

City of Scobey
Public Water System

PWS ID # MT0000326

WELLHEAD PROTECTION PLAN
Source Water Delineation & Assessment Report
Prepared by

MONTANA RURAL WATER



With Assistance from
Source Water Protection Program
Montana Department of Environmental Quality

Public Water System

PWSID # MT0000326

Report Date: February 6, 2004

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GLOSSARY*

Acute Health Effect. An adverse 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.

Best Management Practices (BMPs). Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from nonpoint sources.

Coliform Bacteria. Bacteria found in the intestinal tracts of animals. Their presence in water is an indicator of pollution and possible contamination by pathogens.

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 that inhibits the flow of water.

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.

Delineation. A process of mapping source water management areas.

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

Hazard. A measure of the potential of a contaminant leaked from a facility to reach a public water supply source. Proximity or density of significant potential contaminant sources determines hazard.

Hydraulic Conductivity. A coefficient of proportionality describing the rate at which water can move through an aquifer.

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

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.

Nitrate. An important plant nutrient and type of inorganic fertilizer. In water the major sources of nitrates are 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.

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

Point-Source. A stationary location or fixed facility from which pollutants are discharged.

Public Water System. A system that provides piped water for human consumption to at least 15 service connections or regularly serves 25 individuals.

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

Recharge Region. A source water management region that is generally the entire area that could contribute water to an aquifer used by a public water supply. Includes areas that could contribute water over long time periods or under different water usage patterns.

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

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 Protection Area. For surface water sources, the land and surface drainage network that contributes water to a stream or reservoir used by a public water supply.

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

Susceptibility (of a PWS). The 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.

Transmissivity. The ability of an aquifer to transmit water.

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.

Volatile Organic Compounds (VOC). Any organic compound which evaporates readily to the atmosphere.

* Definitions taken from EPA's Glossary of Selected Terms and Abbreviations

(<http://www.epa.gov/ceisweb1/ceishome/ceisdocs/glossary/glossary.html>)

INTRODUCTION

This report was completed by Bill O'Connell, Groundwater Specialist with Montana Rural Water Systems inc. (MRWS) and Art Holum, the licensed operator for Scobey's Public Water System (PWS). This report is an update for a previous Wellhead Protection Plan completed in 1995. On August 21, 1995 the Scobey City Council approved the Wellhead Protection Program.

Some additional information has been added by the Montana Department of Environmental Quality (DEQ) to update and build upon the Wellhead Protection Plan to meet the requirements and guidance of the Federal Safe Drinking Water Act and the US Environmental Protection Agency, as well as a detailed Source Water Assessment Plan developed by a statewide citizen's advisory committee here in Montana. The Department of Environmental Quality (DEQ) is conducting these assessments for all public water systems in Montana. The sections shown in italics are provided by DEQ to update and amend the original text.

Purpose

This report uses the Source Water Assessment Program (SWAP) to meet the technical requirements for the completion of the Wellhead/ Protection Plan (WHPP) for Scobey. A Source Water Assessment is required by the Montana Source Water Protection Program (DEQ, 1999) and the federal Safe Drinking Water Act (SDWA) Amendments of 1996.

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

Limitations

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

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

health threats.

CHAPTER 1 BACKGROUND

The Community

Scobey is an incorporated city and county seat of Daniels County. Scobey is located along the highline in northeast Montana, 15 miles south of the Canadian border. The city provides services to the surrounding agricultural community. The Public Water System (PWS) has 630 hook-ups (604 in DEQ records) and serves 1,134 residents. The community's transportation services includes MT 13 which runs from the Canadian border to Circle, MT 5 which runs east to Plentywood and a short-line railroad right-of-way which had connected to the BN Railroads northern tier mainline was abandoned in 1995. See the vicinity map in [Figure 1](#).

Geographic setting

Scobey is located in the Glaciated Missouri Plateau of the Great Plains Physiographic Province of northeastern Montana. The Poplar River flows south west of city. The land is open range consisting of rolling prairie, with the topography gently rising to the north into Canada.

The climate is semi-arid continental, and is characterized by warm summers and cold winters.

Table 1. Scobey's Climate Records

SCOBEY, MONTANA (247424)													
<u>Period of Record Monthly Climate Summary</u>													
Period of Record: 7/ 2/1948 to 5/31/1987													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	19.4	27.2	37.8	55.8	69.3	77.7	85.5	84.3	71.7	59.4	39.0	25.2	54.4
Average Min. Temperature (F)	-1.8	5.5	15.1	29.4	40.5	48.9	54.2	51.9	41.3	31.6	17.4	4.4	28.2
Average Total Precipitation (in.)	0.56	0.46	0.65	0.98	1.89	2.66	1.64	1.57	1.30	0.66	0.49	0.61	13.48
Average Total SnowFall (in.)	7.8	5.6	6.9	1.6	0.0	0.0	0.0	0.0	0.1	0.3	1.0	5.8	28.9
Average Snow Depth (in.)	1	1	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.

Max. Temp.: 98.4% Min. Temp.: 98% Precipitation: 99% Snowfall: 53.5% Snow Depth: 43.8%

Check [Station Metadata](#) or [Metadata graphics](#) for more detail about data completeness.

General Description of the Source Water

Scobey currently uses groundwater supplied by 5 wells as its' drinking water source ([Figure 2](#)). Three wells are used to supply the city (*Well numbers 5, 6, and 7, DEQ Source Numbers WL004, WL005, and WL006 respectively*) and the other wells are for emergency backup. All the wells are shallow at less than 50 feet below the ground surface. The wells tap the alluvial aquifer in the channel of the Poplar River. The aquifer is sand between blue clay at the bottom and 9 feet of sandy yellow clay on top. Normal groundwater recharge is toward the Poplar River but under pumping conditions the gradient is reversed and local groundwater flow is toward the wells.

Table 2. List of geologic or hydrogeologic maps available for the Scobey, Montana area.

Title or Description	Scale	Area Covered	Reference
Geological	Various	Northeast Montana	Alt 1988
Geological	Various	Montana	Taylor and Ashley
<i>Geological</i>	<i>1:100,000</i>	<i>Scobey 30'x60' quadrangle</i>	<i>Bergantino, R.N. and Wilde, E.M., 1998</i>

The Public Water Supply

The city of Scobey is classified as a community public water system (PWS) since it serves at least 25 of the same people every day. The PWS has 604 connections and serves 1,134 people. The Public Water Supply consists of 3 wells pumping into two pipes (one is 8", the other is 10") that run up to the 100,000-gallon storage tank on the southwest side of city. A second 400,000-gallon storage tank is located on a hillside ½ mile east of Scobey. The PWS maintains over 60,000 feet of distribution mains (Aquoneering 1991, pages 4 and 34).

Wells 5, 6, and 7 pump to a common header that discharges to a cistern. At this point, sodium tripolyphosphate is added to sequester iron, and then chlorine and fluoride are added. The treated water is pumped to the distribution system and the two storage reservoirs (July 17, 2002 Sanitary Survey Inspection, Appendix I).

A preliminary assessment of groundwater sources under the direct influence of surface water (GWUDISW) was completed for the Scobey PWS in 2002 (provided in Appendix I). The three wells passed the assessment and are classified as groundwater.

Water Quality

Scobey is routinely monitored for compliance with drinking water standards. Bacteriological monitoring occurs monthly. Compliance with other drinking water standards is based on additional sampling on a variety of schedules. Water quality testing identifies the water as

sodium/bicarbonate-sulfate water with modest Total Dissolved Solids at 900 ppm.

Every PWS performs monitoring for contamination to their water supply. The monitoring constituents include coliform, nitrates, metals, multiple organic chemicals, and radionuclides. The monitoring schedule depends on many factors such as the size and source water of 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. PWS monitoring schedules are available at <http://nris.state.mt.us/wis/swap/swapquery.asp>. The Scobey PWS monitoring data from DEQ's PWS database for the past five years was reviewed and is summarized in this section.

Confirmed detections of total coliform or nitrate have not been detected in the source water. The only compounds detected in City of Scobey's source water monitoring over the past 5 years include fluoride (0.41 to 2.16 mg/L), arsenic (0.008 mg/L), sulfate (381 mg/L), and chloroform (0.58 mg/L). The detection of chloroform is likely a result of the treatment (chlorination) process and is not likely present in the source water. These detections are all below EPA primary maximum contaminant levels (MCLs) where established.

National secondary drinking water standards (SMCLs) are non-enforceable guidelines regarding contaminants that may cause cosmetic effects (such as taste, odor, or color) and are generally not a health risk. The SMCLs for sulfate of 250 mg/L was exceeded. Background monitoring (see Appendix II) conducted by Montana Bureau of Mines and Geology in 1985 and by the US Geological Survey in 1977 on well #4 (which is currently inactive) also indicates high levels of iron (0.3 to 1.6 mg/L which exceeds the SMCL of 0.3 mg/L), manganese (0.06 to 0.07 mg/L which exceeds the SMCL of 0.05 mg/L) and sodium (262 to 270 mg/L which is above the SMCL of 250 mg/L). The Scobey water system uses sodium tripolyphosphate to treat iron and manganese in the water. Water systems having greater than 20 mg/L of sodium in their drinking water source are encouraged to inform their customers of the presence of this constituent so that those individuals on a physician-prescribed low-sodium diet can inform their doctors of this source of sodium in their diet.

Influencing Factors

The Wellhead Protection Plan (WHPP) was started at the request of City Clerk Tom Kibbe and Art Holum the Director of Public Works.

Source Water Protection Management

Art Holum, the Scobey's licensed operator will oversee implementation of the WHPP.

CHAPTER 2 DELINEATION

The portion of the aquifers that contributes water to the wells is identified in this chapter. Three management regions (the control zone, inventory region, and recharge region) are mapped for the well. The goal of management in the control zone is to protect against direct introduction of contaminants into the well or the immediate surrounding area.

Management in the inventory region should focus on pollution prevention activities where water is likely to flow to the wells within a relatively short time period. The goal of management in the recharge region is to maintain and improve the quality of groundwater that could reach the well over longer times or with increasing water usage.

PWS Wells

Scobey's public water system is supplied by 3 wells. The wells were completed with 15 feet of 0.125 stainless steel screen and were cement grouted. The well logs are provided in Appendix III and the construction details are summarized in Table 3.

Table 3. Well information for Scobey

	Well 4	Well 6	Well 7
MBMG #	4024		
Water Right #			
Latitude/ Longitude	48.7852/105.4505		
Date Completed		11/14/92	11/14/92
Depth	41 ft	37	37
Perforated Interval	12 to 17 feet	22 to 37	22 to 37
SWL Depth	11.97	9.5	9.5
PWL Depth		13	13
Drawdown		4.5	4.5
Test Pumping Rate		900 gpm	900 gpm
Specific Capacity		257 gpm/ft	257 gpm/ft
Pumping Rate	292	600 gpm	600 gpm
Source Type	Groundwater	Groundwater	Groundwater

Geologic Conditions and Aquifer Characteristics

Scobey uses groundwater supplied by 3 wells to meet its' drinking water requirements. The wells are from 30 feet deep to 50 feet deep. The Poplar River cuts through the Flaxville Gravel Formation in the Scobey area. The Poplar River Valley Aquifer consists of predominantly of sand and gravel glacial outwash material (Water Supply Inc., 1990 page 2). The wells are completed in a sand series of sand and/or gravel layers up to 30 feet thick. The sand has a saturated thickness of 20 feet as recorded in driller's logs for the area. The River flows southeast from Canada to the Missouri River. A detailed hydrogeologic assessment was completed July 20, 1990 by Water Supply Inc. and is available at the city hall. The water chemistry indicates the water is Sodium/Bicarbonate-sulfate.

Conceptual Model and Assumptions

The City of Scobey's wells are located in the Poplar River watershed (USGS Hydrologic Unit Code 10060003), which is within the Lower Missouri River Watershed Management Region for Montana. The source of City of Scobey's drinking water is interpreted to be buried sand and gravel glacial outwash material. The aquifer is locally semi-confined by overlying clay layers and may be unconfined in other areas of the outwash and alluvial channel. The aquifer is recharged from infiltrating surface water draining into the Poplar River Valley.

*Using DEQ Source Water Protection Program criteria for ranking aquifer sensitivity (Table 4), the City of Scobey source water is considered as having **High Source Water Sensitivity** to contamination. Sensitivity is defined as the relative ease that contaminants can migrate to source water.*

Table 4. Source Water (Aquifer) Sensitivity Criteria
based on DEQ Source Water Protection Program Criteria (DEQ, 1999)

High Source Water Sensitivity	Moderate Source Water Sensitivity	Low Source Water Sensitivity
<ul style="list-style-type: none"> • Surface water and GWUDISW • Unconsolidated Alluvium (unconfined) • Fluvial-Glacial Gravel • Terrace and Pediment Gravel • Shallow Fractured or Carbonate Bedrock 	<ul style="list-style-type: none"> • Semi-consolidated Valley Fill sediments (semi-confined) • Unconsolidated Alluvium (semi-confined) 	<ul style="list-style-type: none"> • Consolidated Sandstone Bedrock • Deep Fractured or Carbonate Bedrock • Semi-consolidated • Confined Aquifers

Methods and Criteria

DEQ's Source Water Protection Program specifies methods and criteria used to delineate subregions of the source water protection areas for Scobey. A one-hundred-foot radius **Control Zone** is delineated for each well.

An **Inventory Region** was delineated for the well-field using hydrogeologic mapping based on the Uniform Flow Equation, which calculated an up-gradient time-of-travel distance of 13000 feet over a 10 year time period. The Inventory region was expanded to 15000 feet to capture a major bend in the Poplar River. The Inventory Region includes an area of 3.5 miles².

A **Protection Region** identifies the recharge area for the aquifer, includes the Poplar River drainage up-gradient from the wells. See [Figure 3](#).

CHAPTER 3 INVENTORY

Potential sources of contamination were inventoried to assess the susceptibility of Scobey's drinking water sources to contamination. Potential sources of all contaminants with primary drinking water standards and cryptosporidium were identified but a detailed inventory was conducted only for potential sources of contaminants that are the greatest threat to health. The contaminant of greatest concern to Scobey is nitrate.

The inventory focuses on all activities in the control zone, major facilities in the inventory region, and general land uses in the recharge region.

Inventory Method

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

Step 1: Major road and rail transportation routes were identified throughout the inventory region.

Step 2. All land uses and facilities that generate, store, or use large quantities of hazardous materials were identified within the recharge region and identified on the base map.

Step 3: Urban and agricultural land uses were identified from the U.S. Geological Survey's Geographic Information Retrieval and Analysis System (<http://nris.state.mt.us/gis/datalist.html>). Sewered and unsewered residential land uses were identified from boundaries of sewer coverage obtained from municipal wastewater utilities.

Step 4: EPA's Envirofacts System (<http://www.epa.gov/enviro/>) 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), and Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) and the Permit Compliance System (PCS - for Concentrated Animal Feeding Operations with MPDES permits). The available reports were browsed for facility information including the Handler/Facility Classification to be used in assessing whether a facility should be classified as a significant potential contaminant source.

Step 5: Databases were queried to identify the following in the inventory region:

- *Underground Storage Tanks (UST) (<http://www.deq.state.mt.us/UST/USTDownloads.asp>)*
- *Hazardous waste contaminated sites (DEQ hazardous waste site cleanup bureau),*
- *Landfills (<http://nris.state.mt.us/gis/datalist.html>), and*
- *Abandoned and active mines including gravel pits (<http://nris.state.mt.us/gis/datalist.html>)*
Any information on past releases and present compliance status was noted.

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

1. Large quantity hazardous waste generators
2. Landfills
3. Hazardous waste contaminated sites
4. Underground storage tanks
5. Major roads or rail transportation routes
6. Cultivated cropland
7. Animal feeding operations
8. Wastewater treatment or spray irrigation
9. Septic systems, Sewered residential areas
10. Storm sewer outflows

Inventory Results/Control Zone

The control zone is the 100-foot radius around each well. Within the control zone for the existing wells, the potential contaminant source is the access road.

Vehicle traffic on the road can bring a variety of chemicals to the Control Zone. Spills resulting from vehicle accidents or maintenance could contaminate the well.

Inventory Results/Inventory Region

The Inventory Region includes agricultural land, county roads, the Poplar River and the abandoned railroad right-of-way. These potential contaminant sources could impact the aquifer or the River that recharges the PWS wells.

Septic density in the inventory region is low and does not pose a hazard to the PWS (see [Figure 4](#)). *Land cover in the inventory region is primarily undeveloped grasslands (48%) and agricultural crop lands (44%) with the remaining 8% being open water, forest and pasture lands (Figure 5). The percentage of agricultural land poses a moderate hazard to the water supply based on the Montana Source Water Protection Guidance Manual (1999).*

Table 5. Results for Scobey’s Inventory Region

Potential Contaminant Source	Description/Concern
Agriculture	<i>Over-application or improper handling of pesticides or fertilizers may impact drinking water. Excessive irrigation may cause transport of contaminants or sediments to groundwater/surface water through runoff</i>
Roads	<i>Vehicle usage increases the risks for leaks or spills of fuels and other hazardous materials that may impact drinking water. Over-application or improper handling of pesticides or fertilizers in the right-of-way may impact the drinking water supply</i>
Poplar River	Rapid transport of chemicals

Inventory Results/Recharge Region

The Recharge Region for the wells is located along east side of the Poplar River Valley and includes:

- Agricultural chemicals could be transported by the River to the wells. See land use map in [Figure 5](#).
- Sanitary sewers are outside of the Inventory Region but persistent leaks could possibly reach the wells. There were no septic systems in this area, see [Figure 4](#). Septic System Density.
- Vehicle accidents could spill chemicals that could contaminate the aquifer.

Inventory Update

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

Inventory Limitations

The potential sources of contaminants for Scobey are determined from readily available data and reports. Unregulated activities or unreported contaminant releases may have been missed. The use of multiple sources of data, however, should ensure the major threats to the water sources for the PWS are identified. *It is highly recommended that the PWS operator and community members familiar with the nature of businesses and land use in the area enhance the inventory through further research and local input.*

CHAPTER 4 SUSCEPTIBILITY ASSESSMENT

The susceptibility of Scobey’s wells to significant potential contaminant sources is assessed in this chapter to rank threats to the drinking water source. The degree of susceptibility is determined by the hazard associated with a source and the existence of barriers to contamination (Table 6). The proximity of point contaminant sources to the community’s wells or the density of non-point sources in the inventory region determines hazard (Table 7). Barriers can be anything that decreases the likelihood that contaminated water will flow to the city’s wells. Barriers can be engineered structures, management actions, or natural conditions. Examples of engineered barriers are spill catchment structures for industrial facilities and leak detection for underground storage tanks. Emergency planning and best management practices can be considered management barriers. Thick clayey soils, a deep water table, or a thick saturated zone above the well intake can be natural barriers.

Susceptibility ratings are presented individually for each significant potential contaminant source in the inventory region. Scobey is not considered susceptible to individual point sources in the recharge region because dispersion and dilution of contaminants should reduce concentrations of contaminants below levels associated with adverse health affects.

Table 6. Susceptibility to specific contaminant sources as determined by hazard and the presence of barriers.

	High Hazard	Moderate Hazard	Low Hazard
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

Table 7. Hazard Rating of potential contaminant sources.

	High Hazard	Moderate Hazard	Low Hazard
Point Sources of All Contaminants	Within one-year TOT	one to three years TOT	Over three years TOT
Septic Systems	More than 300 per sq. mi.	50 – 300 per sq. mi.	Less than 50 per sq. mi.
Municipal Sanitary Sewer (percent land use)	More than 50 percent of region	20 to 50 percent of region	Less than 20 percent of region
Cropped Agricultural Land (percent land use)	More than 50 percent of region	20 to 50 percent of region	Less than 20 percent of region

The results of the susceptibility assessment for Scobey are summarized in Table 8.

Table 8. Susceptibility assessment for the Inventory Regions.

Potential Source	Contaminant	Hazard	Rating	Barriers	Susceptibility	Management
Roads and Highway	VOCs SOCs, petroleum products, other chemicals	Spills, routine spraying, storm water runoff, infiltration into groundwater	Moderate	Wells are in isolated area with restricted access - County Emergency Response Plan, training and preparation of local response personnel	Moderate	Notify owners of well and protection area locations. Routine monitoring and local emergency planning, use of levees and engineered storm drainage to carry any spills away and prevent infiltration into ground, cooperation with MDOT/County/Local road owners to reduce herbicide use.
Agriculture	pathogens, nitrates and SOCs from fertilizer, pesticides and herbicides.	Spills and Runoff Infiltration	Moderate (since between 20 and 50% of Inventory Region)	Distance to wells from ag-land Clay layers overlie the aquifer	Low	Routine monitoring Notify landowners of well and protection area locations. Encourage use of agricultural best management practices (BMPs) in the inventory and recharge region

CHAPTER 5 MANAGEMENT

The goal of the Source Water Protection Program is to prevent Scobey's drinking water source from being contaminated. All land uses have been inventoried and the potential for these activities to contaminate the drinking water have been ranked. Management activities can be considered as another barrier developed to reduce the susceptibility of a specific contaminant from entering the community's water.

Scobey's management plan as provided in the original Wellhead Protection Plan is provided below. Additional management recommendations that could be implemented are provided by DEQ in italics. It should be noted that even small releases of some chemicals in close proximity to a public water supply well can have significant negative impact on water quality, and therefore are a significant threat to the public water supply. Some of the DEQ management recommendations are also detailed in the susceptibility table for the City of Scobey PWS (Table 8). If these, and other, management recommendations are implemented; they may be considered additional barriers that will reduce the susceptibility of the PWS to specific sources and contaminants.

Control Zone Management

No chemicals will be used or stored within the 100-foot radius of the well. The land around wells is owned by the PWS and access is restricted.

***Additional DEQ Management Recommendations:** Scobey should continue to restrict chemical handling, use and storage within the control zones for the production wells (including pesticides and herbicides). Ongoing training to promote safe handling and proper storage, transport, use, and disposal of hazardous materials should be provided if these materials are used in the control zone.*

Inventory Region Management

Management of this region for Scobey is based on the wells' location away from any industrial activities. Coordinating local emergency response with other agencies will ensure the protection of the public water system is not overlooked.

***Additional DEQ Management Recommendation:** The water system should encourage local agricultural land users in the Inventory Region and the Recharge Region to utilize Best Management Practices BMPs that (1) address application and mixing of fertilizer and pesticides and (2) keep the concentration of cattle low in the inventory region. Fencing should be maintained to keep livestock (if present) away from the control zone for the wells. BMPs are generally voluntary but their implementation can be encouraged through education and technical assistance.*

Recharge Region Management

The recharge region for Scobey sparsely populated range and farmland. The county encourages Best Management Practices.

Management Implementation

The management strategies have been in use as part of the Public Water Systems operation.

***Additional DEQ Management Recommendations:** The Scobey PWS should continue to implement the existing wellhead protection plan. At a minimum, the water system operator and other parties interested and/or knowledgeable of the area should meet annually to verify the existing conditions and update the Wellhead Protection Plan management and emergency response plan if warranted. The PWS should verify that the existing county Emergency Response Plan contains a clear listing of all emergency contacts, emergency numbers, and resources available within the county to respond to an emergency situation, such as a hazardous material spill.*

CHAPTER 6

EMERGENCY PLAN

Procedures for responding to emergencies are described and an emergency coordinator is designated in this chapter. The equipment and materials needed to respond to an emergency and the source of a temporary water supply are also described.

Note: Contingency planning is not part of a typical Source Water Delineation and Assessment Report but is highly recommended as part of voluntary protection measures by each PWS. DEQ has not reviewed this chapter to confirm that the emergency plan identifies the potential threats to the drinking water supply and provides the detail necessary to implement a response to contamination or disruption of the public water system. As previously recommended, the water system operator and other parties interested and/or knowledgeable of the area should meet annually to verify the existing conditions and update this emergency plan if warranted. The PWS should verify that the existing county Emergency Response Plan contains a clear listing of all emergency contacts, emergency numbers, and resources available within the county to respond to an emergency situation, such as a hazardous material spill.

Possible Disruption Threats

The main threat to the PWS has been identified as casing failure or line breaks. A failure of the casing could allow contaminated surface water or poorer quality water from a different aquifer to enter the well and aquifer.

Emergency Coordinator

The emergency coordinator for Scobey is Art Holum.

Equipment and Material Resources

A catastrophic loss of water will require the services of an engineer and a well driller. Minor disruptions to the public water system will be handled by the community.

Procedures to Shut Down the Well

The wells can be isolated from the water distribution system by using the valves at the well pumphouses. Any well can be turned off at the pump house but requires a key for access. The keys are located with the operator.

Security

In the wake of the September 11th attacks a new emphasis has been placed on site security. Scobey's water facilities are located within the community. The pump houses are locked as is the water tank. The well caps should be locked to prevent tampering.

CHAPTER 7

ALTERNATE WATER SOURCES

Scobey has sufficient water to meet the community's requirements. However, Scobey is committed to the Dry Prairie Regional Water System.

Note: Evaluation of alternate water sources is not part of a typical Source Water Delineation and Assessment Report but is highly recommended as part of voluntary protection measures by each PWS. DEQ recommends that the methods used for evaluation of the susceptibility of existing sources presented in this report be considered when evaluating additional sources of water for the PWS.

CHAPTER 8

MONITORING WAIVERS

Note: this chapter was added by DEQ as part of the Source Water Delineation and Assessment Report update.

Waiver Recommendation

The City of Scobey PWS has a waiver for Phase 2 inorganics (which includes barium, cadmium, chromium, fluoride, mercury and selenium). The waiver allows Scobey to collect one sample round for these constituents every 9-year cycle (the standard is one sample round per 3-year cycle). In addition, Scobey was grandfathered under the radionuclide rule and is only required to sample once every 9-years. Based on the susceptibility assessment, the City of Scobey PWS may be eligible for other waivers. The information on susceptibility and use waivers is provided in this section to give the PWS operators an opportunity to consider if waivers may be feasible.

Before a susceptibility or use waiver is requested, the PWS Operators are encouraged to carefully review the following section on Monitoring Waiver Requirements. If after reviewing this section it is determined that an additional waivers are feasible, the PWS should submit a letter to DEQ requesting the specific monitoring waivers. If requested by DEQ, the PWS may also need to provide additional information regarding chemical use in the area within the Inventory Region. Table 9 shows how identified potential contaminant sources affect the eligibility for monitoring waivers.

Table 9. Susceptibility Assessment as it relates to Waiver Eligibility for Significant Potential Contaminant Sources in the Inventory Region

Source	Contaminant	Susceptibility	Waiver Eligibility
Agricultural /Grazing Lands	Nitrate and SOCs from fertilizer, pesticides and herbicides. Pathogens (if grazing occurs)	Low	Waivers are not available for pathogens and nitrate. Chemical use may preclude waivers for some chemicals. The PWS should confirm chemical use/storage history by land parcel.
Highway	VOCs, SOCs, petroleum products and other chemicals	Moderate	Chemical use in right-of-way may preclude waivers for some chemicals. PWS should confirm chemical use history along the right-of-way. Waivers might be rescinded if a spill occurred.

Monitoring Waiver Requirements

The 1986 Amendments to the Safe Drinking Water Act require that community and non-community PWSs sample drinking water sources for the presence of volatile organic chemicals

(VOCs) and synthetic organic chemicals (SOCs). The US EPA has authorized states to issue monitoring waivers for the organic chemicals to systems that have completed an approved waiver application and review process. All PWSs in the State of Montana are eligible for consideration of monitoring waivers for several organic chemicals. The chemicals diquat, endothall, glyphosate, dioxins, ethylene dibromide (EDB), dibromochloropropane (DBCP), and polychlorinated biphenyls are excluded from monitoring requirements by statewide waivers.

Use Waivers

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

Susceptibility Waivers

If a Use Waiver is not granted, a system may still be eligible for a Susceptibility Waiver, if through a vulnerability assessment it is demonstrated that the water source would not be susceptible to contamination. Susceptibility is based on prior analytical or vulnerability assessment results, environmental persistence, and transport of the contaminants, natural protection of the source, wellhead protection program efforts, and the level of susceptibility indicators (such as nitrate and coliform bacteria). The vulnerability assessment of a surface water source must consider the watershed area above the source, or a minimum fixed radius of 1.5 miles upgradient of the surface water intake. PWSs developed in unconfined aquifers should use a minimum fixed radius of 1.0 mile as an area of investigation for the use of organic chemicals. Vulnerability assessment of spring water sources should use a minimum fixed radius of 1.0 mile as an area of investigation for the use of organic chemicals. Shallow groundwater sources under the direct influence of surface water (GWUDISW) should use the same area of investigation as surface water systems; that is, the watershed area above the source, or a minimum fixed radius of 1.5 miles upgradient of the point of diversion. The purpose of the vulnerability assessment procedures outlined in this section is to determine which of the organic chemical contaminants are in the area of investigation.

Given the wide range of landforms, land uses, and the diversity of groundwater and surface water sources across the state, additional information is often required during the review of a waiver application. Additional information may include well logs, pump test data, or water quality monitoring data from surrounding public water systems; delineation of zones of influence and contribution to a well; time-of-travel or attenuation studies; vulnerability mapping; and the use of computerized groundwater flow and transport models. DEQ's PWS Section and DEQ's Source Water Protection Program will conduct review of an organic chemical monitoring waiver application. Other state agencies may be asked for assistance.

Susceptibility Waiver for Unconfined Aquifers

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

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

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

Susceptibility Waiver for Confined Aquifers

Confined groundwater is isolated from overlying material by relatively impermeable geologic formations. A confined aquifer is subject to pressures higher than atmospheric pressure that would exist at the top of the aquifer if the aquifer were not geologically confined. A well that is drilled through the impervious layer into a confined aquifer will enable the water to rise in the borehole to a level that is proportional to the water pressure (hydrostatic head) that exists at the top of a confined aquifer.

The susceptibility of a confined aquifer relates to the probability of an introduced contaminant to travel from the source of contamination to the aquifer. Susceptibility of an aquifer to contamination will be influenced by the hydrogeologic characteristics of the soil, vadose zone (the unsaturated geologic materials between the ground surface and the aquifer), and confining layers. Important hydrogeologic controls include the thickness of the soil, the depth of the aquifer, the permeability of the soil and vadose zones, the thickness and uniformity of low permeability and confining layers between the surface and the aquifer, and hydrostatic head of the aquifer. These factors will control how readily a contaminant will infiltrate and percolate toward the groundwater.

The Susceptibility waiver has the objective of assessing the potential of contaminants reaching the groundwater used by the PWS. A groundwater source that appears to be confined from surface infiltration in the immediate area of the wellhead may eventually be affected by contaminated groundwater flow from elsewhere in the recharge area. Contaminants could also enter the confined aquifer through improper well construction or abandonment where the well provides a hydraulic connection from the surface to the confined aquifer. The extent of confinement of an aquifer is critical to limiting susceptibility to organic chemical contamination. Regional conditions that define the confinement of a groundwater source must be demonstrated by the PWS in order to be considered for a confined aquifer susceptibility waiver. Confinement of an aquifer can be demonstrated by pump test data (storage coefficient), geologic mapping, and well logs. Site-specific information is required to sufficiently represent the recharge area of the aquifer and the zone of contribution to the PWS well. The following information should be provided:

- Abandoned wells in the region (zone of contribution to the well),
- Other wells in the region (zone of contribution to the well),
- Nitrate/Coliform bacteria analytical history of the PWS well, and
- Organic chemical analytical history of the PWS well.

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Appendix I
Sanitary Survey and
GWUDI Assessment

Appendix II

Water Chemistry

Appendix III

Well Logs