

# **Crystal Lake Campground**

## **Source Water Delineation and Assessment Report (SWDAR)**

### **Crystal Lake Campground United States Forest Service Public Water Supply**

State of Montana Public Water Supply ID# MT0062340

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**May 2004**

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## 1.0 INTRODUCTION

The Safe Drinking Water Act (SDWA) Amendments of 1996 require 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 US Environmental Protection Agency (EPA) formally approved the Montana SWAP, prepared and administered by the Montana Department of Environmental Quality (MDEQ), 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.

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. *The Crystal Lake Campground PWS is a transient non-community system.*

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 United States Forest Service (USFS) works with the Montana DEQ to complete delineation and assessment reports for USFS managed 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 the USFS to develop source water protection plans for potable water supplies. 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.

**Scope and Purpose**

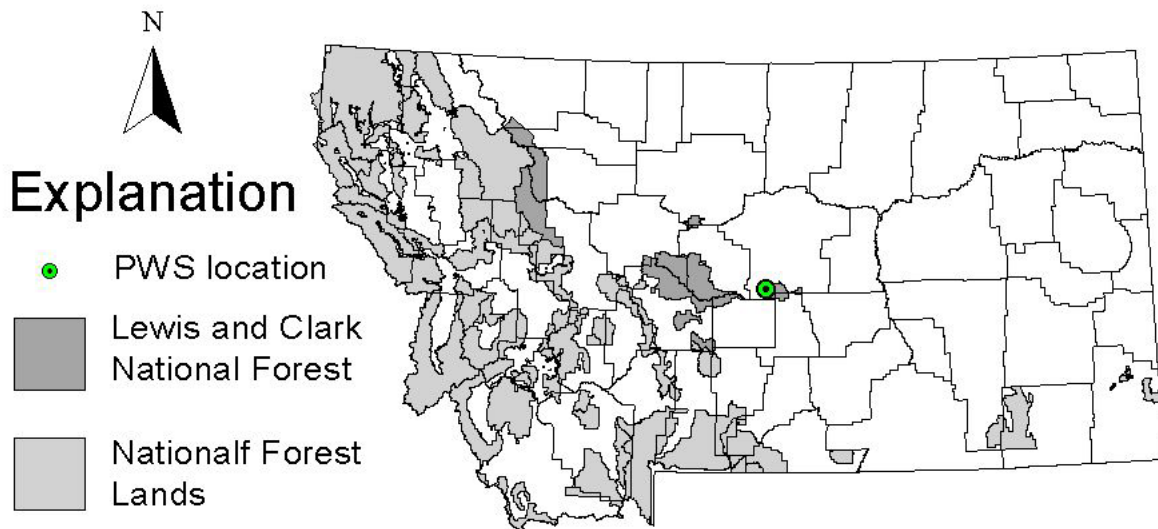
This report presents the source water delineation and assessments for the public water supply for the Crystal Lake Campground located approximately 18 miles south of the Town of Lewiston in southwestern Fergus County, Montana. This report is intended to meet the technical requirements for the completion 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).

**Acknowledgements**

This report was prepared by James Swierc, hydrogeologist and Brian Story, Environmental Engineering trainee, both with the USFS Region 1 office, as part of a cooperative agreement with the United States Environmental Protection Agency.

**Limitations**

This report was prepared to assess threats to the Crystal Lake Campground public water supply and is based on published information. 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 supply in this report. As a result, other potential sources of contamination to surface and ground water in the area may not be identified.



*Figure 1 – Crystal Lake Campground Location*

## 2.0 BACKGROUND AND DELINEATION

The Crystal Lake Campground is located near the headwater drainages for the northward flowing Rock Creek, in southwestern Fergus County ([Figure 1](#)). Lewistown, the largest town in the area with commercial services, is located approximately 18 miles north of the Crystal Lake Campground, in western Fergus County. The campground is located directly upstream of Crystal Lake itself. The campground is a transient, non-community public water supply. The area is predominantly undeveloped at this time. The Crystal Lake Campground is located in Section 19 of Township 12 North, Range 18 East at 46.79°N latitude and 109.51°W longitude. The water supply system serves approximately 2 residents and 40 non-residents per day during its summer operating season.

The public water supply uses one well (Source 002), which was installed in 1994 and deepened in 1995. The well is installed to a depth of 120 feet. The well log from the MBMG-GWIC database is included in Appendix B. Known well information is summarized in Table 1. There is no Water Right number given in the DNRC files. Water is pumped into one 1,500-gallon polyethylene tank before flowing to the distribution system. There is no treatment of the water prior to use.

*Table 1. Source Well Information Summary.*

Well	Well 1
Source ID	002
MBMG-GWIC ID#	154318
DNRC Water Right	---
Location	46.7940°N Lat 109.5112 °W Long T12N, R18E, Section 19 BBBB
Total Depth	120 feet
Completion Date	7/22/1995
Perforated Interval	80-100 feet
Static Water Level	54 feet
Pumping Water Level	---
Pump Test Rate	12 gpm
Drawdown	---
Specific Yield	---

### Hydrogeologic Assessment

There are no readily available references specific to the hydrology of the area. A generalized geologic map for the area is depicted in [Figure 3](#). Ground water in the area near Crystal Lake Campground is present in a locally confined aquifer interpreted to represent coarse-grained glacial outwash overlying limestone bedrock. According to the well log for the PWS well, the

source aquifer is clean gravel and sand, with the well installed through approximately 58 feet of clay lenses. The Mississippian Madison Limestone is present in the upper elevations of the Big Snowy Mountains. The limestone represents a regional aquifer at lower elevations away from the mountains, and provides a source for springs throughout the mountains. The presence of the limestone beneath the glacial strata infers a recharge source to the aquifer from bedrock discharge. Additional recharge to the source aquifer for the Crystal Lake Campground PWS is interpreted to occur from infiltration of snowmelt and other precipitation into the aquifer where it is exposed in the adjacent mountains.

Ground water flow in the source aquifer is interpreted to generally follow the topographic gradient towards Crystal Lake from higher elevations. Based on the hydrogeologic setting, the Crystal Lake Campground water source is a confined aquifer in unconsolidated glacial deposits and/or dissolved limestone bedrock, both which are considered to have a *high* source water sensitivity to contamination according to the Montana SWAP Program (DEQ, 1999).

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

The source water protection areas for the Crystal Lake Campground PWS are identified based on the criteria for a transient non-community PWS as defined in the Montana SWAP Program (DEQ, 1999). For the PWS source, two primary management areas are identified within the source water protection area; the control zone and the inventory region. The control zone, also known as the exclusion zone, is an area at least 100-foot radius around the well. The inventory region for the confined aquifer is delineated as the area within a 1,000-foot radius around the well. The inventory zone for the well and the surrounding area is depicted in [Figure 4](#).

### **Crystal Lake Campground Sampling Results and Water Quality**

Every PWS is required to perform monitoring for contamination to their water supply. The monitoring parameters for transient non-community systems typically include coliforms (as an indicator of pathogenic organisms), and nitrates as an acute health risk. A review of DEQ and USFS databases of monitoring results for the Crystal Lake Campground PWS (Appendix A) indicates no health-based violations and only a few monitoring violations for missed samples. The detected level of nitrates has been consistently less than the drinking water standard of 10 mg/L.

## **3.0 INVENTORY**

An inventory of potential sources of acute health hazards was conducted for the Crystal Lake Campground PWS source within the control and inventory zones. The contaminants in this category represent nitrates and pathogens, as required by the Montana Source Water Protection Program (DEQ, 1999). Potential sources include areas with septic systems and agricultural areas where nitrogen fertilizers may be used. Land use for the area is shown in [Figure 5](#). While additional sources of contamination may be present, this assessment only focuses on the above listed potential contaminants.

### **Inventory Results/Control Zone**

The control zone represents the most critical point to protecting the integrity of a wellhead for ground water sources. Locating the well 1000 feet away from the campground has preserved the control zone. The well access road represents the only potential contaminant source in the control zone.

### **Inventory Results/Inventory Region**

The inventory region represents the area near the source well where any contaminant spilled onto the ground or subsurface has the potential to migrate directly into the PWS source aquifer. The two potential sources identified in the inventory region vault toilets on the south edge of the campground and access roads in the campground. The area is primarily undeveloped.

### **Inventory Results/Surface Water Buffer Zone and Watershed Regions**

Land use within the inventory region is classified as non-agricultural and non-urban; primarily forest as shown in [Figure 5](#).

## 4.0 SUSCEPTIBILITY ASSESSMENT

Susceptibility is the potential for a public water supply to draw water contaminated by inventoried sources at concentrations that would pose concern. Susceptibility is assessed in order to prioritize potential pollutant sources for management actions by the Lewis and Clark National Forest, in this case the Crystal Lake Campground PWS.

The goal of Source Water Management is to protect the source water by controlling activities in the control zones and managing significant potential contaminant sources in the Inventory Regions. 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 to reduce susceptibility are recommended.

For point sources, a relative hazard for the potential contaminant sources is assigned based on the type of aquifer. 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. There are no other wells in the area.

After the relative hazard of a potential contaminant source is assigned, the relative susceptibility is determined based on the presence of barriers that may mitigate the potential for a contaminant source to impact a water source. Barriers may represent natural conditions, engineered barriers or management actions. Natural barriers include anything that can be demonstrated as effective in slowing the migration of any chemicals released at the surface. Engineered barriers represent man-made structures to contain chemicals if they are released. Management barriers are plans that prohibit or control potentially polluting activities, but only if there is a plan or approach that has been formally implemented. For the Crystal Lake Campground PWS source, a management barrier is noted for the vault toilets, representing the proper maintenance of the facilities. A natural barrier of clay-rich soils is also identified for any surface spills.

### **Susceptibility Assessment Results**

The results of the susceptibility assessment for the Crystal Lake Campground PWS are listed in Table 2. The primary threats identified are the vault toilets and the access road to the campground. The summary information in Table 2 reviews the relative hazard, barriers and susceptibility ranking of each potential source. Management alternatives are recommended that can help reduce the relative susceptibility of each identified potential contaminant source to the PWS sources.

**Table 2. Susceptibility assessment of significant potential contaminant sources.**

Source	Contaminant	Hazard	Hazard Rating	Barriers	Susceptibility	Management
<b><i>Control Zone</i></b>						
No Sites Identified						
<b><i>Inventory Zone</i></b>						
Vault Toilets	Nitrates and Pathogens	Infiltration and Runoff	High	Management, Clay-rich soils	Moderate	Maintain proper operation and maintenance protocols
Well Access Road	Various Chemicals	Spills	High	Clay-Rich Soils	High	Develop emergency response plan

## 5.0 REFERENCES

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