL) assessment for the surface waters in the area will identify threats to the listed potential uses for the surface waters in the area. The TMDL assessment will evaluate the ability of the surface waters to buffer various types of discharges to the waters, including both natural and human caused sources, and the impact to the overall health of the water bodies. These include wastewater treatment plant discharges, surface water runoff and non-point source pollution. After the TMDL assessment is complete, the results will be presented to area and community leaders to help identify and plan methods to meet the goals of the TMDL assessment in preserving and improving surface water quality in the area. The Big Spring Creek watershed above Spring Creek Colony is classified as a high priority watershed for TMDL development.

CHAPTER 3 DELINEATION

The source water protection area, the land area that contributes water to Spring Creek 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 wells. The control zone, also known as the exclusion zone, is an area at least 100-foot radius around each well. The inventory region for the confined aquifer is defined as the area within a 1,000-foot radius of each well. The recharge region represents the area where the source aquifer for the Spring Creek Colony water system wells is replenished.

Hydrogeologic Conditions

There are no readily available documents on water quality and quantity in the Big Spring Creek area where Spring Creek Colony is located. Perry (1932) presents an overview of water resources of the entire Judith Basin, with no specific information on the area near Spring Creek Colony. Miller (1959) reviews the geology of the South Moccasin Mountains northeast 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 Spring Creek Colony. The PWS source is interpreted to be from ground water in a both a confined bedrock aquifer and potentially from a shallow unconfined alluvial aquifer. The hydrogeology of both settings will be reviewed in the following discussion.

The bedrock in the area around the PWS wells comprises Lower Cretaceous shales and sandstones. Older rocks are exposed in the South Moccasin Mountains. 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. Water in the area occurs primarily in the coarser grained sandstones and limestones, with limited amounts of shallow ground water occurring in the gravels. Wells in the Judith Basin area south and east of the colony are 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 Spring Creek Colony. However, none of these wells include lithologic well logs that identify the geologic units in the area. Since there are no well logs for the Spring Creek Colony PWS wells, and detailed geologic information on the area is limited, the exact formation that is the bedrock source aquifer for the PWS cannot be identified at this time.

Recharge to the bedrock aquifer is interpreted to occur from surface water infiltration within the Big Spring Creek and Judith River watershed areas upgradient from the wells. Ground water flow is estimated to follow topography, generally to the north following the trend of the watershed drainages.

Shallow ground water in alluvium of the Big Spring Creek valley is considered to be the second potential source for water into the wells. Communication of shallow ground water into the wells would occur through the well bore, where the presence of proper sanitary seals through the entire thickness of alluvium has not been determined. Shallow ground water would be in communication with water in the stream, and would flow in the general direction of the stream flow. There is no available data to indicate if Big Spring Creek is gaining or losing flow in the area of Spring Creek Colony. In addition, the presence of irrigation canals in the valley would likely complicate the shallow ground water flow regime.

Conceptual Model and Assumptions

A conceptual hydrogeologic model is a simplified representation of the hydrogeologic system. For the Spring Creek Colony, ground water occurs in a confined bedrock aquifer. The aquifer is recharged by surface water infiltration from precipitation and from stream loss in the drainages. Ground water flows in a general

northward direction following topography.

Based on the hydrogeologic setting, the Spring Creek Colony bedrock water source is a confined aquifer in consolidated bedrock, which is considered to have a *low* source water sensitivity to contamination. The shallow alluvial water source is considered to have a *high* source water sensitivity to contamination.

Well Information

The locations of the wells for the Spring Creek Colony are depicted in [Figure 3](#). Information on these sources is summarized in Table 1. There are no driller lithology or construction logs available for the PWS wells

Figure 2 – Geologic Map of Study Area

Table 1 - Source Well Information for Spring Creek Colony.

Information	Well 1	Well
PWS Source Code	002	003
Well Location (T, R, Sec)	T16N, R17E Sec 18 BADA	T16N, R17E Sec 18 BADB
Well Location (lat, long)	47.1547°N -109.6202°W	47.1544°N -109.6202°W
MBMG #	<i>Not Reported</i>	<i>Not Reported</i>
Water Right #	<i>Not Reported</i>	<i>Not Reported</i>
Date Well was Completed	1945	1960
Total Depth	380 feet	400 feet
Perforated Interval	<i>Not Reported</i>	<i>Not Reported</i>
Static Water Level	<i>Not Reported</i>	<i>Not Reported</i>
Pumping Water Level	<i>Not Reported</i>	<i>Not Reported</i>
Drawdown	<i>Not Reported</i>	<i>Not Reported</i>
Test Pumping Rate	<i>Not Reported</i>	<i>Not Reported</i>
Specific Capacity	--	--
Yield	<i>Not Reported</i>	<i>Not Reported</i>

Delineation Methods and Criteria

The source water protection management areas for the wells were defined 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 local recharge zone is delineated based on a one-mile radius around the PWS well, biased towards the area hydrologically upgradient from the wells. The complete recharge area for the wells is considered to be the Judith River and Big Spring Creek watershed areas north from the colony.

Source Water Protection Management Zones

The delineated management zones for the wells around Spring Creek Colony are depicted in [Figure 3](#) and [Figure 4](#). The control zone comprises an area of a 100-foot radius around each wellhead. The inventory zone

reflects an area with a 1,000-foot radius around the wellheads. The recharge area reflects the area within a one-mile radius buffer of the wells to help with assessing susceptibility and management options.

The Big Spring Creek watershed above Spring Creek Colony is delineated in [Figure 4](#). In addition, since the shallow ground water is in communication with surface water, a Surface Water Buffer Zone is delineated around all surface water bodies for a distance of 10 miles upstream from Spring Creek Colony. The Surface Water Buffer Zone is the area within one-half mile of each side of a stream, where potential contaminants are potentially more likely to impact water quality in the PWS than the upper reaches of the watershed.

Limiting Factors

The lack of any well construction information or lithology, and site and regional hydrogeologic data represent the greatest potential sources of error to accurate delineations of the management zones for the water sources at Spring Creek Colony. The local recharge zone of a one-mile radius provides a conservative approach that helps to minimize the potential effects from the lack of hydrologic data for the area.

CHAPTER 4 INVENTORY

An inventory of potential sources of contamination was conducted for the Spring Creek 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 Spring Creek Colony PWS management regions are nitrates, pathogens, herbicides/pesticides and fertilizer from colony activities and agricultural land.

Inventory Method

The inventory for Spring Creek 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 on [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 the inventory region or local recharge area for the PWS wells. However, several facilities are present within the watershed area for Big Spring Creek. The location of these facilities are depicted in [Figure 7](#).

Inventory Results/Inventory and Control Zones

The potential contaminant sources identified for the control and inventory zones for the PWS wells reflect 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 septic systems, animal waste storage pits, spilled fuels and other farm chemicals, and crop fertilizers and herbicides. The primary hazards are leakage from the domestic septic systems 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 wellbores, and from the actual land application of animal wastes.

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

Inventory Results/Recharge Region

The watershed region is comprised of agricultural cropland, with some areas used for open range cattle grazing. Fertilizers, weed control herbicides and fuels for farm machinery are the primary contaminants of concern in the recharge region.

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 Spring Creek 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 Spring Creek Colony.

Table 2 - Significant Potential Contaminant Sources.

Source	Hazard
<i>Control and Inventory Zones</i>	
Fuel/Chemical Storage	Spills or Leakage of Stored Chemicals
Septic Systems	System Failure
Dairy Barn and Waste Tank	Leaking Waste Collection System
Hog Barn and Waste Tank	Leaking Waste Collection System
Chicken Barn and Waste Tank	Leaking Waste Collection System
Farm Chemical Storage and Mixing Area	Waste Chemical spills
County Roads	Spill or Accident from Transported Chemicals or Fuels
Garden Area	Land Application of Animal Waste Spills and Excess Application of Herbicides
Junkyard Area	Leakage from disposed chemicals, or nutrient waste from disposed animal carcasses
<i>Recharge Area – All PWS Wells</i>	
County Roads	Spill or Accident from Transported Chemicals or Fuels
Railroad Tracks	Spill or Accident from Transported Chemicals or Fuels
Cropped Agricultural Land	Land Application of Animal Waste Spills and Excess Application of Herbicides

CHAPTER 5 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 Spring Creek 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 Spring Creek 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 Spring Creek Colony PWS wells (Table 3). Hazard is rated by the proximity of the potential contaminant sources to the wells. Susceptibility ratings are presented individually for each significant potential contaminant source and each associated contaminant. The susceptibility of each well to each potential contaminant source is assessed separately, however, the proximity of the wells and limited number of potential contaminant sources results in both wells assessed together with the same threats.

Table 3 - Relative Susceptibility Based on Hazards and Barriers

Presence Of Barriers	Hazard		
	High	Moderate	Low
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

Since the source aquifer for the Spring Creek Colony PWS wells is considered to reflect both a confined bedrock aquifer and an unconfined alluvial aquifer, the susceptibility criteria for a confined aquifer is applied to the system. The use of the criteria for the confined aquifer is modified with the one-mile radius informal recharge zone. This delineates the areas where significant potential contaminant sources may be located in a position that could threaten the source aquifer under “worst-case” conditions.

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.

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

Source Type	High Hazard	Moderate Hazard	Low Hazard
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

The hazards for the wells are based on the completion criteria for the wells. There are no well logs available with information on the well construction. Based on the lack of data on well construction and the age of the wells, the wells are assumed to not have been completed with proper sanitary seals. Based on this, all of the potential contaminant sources identified within the control zone are given a relative hazard of very high, and all others within the inventory zone are given a relative hazard of high.

For the Spring Creek Colony PWS, there are no barriers identified for the agricultural activities that can reduce the susceptibility of the PWS wells to contamination under “worst-case” conditions. Implementation of best management practices, including fencing the control zones, can reduce the relative susceptibility of the system to contamination.

The susceptibility assessment is applied to all of the significant potential contaminant sources identified within the one-mile radius around the colony. The potential sources all reflect operations at the colony, with the locations of specific buildings and other features depicted in [Figure 8](#). Multiple significant potential contaminant sources present in the Big Spring Creek Watershed area, including the Surface Water Buffer Zone. These potential sources are all given a relative susceptibility of low; and are considered highly unlikely to impact the Spring Creek Colony wells. However, the locations are noted on the map to aid in source water protection planning in case of a natural disaster or “worst-case” scenario where one or more of these sources may impact Big Spring Creek, and potential the colony PWS. The disposition of these potential contaminant sources within the watershed will be addressed during the TMDL planning process for the watershed.

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

Table 5 - Susceptibility Assessment of Significant Potential Contaminant Sources.

Source	Contaminant	Hazard	Hazard Rating	Barriers	Susceptibility	Management
Control Zone – Well 1 (Source 002)						
Septic System	SOCs/Nitrates	Leakage, infiltration	Very High	None	Very High	Remove septic systems from control zone area; monitor efficiency of septic system for waste disposal
Control Zone – Well 2 (Source 003)						
Septic System	SOCs/Nitrates	Leakage, infiltration	Very High	None	Very High	Remove septic systems from control zone area; monitor efficiency of septic system for waste disposal
Dairy Barn	Pathogens and Nitrates	Spills, Infiltration	Very High	None	Very High	Dispose of Waste Outside Inventory Region
Inventory Zone						
Fuel Storage	VOCs, SOC's	Spills	High	BMPs for Handling	High	Recycle / Dispose of Waste Chemicals Properly
Septic Systems	Pathogens and Nitrate	System Failure, leakage	High	None	Very High	Monitor efficiency of septic systems for waste disposal
Dairy Barns and Waste Tank	Pathogens and Nitrates	Spills, Infiltration	High	None	Very High	Dispose of Waste Outside Inventory Region
Hog Barns and Waste Tank	Pathogens and Nitrates	Spills, Infiltration	High	None	Very High	Dispose of Waste Outside Inventory Region
Chicken Barns and Waste Tank	Pathogens and Nitrates	Spills, Infiltration	High	None	Very High	Dispose of Waste Outside Inventory Region
Chemical Storage and Mixing	VOCs, SOC's	Spills	High	BMPs for Handling	High	Recycle / Dispose of Waste Chemicals Properly
Colony Access Road	VOCs, Pathogens and Nitrate	Spills	High	None	Very High	Develop emergency response plan
Garden	SOCs, Pathogens and Nitrate	Spills, Infiltration	High	BMPs for Handling	High	Recycle / Dispose of Waste Chemicals Properly
Junkyard	Various chemicals	Infiltration	High	None	Very High	Monitor what is disposed in junkyard area
Recharge Area						
County and Colony Access Roads	VOCs, Pathogens and Nitrate	Spills	Moderate	None	High	Develop emergency response plan
Railroad Tracks	VOCs, Pathogens and Nitrate	Spills	Moderate	None	High	Develop emergency response plan
Cropped Agricultural Land	SOCs, Nitrates	Infiltration and Runoff	Moderate	BMPs for handling	Moderate	Communicate with adjacent landowner, apply chemicals according to label instructions

REFERENCES

- Alden, W.C., 1932. Physiography and glacial geology of eastern Montana and adjacent areas. U.S. Geological Survey Professional Paper 174.
- Fetter, C.W., 1994. Applied Hydrogeology, Macmillan College Publishing Co., New York, NY.
- Heath, R., 1982. Basic Ground Water Hydrology, U.S. Geological Survey Water Supply Paper 2220.
- Miller, R.N., 1959. Geology of the South Moccasin Mountains, Fergus County, Montana. Montana Bureau of Mines and Geology Memoir 37.
- Montana Department of Environmental Quality (DEQ), 1999. Montana Source Water Protection Program.
- Perry, E.S., 1932. Ground-Water Resources of the Judith Basin, Montana. Montana Bureau of Mines and Geology Memoir 7.
- Ross, C.P., Andrews, D.A., and I.J. Witkind, 1955. Geologic Map of Montana; United States Geological Survey, in cooperation with the Montana Bureau of Mines and Geology.
- Todd, D.K., 1980, Ground Water Hydrology, John Wiley and Sons, New York, NY.
- United States Environmental Protection Agency (EPA), 1993. Seminar Publication – Wellhead Protection: A Guide for Small Communities, EPA/625/R-93/002.
- United States Geological Survey, 2000. National Landcover Data – Montana Dataset
- Zimmerman, E.A., 1966. Geology and Ground Water Resources of Western and Southern Parts of Judith Basin, Montana. Montana Bureau of Mines and Geology Bulletin 50-A.

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.

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

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

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

Montana Bureau of Mines and Geology – 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.

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).

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

Public Water System (PWS). A system that provides water for human consumption through at least 15 service connections or regularly serves 25 individuals.

Pumping Water Level. Water level elevation in a well when the pump is operating.

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

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

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

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

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

Source Water. Any surface water, spring, or 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 that evaporate readily to the atmosphere.

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

* With the exception of the definitions for Lacustrine, Phase II and Phase V Rules, and Standard Industrial Classification Code, definitions were adapted from EPA's Term References System (formerly known as Glossary of Selected Terms and Abbreviations) which can be found at:

<http://www.epa.gov/trs/index.htm>

The definitions of glacial and lacustrine were taken from the Glossary of Geology by Robert L. Bates and Julia A. Jackson.

The definitions for Phase II and Phase V Rules were adapted from:

<http://www.epa.gov/OGWDW/source/therule.html#PhaseII>

<http://www.epa.gov/OGWDW/source/therule.html#PhaseV>

The definition for Standard Industrial Classification Code was adapted from:

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

APPENDICES

APPENDIX A

PWS Sanitary Survey with System Layout

APPENDIX B

Checklist

Department of Environmental Quality
Source Water Protection Program

CERTIFICATION CHECKLIST

*Source Water Delineation and Assessment Reports (SWDAR)
for Community and non-community non-transient PWSs*

The following items represent the minimum requirements for certification of a completed SWDAR for Community and non-community non-transient PWSs. The SWDAR represents the technical component of the SWPP, and must be completed per the 1996 amendments to the Federal Safe Drinking Water Act. This checklist should be used in conjunction with the information and general format provided in the template for preparing SWDAR documents. While the format of the template may be modified as needed, all requested information should be included for certification.

For any items that are not applicable or information is not available, note in checklist column and provide an explanation. Attach additional sheets for explanation, if necessary.

Name of System: Spring Creek Colony

PWS ID# 433

Date Plan Submitted

Operator Name: Ken Walter

SWPP Contact: Name: Spring Creek Colony
Address: P.O. Box 518
Lewistown, MT 59457
Phone: (406) 538-3575

Person Preparing Plan Contact: Name: James E. Swierc, P.G.
Address: Montana DEQ – Source Water Protection Program
P.O. Box 200901
Helena, MT 59620-0901
Phone: (406) 444-5492

The following summary checklist is derived from the Source Water Delineation and Assessment Report template document. The completed plan should include summary discussions, when appropriate, for each listed item. Indicate the page and/or section number where this information is, or indicate not applicable (n/a) when appropriate. For items indicated as not applicable, the text should indicate why.

Introduction

Page

- Person who prepared document 2
- Name of System and county located in 2
- PWS Identification Number cover
- PWS Contact person, with address and phone number cover

Chapter 1 - Background

This section provides background information on the community served by the PWS.

Page

1. The Community:

- Population 3
- Economic base 3
- Major water users 3
- Major waste generators 3
- Domestic sewage treatment and disposal 3

2. Geographic Setting

- Geographic setting, including surrounding area 3
- Physiographic Features 3
- Streams and Lakes 3
- Climate information (including annual precipitation and temperatures) 3
- A vicinity map at appropriate scale Fig. 1

For surface water sources, or ground water systems influenced by surface water

- 8 and 11 digit USGS Hydrologic Units 3
- Montana Watershed Management Region 3

3. General Description of Source Water

3

Page

Description of PWS system, including:

- Source of water (number of wells, depth, etc.) 4
- Well lithology and construction logs (in appendix) n/a
- Distribution system Appx A

- Number of connections and users 4
- PWS Treatment System 4
- Copy of latest Sanitary Survey (in appendix) Appx A
- A map indicating the general layout of the PWS. Appx A

4. Water Quality:

- Summarize enforcement actions in the past 5 years n/a
- Describe background/regional water quality n/a
- Table summarizing background water quality n/a

For surface water sources, or ground water systems influenced by surface water

- Use classification 5
- Threatened or impaired streams in watershed 5
- TMDL development prioritization and status 5

Chapter 2 - Delineation

This section provides information on the hydrogeology of the water supply for the PWS. Background information on the hydrogeologic setting should be assembled into a *Hydrogeologic Conceptual Model* that summarizes the ground water system in a simplified manner. The background information should support the process to delineate management areas.

	<u>Page</u>
1. Hydrogeologic Conditions	
• Identification of references for hydrogeologic information	6
• Summary tables of hydrogeologic studies and maps for area	6
• Summary of wells in area from GWIC database	n/a
• Geologic map(s) included (if not, valid justification for omission)	Fig. 2
• Geologic cross section(s) included	n/a
For ground water systems:	
• Identify aquifer	6
• Geologic setting of aquifer	6
• Aquifer properties (lithology, boundaries, etc)	6
• Aquifer type (confined, unconfined, semi-confined)	6
• Connection with surface water	6
• Classify sensitivity of hydrogeologic setting of source water	7
For surface water sources, or ground water systems influenced by surface water	
• Hydrogeologic setting of PWS watershed	6
• Identification of references for hydrogeologic information	6
• Stream flow characteristics	n/a
2. Conceptual Model and Assumptions	
• Seasonal trends in system	n/a
• Assumptions made to simplify model	6-7
For ground water systems:	
• Aquifer boundaries	6
• Aquifer recharge areas	6
• Ground water flow direction	6
• Communication with surface water	6
For surface water sources, or ground water systems influenced by surface water	
• Relationship of surface water with ground water system	6
	<u>Page</u>
3. Well (or Source) Information	
For ground water systems:	
• Well depths, construction details	n/a

- Well locations described 8
- Summary table of source information 8

[Source information to include: PWS Source Code, Well Location, MBMG (GWIC) No., MT Water Right No., Date Well completed, total depth, perforated interval, static water level, pumping water level, drawdown, test pumping rate, and specific capacity]

For surface water sources, or ground water systems influenced by surface water

- Description of source water intake system n/a
- Streamflow data, if available n/a

4. Delineation Methods and Criteria

- Overview of approach used for delineation 8

5. Model Input

For ground water systems:

- Identify analytical method used, with source reference n/a
- Values of hydraulic parameters identified, with ranges n/a
- Identify hydrogeologic parameter values used, with rationale n/a
- Summary table of input values for model n/a
- Reference and justification for assumed values n/a
- Time of travel equations or model specifications n/a

For surface water sources, or ground water systems influenced by surface water

- Time of travel calculations for surface water body n/a
- Summary of ranges for streamflow parameter values n/a
- Identify streamflow parameter values used, with rationale n/a
- Summary table of input values for model n/a

6. Delineation Results

- Travel time calculation results, or computer model calibration criteria n/a
- Management zones identified on map(s) 9, Figs. 3-4
- Delineated areas reflect seasonal variations in hydrologic systems n/a

7. Limiting Factors

- Identify uncertainties in delineation approach based on assumptions n/a
- Identify how uncertainties may effect delineated areas 8

Chapter 3 - Inventory

This section identifies all known and potential contaminant sources which may affect the PWS.

	<u>Page</u>
1. Inventory methods identified	11
2. Appropriate databases searched, with potential sources identified	11
For ground water systems:	
• Control zone	11
Description of land uses	
Description of potential contaminant sources	
Worksheets completed for significant potential sources	
Potential contaminant sources summarized in a table	
Potential contaminant sources located on a base map	
• Inventory Region	11
Description of land uses	
Description of potential contaminant sources	
Worksheets completed for significant potential sources	
Significant potential contaminant sources summarized in a table	
Significant potential contaminant sources located on a base map	
• Surface Water Buffer	11
Description of land uses	
Description of potential contaminant sources for pathogens (acute health hazards)	
• Recharge Region	11
<u>Description of land uses</u>	
Description of large potential contaminant sources	
Large potential sources and land use shown on a map	
For surface water sources, or ground water systems influenced by surface water	
• Spill Response Region	n/a
Description of land uses	
Description of potential contaminant sources	
Worksheets completed for significant potential sources	
Significant potential contaminant sources summarized in a table	
Significant potential contaminant sources located on a base map	
• Watershed Region	n/a
<u>Description of land uses</u>	
Description of large potential contaminant sources	
Map of watershed region showing significant potential contaminant sources (e.g. MPDES permitted discharges, to the extent practical with existing databases)	
For all systems	
• Inventory update – procedures to update every five years	12
• Inventory limitations identified	12

Chapter 4 – Susceptibility Assessment

This section evaluates the potential for the PWS water supply to be contaminated by the significant potential sources of contamination identified in Chapter 3. This information can be used by local officials to prioritize management actions for the delineated control and inventory zones. Worksheets to be considered when completing each task are listed with each topic.

Attach completed worksheets as Appendices to final document

- | | |
|---|-----|
| 1. Hazard of potential contaminant sources identified | 17 |
| 2. Barriers for each potential contaminant sources identified and evaluated | n/a |
| • Supporting information for identification of features as barriers | |
| 3. Threats from significant potential contaminant sources ranked | 18 |

References

All technical references are listed in the appropriate format	20
---	----

Appendices

All necessary supporting information is included in Appendices	yes
--	-----

List any Deficiencies:

none

APPENDIX C

Concurrence Letter