

# **Cribbage Board Source Water Delineation and Assessment Report**

**Public Water Supply:**        **Cribbage Board**  
  **(PWSID #MT0001399)**

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**Contact Person:**            **Lewis Perino**  
  **Box 16**  
  **Jefferson City, MT 59638**  
  **(406) 933-8674**

## **Introduction**

This delineation and assessment report is intended to meet the technical requirements of the Montana Source Water Protection Program (DEQ, 1999) and the federal Safe Drinking Water Act (SDWA) Amendments of 1996 (P.L. 104-182). Joe Meek with the Montana Department of Environmental Quality (DEQ) prepared the final report with assistance from intern Bethany Haines. Information on land use and potential contaminant sources comes 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.

## **Purpose**

The purpose of this delineation and assessment report is to assess threats to Cribbage Board public water supply using information obtained from personnel managing the site, the most recent sanitary survey, which was completed in 2003 by Denver Fraser of the Cadmus Group, Inc. (available from DEQ upon request), DEQ file information, and from published reports. Delineation is a process whereby areas that contribute water to aquifers or surface waters used for drinking water are identified on a map. These areas are referred to as source water protection areas. Assessment involves identifying locations or regions in source water protection areas where contaminants may be generated, stored, or transported and then determining the potential for contamination of drinking water by these sources.

## **Public Water Supply Information**

Cribbage Board is a bar located in Jefferson County in Jefferson City, on Interstate 15 ([Figure 1](#)). Cribbage Board water supply serves a transient population of about 50 people daily one service connection. One well supplies water for the bar. The well is located south of the bar. Because the water supply does not regularly serve the same 25

persons for at least six months a year, it is classified as a transient, non-community public water supply. Water demand is approximately 500 gallons per day, assuming water use is 10 gallons per day per transient person (EPA, 1991). The bar is served by a large capacity on-site septic system.

No well log is available for the well at Cribbage Board, but the sanitary survey indicates the well was drilled to an estimated depth of 65 feet in 1948. The static water level, pumping water level, well yield is unknown. Due to the fact that no well log was available for this site, there are no well completion details and no information on the lithology underlying the site. The aquifer tapped by the Cribbage Board well is considered to be unconfined and is assigned a high sensitivity rating to potential contaminant sources in the area, in accordance with the Source Water Protection Guideline document (MT DEQ, 1999). If a well log or additional accurate well completion information becomes available in the future, it may be necessary to amend the sensitivity rating and susceptibility ratings in Table 1.

Cribbage Board tests for microbiological contaminants and nitrate. The well system must complete bacteriological samples monthly, as well as an annual nitrate sample. In the past five years, there have been no confirmed detections of coliform bacteria. The accuracy of the monitoring should be noted, however, that since twelve tests have been missed in the past five years. The highest nitrate reading recorded for the well in the past five years was 1.00 mg/L in 2002 which is below the maximum concentration level (MCL) for nitrate is 10 mg/L set by the U.S. Environmental Protection Agency (EPA).

### **Delineation**

Source water protection zones around the well are delineated for Cribbage Board. They include a 100-foot radius control zone and a one-mile radius inventory region ([Figure 1](#)). The control zone is the most critical area from which direct introduction of contaminants into the well or immediate area can occur. The inventory region encompasses the area from which water or contaminants can flow into the bar's water supply over a period of months to years.

### **Inventory**

The Montana Source Water Protection Program (Montana DEQ, 1999) requires that land uses and potential sources of nitrates and microbial pathogens within the control zone inventory region be identified.

The sanitary survey for Cribbage Board indicates that portions of the bar building, parking area, and street are within the control zone.

A leaking underground storage tank that was closed in place in the 1980s at the Jefferson City Store is located in the inventory region, but is not considered to be a potential source of regulated contaminants for a transient PWS. Cribbage Board is connected to a large capacity system for waste disposal. The septic system is considered a large capacity

septic system since it serves 20 or more people per day. The septic lines, tank, and drainfield are a potential source of contamination if a break or leak were to occur. No specific information concerning the large capacity septic system is available other than the general location being north of the bar across spring creek.

Analysis of the inventory region area surrounding Cribbage Board reveals that the predominant land covers are grasslands (95%). This land use is not considered a threat to the water supply. See [Figure 2](#) summarization of this data.

Septic density in the inventory region is 5% high, 20% moderate and 90% low.

### **Susceptibility Assessment**

Susceptibility to potential contaminant sources is assessed for a public water supply well. It is assumed that the aquifer is unconfined with a high sensitivity to potential contaminant sources located in the area (Montana DEQ, 2000, Table 2). Well log information helps verify that the well is constructed properly and helps identify the aquifer that the well is completed in. When constructed properly, shallow ground water that is more vulnerable to contaminant sources at the land surface is prevented from entering the well's bore hole and co-mingling with water from the deeper aquifer. Under some circumstances, the well bore would act as a conduit for contaminants entering the aquifer.

Natural conditions engineered structures, or management actions can be considered as barriers that would lower the susceptibility to contamination within the inventory region. Because of the lack of the well log, no barriers were identified for Cribbage Board.

The bar's own drain field and septic tank pose the greatest threats to the well and are considered to represent a high hazard (Montana DEQ, 2000, Table 6b). Since there are no barriers identified that could slow or prevent nitrates and pathogens from entering the aquifer, the susceptibility to the large capacity drain field is classified as very high (Montana DEQ, 2000, Table 5).

### **Management Options**

Possible management options for potential contamination from the drain field and large septic system include properly maintaining the drain field and distribution lines.

The hazard and susceptibility ratings for each potential contaminant source, as well as management options, are summarized in the table below.

**Table 1: Significant Potential Contaminant Sources**

<b>Source</b>	<b>Contaminant</b>	<b>Hazard Rating</b>	<b>Barriers</b>	<b>Susceptibility</b>	<b>Recommended Management Options</b>
<b>Large Capacity Septic System</b>	Nitrates, Pathogens	High	None	Very High	Properly operate and maintain the on-site septic system and distribution lines. (For large capacity septic systems, see Fact Sheet – Appendix B).

**References:**

DEQ Permitting and Compliance Division, 2002. Sanitary Survey for Cribbage Board, PWS- PWS ID: #MT0001399.

Montana Bureau of Mines and Geology, 1982. Occurrence and Characteristics of Ground Water In Montana, Volume 1, pp 68-73.

Montana DEQ, 1999. Montana Source Water Protection Program, Approved by EPA in November 1999.

Montana DEQ, 2000. Montana Source Water Protection Program, Template for Non-Community Transient Public Water Supplies, Revised 2002.

Montana State Library - Natural Resources Information System (NRIS) 2000 map base of the USGS Topographical coverage at 1:24,000 scale in MrSID format.

Town of Hobson SWDAR, November 2001, Montana DEQ Source Water Protection Report. Available from the Source Water Protection Program and on the web at: <http://nr.is.state.mt.us/wis/swap/swapquery.asp>

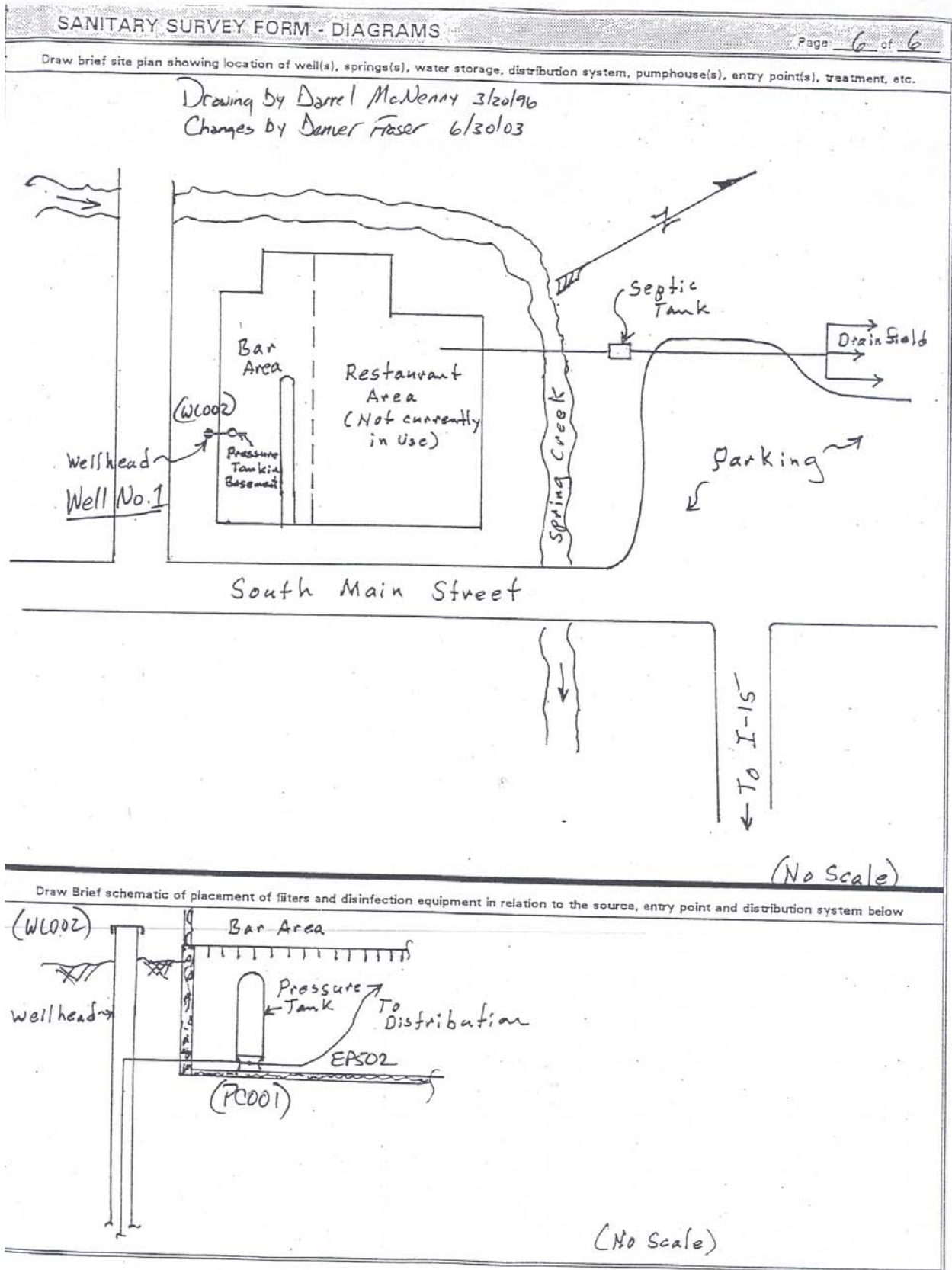
U.S. EPA, Office of Water, 1991. Manual of Small Public Water Supply Systems, EPA 570/9-91-003, 211 p.

U.S. Geological Survey, 2000. National Landcover Dataset, Montana. 30-meter electronic digital landcover/land use dataset interpreted from satellite imagery.



**Figure 1 General Location Map and Figure 2 Land Cover Map**

**Appendix A: Site map of Cribbage Board**

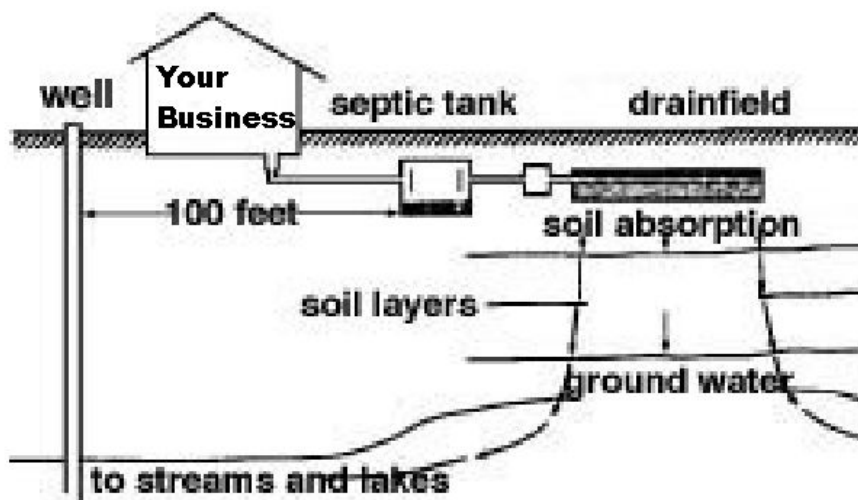


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\*Drawing by Denver Fraser, taken from 2003 sanitary survey of Cribbage Board.  
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# Large Capacity Septic System Operation and Maintenance

Basic information on proper operation and maintenance of residential scale septic systems is available through various sources in the state (see Resources near the end of this publication). For some commercial establishments, the sources and characteristics of wastewater may be quite similar to those of residential wastewater. For other businesses and institutions, however, wastewater may be very different: for example, it may contain harsh industrial-strength cleaners or high concentrations of oils, or it may derive from processes (e.g., small-scale manufacturing) that introduce chemicals and other substances not found in residential wastewater. Accordingly, many large capacity septic system owners face a couple of special considerations in operating and maintaining their systems. If improperly used or operated, septic systems can be a significant source of ground water contamination that can lead to waterborne disease outbreaks and other adverse health effects. This fact sheet is provided to address some of those considerations and to help owners of large capacity septic systems protect their source of drinking water.



Large capacity septic systems fall under the EPA designation of "Class V Injection Wells" and are regulated by Underground Injection Control (UIC) programs set up by the EPA. In broad terms, this means commercial systems are subject to more stringent oversight than residential systems--out of heightened concern for contamination of

groundwater by various types of Class V wells and shallow disposal systems. Of particular concern are systems receiving wastewater from industries and automotive service stations.

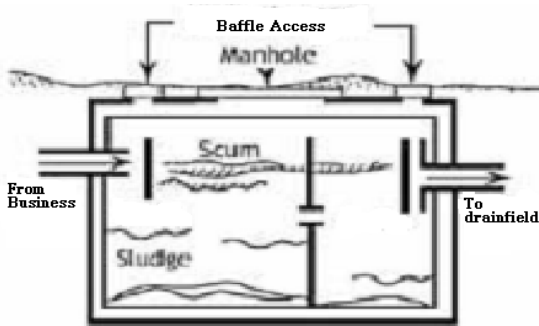
### **Tank Pumping Frequency**

As with residential systems, regular, scheduled pumping of the septic tank is arguably the most essential element of large capacity septic system maintenance. The key difference lies in the frequency of pumping: commercial septic tanks typically require (much) more frequent pumping than their residential counterparts. There are several reasons for this:



- Faster rate of wastewater flow, resulting in greater likelihood of solids carry-over to drainfield
- Greater strength of wastewater (higher "organic load," that is, higher concentrations of solids and fats, oils and grease), resulting in faster accumulation of solids in septic tank
- Presence of higher strength cleaners and other chemicals not normally found in household wastewater, potentially resulting in harm to bacteria that breakdown wastewater in the septic tank
- Varied and changeable group of system users (employees and customers), resulting in somewhat lessened ability to control/enforce good maintenance practices (as compared to household)

How frequently you will need to have your particular tank pumped depends on a number of factors, including:



- Type and size of your establishment
- Size of your septic tank
- Volume and rate of wastewater flows
- Amount of organic matter (e.g., waste solids, food scraps, fats/oils/grease) in your establishment's wastewater

The first two factors are essentially fixed. If, however, your septic tank is undersized, you may need to replace it with a larger tank to improve the

quality of wastewater treatment. The second two factors can be significantly influenced by your operational practices.

Here are some things you can do to avoid overstressing your septic system over the long term and using pumping (which will always be necessary, whatever your maintenance habits) as a substitute for good operational basics:

- *In restrooms:* make sure plumbing fixtures don't leak; install automatic shut-off faucets;
- *In kitchens:* divert kitchen wastewater to grease trap; scrape plates into the garbage, not the sink; install drain covers and sink baskets/strainers to prevent solids (food scraps, fats, oils and grease) from entering your system; avoid use of garbage disposal; use water-saving dishwasher cycle; use mild detergents, not harsh industrial cleaners; use paper towels rather than rags to mop up grease from counters, grills, etc.
- *In laundry facilities:* avoid use of harsh detergents; space out laundry over the course of the week rather than doing establishment's washing all at once

An inspection of your septic system by a licensed septic inspector (which should be an annual event) can help you determine the pumping frequency your tank requires. You should schedule pumpings with a licensed pumper based on your required frequency (e.g., every three months, twice a year). This same pumper can also pump out your grease trap. Note, however, that grease traps will almost always require more frequent pumping than your septic tank to function effectively.

### ***Fats, Oils and Grease***

The most serious problem that plagues large capacity septic systems is the carry-over of fats, oils and grease (sometimes referred to as FOG) into the drainfield (leachfield). When carry-over occurs, these materials reduce the absorption capacity of the drainfield and can lead to system overflows (i.e., breakout), at which point, depending on the extent of damage, the drainfield will need to be repaired, extended or even replaced.

The drainfield of a well-designed and maintained system can handle small amounts of FOG, such as natural body oils carried over from a household's shower water. However, drainfields or alternative treatment systems cannot accommodate significant concentrations of FOG, such as that produced by restaurants, bakeries, cafeterias and camps (and even households that are heavy garbage disposal users and regularly pour cooking grease down their drains).

For this reason, many counties and states require the use of grease traps (also called grease interceptors) by restaurants and similar commercial establishments. Grease traps are holding tanks; modified septic tanks that receive kitchen wastewater prior to the passage of that wastewater to the main septic tank. In the grease trap, wastewater is slowed and allowed to cool somewhat, giving fats, oils and grease a chance to settle out before the effluent passes to the septic tank, where further settling occurs. Grease traps generally range in size from one to three times the average daily flow that will be discharged into it. As with the main septic tank, proper sizing of the grease trap is critical to its ability to fulfill its function.

### ***Operation and Maintenance***

Good operation and maintenance practices enable the grease trap and septic tank to work effectively in reducing grease and oil. Restaurants and other establishments should:

- Scrape food scraps and congealed fats into the garbage
- Use drain covers and sink baskets and strainers to prevent solids from entering the flow of wastewater
- Eliminate the use of a garbage disposal
- Avoid pouring cooking oil and grease should down the drain
- Not rely on septic system additives that claim to reduce oils and grease. Although these additives do indeed dissolve oils and grease, this only increases the likelihood that these materials will be carried over to the drainfield rather than remaining in the grease trap and septic tank where they can be slowly broken down and pumped out at regular intervals.

Perhaps above all else, the key to the grease trap's effectiveness is regular, frequent pumpings. Depending on the size of the grease trap and the strength and flow of wastewater at a given commercial establishment, required pumping frequency may range from twice per month to once every three or six months. A proper pumping does not just remove the liquid in the grease trap but scours the grease trap and the associated lines to eliminate caked-on substances and oily residue. Pumping should be done by a licensed solid waste hauler who will dispose of grease and oils properly (e.g., in designated landfill areas).

**Resources: Where can you get help?**

For local assistance, check your phone directory for the following telephone numbers:

- County Environmental Health Department or Sanitarian's Office under *County Government* listings.
- *Septic tanks and Systems Cleaning and pump-and-haul contractors* in the yellow pages.

DEQ can provide information about state and federal requirements for:

- Safe alternatives for industrial chemicals
- Hazardous waste technical assistance
- Pollution prevention and planning
- Drinking water protection planning
- Underground injection control
- Shallow disposal systems
- Air and water quality compliance assistance
- Discharge permits
- Septic or other waste disposal systems
- Underground storage tanks
- Solid waste management and disposal

Call DEQ at (406) 444-6697 for assistance. You can also access DEQ's Internet Page at <http://www.deq.state.mt.us/>. If you would like more information on drinking water protection, please contact DEQ's Source Water Protection Program – Joe Meek 406-444-4806.

Montana State University Extension Service has several publications on septic systems and other topics available (406) 994-3273 or on the Internet at [www.montana.edu/publications](http://www.montana.edu/publications).

Contact EPA in Denver to learn about federal regulations pertaining to large capacity septic systems by calling (303) 312-6276 or visit EPA on the Internet at <http://www.epa.gov/region8/water/uic/>

**The bottom line for a large capacity septic systems is:**

- **Have a knowledgeable septic professional determine how frequently your tank and grease trap requires pumping,**
- **Set a maintenance schedule based on that and stick to it!**

Reference: Septic Information and Resources On-Line. Retrieved September 2003 from the World Wide Web: [www.Septic-Info.com](http://www.Septic-Info.com)

## Appendix C: Concurrence Letter