

Valley West Trailer Court

SOURCE WATER DELINEATION AND ASSESSMENT REPORT

11/99

Valley West Trailer Court

PWSID #MT0000444

Date of 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.

Aquifer A water-bearing layer of rock or sediment that will yield water in usable quantity to a well or spring.

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.

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.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Enacted in 1980. CERCLA provides a Federal "Superfund" to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. Through the Act, EPA was given power to seek out those parties responsible for any release and assure their cooperation in the cleanup.

Delineation A process of mapping source water management areas.

Hardness Characteristic of water caused by presence of various chemical compounds. 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.

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

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 nitrate pollution are septic tanks, sanitary sewers, feed lots and fertilizers.

Nonpoint-Source Pollution Pollution sources such as stormwater runoff 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 Bacterial organisms 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.

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

Pumping Water Level Water level elevation in a well when the pump is operating.

Recharge Region Source water management region that is generally the entire area that could contribute water to an aquifer used by a public water system. Includes areas that could contribute water over long time-periods or under different water usage patterns.

Resource Conservation and Recovery Act (RCRA) Enacted by Congress in 1976. RCRA's primary goals are to protect human health and the environment from the potential hazards of waste disposal, to conserve energy and natural resources, to reduce the amount of waste generated, and to ensure that wastes are managed in an environmentally sound manner.

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.

Static Water Level (SWL) Water level elevation in a well when the pump is not operating.

Susceptibility (of a PWS) The potential for a public water system to draw water with contamination 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) Manmade organic chemical compounds such as herbicides and 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.

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.

* Definitions taken from EPA's Glossary of Selected Terms and Abbreviations
(<http://www.epa.gov/ceisweb1/ceishome/ceisdocs/glossary/glossary.html>)

INTRODUCTION

This report is intended to meet the technical requirements for the completion of the delineation and assessment report for Valley West Trailer Court as required by the Montana Source Water Protection Program and the federal Safe Drinking Water Act (SDWA).

The Montana Source Water Protection Program is intended to be a practical and cost-effective approach to protecting public drinking water supplies from contamination. A major component of the Montana Source Water Protection Program is termed delineation and assessment. The emphasis of this delineation and assessment report is identifying significant potential contaminant threats to public drinking water sources and providing the information needed to develop a source water protection plan for Valley West Trailer Court. 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 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. Valley West Trailer Court can use this information to protect their drinking water source. Although voluntary, source water protection plans are the ultimate focus of source water delineation and assessment. This delineation and assessment report is written to encourage and facilitate the Valley West Trailer Court operator and the community to complete a source water protection plan that meets their specific needs.

CHAPTER 1 BACKGROUND

The Community

Lolo is located in the northern edge of the Bitterroot Valley ([Figure 1](#)). The population of Lolo was approximately 3,338 in the year 2000. The floodplain of the Bitterroot River constitutes the eastern boundary of the community and Lolo is bordered by Mormon Creek Ridge on the southwestern edge. Lolo is a bedroom community of Missoula and the local economy relies on small businesses. The Bitterroot Valley also benefits from timber harvesting and mining. There are two major highways in Lolo: Highway 93 extending north to Missoula and south to Hamilton and Highway 12 extending west into Idaho.

Wastewater from the community is collected in one sanitary sewer system that serves the northern portion of Lolo while the southern portion of Lolo relies on individual sewage disposal systems. The public sewer system discharges into the Bitterroot River north of Lolo ([Figure 2](#)).

Geographic setting

Lolo is located on the northern edge of the Bitterroot Valley, east of Mormon Creek and west of the Bitterroot River and Highway 93 as shown in [Figure 1](#). The elevation of Lolo is approximately 3200 feet above sea level. Mormon Creek Ridge along the southwest border of Lolo is approximately 3562 feet above sea level. The Bitterroot Valley is drained by the Bitterroot River which flows generally northward until it reaches the Clark Fork River. Lolo Creek runs through the southern portion of Lolo and flows generally eastward to the Bitterroot River.

The climate in the Lolo area is typical for this part of Western Montana with an average annual precipitation of 13.5 inches. The wettest months are typically May and June and the driest months are January and February. The average high temperature in July is 85°F (minimum July average of 49°F) while the average high temperature in January is 28°F (minimum January average of 10.2°F).

General description of the Source Water

The Valley West Trailer Court PWS obtains water from five wells installed into the Bitterroot Valley aquifer. The five wells are located in Lolo west of US Highway 93 and just north of Mormon Creek Road. Well depths are listed below.

The Public Water Supply

The Bitterroot Valley is drained by the Bitterroot River which flows generally northward until it reaches the Clark Fork River. Lolo Creek runs through the southern portion of Lolo and flows generally eastward to the Bitterroot River. The Valley West Trailer Court PWS obtains water from five wells installed into the Bitterroot Valley aquifer. The five wells are located in Lolo west of US Highway 93 and just north of Mormon Creek Road. The Valley West Trailer Court PWS currently serves an estimated population of 145 with 46 active service connections. Well data are listed below. The location of the wells is shown in [Figure 2](#). The five wells are linked to three pressure storage tanks prior to distribution to the 46 living units. There is currently no treatment system for the water. A general plan showing the layout of the distribution system is presented in Appendix A, with copies of the drillers well logs.

Well data for the five wells servicing Valley West Trailer Court.

Well Number	Source Number	Year Drilled	Depth
1	002	1959	70 ft
2	003	1973	88 ft
3	004	1974	61 ft
4	005	1974	61 ft
5	006	1970	65 ft

Water Quality

Every PWS is required to perform monitoring for contamination to their water supply. Water is typically monitored for total coliforms and fecal coliform, nitrates, metals and chemicals. The monitoring schedule depends on the population served, the number of wells and the source water for the PWS. DEQ defines monitoring programs and protocols that are specific to each PWS. Missoula Valley Water Quality District water samples indicate low nitrate levels for the PWS. In December of 2000, there was 0.70 mg/L of nitrates in the water sample taken from this PWS. No other organics have been detected in this PWS.

Table 1 lists the constituents of the water in the aquifer in Lolo. This water is generally acceptable for all uses, including use as a drinking water supply source.

Table 1. Background Water Quality in Lolo (Land and water Consulting, 1995 Water Quality District Data, 2001).

Sample Date	PH SU	Hardness As CaCO3 mg/L	Ca mg/L	Mg mg/L	Na mg/L	Zn mg/L	HCO ₃ Mg/L	Cu mg/L	SO ₄ mg/L	Cl mg/L	F mg/L	As mg/L	NO ₃ mg/L	Mn mg/L	Cd mg/L	Fe mg/L
1974	8.2	192	41	22	3.3	<0.01	220	<0.01	21	0.4	0.14	<0.01	0.16	<0.02	<0.01	<0.04
1985	7.64	182	41	19.3	3.4		196.4		9.7		0.1	0.1	0.3	0.5	0.1	0.1
2001			49.12	18.56	5.06	.003	177		11.63	7.44		<.0005	0.8	<0.005	<0.001	0.008
2001			13.76	4.51	4.12		55		4.56	5.57		<0.005	0.53	<0.005	<0.001	0.008

CHAPTER 2 DELINEATION

The source water protection area, the land area that contributes water to the Valley West Trailer Court PWS, is identified in this chapter. Three management areas are identified within the source water protection area. These three regions are the control zone, inventory region, and recharge region. The control zone, also known as the exclusion zone, is an area at least 100-foot radius around the well. The inventory region represents the zone of contribution of the well, which approximates a three-year groundwater time-of-travel. Analytical equations describing ground water flow using estimates of pumping and aquifer characteristics and simple hydrogeologic mapping are used to calculate groundwater time-of-travel distance. The recharge region represents the entire portion of the aquifer which contributes water to the Valley West Trailer Court water system.

Hydrogeologic Conditions

Geologic and hydrologic studies of the Bitterroot Valley and the Lolo area are listed in Table 2, with summary of maps listed in Table 3. The hydrogeologic system in the Bitterroot Valley, including the Lolo area is described in detail by the United States Geological Survey (1996). The following description of the local hydrogeology is adapted from this source. The Bitterroot Valley was formed either by the basin floor dropping down when the Idaho Batholith was formed or by a major thrust plate. The valley is bordered granitic rocks to the west in the Bitterroot Mountains and by metasedimentary rocks to the east in the Sapphire Mountains.

Lolo creek drains an area of about 274 square miles west of its confluence with the Bitterroot River. Major tributaries are the West Fork, East Fork and South Fork of Lolo Creek. Granitic rocks of the Bitterroot Range dominate the major tributaries of Lolo Creek ([Figure 3](#)).

Significant alluvial deposits begin just upstream from the junction of Lolo Creek and the South Fork of Lolo Creek. Alluvial terrace deposits begin about 4 miles upstream from the confluence of Lolo Creek and the Bitterroot River.

The Lolo Creek Aquifer is associated with these modern alluvial deposits. Snowmelt, precipitation and subsurface flow contribute flow to Lolo Creek in the upper drainage. Lolo Creek recharges the alluvial aquifer in the lower drainage. A University of Montana graduate student began a study of the Lower Lolo Creek Aquifer in 2001. Staff gauges were installed in Lolo Creek and elevations of ground water wells surveyed. Ground water elevations were measured in wells in an area extending about 2 miles upstream from the confluence with the Bitterroot River. The study found that Lolo Creek loses water to the aquifer throughout this two mile reach.

The community of Lolo is located north and south of Lolo creek, west of the Bitterroot River on these alluvial terrace deposits. These deposits are characteristically composed of gravel and sand with small amounts of clay and silt. Major dissolved ions in the groundwater in the Bitterroot Valley are calcium, sodium and bicarbonate. [Figure 4](#) presents a geologic map of the Bitterroot Valley.

In general, the ground water flows from the western-sloped granitic rocks east to the Bitterroot River. The aquifer is recharged predominantly by Lolo Creek, excess irrigation and leaky canals. Other sources of recharge include snowmelt and precipitation, subsurface flow and tributary streams.

The aquifer is considered an unconsolidated alluvium (unconfined) and therefore is categorized as having high source water sensitivity to contamination.

Table 2. List of geologic or hydrogeologic investigations in or near the Lolo area.

Title of Project	Reference Information	Area Covered	Project Purpose
Geographic, Geologic and Hydrologic Summaries of Intermontane Basins of the Northern Rocky Mountains, Montana	US Geological Survey, 1996	Western Montana Rocky Mountain region including the Bitterroot Valley.	Summarize the geographic, geologic and hydrologic characteristics of the Rocky Mountain region in western Montana.
Preliminary Evaluation of deep aquifers in the Bitterroot and Missoula Valleys in western Montana	Prepared for the US Geological Survey Water Resources Division, 1980 by MBMG	Bitterroot and Missoula Valleys.	Evaluation of the Bitterroot and Missoula Valley Aquifers.
Geology and Water Resources of Bitterroot Valley, Montana	R.G. McMurtrey et al., 1968	Bitterroot Valley	Study the availability of water for future development

Table 3. List of geologic or hydrogeologic maps available for the Lolo area.

Title or Description	Date	Area Covered	Reference
Geologic Map of the Missoula West 30' X 60' Quadrangle	1998	Missoula West	Montana Bureau of Mines

Conceptual Model and Assumptions

A conceptual hydrogeologic model is a simplified representation of the hydrogeologic system. For the Lolo area, the shallow ground water occurs in gravel and sand deposits that are interpreted as alluvium and is recharged principally by Lolo Creek, leaky canals, precipitation, snowmelt and subsurface flow. Ground water flows generally northeast from Lolo Creek to the Bitterroot River north of Lolo Creek and is highest in the spring due to snowmelt and precipitation and lowest toward the middle of winter ([figure 5](#)). South of Lolo Creek, groundwater flow generally parallels the creek with recharge from Lolo Creek influencing flow direction near the creek. This inventory is done on the assumption that the aquifer is homogeneous and exhibits the same characteristics throughout the aquifer in order to simplify the inventory. An irrigation canal south of Lolo Creek influences ground water flow during the irrigation season. Leakage from the canal elevates the water table nearby and adds a seasonal NE component to the flow direction ([Figure 5](#), and [Figure 6](#)). A geologic cross section and the hydrogeologic conceptual model are shown in [Figure 7](#) and [Figure 8](#).

Methods and Criteria

The methods and criteria used to delineate the source water protection zones for the Lolo water system are specified in the Montana Department of Environmental Quality Source Water Protection Program (DEQ, 1999). For the Valley West Trailer Court system, the criteria for unconfined systems was followed for the wells. Since the aquifer is somewhat recharged by tributary streams in the area, surface water criteria establishing Surface Water Buffer Zones was applied to Lolo Creek.

Time of travel calculations were completed for the ground water system using the uniform flow equation (EPA, 1991). Using published reports, estimates of the aquifer properties were made and are discussed in the following section. Because the tributary streams in the area influence ground water, the recharge area is defined as the area where the aquifer is present upgradient from the well(s). The surface water buffer zones were delineated based on standard distance criteria of 10 miles upstream from the ground water inventory zone and encompassed ½ mile width of land area on each side of the drainage.

Well(s) Information

All five wells are located on the property, surrounded by the 46 living units. Table 4 is a summary of the well information and Appendix B contains copies of the drillers well logs. Well #1 is cased to 70 ft, well #2 is cased to 88 ft, well #3 is cased to 61 ft, well #4 is cased to 61 ft and well #5 is cased to 65 ft.

Table 3. Source well information for Valley West Trailer Court PWS.

Information	Well #1	Well #2	Well #3	Well #4	Well #5
PWS Source Code	002	003	004	005	006
Well Location (T, R, Sec or lat, long)	Lat: 46.4450 Long: -114.0510	Lat: 46.4454 Long: - 114.0528	Lat: 46.4455 Long: -114.5254	Lat: 46.4454 Long: - 114.0533	Lat: 46.4453 Long: - 114.0533
MBMG#	67449	67458	184164	171788	171789
Water Right #	CO11393	CO28027	CO12577	CO28028	CO17172
Date Well was Completed	1959	1973	1974	1974	1970
Total Depth	70 ft	88 ft	61 ft	61 ft	65 ft
Perforated Interval	Not listed	Not listed	Not listed	Not listed	Not listed
Static Water Level	20 ft	12 ft	15 ft	17 ft	--
Pumping Water Level	42 ft	14 ft	30 ft	30 ft	
Drawdown	22 ft	21 ft	15 ft	30 ft	
Pumpi ng Rate	50 gpm	45 gpm	60 gpm	75 gpm	50 gpm
Specific Capacity	2.27 gpm/ft	2.14 gpm/ft	4.00 gpm/ft	2.5 gpm/ft	--

Model Input

Time of travel calculation values are conservative assumptions made to identify areas that potentially impact source water for the Valley West Trailer Court PWS. These values assume that the general characteristics of the aquifer are the same for all five wells and all five wells are drilled into the same aquifer. The criteria for selection of each value used for this delineation is summarized as follows:

Transmissivity: The estimated value for transmissivity in this area is 34,860 ft²/day based on current well sampling to be used for a Master's thesis (2001).

Hydraulic Conductivity: A value for hydraulic conductivity is estimated using the basic relationship

$$T = Kb, \text{ where } T - \text{transmissivity} = 34,860 \text{ ft}^2/\text{day}$$

$$B = \text{aquifer thickness} = 83 \text{ ft}$$

The estimated hydraulic conductivity (K) is 420 ft/day.

Hydraulic Gradient: The hydraulic gradient was derived from well sampling to be used for a Master's thesis (2001). The sampling showed yielded a gradient of 0.007.

Flow Direction: The flow direction in the Lolo area is generally eastward. The estimated flow direction for the purposes of this study is 90 degrees, which follows the general direction of Lolo Creek toward the Bitterroot River (USGS, 1996).

Porosity: The value for effective porosity is estimated at 20% (USGS, 1996). The estimated value is considered representative of unconsolidated sand and gravel.

Pumping Rate: The average test pumping rate for the wells was 56 gpm based on the well logs.

Travel distances for one and three years are calculated to approximate the combined effect of the three wells by assuming one well is pumped at the average combined pumping rate. The one-year time-of-travel distance is used in Chapter 4 to rate the hazards of potential contaminant sources.

Estimates including aquifer flow properties, well discharge rate, ambient groundwater flow direction, and groundwater gradient are used to calculate the distance corresponding to one- and three-year times-of-travel (Table 5). Aquifer flow properties estimated are hydraulic conductivity, thickness, transmissivity, and effective porosity. An averaged estimated hydraulic conductivity (K) value of 420 ft/day is used to delineate the inventory region. Transmissivity was estimated at 34,860 ft²/day by assuming an aquifer thickness of 83 ft (USGS, 1996). Total porosity is the percent of a rock or sediment occupied by voids. For Bitterroot Aquifer the effective porosity is estimated at 20 percent to calculate the limits of the inventory region.

Groundwater flow direction and gradient were estimated from a current study to describe the Bitterroot Aquifer in the Lolo area ([Figure 5](#), and [Figure 6](#)). The gradient ranges between 0.005 and 0.008 based on this study. It is assumed that Lolo Creek is a gaining stream through most of its upper reach. The current study gauged stream flow and measured state elevation and ground water elevations. Lolo creek was found to be recharging ground water through the extend of the study area, which started about 2 miles west of the confluence with the Bitterroot River. Ground water flows to the NE north of Lolo

Creek and east and SE south of the creek in the study area. Finally, the average test pumping rate is based on 56 gallons per day estimated use per resident obtained from the well logs.

Table 4. Estimates of input parameters used to delineate the source water protection area.

Input Parameter	Values Used Well #1
PWS Source Code	002
Transmissivity	34,860 ft²/day
Thickness	83 ft
Hydraulic Conductivity	420 ft/day
Hydraulic Gradient	0.007 ft/ft
Flow Direction	90° (east)
Effective Porosity	20%
Test Pumping Rate	56 gpm
100-day TOT	1,509 ft 0.29 miles
1-Year TOT*	5,413 ft 1.03 miles
3-Year TOT*	16,153 ft 3.06 miles

*Time of Travel

Delineation Results

The results of the calculations indicate an estimated average distance of 1,509 feet (0.29 miles) for a 100-day time of travel (TOT), an average distance of 5,413 feet (1.03 miles) for a one-year TOT and an average distance of 16,153 feet (3.06 miles) for a three-year TOT. The delineated inventory zones are depicted in [Figure 6](#) for the Valley West Trailer Court PWS. The surface water buffer zones Lolo Creek and the Bitterroot River are shown in [Figure 7](#). The recharge region for the aquifer comprises the aquifer upgradient from the supply wells, delineated in the inventory zone.

Limiting Factors

This delineation is based on estimated aquifer properties, pumping conditions and groundwater flow conditions. Conclusions based on this interpretation are uncertain because the extent and properties of the aquifer, and the direction and rate of groundwater flow are not known precisely. Time of travel distances are estimates based on available data and the reliability of the data.

CHAPTER 3 INVENTORY

An inventory of potential sources of contamination was conducted for the Valley West Trailer Court PWS within the control and inventory regions. Potential sources of all primary drinking water contaminants and *Cryptosporidium* were identified, however, only significant potential contaminant sources were selected for detailed inventory. The significant potential contaminants in the Valley West Trailer Court inventory region are nitrates and pathogens from individual sewage disposal systems, fuels from underground storage tanks, herbicides and pesticides from nearby agricultural land and various chemicals potentially spilled within the urban land use boundary.

The inventory for Valley West Trailer Court focuses on all activities in the control zone, municipal and private facilities in the inventory region, and general land uses and large facilities in the recharge region ([Figure 9](#), and [Figure 10](#)).

Inventory Method

A “windshield survey” was conducted to obtain data for this assessment. Available databases were 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: Urban and agricultural land uses were identified from the U.S. Geological Survey's Geographic Information Retrieval and Analysis System. Sewered and unsewered residential land use were identified from boundaries of sewer coverage obtained from Lolo Sewer and Water Assessment Records (Department of Revenue CAMA databases of residential and commercial property).

Step 2: EPA’s Envirofacts System was queried to identify EPA regulated facilities located in the Inventory Region (Table 6). This system accesses facilities listed in the following databases: Resource Conservation and Recovery Information System (RCRIS), Biennial Reporting System (BRS), Toxic Release Inventory (TRI), 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 should be classified as a significant potential contaminant source.

- A total of one facility was identified using this query. The location of the facility is located in [Figure 14](#).

Table 6. EPA Envirofact Sites.

Facility Name	Address	EPA Facility ID	Comments
Hendrickson Ranch	8090 Hwy 12	9357826	Land application of sewage

Step 3: The Permit Compliance System (PCS) was queried using Envirofacts to identify Confined Animal Feeding Operations (CAFO’s) with MPDES permits. The water system operator or other local official familiar with the area included in the inventory region identified animal feeding operations that are not required to obtain a permit.

- No facilities in the Lolo area were identified with this query.

Step 4: Databases were queried to identify the following in the inventory region: Underground Storage Tanks (UST), hazardous waste contaminated sites (DEQ hazardous waste site cleanup bureau), landfills, abandoned mines and active mines including gravel pits. Any information on past releases and present compliance status was noted.

- The following active UST sites were identified (Table 7). Four UST's are located within the inventory region. The location of these sites is shown in [Figure 14](#).

Table 7. Lolo Area Active Underground Storage Tanks

Name	Address	Facility ID	Number USTs	Comments
Lolo Superstop	12011 Hwy 93 S	3213808	5	Active Facility, No Active Leak
Ole's #14	11400 Hwy 93 S	3205215	3	Active Facility, No Active Leak
Town Pump Inc (Lolo #1)	10955 Hwy 93 S	3209414	4	Active Facility
Town Pump Inc (Lolo)	11882 Hwy 93 S	3201639	7	Active Facility

- The following Leaking UST (LUST) sites were identified (Table 8). Five sites are located within the inventory region for the PWS wells. The location of these sites is shown in [Figure 14](#).

Table 8. Lolo Area Leaking Underground Storage Tank Sites

Name	Address	Facility ID	# of UST's	Comments
Town Pump Inc (Lolo)	11882 Hwy 93 S	3201639	12	Not Active
Town Pump Inc. (Lolo #1)	10955 Hwy 93 S	3209414	5	Not Active
Stirm, Vernon (Old Circle K)	1110 Hwy93 S	3200114	2	Not Active
Travel's Rest, Inc.	10565 Hwy 12	3211303	3	Active
Fueling Station	13350 Hwy 93 S	3213236	Spill	Not Active

- There are no hazardous waste contaminated sites (CECRA Sites) in the DEQ database for the Lolo area.
- There are no landfills, either active or closed, in the DEQ database for the Lolo area.
- There are no inactive mines in the Lolo area. There are five active mines in the Lolo area. The location of these mines is located in [Figure 14](#). None of these mines are located within the inventory region

Table 9. Lolo Area Active Mining Sites

Name	Activity	Commodities	Operation Type	Sequence Number
Black Diamond Mica Mine	Producer	Mica	Unknown	300630129
Macclay	Unknown	Silicon	Unknown	30630122
Sweet Bye and Bye Mine	Past Producer	Gold Silver	Underground	300630100
Unnamed Pumice	Unknown	Pumice	Mineral Loc	300630071
Unnamed Pumice	Unknown	Pumice	Mineral Loc	300630073

Step 5: County records were queried to identify businesses that generate, use, or store chemicals in the inventory region. The facilities include equipment manufacturing and/or repair facilities, printing or photographic shops, dry cleaners, farm chemical suppliers, and wholesale fuel suppliers.

- Table 10 lists the following four facilities in addition to the facilities with UST's were listed as storing chemicals and are within the inventory region.

Table 10. Chemicals stored at facilities in the Lolo area.

Name	Address	Chemicals Stored
Body Specialists	13002 Kimwood Drive	Body filler, paint, lacquer, enamel, DTR 601 and 603, DL3, K200/201, PT 860, PTL 16, PVV 1160
Missoula Rural Fire Station #5	12221 Highway 93 S.	Gasoline, motor oil, oxygen
Sea-Nic Transport, Inc.	11890 Hwy 93 S.	Acetylene, motor oil, oxygen, waste oil
US West Communications	Route 93	Sulfuric acid

Step 6: Major road and rail transportation routes were identified throughout the inventory region.

- Two major transportation routes run through Lolo. US 93 runs north through Lolo and Highway 12 runs east-west out of Lolo. Montana Rail Link is also present in a general parallel direction to US 93. The locations of these are located on [Figure 14](#).

Step 7. All land uses and facilities that generate, store, or use large quantities of hazardous materials were identified within the recharge region and identified on the base map.

- All of the inventoried facilities are identified on the base map in [Figure 14](#).

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) Underground storage tanks.
- 4) Known groundwater contamination (including open or closed hazardous waste sites, state or federal superfund sites, and UST leak sites).
- 5) Underground injection wells.
- 6) Major roads or rail transportation routes.
- 7) Cultivated cropland greater than 20 % of the inventory region.
- 8) Animal feeding operations.
- 9) Wastewater treatment facilities, sludge handling sites, or land application areas.
- 10) Septic systems.
- 11) Sewer mains.
- 12) Storm sewer outflows.
- 13) Abandoned or active mines.

The following is a summary of the results of the inventory for properties or sites within the delineated Source Water Protection Zones for the Lolo area. The potential contaminants are listed, with a description of the potential release mechanism for the site. In all cases, releases may occur due to unavoidable conditions such as flooding, lightning or fire.

Inventory Results/Control Zone

The control zone represents the most critical point to protecting the integrity of the wellhead for ground water sources. The land within the control zone for the wells is primarily urban/residential land use. Inventory sheets for these properties are in Appendix E.

Table 11. Summary of Results for Valley West PWS Inventory Region.

ID#	Source	Potential Contaminants	Description/Concern
1	Sanitary Sewer Systems	Pathogens and Nitrates	Leakage from sewer lines
2	Storm Water Discharge Points	Spills of various chemicals	Point source to non-point source releases from urban land use
3	UST's	Gasoline	Lolo Superstop
4	Leaking UST's	Gasoline	Town Pump, Inc., Travel's Rest
5	Agricultural Land Use	Pathogens and Nitrates; Pesticides and Herbicides	Non-point source pollution, concentration of fertilizers/chemicals in surface/ground water
6	Urban Land Use	Spills of various chemicals	Non-point source pollution, small spills of household chemicals
7	Stormwater Injection wells	Various organic chemicals	Not inventoried at this time; may provide conduits for chemicals into subsurface

Inventory Results/Inventory Region

Land use within the 1 year TOT inventory region is primarily urban/residential/commercial ([Figure 11](#)). The significant potential contaminant sources within the inventory region are listed in Table 11. The general locations of these sources are shown in [Figure 14](#). Septic density within the 1 year TOT inventory region is approximately 254 septic systems per square mile and septic density within the 3 year TOT region is approximately 35 septic systems per square mile. South of Lolo Creek, the septic density is approximately 346 septic systems per square mile while north of the creek it is approximately 244 septic systems per square mile ([Figure 12](#), and [Figure 13](#)).

Table 12. Significant Potential Contaminant Sources for Valley West PWS.

ID #	Source	Contaminants	Description
1	Septic systems	Pathogens and Nitrates	Areas of medium and high hazard located upgradient with a one-year time of travel for PWS wells
2	Storm water discharge points	Various organic chemicals	Spills from general urban land use
3	Agricultural land use	Pathogens and nitrates; pesticides and herbicides	Irrigated agriculture in inventory region
4	Urban land use	Spills of various chemicals	Small amounts of spilled chemicals concentrating in storm water runoff
5	Transportation routes	Spills of various chemicals	US 93, Hwy 12 and railroad

Inventory Results/Surface Water Buffer Zone

Significant potential contaminant sources for the surface water buffer zone are pathogens and nitrates from individual sewage disposal systems and agricultural land use that may also contribute pesticides and herbicides to surface waters. There are no permitted confined animal feeding units in the Lolo area. The septic density in this area is approximately 8 septic systems per square mile. Land use is primarily crop/grazing (13%) and conifer forest (87%).

Inventory Results/Recharge Region

The land use in the recharge area is mostly conifer forest, rangeland and irrigated pasture. General land use for the area is depicted in [Figure 8](#). The Lolo Creek watershed is almost entirely within the Lolo National Forest. Plum Creek Timber is also a major land owner in the watershed.

Inventory Update

The certified operator will update the inventory every year. Changes in land uses or potential contaminant sources will be noted and additions made as needed. The complete inventory will be submitted to DEQ every five years to ensure re-certification of the source water delineation and assessment report.

Inventory Limitations

The accuracy of the inventory is limited by the accuracy of the information in databases and given in person used for the assessment. The windshield survey provides a level of quality assurance that the information presented reflects current conditions at the time of preparation of this report. The inventory is based on the assumption that the aquifer is homogeneous and exhibits uniform characteristics which is highly unlikely.

CHAPTER 4 SUSCEPTIBILITY ASSESSMENT

Susceptibility is the potential for a well to be contaminated by one of the sources inventoried in the previous chapter. Hazard ratings and the presence of barriers determine susceptibility (Table 6). Hazard susceptibility ratings are determined by the proximity of a potential contaminant source to the well. For the Valley West PWS, contaminant sources within the one year TOT were given a high hazard rating and all other sources within the inventory region were given moderate hazard rating. Barriers can be engineered structures, management actions and/or natural conditions. Bentonite liners are an example of engineered barriers. An example of management barriers are chemical and manure management plans (safe mixing and application). Natural barriers include clay soils, deep wells and a thick layer of substrate above an aquifer.

Table 13. Relative susceptibility to specific contaminant sources as determined by hazard and the presence of barriers.

Presence Of Barriers	Hazard		
	High	Moderate	Low
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

For point sources, the relative hazard of the significant potential contaminant sources listed in Table 6 reflects the location of the sites relative to the PWS wells and how long ground water would take to travel from that site to the wells. For sites located within a time of travel distance of less than one year, the relative hazard is assigned as high. For the remaining sites located in the recharge region, the relative hazard assigned is low.

For non-point sources, the relative hazard is assigned based on Table 14:

Table 14. Non-point source relative hazard ratings.

Source Type	High Hazard	Moderate Hazard	Low Hazard
Septic Systems	>300 per sq. mi.	50-300 per sq. mi	<50 per sq. mi.
Municipal Sanitary Sewer (% Land Use)	>50% of region	20%-50% of region	<20% of region
Cropped Agricultural Land (% Land Use)	>50% of region	20%-50% of region	<20% of region

Table 15. Susceptibility assessment for significant potential contaminant sources in the Control Zone and Inventory Region.

Source	Contaminant	Hazard	Hazard Rating	Barriers	Susceptibility	Management
Septic Systems	Pathogens and Nitrates	Leak	High	None	High	Manage density with land use planning; prioritize connection of high density areas to sewer
Agricultural Land Use	Pesticides, herbicides, pathogens and nitrates	Non-point source concentration	Moderate	None	Moderate	Educate community of BMPs for agriculture
Storm water/urban land use	Various chemicals	Small spills	Moderate	None	Moderate	Develop stormwater management plan

Results of the Susceptibility Assessment

The results of the susceptibility assessment indicate that septic systems, transportation routes, agricultural land use, urban land use and leaking underground storage tanks pose the most significant threats to the source water for Valley West public water supply.. The high density of septic systems in the immediate vicinity are probably the most significant contaminant source.

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