

Havre City County Airport Source Water Delineation and Assessment Report

Public Water Supply: Havre City County Airport
(PWSID #MT0002848)
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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). Julie Harvey, Hydrogeologist with the Montana Department of Environmental Quality (DEQ) prepared the 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 water quality threats to Havre City County Airport water supply using information obtained from personnel managing the site, the most recent sanitary survey, which was completed in January 30, 2003 by Denver Fraser of The Cadmus Group, Inc. (available from DEQ upon request), 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

Havre City County Airport is an airport located about 4 miles west of Havre off of Highway 2 ([Figure 1](#)). A single well located in the basement of the Hanger serves the

system. The well is equipped with a ½ horsepower submersible pump that was installed in 1994. The distribution system consists of a captive air tank that prevents excessive cycling of the submersible pump, a wellhead pellet chlorinator, and two sediment cartridge filters. At the terminal building, there is a ½ horsepower booster pump, another captive air tank, and a softening unit; however, none of this equipment is used and has not been used in years according to the operator. The system serves a non-resident population of 5 people daily through one service connection. The sanitary survey states bottled water is used for drinking according to the operator. 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 25 gallons per day depending on the season, assuming water use is 5 gallons per day per person (EPA, 1991). Havre City County Airport is connected a large capacity septic system and drainfield. The septic systems would be considered large capacity septic systems if they serves 20 or more people per day.

The sanitary survey indicates a well log from the Montana Bureau of Mines and Geology (MBMG) states that the well was drilled on September 8, 1941 to a depth of 150 feet, and has a 6-inch steel casing. The well was reconstructed in June 1994 due to a history of positive bacteriological tests. During that reconstruction, it was determined that the original 6-inch casing had split and the well had packed in with silt. A 4-inch PVC casing was sleeved through the original casing to a depth of 125 feet. The screened interval extends from 120 to 125 feet in the new plastic. The static water level is 20 feet below surface and the well yield is 30 gallons per minute (gpm). The sanitary survey notes that well casing is properly sealed. According to the sanitary survey the well is located 12 inches above a finished floor. An area on airport grounds near the well is reported as wet and marshy, however there is no indication that this water impacts the well and the water is classified as groundwater.

Treatment consists of a wellhead pellet chlorinator that provides calcium hypochlorite down the well when the submersible pump is operating. The chlorinator uses 70% calcium hypochlorite.

The well log is lacking lithology information for the well; based on well depth, local geology and groundwater production capability, it appears that the Havre City County Airport well taps an unconsolidated alluvial aquifer which is composed of uncompacted gravels, sands, silts and clays, which can be either sorted or unsorted. Recharge to these deposits takes place through direct infiltration of precipitation, stream flow loss, upward leakage from underlying bedrock units, and irrigation return-flow. Well yields and water quality are variable for these aquifers (MBMG, 1982). Based on the high static water level indicating pressure the aquifer would be considered semiconfined; however, the exact lithology is unknown therefore a conservative assumption of an unconfined aquifer is applied. This aquifer is assigned a high sensitivity to potential sources of contamination, in accordance with the Source Water Protection Guideline document (MT DEQ, 1999).

The 2003 sanitary survey for Havre City County Airport listed three recommendations that might be helpful in the future. First the removal of the water softener, booster pump, and

booster pump captive air tank from the water system plumbing if they are no longer going to be used. In addition to this the removal of the cartridge filters if the well's sediment problem was remedied by reconstruction of the well. If sediment problem continues and filters are necessary, then it is important to replace the filters on a monthly basis to prevent bacteriological growth. Secondly, the State requires that daily chlorine residuals be taken at the point of application and the distribution system for water systems that are utilizing chlorination. Finally, if the softener is used the end of the softener waste line leading to the sink needs to be elevated to where it has a minimum of two pipe diameters distance between the pipe discharge and the top of the sink. This will allow an airgap between the sink and the softener and prevent the possibility of backflow into the potable water system.

Havre City County Airport is required to test for microbiological contaminants and nitrate. The well system must complete quarterly bacteriological samples, as well as an annual nitrate sample. There have been no coliform detected in the past five years. The wells highest nitrate detection in the last five years is less than 0.05 mg/L in 2000, which is well below the maximum concentration level (MCL) for nitrate is 10 mg/L set by the U.S. Environmental Protection Agency (EPA).

Delineation

Two source water protection zones are delineated for Havre City County Airport. They are 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 airport'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 all potential sources of nitrate and microbial pathogens within the control zone and inventory region be identified.

The sanitary survey for the Havre City County Airport provides little information about the control zone other than a general site plan (Appendix B). The Hanger is located in the control zone and is a potential source of contamination. Activities at the airport using fuels, solvents, pesticides, fertilizers, and other chemicals may pose a risk to the water supply.

Analysis of the area surrounding the Havre City County Airport facility reveals that the predominant land covers include grassland/shrubland (61%), small grains/fallow (24%), open water (8%), commercial/industrial/transportation (3%), mixed forest (2%), and other (bare rock/sand/clay, pasture/hay, and woody wetlands) (1%). See [Figure 2](#) and [Figure 3](#) for a summarization of this data. Grassland/shrubland is generally not considered a potential source of contamination unless there is excessive grazing. The amount of small grains/fallow (24%) land present in this region poses a possible threat to the airport's water

supply. The concern is the potential for mismanagement or over-application of fertilizers and/or pesticides on the land that occupies a significant portion of the inventory region

The on-site septic system and drain fields within the inventory region are considered point sources and pose a high potential hazard to the source water.

State Highway 2 poses a potential threat to the well as it is 6/10 mile north of the site and could pose a threat to the well if accidents or spills were to occur.

Susceptibility Assessment

Susceptibility to potential contaminant sources is assessed for a public water supply well. There is no lithology information available to confirm the composition and confinement status of the aquifer, the susceptibility analysis is conducted in a more conservative manner than if lithology information was available. 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 deeper aquifer.

The airport's well system is susceptible to nitrate and bacterial contaminants from the surrounding croplands, the on-site septic system(s), local roads and any fertilizer mixing or application that occurs at the airport. The sanitary survey indicates the well has two barriers to potential contamination. The depth to the aquifer and the depth of intake below the static water level provide protection for the ground water source.

As mentioned previously, 24% of the land cover surrounding the airport is used for agricultural purposes. There is potential for mismanagement or over-application of fertilizers and/or pesticides on the cropland. This percentage of cropland present in the inventory region is considered to represent a moderate hazard (Montana DEQ, 2000, Table 9c). The depth to the aquifer and intake level considered as a barriers the susceptibility to the cropland is rated as low (Montana DEQ, 2000, Table 10).

The airport's own drain field and septic tank pose threats to the well and is considered to represent a high hazard (Montana DEQ, 2000, Table 9b). When the two barriers identified that could slow or prevent nitrates and pathogens from entering the aquifer, the susceptibility to the drain field is classified as moderate (Montana DEQ, 2000, Table 10). It appears that other areas around the airport are low septic density and do not pose a risk to the airport's well.

The airport's activities of maintenance/fueling pose a risk of spills, leaks, of fuels, de-icers, and other chemicals (including pesticides and fertilizers if used by crop applicators) during transportation, use, storage and disposal may impact the drinking water supply; therefore,

the airport's activities is assigned a high hazard (Montana DEQ, 2000, Table 9b). Because depth to the aquifer and intake level considered as a barriers the susceptibility is rated as moderate (Montana DEQ, 2000, Table 10).

State Highway 2 poses a potential threat to the well as it is 6/10 mile north of the site. Hazard for this source is rated as high because it represents a point source of contamination (Montana DEQ, 2000, Table 9b). Because of the barriers identified, the susceptibility is rated as moderate

Management Options

Options for managing contamination by cropland surrounding the well include encouraging and supporting efforts to provide educational information, materials, and resources to land owners on the proper application and storage of pesticides and fertilizers and implementing agricultural best management practices (BMPs). Possible management options for potential contamination from the drain field and large septic system include properly maintaining the drain field and distribution lines, encourage and support city and county efforts to extend city sewer or to promote maintenance of septic tanks and distribution lines. The airport owners should properly operate and maintain their on-site septic tank, drainfield and distribution lines.

Management for airport is to use best management practice for proper application and storage of chemicals and fuel. Management for spill hazard from the road or airport is to encourage and support county and local efforts for emergency planning, training of local emergency response personnel, use of levees and engineered storm drainage to carry any spills away and prevent infiltration into ground. The hazard and susceptibility ratings for each potential contaminant source as well as management options are summarized in Table 1. the table below.

Table 1:

Source	Contaminant	Hazard Rating	Barriers	Susceptibility	Management Options
Cultivated Croplands	Fertilizers, pesticides, pathogens, nitrate	Moderate	1. Aquifer depth >100 feet below ground surface (bgs) 2. Intake depth of >50 feet below static water level.	Low	Encourage and support city and county efforts to provide educational information, materials and resources to land owners on the proper application and storage of pesticide and fertilizers; implement agricultural BMPs
Large capacity septic system	Pathogens, nitrate	High	1. Aquifer depth >100 feet below ground surface (bgs) 2. Intake depth of >50 feet below static water level.	Moderate	Properly operate and maintain on-site septic tank, drainfield and distribution lines (see attached Fact Sheet – Attachment C).
Airport	Pesticide/ fertilizer mixing and storage, fuels, de-icers, various others	High	1. Aquifer depth >100 feet below ground surface (bgs) 2. Intake depth of >50 feet below static water level.	Moderate	Restrict fuels/chemicals use within the 100 feet control zone for well. Encourage and support county and local efforts for emergency planning, training of local emergency response personnel, use of levees and engineered storm drainage to carry any spills away and prevent infiltration into ground.
Transportation Corridors (Highway/ Railroad)	Pathogens, nitrate	High	1. Aquifer depth >100 feet below ground surface (bgs) 2. Intake depth of >50 feet below static water level.	Moderate	Encourage and support county and local efforts for emergency planning, training of local emergency response personnel, use of levees and engineered storm drainage to carry any spills away and prevent infiltration into ground. Encourage railroad managers or MDOT to reduce herbicide use.

References:

DEQ Permitting and Compliance Division, 2001. Sanitary Survey for Havre City County Airport PWS- PWS ID: #MT0002848.

Havre SWDAR, March 2003, Montana DEQ Source Water Protection Report.
Available from the Source Water Protection Program and on the web at:
<http://nris.state.mt.us/wis/swap/swapquery.asp>

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.

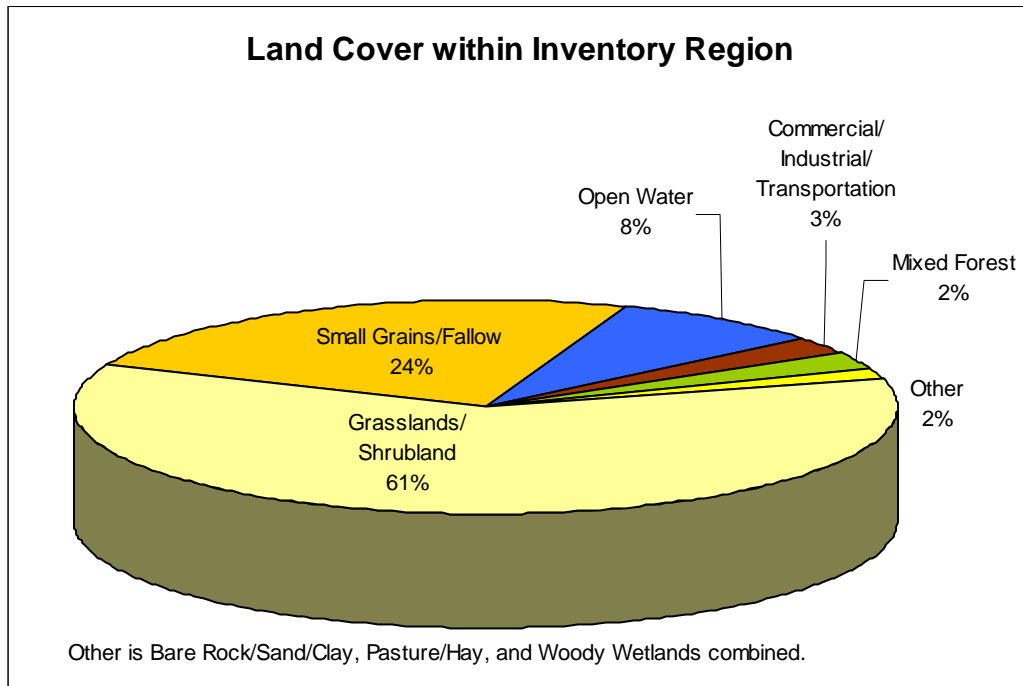
Montana State Library - Natural Resources Information System (NRIS) 2000 map base of the USGS Topographical coverage at 1:24,000 scale in MrSID format.

Remediation Division Underground Storage Tank (UST) database. A statewide database of all known tanks. <http://www.deq.state.mt.us/rem/tsb/iss/USTDownloads.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 3: Land use pie chart



Attachment A- PWS Well Log

Montana Bureau of Mines and Geology
Ground-Water Information Center Site Report
HAVRE CITY COUNTY AIRPORT BOARD

[Plot this site on a topographic map](#)

Location Information

GWIC Id: 43424	Source of Data:
Location (TRS): 32N 15E 10 DBBA	Latitude (dd): 48.5462
County (MT): HILL	Longitude (dd): -109.7647
DNRC Water Right:	Geomethod: MAP
PWS Id: 02848002	Datum: NAD27
Block:	Altitude (feet):
Lot:	Certificate of Survey:
Addition:	Type of Site: WELL

Well Construction and Performance Data

Total Depth (ft): 150.00	How Drilled:
Static Water Level (ft): 20.00	Driller's Name:
Pumping Water Level (ft):	Driller License:
Yield (gpm): 30.00	Completion Date (m/d/y): 9/8/1941
Test Type: PUMP	Special Conditions:
Test Duration:	Is Well Flowing?:
Drill Stem Setting (ft):	Shut-In Pressure:
Recovery Water Level (ft):	Geology/Aquifer: Not Reported
Recovery Time (hrs):	Well/Water Use: COMMERCIAL PUBLIC WATER SUPPLY

Well Notes:

Hole Diameter Information

From	To	Diameter
0.0	150.0	0.0

Casing Information¹

From	To	Dia	Wall Thickness	Pressure Rating	Joint	Type
0.0	150.0	6.0				CASING

Annular Seal Information

No Seal Records currently in GWIC.

Completion Information¹

From	To	Dia	# of Openings	Size of Openings	Description
150.0	150.0	6.0			OPEN BOTTOM

Lithology Information

No Lithology Records currently in GWIC.

¹ - All diameters reported are **inside** diameter of the casing.

These data represent the contents of the GWIC databases at the Montana Bureau of Mines and Geology at the time and date of the retrieval. The information is considered unpublished and is subject to correction and review on a daily basis. The Bureau warrants the accurate transmission of the data to the original end user. Retransmission of the data to other users is discouraged and the Bureau claims no responsibility if the material is retransmitted. Note: non-reported casing, completion, and lithologic records may exist in paper files at GWIC.

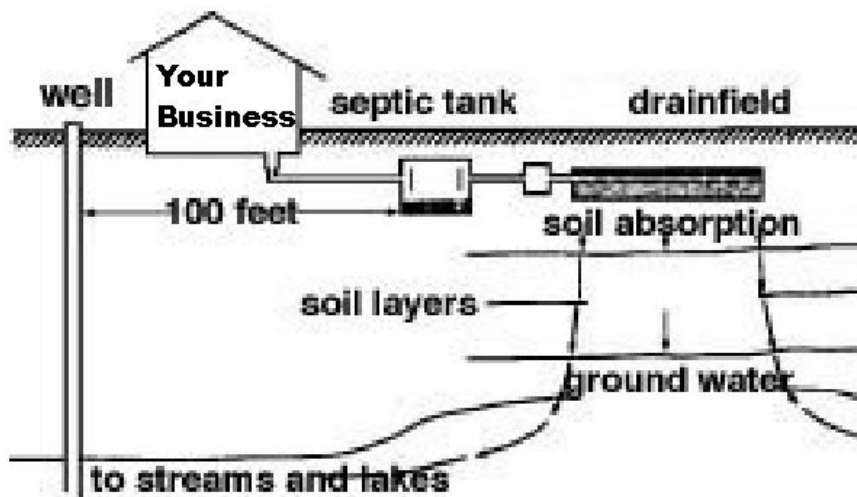
Attachment B – Site Layout Plan

SANITARY SURVEY FORM - DIAGRAMS	
Draw brief site plan showing location of well(s), springs(s), water storage, distribution system, pumphouse(s), entry point(s), treatment, etc. and label with appropriate facility designation. (See example on instruction sheet)	
Airport Access Road	

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.

A Word About Access

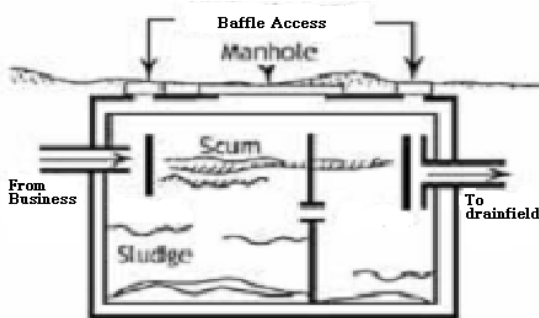
Routine septic tank maintenance cannot occur if reasonable tank access is not provided. Moreover, emergency repairs in the winter can be totally stalled when septic tank access is blocked by frozen soils. If your tank is completely buried, consider asking your pumping contractor what he recommends for improved access.

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 and/or clean your effluent filter. 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.

Effluent Filters

Effluent filters are typically installed on the outlet tee of the septic tank in order to inhibit suspended solids from entering the drainfield. Solids that get into the drainfield can clog the drainfield and lead to drainfield failure. Effluent filters are common on newer septic tanks but often are not found on older tanks.

The popularity of effluent filters is increasing since they can significantly increase drainfield longevity. Septic tank pumpers may advise owners to consider installing an effluent filter.

The servicing of effluent filters is relatively simple. The filter should be removed from its basket and rinsed down while being held over the tank opening. Care should be taken not to spray the filter growth onto surfaces that might be contacted by the unprotected person. In addition, the person servicing the filter should protect himself or herself from back spray. Servicing of the filter can be performed by a licensed septic pumper familiar with the cleaning precautions and procedures.

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.

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