

# **EMIGRANT REST STOP**

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

**Public Water Supply:**

**PWSID #MT0001955**

**Emigrant Rest Stop  
Montana Department of Transportation  
Park County  
U.S. Highway 89, Mile Post 28.8  
South of Livingston, Montana**

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### **INTRODUCTION**

This delineation and assessment report is intended to meet the technical requirements of the Montana Source Water Protection Program (Montana Department of Environmental Quality [Montana DEQ], 1999) and the federal Safe Drinking Water Act (SDWA) Amendments of 1996 (P.L. 104-182). Tetra Tech EM Inc. prepared this report under contract with the Montana Department of Transportation (MDT). Information provided by MDT was used in preparing the reports. Well completion information was obtained from the Montana Ground Water Information Center (GWIC). Information on the water supply system was obtained from a sanitary survey prepared on October 18, 1995 by McNenny Environmental Engineering and Consulting (available from Montana DEQ upon request) and from Dave Hand and Larry Dassinger of MDT (Hand 2001; Dassinger 2001). Water quality data are derived from the U.S. Environmental Protection Agency (U.S. EPA) Envirofacts Warehouse website (U.S. EPA 2001). Land use information was obtained from the Montana State Library; Natural Resource Information Service (NRIS) database (NRIS 2000).

This source water delineation and assessment report includes a site location topographic map and a land use map showing the inventory region of the source water protection area and the land uses and potential contaminant sources within that area ([Figures 1](#) and [2](#) at end of this report). The report also includes a narrative description of the public water supply (PWS), inventory region delineation, an inventory of land uses and activities that may impact the PWS, and a susceptibility assessment. Well information for the PWS is attached.

## **PURPOSE**

The purpose of this delineation and assessment report is to assess possible threats to the water supply at the MDT Emigrant Rest Stop located south of Livingston, Montana using information obtained from published reports. Delineation is a process in which areas that contribute water used for drinking are identified on a map. Geologic and hydrologic conditions are evaluated in order to delineate source water protection areas. The source water protection area is assessed to identify locations or regions where contaminants may be generated, stored, or transported and then to evaluate the potential for contamination of drinking water by these sources.

## **PUBLIC WATER SUPPLY INFORMATION**

The water system at this rest stop is classified as a transient, non-community PWS because it serves 25 or more persons per day but does not regularly serve the same persons for at least six months a year. Approximately 800 transient persons are estimated to use the rest stop per day during the season (May 1 through October 30) (McNenny 1995). The rest stop is closed during the winter. Approximately 720,000 gallons of water is used during the season (U.S. EPA 1991).

### ***Facility Description***

The Emigrant Rest Stop is located in Park County on the southeast side of U.S. Highway 89 at milepost 28.8 and services traffic on both sides of the highway ([Figure 1](#)). The public water supply wellhead is located in the island of the parking area and approximately 150 feet from the comfort station. An irrigation well is also located on the island. A septic system drain field is located more than 200 feet northwest of the public water supply well. McNenny reported in 1995 that the rest stop operates seasonally from approximately May 1 through October 30 and is closed in the winter (McNenny 1995). However, the rest stop is currently open year round (Dassinger 2001).

### ***Public Water Supply System***

Well log information indicates that the well was drilled in May 1989. The well is constructed of 6-inch diameter steel casing from the surface to a depth of 75 feet below ground surface. Fifteen feet of 6-inch diameter Johnson stainless screen is installed from 73 feet to 88 feet below ground surface. Five feet of 5-inch diameter tail pipe is located from 88 feet to 93 feet below ground surface (GWIC 2001). Static water level was at 7 feet below ground surface in 1989. The GWIC well log is attached to this report. A 3/4-horsepower submersible pump delivers water to the utility room of the comfort station through a 12-cartridge multi-filter for sediment removal, then to a bank of 3 captive air pressure tanks, and then to service throughout the building (McNenny 1995).

### ***Public Water Supply Quality***

MDT is required to monitor the rest stop public water supply for coliform bacteria on a monthly basis and nitrate as nitrogen annually, or if nitrogen is present at concentrations less than 0.5 milligrams per liter (mg/L), once every three years. No health-based water quality violation has been reported to the Environmental Protection Agency within the past five years (U.S. EPA 2001).

According to the Emigrant Rest Stop Sanitary Survey (McNenny 1995), the water supply system is well designed, constructed, operated, and maintained. The sanitary survey recommended minor changes to the water quality monitoring program and reporting.

### ***Source Water Hydrogeology***

The Emigrant Rest Stop is located in the Yellowstone River valley about 6.5 miles south of Emigrant ([Figure 1](#)). Quaternary alluvium and Tertiary volcanic units dominate the surface geology in the area (Ross 1955). Lithologic information from the well log indicates that the well is screened in sand and gravel at a depth of 73 to 88 feet below ground surface. The aquifer appears to be semi-confined unconsolidated alluvium. A soil horizon was located in the upper portion of the well, and clay was encountered to a depth of 40 feet below ground surface. The Colorado shale underlies the sand and gravel aquifer.

## **DELINEATION**

An inventory region around the wellhead and on either side of the Yellowstone River for 10 miles upstream from the well head has been delineated by the Montana DEQ Source Water Assessment Program personnel for the Emigrant Rest Stop ([Figure 1](#)). The inventory region encompasses the area from which water or contaminants can flow to the well over a period of years. The control zone (100-foot radius from well head) is the most critical area within which direct introduction of contaminants into the well or immediate area can occur.

## **INVENTORY**

The Montana Source Water Protection Program requires that land uses and all potential sources of nitrate and microbial contaminants be identified within the control zone and inventory region of non-community, transient public water supplies (Montana DEQ 1999).

### ***Sanitary Survey Information***

According to information in the Emigrant Rest Stop Sanitary Survey, the system appears to be in good working order (McNenny 1995). No potential sources of microbial contaminants were identified.

### ***Land Use***

Land use of the Emigrant Rest Stop inventory region is summarized in [Figure 2](#). Land use information was obtained from the Montana Natural Resources Information System website (NRIS 2000). Other sources of information include existing databases available through Montana DEQ and information provided by MDT.

Land use in the inventory region of the Emigrant Rest Stop PWS well is primarily grasslands and shrubland with minor evergreen forests.. A transportation corridor exists along the highway. No animal feeding operations are located within the Emigrant Rest Stop inventory region. Septic system density is low throughout the inventory region. Potential sources of nitrates or microbial contaminants include the rest stop septic system.

## **SUSCEPTIBILITY ASSESSMENT**

Susceptibility of source water to contamination is a function of source water sensitivity, the presence of significant potential sources of microbial and nitrate contamination, and the presence of barriers to contamination from the sources. Source water susceptibility is based on the following factors:

- ▶ Source water sensitivity
- ▶ Documented water contamination in the previous five years
- ▶ Presence of potential contaminant sources within the inventory region
- ▶ Density of potential contaminant sources within the inventory region
- ▶ Presence and numbers of natural and engineered barriers to contaminant migration

### ***Source Water Sensitivity***

Source water sensitivity is defined as the relative ease with which contaminants can migrate to a source aquifer or surface water body. The Emigrant Rest Stop has a moderate source water sensitivity rating because the source water aquifer appears to be semi-confined unconsolidated alluvium.

### ***Documented water contamination***

Records from the U.S. EPA safe drinking water information website indicate that no water contamination has been documented in the previous five years (U.S. EPA 2001).

### ***Intersystem Source Water Susceptibility***

No documented water contamination in the previous five years indicates that the Emigrant Rest Stop PWS has a moderate intersystem susceptibility to microbial contaminants. Intersystem susceptibility is determined by source sensitivity and exposure as indicated by documented water contamination. Documented exposure to contaminants regulated for their acute health effects (fecal coliform and nitrate) is given greater weight when determining intersystem susceptibility than exposure to contaminants regulated for non-acute health risks. Intersystem susceptibility of the Emigrant Rest Stop source water is summarized in Table 1.

<b>Table 1</b>			
<b>Intersystem Source Water Susceptibility Summary</b>			
<b>Potential Contaminant</b>	<b>Documented Exposure</b>	<b>Source Water Sensitivity<sup>a</sup></b>	<b>Intersystem Susceptibility<sup>a</sup></b>
Fecal Coliform	0	Moderate	Moderate
Nitrate	0	Moderate	Moderate
Nonacute contaminants	0	Moderate	Moderate

Notes:

<sup>a</sup>Based on Table 4, Section 5 (Montana DEQ 2001)

### ***Hazard of Potential Contaminant Sources***

The hazard posed by potential contaminant sources is a function of the type of and density of contaminant sources within the inventory region. Hazard of contaminant sources within the Emigrant Rest Stop PWS inventory region are summarized in Table 2.

<b>Table 2</b>		
<b>Contaminant Source Hazard Rating Determination</b>		
<b>Type of Contaminant Source</b>	<b>Density within Inventory Region</b>	<b>Hazard Rating<sup>a</sup></b>
Septic Systems	Less than 50 per square mile	Low
Municipal Sanitary Sewer	Less than 20 percent of region	Low
Cropped Agricultural Land	Less than 20 percent of region	Low
Contaminant Sources within Control Zone (confined aquifer)	NA	NA
Contaminant Sources within control zone (unconfined aquifer)	NA	NA

Notes:

<sup>a</sup>Based on Table 6, Section 5 of Montana Source Water Program Guidance (Montana DEQ 2001)

NA – not applicable

### ***Barriers to Contamination***

Barriers to contamination can be natural conditions, engineered structures, or management actions. Natural barriers to a groundwater source may include a continuous clay layer, a deep water table, contaminant attenuation capacity of vadose zone and aquifer materials, and dilution. Engineered barriers provide physical containment or early detection of potential contaminants such as double walled underground storage tanks, spill catchment basins and monitoring wells installed for leak detection. PWS wells that meet state construction standards are considered engineered barriers to contamination in control zones. Contamination barriers for the Emigrant Rest Stop PWS are listed below.

- ▶ Well meets state construction standards and is protected by a concrete apron (Control zone barrier only)

- ▶ Approximately 40 feet of low permeability clay overly the aquifer

**Source Water Intrasystem Susceptibility**

Intrasystem susceptibility is determined by the hazard associated with potential contaminant sources and the existence of barriers that may decrease the likelihood that contaminated water will flow to a PWS well or intake. A summary of all significant potential contaminant sources identified in the inventory region, their associated hazard, the presence of barriers, and relative susceptibility ratings is presented in Table 3.

The Emigrant Rest Stop PWS has a moderate susceptibility to contamination from the on-site septic system and low susceptibility to cropped agricultural land. Natural, engineered or management barriers include: well constructed in accordance with state construction standards. This is a barrier to contamination within the control zone.

<b>Table 3</b>				
<b>Source Water Intrasystem Susceptibility</b>				
<b>Potential Source<sup>a</sup></b>	<b>Contaminant</b>	<b>Hazard Rating<sup>b</sup></b>	<b>Barrier</b>	<b>Susceptibility<sup>c</sup></b>
On-site septic system	Nitrates,  Microbial contaminants	High	Appears to be down-gradient from the wellhead  Setback distance > 100 ft.	Moderate
Off-site septic systems	Nitrates  Microbial contaminants	Low	Thick low permeability clay overly aquifer (control zone and inventory region barrier)	Low

Notes:

<sup>a</sup>Source based on land use within inventory zone.

<sup>b</sup>Hazard rating based on Table 6, Section 5 (Montana DEQ 2001)

<sup>c</sup>Susceptibility rating based on Tables 5, Section 5 (Montana DEQ 2001)

NA = Not Applicable

## REFERENCES

GWIC. 2001. Montana School of Technology, University of Montana. Montana Groundwater Information Center website well log reports. <http://mbmggwic.mtech.edu/>

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Ross, Clyde; Andrews, David; and Witkind, Irving. 1955. "Geologic Map of Montana." Montana Bureau of Mines and Geology.

U.S. EPA. 2001. U.S. Environmental Protection Agency Envirofacts Warehouse Safe Drinking Water Information website at [http://www.epa.gov/enviro/index\\_java.html](http://www.epa.gov/enviro/index_java.html) .

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

[Figure 1.](#) Location Map

[Figure 2.](#) Rest Stop Inventory Region and Land Use

ATTACH WELL LOG