

# Source Water Delineation and Assessment Report

**Public Water Supply:** Valley Fuel & Supply  
(PWSID #MT0003706)  
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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). Jim Stimson, Hydrogeologist with the Montana Department of Environmental Quality (DEQ) prepared the final report with assistance from intern Marilee Simons. 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.mt.gov/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 the Valley Fuel & Supply water supply using information obtained from personnel managing the site, the most recent sanitary survey, which was completed in May 2001 by Tim Hunter of HDR Engineering, 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

Valley Fuel & Supply is located in the town of Savage, Montana ([Figure 1-B](#)). A single well located east of the store serves the system. The well has a submersible pump that

delivers water to a captive air pressure tank. The tank pressurizes the plumbing system in the range of 40-60 psi. The system serves a transient population of 75 people per day in the summer and 50 people per day in the winter through one service connection. Because the water supply does not regularly serve at least 25 of the same people for at least six months a year, it is classified as a transient, non-community public water supply. Water demand is approximately 500 to 750 gallons per day depending on the season, assuming water use is 10 gallons per day per person (EPA, 1991).

According to the well log and sanitary survey for Valley Fuel & Supply, the well was drilled in 1993 to a depth of 38 feet and is grouted to a depth of 25 feet. It has a screened interval from 30 to 34 feet. The well has a 5-inch casing and extends 18 inches from the ground. The well yield is 16 gpm. The static water level is 23 feet while the pumping water level is 30 feet. The system also consists of a one horsepower submersible pump and a Goulds G40 captive air pressure tank. Based on the lithology shown on the Valley Fuel & Supply well log, it appears that the aquifer is unconfined and composed of alluvium. The MBMG has identified the aquifer as an alluvial formation. Therefore, it 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). The well log for the Valley Fuel & Supply well is attached to this report. For more information concerning the hydrogeology in the vicinity of Savage, refer to the Source Water Delineation and Assessment Report (SWDAR) for the Savage School Public Water Supply System (Savage School SWDAR, January 2003).

The town of Savage has a wastewater treatment facility that serves areas within the town limits. Valley Fuel Supply is connected to the town's sewer system (Jim Steffen, personal communication 06/08/2003). The store's well log confirms proper construction of the well. Proper construction prevents water from shallow and deeper aquifers from co-mingling and reduces the threat of contamination from potential sources like sewer mains or septic systems. According to the sanitary survey, Valley Fuel Supply does not treat the well water.

The sanitary survey for Valley Fuel & Supply listed three recommendations that may be helpful in the future. It points out that the wellhead is not protected from vehicular traffic and should be properly confined so as to prevent damage to it. Secondly, an inverted and screened vent should be added to the well cap. Finally, nitrate monitoring should be done in accordance with DEQ requirements.

Valley Fuel & Supply is required to test for microbiological contaminants and nitrate. The well system must complete monthly bacteriological samples, as well as an annual nitrate sample. It appears as though Valley Fuel & Supply has an agreement with the DEQ Public Water Supply Program that allows them to take bacteriological samples quarterly rather than monthly beginning 7/10/98. The well has had no bacterial detects in the last five years. The highest level of nitrate detected in the well in the last five years is 2.41 mg/L in 1998, which is below the maximum concentration level (MCL) of 10 mg/L set by the U.S. Environmental Protection Agency (EPA).

## **Delineation**

Three source water protection zones are delineated for Valley Fuel & Supply. They include a 100-foot radius control zone and a one-mile radius inventory region ([Figure 1-A](#)). Ground water flow direction near the well is interpreted to be from the northwest toward the southeast ([Figure 1-B](#)). The Burlington Northern railroad tracks were arbitrarily chosen as the cross- and down-gradient eastern boundary of the inventory region ([Figure 1-B](#)). Usually there would also be a surface water buffer zone delineated for the Yellowstone River because the river is located within the one-mile fixed radius inventory region. However, the surface water buffer zone is not delineated due to the fact that the river is located over ½ mile away in a cross- and down-gradient position from the well ([Figure 1-B](#)). 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 store'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.

Analysis of the area surrounding Valley Fuel & Supply reveals that the predominant land covers include ag-land (82%), residential/commercial lands (8%), grassland (6%), and forest (4%). See [figure 2](#) for a pie chart summarization of this data. The large amount of agricultural land present in this region poses the greatest threat to the store's water supply as much of it is up-gradient from the well. The concern is the potential for mismanagement or over-application of fertilizers and/or pesticides on the ag-land that occupies such a large portion of the inventory region. The residential/commercial land is concentrated within the city limits of Savage. There is a sewer system in the town so the significance of residential/commercial land use is the concentration of the system. Although this land is in close proximity to the store's water supply, a large portion of it is cross- and down-gradient of the well. In addition, Valley Fuel & Supply is located on the outskirts of the town so these land areas do not pose an immediate threat to its well.

Analysis of septic density within the inventory region reveals that the vast majority of the land is of low septic density (87%), while 10% is medium density and 3% is high density. The high septic density concentrated within the town of Savage appears to be in error because Savage is sewered (Jim Steffen, personal communication 06/08/2003). Valley Fuel & Supply is located in the junction between the low and medium septic density areas ([Figure 1-B](#)). The low-density land is up-gradient of the well and surrounds it on the west and southwest sides. Medium density areas are present to the south of the well and do not pose a threat to it. While the exact boundaries of Savage's sewer system are not know, it appears that the high-density areas shown on the map near Valley Fuel & Supply are served by the town's sewer system.

## **Susceptibility Assessment**

Susceptibility to potential contaminant sources is assessed for a public water supply well. Based on lithology information from the well log, the aquifer is interpreted to be composed of unconsolidated alluvium and considered to have a high sensitivity to potential contaminant sources (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 contaminate 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. In this case, no barriers that could slow or prevent nitrates and pathogens from entering the aquifer can be identified due to the depth and composition of the aquifer.

The Valley Fuel & Supply water supply system is susceptible to nitrate and bacterial contaminants from sewer mains, the surrounding agricultural land, the high septic density areas bordering the well, and possibly from Class V injection wells.

As previously mentioned, 82% of the land cover surrounding Valley Fuel & Supply is used for agricultural purposes. There is potential for mismanagement or over-application of fertilizers and/or pesticides on the ag-land. This percentage of ag-land present in the inventory region is considered to represent a high hazard. Because no barriers could be identified, the susceptibility to the ag-land is rated as very high (Montana DEQ, 2000, Table 10).

Hazard for individual septic systems is rated as low because the majority of the land in the inventory region is of a low septic density. The overall hazard for individual septic systems within the inventory region is assigned as low (Montana DEQ, 2000, Table 9b). Susceptibility is rated as moderate with no barriers identified. (Montana DEQ, 2000, Table 10). Class V Injection Wells could also represent a possible hazard, although the rating and susceptibility is unknown as no data is available to inventory

## **Management Options**

Possible management options for managing contamination by ag-land 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 BMPs. Options for potential contamination from individual septic systems includes encouraging and supporting efforts to establish a wastewater treatment facility and extend sewer to the city limits, and promoting the maintenance of septic tanks and distribution lines. To manage potential contamination by Class V injection wells, options include encouraging efforts to inventory such wells and provide educational information to business owners and the public on proper waste disposal and recycling. The hazard and susceptibility ratings for each potential contaminant source as well as management options are summarized in the table below.

**Table 1**

Source	Contaminant	Hazard Rating	Barriers	Susceptibility	Management
<b>Cultivated Croplands</b>	Fertilizers, pesticides, pathogens, nitrate	High	None	Very High	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
<b>High Density Septic Area</b>	Pathogens, nitrate	Low	None	Moderate	Encourage and support city and county efforts to extend city sewer or to promote maintenance of septic tanks and distribution lines.
<b>Sewer Mains</b>	Pathogens, nitrate	Low	None	Moderate	Encourage city and county efforts to provide educational information, materials and resources to business owners and the public on proper waste disposal and recycling.
<b>Class V Injection Wells</b>	VOCs, SOCs, pathogens, nitrate	Unknown	None	Unknown	Encourage city and county efforts to inventory Class V wells, to provide educational information, materials and resources to business owners and the public on proper waste disposal and recycling

**References:**

DEQ Permitting and Compliance Division, 2001. Sanitary Survey for Valley Fuel & Supply PWS- PWS ID: #MT0003706

Savage School SWDAR, January 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.

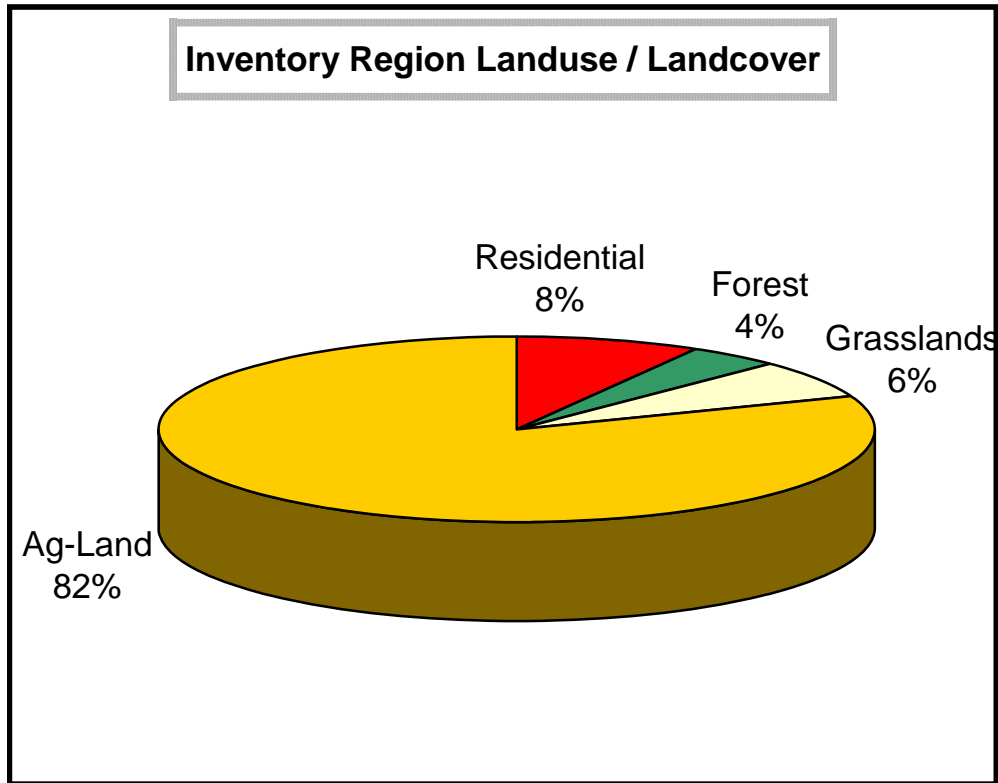
Montana DEQ, 2000. Montana Source Water Protection Program, Template for Non-Community Transient Public Water Supplies, Revised 2002.

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

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 2: Land use pie chart



Montana Bureau of Mines and Geology  
 Ground-Water Information Center Site Report  
 VALLEY FUEL AND SUPPLY

Plot this site on a topographic map

**Location Information**

GWIC Id: 138062	Source of Data: LOG
Location (TRS): 20N 58E 32 ADB	Latitude (dd): 47.4521
County (MT): RICHLAND	Longitude (dd): -104.3470
DNRC Water Right: 88251	Geomethod: TRS-TWN
PWS Id:	Datum: 1927
Block:	Certificate of Survey:
Lot:	Type of Site: WELL
Addition:	
Site Notes:	

**Well Construction and Performance Data**

Total Depth (ft): 38.00	How Drilled: ROTARY
Static Water Level (ft): 23.00	Driller's Name: BOYCE
Pumping Water Level (ft): 30.00	Driller License: WWC274
Yield (gpm): 16.00	Completion Date (m/d/y): 5/7/1993
Test Type: PUMP	Special Conditions:
Test Duration: 0.30	Is Well Flowing?:
Drill Stem Setting (ft):	Shut-In Pressure:
Recovery Water Level (ft):	Geology/Aquifer: 111ALVM
Recovery Time (hrs):	Well/Water Use: DOMESTIC
Well Notes:	

**Hole Diameter Information**

No Hole Diameter Records currently in GWIC.

**Casing Information<sup>1</sup>**

From	To	Dia	Description
-1.5	19.5	5.0	STEEL
19.5	34.0	5.0	PVC

**Annular Seal Information**

From	To	Description
0.0	25.0	BENTONITE CHIPS

**Completion Information<sup>1</sup>**

From	To	Dia	Description
30.0	34.0	5.0	.2X2 SAW PERFS

**Lithology Information**

From	To	Description
0.0	11.0	BROWN SAND AND CLAY
11.0	38.0	SAND & GRAVEL

<sup>1</sup> - All diameters reported are **inside** diameter of the casing.