Rock Creek Marina

SOURCE WATER DELINEATION AND ASSESSMENT REPORT

Rock Creek Marina
Public Water System
PWSID # MT0003448

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Source Water Delineation and Assessment Report for Rock Creek Marina

Introduction

This Delineation and Assessment Report was prepared by Perri P. May, Hydrogeologist in the Source Water Protection Program of the Montana Department of Environmental Quality (DEQ). The Rock Creek Marina public water supply (PWS) is located in McCone County, Montana, on the shoreline of Fort Peck Reservoir (Figure 1). The DEQ PWS identification number, operator name, and operator number for the Rock Creek Marina PWS appear on the title page of this report.

Purpose

This report is intended to meet the technical requirements for the completion of the source water delineation and assessment report for the Rock Creek Marina PWS as required by the Montana Source Water Protection Program (DEQ, 1999) and the federal Safe Drinking Water Act (SDWA) Amendments of 1996 (P.L. 104-182). The Montana Source Water Protection Program is intended to be a practical and cost-effective approach to the protection of public drinking water supplies from contamination. The primary purpose of this source water delineation and assessment report is to provide information to assist the Rock Creek Marina PWS operator in the identification of potential contaminant sources near the surface water intake and the need for a source water protection plan to protect the Rock Creek Marina drinking water source. If the source water is determined to be highly susceptible to one or more potential contaminant sources, a source water protection plan detailing recommendations to manage or mitigate the impacts from potential contaminant sources may be warranted.

Delineation and assessment constitute major components of this Source Water Delineation and Assessment Report. Delineation entails mapping the boundaries of source water protection areas, which encompass ground water and/or surface waters contributing to public water supply sources. Assessment involves identifying locations or regions within source water protection areas where contaminants may be generated, stored, transported, or disposed, and determining the relative susceptibility of drinking water to contamination from these sources.

Information on land use and potential contaminant sources was obtained from a variety of sources, including a preliminary land cover data layer produced by the United States Geological Survey (USGS), DEQ Public Water Supply files (including sanitary surveys), and other public sources of information. A web-based GIS application was also used to query and generate maps to support writing this report. This application is called the Source Water Protection Program Query System and is available at the following web address or URL: http://nris.state.mt.us/wis/swap/swapquery.asp. The application was developed by the DEQ Source Water Protection Program (SWPP) and provides access to data from the U.S.EPA, DEQ, Montana Bureau of Mines and Geology (MBMG) and other sources

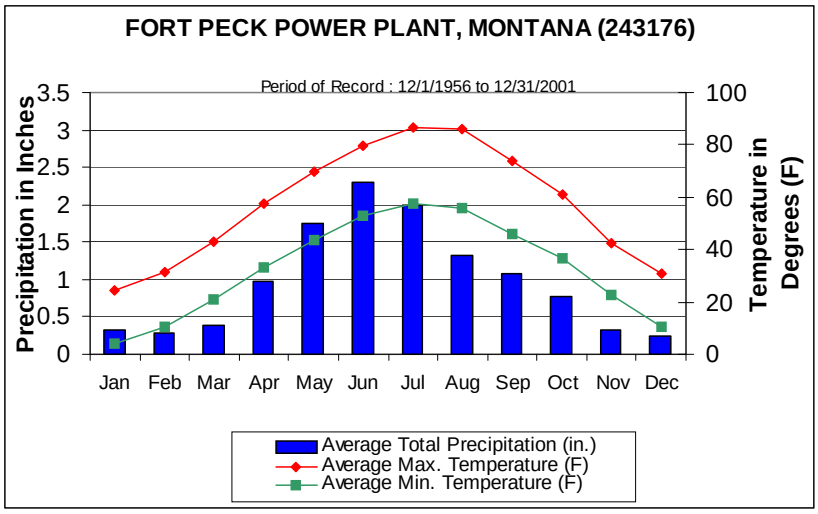
Limitations

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

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

Climate

Figure 2. Fort Peck Average Temperatures and Precipitation



The climate in the vicinity of the town of Fort Peck and Rock Creek Marina is semi-arid. Based on Western Regional Climatic Center data for the December 1, 1956 to December 31, 2001 period of record (Figure 2), annual precipitation averages 11.75 inches. Monthly average precipitation ranges from 0.24 inches in December to 2.3 inches in June. Intense, localized thunderstorms commonly occur from May through July (Donovan, 1988). The annual mean snowfall in Fort Peck is 2.4 inches. Periodic drought cycles (as defined by moving annual precipitation averages less than 10 inches) occur in the region at approximately 10 to 20 year intervals. Evaporation rates are high, averaging 25 to 35 inches per year.

Geology

Upper Cretaceous Bearpaw shale underlies the Quaternary alluvium, colluvium, and glacial deposits exposed at the ground surface in the vicinity of Rock Creek Marina. The Missouri River has incised through the Bearpaw shale, which is exposed in outcrops along the Fort Peck Reservoir shoreline and in tributary drainages on the periphery of the reservoir (Jensen and Varnes, 1964).

Public Water Supply Information

The recreation area is situated on the shoreline of Fort Peck Reservoir, approximately 8 miles west of Highway 24 and 55 miles south of Glasgow (Figure 1). The Rock Creek Marina source water is obtained through an intake on Fort Peck Reservoir. The intake is situated on the Dry Arm of the Reservoir in Rock Creek Bay at approximately 47.73443 N latitude and –106.257 W longitude. Fort Peck Reservoir is 134 miles in length, 220 feet in maximum depth, and is surrounded by 1520 miles of shoreline (http://www.now.usace.army.mil). The reservoir has a storage capacity of 18.7 million acre-feet of water. A total watershed area of 10,200 miles drains into the reservoir. The Rock Creek Marina intake is located in the Fort PeckReservoir watershed. The U.S. Geological Survey hydrologic unit code for this watershed is 10040104.

The Rock Creek Marina PWS is classified as a transient, non-community system under the Federal Safe Drinking Water Act, because the system serves 25 people for at least six months per year. The PWS services a population of 25 via one active service connection annually from May through September. The system services a a main store building with an attached kitchen, a wash room, a shop area, a bath house, four rest rooms (two with showers), six RV hookups, and a shower house on the grounds of the marina and campground (http://fentonrealestate.org/rockcreek.htm).

The Rock Creek Marina obtains its drinking water from a surface water supply. As a result, the source water is classified as highly sensitive to contamination, in accordance with Montana Source Water Protection Program aquifer sensitivity criteria (1999). These criteria are discussed in the next chapter.

Water Quality

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

Fort Peck Reservoir Water Quality

Missouri River water quality samples were collected by the U.S.G.S. at the Missouri River near Fort Peck gaging station. Only the samples collected at this station over the past five years are reported in Table 1 below.

Table 1. Dissolved constituent concentrations in the Missouri River at the Missouri River below Fort Peck Dam U.S.G.S. gaging station (U.S. Geological Survey, NWIS, 2002)

Constituent	Sampling Dates (years)	Range of Dissolved Concentrations	MCL	MCLG	Secondary Standard
Discharge (cfs)	1980 - 1999	1,010 - 15,200	NA	NA	NA
Nitrite + Nitrate (as N) (mg/l)	1980 - 1987	≤ 0.10 - 0.11	NA	NA	NA
Nitrite (as N)	1985 - 1986	≤ 0.010	**1 mg/l**	**1 mg/l**	NA
Arsenic (ug/l)	1980 - 1987	3.0 – 5.0	**0.05 mg/l**	NA	NA
Cadmium (ug/l)	1980 - 1987	≤ 1.00 – 3.00	**0.005 mg/l**	**0.005 mg/l**	NA
Chromium (ug/l)	1980 - 1987	≤ 1.0 - 4.3	**0.1 mg/l**	**0.1 mg/l**	NA
Copper (ug/l)	1980 - 1987	1.0 – 15.0	NA	**1.3 mg/l**	**1.0 mg/l**
Iron (ug/l)	1980 - 1987	≤ 10 - 30	NA	NA	**0.3 mg/l**
Lead (ug/l)	1980 - 1987	≤ 1.00 – 16.0	**TT Action Level = 0.015 mg/l**	**zero**	NA
Manganese (ug/l)	1980 - 1987	≤ 1.0 - 20	NA	NA	**0.05 mg/l**
Selenium (ug/l)	1980 - 1987	≤ 1.0 – 2.0	**0.05 mg/l**	**0.05 mg/l**	NA
Fecal coliform, 0.7 UM-MF count/100 ml)	1980 - 1987	≤ 1 - >200	**0.003 mg/l**	**0.003 mg/l**	NA
Turbidity (NTU)	1980 - 1986	.4 - 13	**1 NTU not to exceed 0.3 NTU in 95% of daily samples in any month**	NA	NA
Mercury (ug/l)	1980 - 1987	≤ .1 - .70	**0.002 mg/l**	**0.002 mg/l**	NA

*E = estimated value

The State of Montana classifies the Fort Peck Reservoir as a B-2 surface water body. B-2 waters are considered suitable for drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supplies pursuant to the Administrative Rules of Montana 17.30.624. The Fort Peck Reservoir is included on Montana's 303(d) of water-quality impaired water bodies. DEQ has determined that drinking water use is not supported, and contact recreation use is partially supported. The probable causes of impairment have been identified as lead, mercury, metals, and noxious aquatic plants. The probable sources of impairment have been identified as agriculture, resource extraction, abandoned mining, atmospheric deposition and debris and bottom deposits.

Rock Creek Marina PWS Water Quality

Within the past five years, one positive total coliform sample was collected during routine contaminant monitoring on July 15, 2002. A fecal coliform sample collected on the same day was negative, and coliform bacteria were not detected in any samples subsequently collected to date. No MCL exceedances were noted for any other constituents monitored over the past five years. Nitrate concentrations have ranged from nondetect to 1.16 mg/l within this time period.

Delineation

The source water protection area, the land area that contributes water to the Rock Creek Marina public water supply surface water intake, is delineated in this chapter. The purpose of delineation is to map the source of Fort Peck's drinking water and to define areas within which to prioritize source water protection efforts.

Source water protection areas for surface water sources are subdivided into spill response and watershed regions, each with separate management goals. The spill response region encompasses an area upstream of the Fort Peck PWS in which contaminants can be drawn into the intake with little lag time. The watershed region encompasses a portion of the Fort Peck Reservoir watershed area upstream of the Rock Creek Marina PWS.

Spill Response Region

A modified ½ mile-radius circle was utilized to delineate the spill response region. The region extends 1/2 mile into Fort Peck Reservoir from the intake location (Figure 3).

Watershed Region

The watershed region for the Rock Creek Marina PWS encompasses two watersheds surrounding the surface water intake (Figure 4). The boundaries of the smaller scale 100401043 and 1004010429 11-digit HUCs (hydrologic unit codes, or watersheds) within the enormous Fort Peck Reservoir watershed were used to delineate the watershed region.

Limiting Factors

The delineations for the Rock Creek Marina PWS spill response region and watershed region are based on fixed-distance and watershed mapping. The spill response region represents an approximation of the distance required for contaminants to reach the surface water intake with little lag time. Numerous assumptions are associated with these Source Water Protection Program (SWPP) criteria for spill response region delineations. Contaminant transport rates and concentrations will vary depending on river and reservoir flow conditions, ground water flux into the river and reservoir, contributions from overland flow, soil types, slope, characteristics of riparian vegetation, the extent of riparian vegetation buffer zones, the extent and duration of contamination, contaminant solution density, adsorption, mechanical dispersion, biological transformation, dilution, molecular diffusion, adsorption, precipitation, oxidation, complexation, and volatilization. As a result, some areas within the spill response region may be more conducive to contaminant transport than others, and should be designated as higher priority areas for source water protection efforts.

Inventory

An inventory of potential sources of contamination was conducted to assess the susceptibility of the Rock Creek Marina PWS to contamination, and to identify priorities for source water protection planning. These inventories were conducted within the delineated spill response and watershed regions. The inventory for the Rock Creek Marina PWS focuses on facilities that generate, use, store, transport, or dispose potential contaminants, and on land types on which potential contaminants are generated, used, stored, transported, or disposed. Additionally, the inventory identifies potential sources of all primary drinking water contaminants and Cryptosporidium. Only significant potential contaminant sources were selected for detailed inventory. The inventory for the Fort Peck PWS also focuses on all activities in the spill response region, as well as general land uses and large potential contaminant sources in the watershed region.

Inventory Method

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

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

Step 2: EPA's Envirofacts System was queried to identify EPA regulated facilities. This system accesses the following databases: Resource Conservation and Recovery Information System (RCRIS), Biennial Reporting System (BRS), Toxic Release Inventory (TRI), Permit Compliance System (PCS), and Comprehensive Environmental

Response Compensation and Liability Information System (CERCLIS). The available reports were browsed for facility information including the Handler/Facility Classification to be used in assessing whether a facility is a significant potential contaminant source.

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

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

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

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

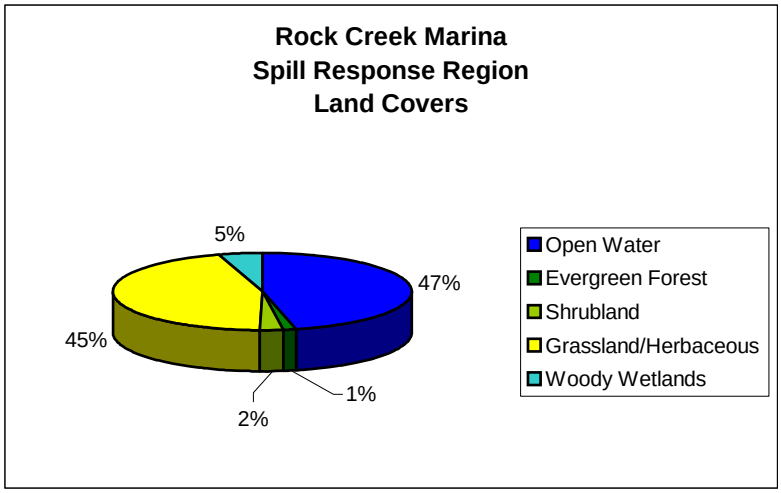
Potential contaminant sources are designated as significant if they fall into one of the following categories:

1) Large quantity hazardous waste generators
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 lagoons or spray irrigation
9) Septic systems
10) Sewered residential areas
11) Storm sewer outflows
12) Floor drains, sumps, or dry wells
13) Abandoned or active mines

Inventory Results/Spill Response Region

Land covers within the spill response region for the Rock Creek Marina PWS include open water, grassland/herbaceous, evergreen forest, woody wetlands, and shrubland (Figure 5). There is no cultivated cropland within the spill response region.

Figure 5. Spill response region land cover areas



Low septic densities occupy the entire spill response region. The on-site septic system for the marina and campground is located within the spill response area, but the design, history, and functionalty of the system are unknown. Leaking connections or malfunctions in the on-site septic system may pose a threat to the PWS source water.

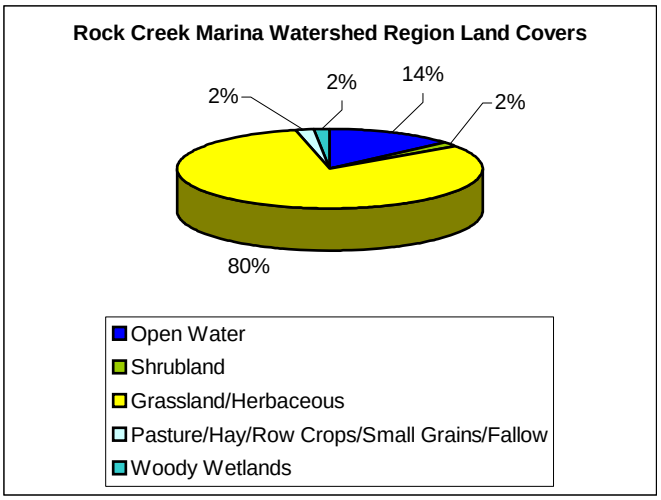
No concentrated animal feeding operations are located in the spill response region, but grazing is permitted on the Charles M. Russell National Wildlife Refuge. The entire area of the spill response region is located on the wildlife refuge outside of the privately owned marina. No major transportation routes are located within the spill response region. If petroleum hydrocarbons (e.g., motorboat gasoline and oil), fertilizers, solvents, or pesticides are handled, stored, or disposed improperly in the marina shop, this area may pose a threat to the marina's source water. Additionally, if oil or gasoline spills occur from boats docked at the marina or offshore within the spill response region, these may present a threat to the quality of the source water at the intake.

Table 3. Significant potential contaminant sources in the spill response region for the Town of Fort Peck PWS.

Source	Address Or Map ID Number	Potential Contaminants	Hazard
Rock Creek Marina and Campground septic system	1	Nitrates, pathogens, SOCs	Spills, storm water runoff into reservoir
Spill at Marina dock or offshore boats	2	Petroleum hydrocarbons	Spills directly into reservoir
Marina shop	3	Petroleum hydrocarbons, fertilizers, pesticides, solvents	Spills; surface runoff into reservoir, infiltration to shallow ground water discharging to reservoir
Grazing on CMR National Wildlife Refuge	4	pathogens, nitrate	Surface runoff into reservoir

Inventory Results/Watershed Region

Figure 6. Watershed region land cover areas



The watershed region for the Rock Creek Marina PWS encompasses two fifth code hydrologic units in the Fort Peck Reservoir watershed (Figure 4). Predominant land covers in the watershed region include grasslands/ herbaceous (80%) and open water (14%) (Figure 6). Herbicides and fertilizers utilized on cultivated cropland in the recharge region do not constitute significant potential contaminant sources, as cultivate cropland only occupies 2 percent of the total area of the watershed region, and nocroplands are located proximal to the marina. No permitted confined animal feeding operations are located in the watershed region.

Seven oil and gas wells are located in the watershed region (Figure 4). All of the wells are development or test wells, and are not currently utilized for oil or gas production. As a result, these wells are not considered significant potential contaminant sources.

Montana Route 24 runs north – south to the east of the reservoir within the study area (Figure 4). This road is not considered a significant potential contaminant source due to the considerable distance between the route and the reservoir. It is extremely unlikely that contaminants originating in road-related spills would be transported via surface runoff or shallow ground water into Fort Peck Reservoir at detectable concentrations due to natural attenuation and dilution.

A samll airport is located approximately 1.3 miles south of the Rock Creek Marina intake on the shoreline of the reservoir (Figure 4). If petroleum hydrocarbons (e.g., airplane gasoline and oil) or solvents are handled, stored, or disposed improperly in the airport, this area may pose a threat to the marina's source water. Likewise, any petroleum hydrocarbonsspills that occur in the airport hanger or on the runway may pose a threat to the quality of the marina's source water.

Table 4. Significant potential contaminant sources in the watershed region for the Town of Fort Peck PWS.

Source	Address Or Map ID Number	Potential Contaminants	Hazard
Grazing on CMR National Wildlife Refuge	4	pathogens, nitrate	Surface runoff into reservoir
Airport	5	Petroleum hydrocarbons, solvents	Spills; surface runoff into reservoir, infiltration to shallow ground water discharging to reservoir

Inventory Limitations

The extent of the potential contaminant source inventory is limited in several respects. The inventory is based on data readily available through state documents, published reports, and GIS data. Documentation may not be readily available on some potential sources. As a result, all potential contaminant sources may not have been identified. In some instances, inadequate location information precluded the inclusion of potential sources in the inventory.

Susceptibility Assessment

Susceptibility of Rock Creek Marina's source water is determined by two factors: the potential of a contaminant reaching the intake and the resulting health hazard. Susceptibility is assessed in order to prioritize potential pollutant sources in the spill response region in order to guide management actions undertaken by local entities, in this case the owner of the marina and McCone County.

The goal of source water management is to protect the source water, manage significant potential contaminant sources in the spill response region, and ensure that land use activities in the watershed region pose minimal threats to the source water. Management priorities in the spill response region are determined by ranking the significant potential contaminant sources identified in the previous chapter according to susceptibility. Alternative management approaches that could be pursued by Rock Creek Marina PWS owners and operators to reduce susceptibility are also included in this section of the report.

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 reach the PWS intake (Table 4). The hazard presented by point sources of contaminants in Rock Creek Marina's spill response region depends on whether contaminants can discharge directly to the Fort Peck Reservoir. Point source

hazard is also dependent on the health affects associated with potential contaminants (Table 5). Hazard ratings for nonpoint sources are assigned based on criteria listed in Table 6 for septic systems, sanitary sewers, and cropped agricultural land. Barriers can be anything that decreases the likelihood that contaminated water will reach Rock Creek Marina's surface water intake. Examples of barriers include: a vegetated riparian area, protective forest management practices, and dilution.

Table 5. Susceptibility to potential contaminant sources based on 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 6. Hazard of potential contaminant sources for the Rock Creek Marina public water system.

	High Hazard	**Moderate Hazard**	**Low Hazard**
Point Sources of All Contaminants	Potential for direct discharge to source water	Potential for discharge to GW that is hydraulically connected to SW	Potential contaminant sources within the watershed
Septic Systems	More than 300 per sq. mi.	50 – 300 per sq. mi.	Less than 50 per sq. mi.
Municipal Sanitary Sewer (% land use)	More than 50 % of region	20 to 50 % of region	Less than 20 % of region
Cropped Agricultural Land (% land use)	More than 50 % of region	20 to 50 % of region	Less than 20 % of region

Susceptibility ratings are presented individually for each significant potential contaminant source and each associated contaminant (Table 7). The susceptibility of each well to each potential contaminant source is assessed separately.

Susceptibility Assessment Results

The Rock Creek Marina source water is moderately susceptible to contamination from the Rock Creek Marina and Campground septic system, and minimally susceptible to grazing on the Charles M. Russell Wildlife Refuge, Marina dock and offshore boat spills, the Marina shop (Table 7). The marina's intake is susceptible to a number of contaminants, including pathogens, nitrates, fertilizers, pesticides, solvents, and petroleum hydrocarbons. The susceptibility results for each significant potential contaminant source identified follow:

Table 7. Susceptibility assessment for significant potential contaminant sources in the spill response and watershed regions for the Rock Creek Marina PWS surface water intake.

Source	Contaminant	Map ID Number	Hazard	Hazard Rating	Barriers	Susceptibility	Management Recommendations
Marina septic system	Pathogens, nitrate, VOCs, SOCs	1	System failure, infiltration to shallow ground water discharging to reservoir	Moderate	Natural attenuation	Moderate	Proper system maintenance and replacement when necessary
Marina Dock and Boats Offshore	Petroleum hydrocarbons	2	Spills directly into reservoir	Moderate	Natural attenuation,Dilution	Low	Maintain preparedness of local emergency personnel through active training; utilize waste recycling and minimization
Marina Shop	Petroleum hydrocarbons, Fertilizers, pesticides, solvents	3	Spills, over application, surface runoff, infiltration to shallow ground water discharging to reservoir	Moderate	Natural attenuation,Dilution	Low	Educate employees and guests on the proper handling, storage, and disposal of potential contaminants;
Grazing on CMR National Wildlife Refuge	pathogens, nitrate	4	Surface runoff into reservoir	Low	Natural attenuation	Low	Implementation of grazing rotation best management practices (BMPs), focusing on reservoir riparian zones; utilization of agricultural best management practices
Airport	Petroleum hydrocarbons, solvents	5	Spills; surface runoff into reservoir, infiltration to shallow ground water discharging to reservoir	Moderate	Natural attenuation,Dilution	Low	Maintain preparedness of local emergency personnel through active training; utilize waste recycling and minimization

Management Recommendations

Management recommendations are included in the susceptibility table for the Rock creek Marina PWS (Table 6). If these management recommendations are implemented, they may be considered additional barriers that will reduce the susceptibility of Rock Creek Marina's intake to specific sources and contaminants.

Management recommendations fall into the following categories:

- Agricultural best management practices

- Stormwater management
- Education
- Emergency Response Plan

Agricultural best management practices (BMPs) – BMPs that address application and mixing of fertilizer and pesticides are a viable alternative to prohibition of their use. BMPs are generally voluntary but their implementation can be encouraged through education and technical assistance. BMPs may also be utilized to minimize surface runoff and soil erosion on cultivated fields, and to minimize riparian vegetation impacts from grazing.

Stormwater management – Stormwater planning should address source and drainage control. Source control can be accomplished through educational programs focusing on residential and commercial chemical use, disposal, and recycling. Drainage control and pollutant removal can be accomplished through the use of vegetated detention basins at outfall locations.

Education - Educational workshops provided to the general public by the city, county, or state promote safe handling and proper storage, transport, use, and disposal of hazardous materials. Ongoing training provided to designated emergency personnel will promote the efficiency and effectiveness of emergency responses to hazardous material spills. Likewise, educational workshops provided to rural homeowners will promote the proper maintenance and replacement of residential septic systems. The EPA and the State of Montana can provide educational materials on these topics.

Emergency Response Plan - An Emergency Response Plan should be compiled and adopted by the marina owner and McCone County. The effectiveness of this response plan will be maximized if it is updated on an annual basis to reflect changes in emergency contacts, emergency numbers, and resources available within the county to respond to an emergency situation, such as a hazardous material spill.

The Rock Creek Marina PWS operator, the and the McCone County administration should consider these management recommendations. Should contamination reach the town's intake, the owner and the County will likely need to work cooperatively to address remediation or relocation of the Rock Creek Marina PWS source. Editorial contributions from the Rock Creek Marina PWS operator have been solicited and incorporated into this report.

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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.

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.

CAFO. Confined animal feeding operation, which is typically registered by the State of Montana.

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.

Delineation. A process of mapping source water management areas.

Effective Porosity. The percent of soil, sediment, or rock through which fluids, such as air or water, can pass. Effective porosity is always less than total porosity because fluids can not pass through all openings.

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.

IOCs. Inorganic Chemicals

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

Large Capacity Septic Systems. As defined by the US EPA Underground Injection Control (UIC) Program, these are septic systems that serve more than 20 persons per day for a period greater than 6 months of the year.

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 or virus 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.

Porosity. The percent of soil, sediment, or rock filled by air, water, or other fluid.

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

POTW. Publicly Owned Treated Wastewater facility, typically a municipal sewer treatment plant with a wastewater discharge.

SIC Code. The U.S. Standard Industrial Classification (SIC) Codes classify categories of businesses. SIC Codes cover the entire range of business categories that exist within the economy.

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.

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. 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, non-point, and natural sources. The TMDL program was established by section 303(d) of the Clean Water Act to help states implement water quality standards.

Turbidity. The cloudy appearance of water caused by the presence of suspended matter.

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.

Volatile Organic Compounds (VOC). Any organic compound which evaporates readily to the atmosphere (e.g. fuels and solvents).

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

APPENDICES

APPENDIX A

SANITARY SURVEY