

Town of Plevna

PWSID # MT0000307

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SOURCE WATER DELINEATION AND ASSESSMENT REPORT

Operator/Manager:

**Norm Panasuk
C/o Honorable Ralph Higgins, Mayor
Town of Plevna
P.O. Box 27
Plevna, MT 59344**

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INTRODUCTION

This Delineation and Assessment Report was prepared by Jim Stimson, a hydrogeologist with the Source Water Protection Program of the Montana Department of Environmental Quality (DEQ) with the assistance of intern Marilee Simons. Plevna public water supply is located in Fallon County, about 13 miles northwest of Baker and about 70 miles east of Miles City ([Figure 1A](#)). The DEQ PWS identification number, operator name, and operator number for the Town of Plevna PWS appear on the title page of this report.

Purpose

This report is intended to meet the technical requirements for the completion of the source water delineation and assessment report for the Town of Plevna PWS as required by the Montana Source Water Protection Program (DEQ, 1999) and the federal Safe Drinking Water Act (SDWA) Amendments of 1996 (P.L. 104-182). The Montana Source Water Protection Program is intended to be a practical and cost-effective approach to the protection of public drinking water supplies from contamination. The primary purpose of this source water delineation and assessment report is to provide information to assist the Plevna PWS operator in the identification of potential contaminant sources near the groundwater source, and to encourage the development of a source water protection plan to help protect the city's drinking water for the long term.

Delineation and assessment constitute major components of the Montana Source Water Protection Program. Delineation entails mapping the boundaries of source water protection areas, which encompass ground water and/or surface waters contributing to public water supply sources. Assessment involves identifying locations or regions within source water protection areas where contaminants may be generated, stored, transported, or disposed, and determining the relative susceptibility of drinking water to contamination from these sources.

Limitations

This report was prepared to assess threats to the Town of Plevna public water supply and is based on published data including the most recent sanitary survey and information obtained from local residents familiar with the community. The terms "drinking water supply" and "drinking water source" refer specifically to the sources of the town's public water supply, and not any other public or private water supply. Also, not all of the potential or existing sources of groundwater or surface-water contamination in and around Plevna are identified. Only potential sources of contamination in areas that contribute water to the identified drinking water sources are considered.

The term "contaminant" is used in this report to refer to constituents for which maximum concentration levels (MCLs) have been specified under the national primary drinking water standards, and to certain carcinogenic or toxic constituents that do not have MCLs but are considered to be significant health threats.

CHAPTER 1 BACKGROUND

The Community

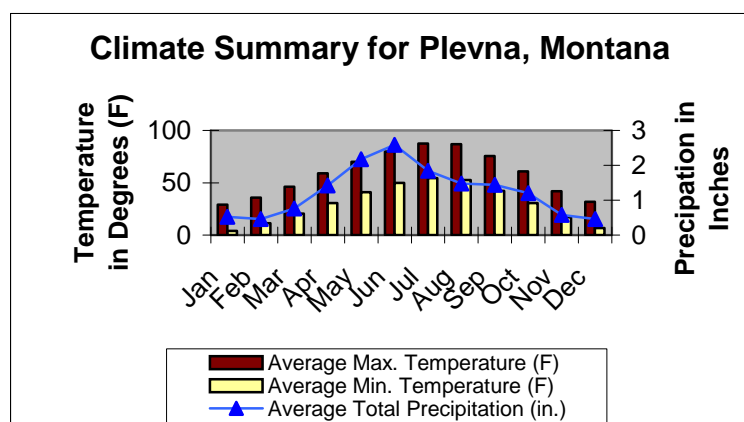
The town of Plevna is located in eastern Montana, 13 miles northwest of Baker, 70 miles east of Miles City, and 25 miles west of the Montana-North Dakota border ([Figures 1A](#) and [Figure 3](#)). According to DEQ records and the most recent sanitary survey, Plevna has about 130 year-round residents. State Highway 12 and the Chicago, Milwaukee, St. Paul, and Pacific Railroad run through Plevna. The U.S. Census Bureau estimates the 2000 population of Fallon County at 2,837 people, 138 of whom reside in Plevna. Fallon County’s population has decreased about 8.6%, while Plevna’s has decreased by about 1.4%, since the 1990 census. Transportation and agriculture contribute significantly to the economy of Fallon County and Plevna.

Residents of Plevna obtain their drinking water from the municipal public water supply. The municipal sewer district services all residents within city limits. Sewage disposal ponds are located about ½ mile south of the town. Residents in areas outlying town limits where sewer and water services are not available utilize on-site septic systems for waste disposal and have individual wells. The town of Plevna obtains water for its residents through three groundwater wells and is considered a community public water supply ([Figure 4](#)). There are no other public water supplies in the area ([Figure 3](#)). Groundwater is the sole source of water for the residents of Plevna (Table 1).

Table 1. Public Water Supplies in the Plevna Area.

PWS_ID	CLASS	PRIMARY NAME	SOURCE NAME
MT0000307	C	Plevna, Town of	Main Well #1
MT0000307	C	Plevna, Town of	Standby Well #2
MT0000307	C	Plevna, Town of	Well #3

Figure 2. Plevna Average Temperatures and Precipitation



Climate

Based on Western Regional Climatic Center data for the period of record, annual precipitation averages 14.92 inches. Monthly average precipitation ranges from 0.45 inches in February to 2.61 inches in June. Summer thunderstorms and winter snows provide a majority of the precipitation in the area. The annual mean snowfall in Plevna is 29.3 inches. A summary of the available climatic data for the Plevna area is presented in Table 2 and Figure 2 below.

Table 2. Climate Summary for the Plevna Area.

PLEVNA, MONTANA (246601)													
1971-2000 Monthly Climate Summary													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	29.1	35.7	46.3	58.9	70.1	79.9	87.5	86.9	75.5	61.0	42.0	31.7	58.9
Average Min. Temperature (F)	4.1	11.4	20.5	30.5	41.0	49.7	54.4	52.6	42.2	30.7	17.2	6.6	30.2
Average Total Precipitation (in.)	0.52	0.46	0.76	1.42	2.17	2.59	1.84	1.48	1.44	1.2	0.58	0.46	14.92

Western Regional Climate Center, <http://www.wrcc@dri.edu>

Geographic Setting

Plevna is located in the non-glaciated portion of the Great Plains physiographic province of North America (Rocky Mountain Association of Geologists, 1972). This area is also designated as the non-glaciated central ground-water region of the United States (Heath, 1984). The elevation at Plevna is approximately 2,750 feet above mean sea level (Figure 1, and Figure 3). Topographic relief in the area is low with highlands rising about 50 to 100 feet above the town site. Many of the creeks and tributaries in the area have moderately incised channels.

Geology

This section provides an overview of the geology and hydrology of the vicinity of Plevna. Reports used for this section include Vuke-Foster et al. 1986, Smith et al. (2000), Slagle (1983), Slagel et al (1984), Stoner and Lewis, (1980), Torrey, A. E., and Swenson, F. A., 1951. The geology of the area can be used to determine the locations, boundaries, and hydraulic properties of local aquifers. An understanding of

hydrogeologic conditions also provides an explanation for the sensitivity of local aquifers to potential contamination sources. Geology is not only important for understanding the hydrologic conditions related to ground water, but it is also valuable for public water supplies that use surface water. For example, the timing and runoff patterns of streams are influenced in part by the geology within a watershed.

Watersheds with large areas of low hydraulic conductivity bedrock tend to respond quickly to precipitation and snowmelt events. Hydrographs from streams within such a watershed show numerous high flow peaks or spikes. On the other hand, streams within watersheds underlain by bedrock that has high hydraulic conductivity tend to have more subdued hydrographs, that is, fewer and more rounded high flow peaks. Infiltration of precipitation and snowmelt waters makes the high flow events rise more gradually and have more rounded peaks. Surface water quality can also be affected by the geology within a watershed and information in this section can be useful for gaining a better understanding of factors that control erosion and sedimentation.

Thin deposits of unconsolidated alluvium are present in the O'Fallon and Sandstone Creek valleys and in many of the smaller tributaries in the area ([Figure 6](#)). The alluvium consists of lenses of unconsolidated clay, sand, and gravel. As much as 40 feet of alluvium is present in the Yellowstone valley and less thick deposits, usually up to 10 feet, are present in other tributaries (Vuke-Foster et al., 1986). The Yellowstone River alluvium yields economic quantities of water to wells and in most places represents an unconfined aquifer. Terrace deposits are also present within the main river valley and the tributaries. Some of the terraces are between tens and hundreds of feet above the streams and are considered to be Quaternary age, ranging from Pleistocene to Recent. These terrace deposits consist of gravel, sand, silt, and clay.

Bedrock exposed at the land surface in the vicinity of Plevna ranges in age from Upper Cretaceous to Tertiary. Around Plevna, the Fort Union Formation dominates the landscape ([Figure 6](#)). The Fort Union can be on the order of 1,600 feet thick in some areas with about 200 feet being exposed near Plevna. The Fort Union is usually divided into three members in descending order: the Tullock, Lebo Shale, and Tongue River. In the Plevna area, however, Vuke-Foster et al., divided the formation into four members (First, Second, Third, Fourth). There are outcrops of red metamorphosed sedimentary rocks within the Fort Union Formation. These beds are referred to as "clinker" and formed when underlying coal beds were ignited and baked the sandstone, siltstone, and shale beds. In some places the heat was so intense that the overlying rocks were metamorphosed into rock resembling volcanic rocks known as scoria. The Hell Creek Formation (Upper Cretaceous) is below the Fort Union, is up to 400 feet thick, and contains beds of silty shale, mudstone, sandstone, and coal. The Hell Creek is exposed at the land surface just east of Plevna and is in a fault-controlled contact with the Fort Union. The Hell Creek is also exposed at the surface along the axis of the Cedar Creek Anticline about 6 miles east of town. Generally, the Hell Creek is more fine grained and contains less coal than the overlying Fort Union. Sandstone beds are more abundant in the lower part of the Hell Creek Formation. Sandstone beds of the Fox Hills Formation and dark shale beds of the Pierre Shale also are found at the land surface along the Cedar Creek Anticline axis. The upper part of the Fox Hills is known as the Colgate Member and consists of light gray and white sandstone that is fine to medium grained. The Colgate Member is an important aquifer in this region and ranges up to 130 feet thick. The Pierre Shale lies below the Fox Hills Formation and can be 500 to 700 feet thick. In some areas a fine-grained sandstone unit is mapped as part of the Pierre and is known as the Groat Sandstone Bed. This bed can be up to 100 feet thick.

General Hydrogeologic Setting

The city's wells are listed as completed in the Fox Hills Formation according to the well logs from the Montana Ground Water Information Center (GWIC). However, the wells area between 800 and 1075 feet deep, which, according to the geologic cross-section provided by Vuke-Foster et al., 1986, would place the screened intervals below the Fox Hills and into the Pierre Shale. Well logs indicate that all of the wells are completed in sandstone. This sandstone is interpreted as a deep confined aquifer with a low sensitivity to contamination, in accordance with the Montana Source Water Protection Program guidelines (DEQ, 1999).

The Public Water Supply

The Plevna PWS is classified as a community system under the Federal Safe Drinking Water Act, because the system serves at least 25 year-round residents through at least 15 service connections. The PWS services about 130 residents via approximately 80 active service connections.

According to the most recent sanitary survey, the town of Plevna obtains water through two wells, Well #2 and Well #3. A third well, Well #1, exists but is currently inactive due to questionable water quality. Well #2 and Well #3 are located on the east side of the town, while inactive Well #1 is located southeast of Plevna about 2/10 mile. All three wells have submersible pumps and a series of seven captive air pressure tanks serve to pressurize the system. A 35,000-gallon concrete storage reservoir is located in the center of town. The sanitary survey notes that the distribution system is in good condition and pressure throughout the system was good. Prior to storage, the well water is treated with chlorine for disinfection purposes.

Based on the sanitary survey and the depth of the wells, it appears that the Fox Hills-Hell Creek aquifer, or another deep confined sandstone aquifer, provides water to Wells #1 and #2, and a sandstone aquifer in the Fox Hills Formation, or another deep confined sandstone aquifer, supplies water to Well #3. In accordance with the Montana Source Water Protection Program criteria (1999), these aquifers are considered to be deep consolidated sandstone bedrock aquifers with a low sensitivity to potential contaminant sources (see Table 3).

Plevna PWS Water Quality

Public water systems must conduct routine monitoring for contaminants in accordance with Federal Safe Drinking Water Act requirements. A community public water supply, like the town of Plevna PWS, must sample in accordance with schedules specified in the Administrative Rules of Montana (ARM). Monitoring includes coliform bacteria, lead, copper, nitrate, nitrite, volatile organic chemicals (including hydrocarbons and chlorinated solvents), inorganic chemicals (including metals), synthetic organic chemicals (including pesticides), and radiological contaminants. Transient, non-community PWSs are

Table 3. Source water sensitivity criteria (DEQ, 1999).

Source Water Sensitivity
<p>High Source Water Sensitivity Surface water and GWUDISW Unconsolidated Alluvium (unconfined) Fluvial-Glacial Gravel Terrace and Pediment Gravel Shallow Fractured or Carbonate Bedrock</p>
<p>Moderate Source Water Sensitivity Semi-consolidated Valley Fill sediments Unconsolidated Alluvium (semi-confined)</p>
<p>Low Source Water Sensitivity Consolidated Sandstone Bedrock Deep Fractured or Carbonate Bedrock Semi-consolidated Valley Fill Sediments (confined)</p>

required to conduct routine monitoring only for pathogens (including coliform bacteria), nitrate, and nitrite. All contaminant concentrations detected in required samples must comply with numeric maximum contaminant levels (MCLs) specified in the Federal Safe Drinking Water Act.

Within the past five years, one positive total coliform sample was collected on 7/7/03 during routine contaminant monitoring. No MCL exceedances were noted for any other constituents monitored over the past five years, this includes nitrate. The highest nitrate value recorded at the PWS is 0.09 milligrams per liter (mg/L) in 2001, which is significantly below the MCL of 10 mg/l (Appendix A).

CHAPTER 2 DELINEATION

The source water protection areas for the Plevna public water system are delineated in this chapter. The purpose of delineation is to map the source of the water used by the Plevna PWS and to define areas within which to prioritize source water protection efforts. Three types of management regions are mapped; they are the control zone, inventory region, and the recharge region.

The goal of management in the control zone is to avoid introducing contaminants directly into the water supply's well or immediate surrounding areas. The inventory region should be managed to prevent contaminants from reaching the well before natural processes reduce their concentrations. The goal of management in the recharge region is to maintain and improve water quality over long periods of time or increased usage.

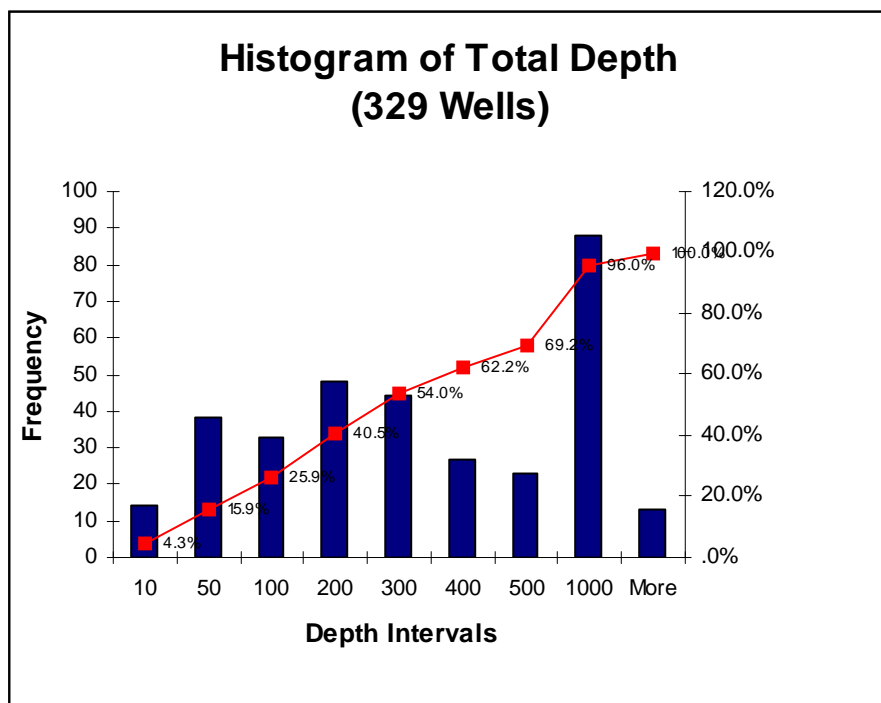
Hydrogeologic Conditions

The town of Plevna is the only public water supplier in the Plevna area. The system uses ground water as the source of drinking water. Aquifers in this region have been grouped together based on their depth from the land surface. The groups are referred to as hydrologic units. The shallow hydrologic unit represents aquifers within 200 feet of the land surface (Slagle et al. 1983, Smith et al. 2000). In most places this includes aquifers within the alluvium and terrace deposits and sandstones in the upper part of the Fort Union Formation. Aquifers within the Hell Creek Formation are located within 200 feet of the land surface. In other areas, the Hell Creek is not exposed at the land surface and its aquifers are found at depths greater than 200 feet from the land surface in the deeper hydrologic unit described below. Ground-water flow within the shallow hydrologic unit is generally from upland areas toward local stream tributaries and major streams. Recharge to the shallow hydrologic unit comes primarily from infiltration of precipitation; to a lesser extent recharge also comes from water losses from some stream channels, irrigation ditches, and return flows from irrigated fields (Smith et al. 2000). Below 200 feet, a deeper hydrologic unit is present below the pervasive claystone and shale beds in the upper Hell Creek Formation. Ground-water flow within the deep hydrologic unit is from upland areas toward major streams and is generally thought to bypass or flow beneath local tributary valleys. Recharge areas for the deep hydrologic unit likely come from the southeast in the Black Hills of South Dakota and other areas in southeastern Fallon County. Sandstones in the lower Hell Creek - upper Fox Hills represent a third hydrologic unit in this region. As noted above, the town of Plevna obtains its water from deep aquifers in or below the Fox Hills-Hell Creek Formation. The Colgate Member of the Fox Hills is an important drilling target in this hydrologic unit (Smith et al, 2000). Ground-water flow in the lower Hell Creek - upper Fox Hills is generally toward major streams including the Yellowstone and Missouri rivers. Recharge here also appears to come from the Black Hills to the southeast (Smith et al. 2000).

About 70 percent of the wells in the lower Yellowstone River Area are completed in the shallow hydrologic unit (Smith et al, 2000). Yield from this hydrologic unit range from 10 gallons per minute (gpm) to 35 gpm, with the higher yields coming from wells completed in the alluvial deposits adjacent the Yellowstone River. About 12 percent of the wells in the region are completed in the deep hydrologic unit with yields most often reported as less than 15 gpm (Smith et al, 2000). Ten percent of the wells in the region are completed in the Fox Hills-lower Hell Creek hydrologic unit and report yields routinely less than 15 gpm with some exceptional wells with yields approaching 100 gpm (Smith et al, 2000).

Figure 5 shows a histogram of well depth for 329 well logs from the Montana Ground Water Information Center (GWIC) for the area around Plevna. About 20 percent of the wells are between 50 and 100 feet deep and completed in the shallow hydrologic unit. It is interesting to note from the histogram that a significant number of wells in the area are greater than 500 feet deep, most are on the order of 1000 feet deep (see bar at the far right of the graph). These wells are completed in or below the Fox Hills-Hell Creek Formation. Average drilling depth for these wells is 397 feet below the land surface and the deepest well in the area is 1200 feet. Average yield for these wells is 10 gpm and the highest yield reported is 285 gpm.

Figure 5: Well Depth Histogram for Wells in Fallon County



Conceptual Model

About 25% of the wells in the vicinity of Plevna are shallow, less than 100 feet deep. Most of these wells are completed in alluvium or the upper part of the Tongue River Formation. Ground-water flow in the shallow unit is generally from upland areas east of Plevna toward the O’Fallon and Sandstone Creek Valleys. The alluvial aquifer used by the shallow wells is unconfined and therefore is considered to have a high sensitivity to potential contaminants. A significant number of wells in the area are more than 500 feet deep (about 30%). These wells, and Plevna’s wells, are

completed in a confined sandstone bedrock aquifer within or below the Fox Hills Formation. Ground-water flow direction in this deeper aquifer is interpreted to be generally to the north towards the Yellowstone River (Slagle et al. 1983, Smith et al. 2000). Recharge areas for the Fox Hills near Plevna is interpreted to be primarily from upland areas to the south-southeast in the Black Hills of South Dakota (Smith et. al., 1998, Map 6).

Table 4 summarizes available well information for the town of Plevna. Some lithology and completion information is lacking due to incomplete well logs.

Table 4. **Summary of Well Information for Plevna PWS.**

Local Name for Well MBMG #	Main Well #1 136070	Standby Well #2 132755	? Well #3 22031
Location	8N 58E 30	8N 58E 30	8N 58E 30
Date Completed	?	5/6/1960	9/30/1974
Depth (ft. bgs*)	804	1070	1075
Screened Interval (ft)	?	877-1070	930-1030
SWL Depth (ft bgs)	?	?	4
PWL Depth (ft bgs)	?	?	300
Grout Depth (ft. bgs)	?	0-877, cement	0-844 Haliburton cement
Drawdown (ft bgs)	?	?	296
Test Pumping Rate (gpm**)	?	?	?
Yield (gpm)	?	80	135
Specific Capacity (gpm/ft dd***)	?	?	.46

*

Feet below ground surface; ** Gallons per minute; *** Gallons per minute per foot of drawdown.

Delineation Results

Control Zones - 100-foot radius control zones are delineated for Plevna’s wells; all sources of potential contaminants should be included in this region. All potential contaminant sources are identified within the control zone ([Figure 4](#)).

Inventory Region – The Fox Hills-Hell Creek Formation is interpreted to have deep confined aquifers so the inventory regions for each of Plevna’s wells consist of a 1000-foot radius circle ([Figure 4](#)). All potential contaminant sources are identified within the inventory region.

Recharge Region - Topographic divides that represent the 11-digit watershed HUC 10100005 will be used as the recharge region for the town of Plevna’s wells ([Figures 7](#) and [Figure 8](#)). The goal of management in the recharge region is to maintain and improve the long-term quality of groundwater in the bedrock and alluvial aquifers.

CHAPTER 3 INVENTORY

An inventory of potential sources of contamination was conducted to assess the susceptibility of the Plevna PWS to potential sources of contamination, and to identify priorities for source water protection planning. Inventories were conducted within the Control Zone, Inventory Region, and Recharge Regions. The inventory focuses on facilities that generate, use, store, transport, or dispose of potential contaminants, and on land types on which potential contaminants are generated, used, stored, transported, or disposed. Additionally, the inventory identifies potential sources of all primary drinking water contaminants and Cryptosporidium. Only significant potential contaminant sources were selected for detailed inventory. The significant contaminants posing potential threats to the Plevna PWS include hazardous materials transported by underground pipeline, nitrate, pathogens, herbicides, and pesticides. The inventory for Plevna PWS also focuses on general land uses and large potential contaminant sources in the Recharge Region.

Inventory Method

Available databases were initially 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: Land cover is identified from the National Land Cover Dataset compiled by the U.S. Geological Survey and U.S. Environmental Protection Agency (U.S.G.S., 2000). Land cover types in this dataset were mapped from satellite imagery at 30-meter resolution using a variety of supporting information.

Step 2: EPA's Envirofacts System was queried to identify EPA regulated facilities. This system accesses the following databases: Resource Conservation and Recovery Information System (RCRIS), Biennial Reporting System (BRS), Toxic Release Inventory (TRI), Permit Compliance System (PCS), 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 is a significant potential contaminant source.

Step 3: DEQ databases were queried to identify Underground Storage Tanks (UST), hazardous waste contaminated sites, landfills, and abandoned mines.

Step 4: A business phone directory was consulted to identify businesses that generate, use, or store chemicals in the inventory region. Equipment manufacturing and/or repair facilities, printing or photographic shops, dry cleaners, farm chemical suppliers, and wholesale fuel suppliers were targeted by Standard Industrial Codes.

Step 5: Major road and rail transportation routes were identified.

Step 6. All significant potential contaminant sources were identified in the inventory region and land uses and facilities that generate, store, transport, or dispose large quantities of hazardous materials were identified within the recharge region.

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) Hazardous waste contaminated sites
- 4) Underground storage tanks
- 5) Major roads or rail transportation routes
- 6) Cultivated cropland
- 7) Animal feeding operations
- 8) Wastewater lagoons or spray irrigation
- 9) Septic systems
- 10) Sewered residential areas
- 11) Storm sewer outflows
- 12) Floor drains, sumps, or dry wells
- 13) Abandoned or active mines

Inventory Results-Control Zone

According to the sanitary survey, the well caps that exist on the two active wells, Well #1 and Well #2, are old and in poor condition without proper ventilation capabilities. These caps could facilitate the entry of contaminants directly into the well and pose a threat to the groundwater source (Town of Plevna Sanitary Survey, November 7, 2001). The wells are located in a developed area so residences surrounding the wells and the city sewer system are also potential threats to the source water.

Inventory Results-Inventory Region

It appears that irrigation canals run through and just outside of the Inventory Region, close to Well #1 ([Figure 4](#)). Canals often lose water through their base and banks, and provide recharge to the shallow ground-water system. The canals can be considered significant potential contaminant sources because they can transport water of poorer quality than the local shallow aquifers. Since canals often have a significant volume of leakage, they can discharge the poorer quality water into shallow aquifers. Contaminants of concern include nitrate, pathogens, herbicides and pesticides (SOCs). Given the depth of Plevna's wells, the canal likely does not pose a threat to the source water.

According to available information, the Chicago, Milwaukee, St. Paul, and Pacific Railroad passes through Plevna within the inventory region about 0.1 miles south of Well #2 and Well #3, and 0.15 miles north of inactive Well #1 ([Figure 4](#)). Railroads represent significant potential contaminant sources if accidents or spills introduce contaminants into the ground water source. Specifically, railroad cars can transport large volumes of fuels (VOCs) and SOC. This railroad is located in an up-gradient direction from Plevna's active wells and may pose a threat to it.

DEQ records show that Plevna has a municipal sewer system. Sewer lines and mains can leak and are considered potential sources of contamination. One underground storage tank (UST) lies within the inventory region. USTs and LUSTs (leaking underground storage tanks) are considered potential contaminant sources because they can introduce VOCs and petroleum hydrocarbons into groundwater. According to DEQ records, this particular UST has a leak history but is inactive. Because of its cross-gradient location relative to the wells and its inactive status, the LUST does not pose a threat to the well. A sewage disposal site is located about 0.3 miles southeast of Plevna, just outside of the inventory region. This site could potentially introduce pathogens and nitrates into the groundwater source, but due to its cross-gradient location and the depth of the wells, the threat of contamination is minimal. An SIC code search did not reveal any automotive related businesses in the town of Plevna that could be potential sources of contamination (Appendix A). Apart from the irrigation canal, the railroad, the municipal sewer, and the sewage disposal ponds, no other significant potential contaminant sources are identified. Table 5 summarizes the inventory results for the town of Plevna PWS.

Table 5. Significant potential contaminant sources in the Inventory Region.

Potential Source	ID Number On Maps	Potential Contaminants	Hazard
Irrigation Canal	3	Pathogens, nitrate, VOCs, SOCs, and other potential contaminants	Infiltration into ground water
Railroad right-of-way	9	VOCs, SOCs, petroleum hydrocarbons, metals, pathogens, nitrate	Accidents or spills, infiltration into groundwater
Municipal Sewer lines and mains	2	Pathogens, nitrate, VOCs, SOCs, and other potential contaminants	Infiltration into ground water
Sewage disposal ponds/wastewater discharge site	5	Pathogens, nitrate,	Leaks, spills, improper handling and disposal/discharge of chemicals used by various businesses are released to systems that allow discharge of contaminants with wastewater to surface water

From the above list of potential contaminant sources, some are considered significant based upon the following factors: the volume of potential releases, the volume of hazardous materials typically handled, the potential of the released materials to impact nearby surface water or groundwater, and the proximity of the sources to the PWS surface water intakes. Significant potential contaminant sources from the above list are discussed individually in the following section on susceptibility assessment and are listed in Table 8.

Inventory Results/Recharge Region

Areas east of Plevna within the Recharge Region are quite rural and dominated by range and grassland ([Figure 7](#) and [Figure 8](#)). Thirty-six percent of the Recharge Region has agricultural landuse with the majority of the ag-land located on the order of 1 to 3 miles from the town ([Figure 7](#)). Agricultural landuse surrounds Plevna on all sides ([Figure 7](#)). The concern with ag-land as a potential contaminant source is the potential for mismanagement or over- application of fertilizers and/or pesticides that could result in SOCs entering surface and ground water.

A major railroad, the Chicago, Milwaukee, St. Paul, Pacific Railroad, passes through the center of the recharge region south of the public water supply wells. Highway 12 also passes through the recharge region and directly through Plevna. These transportation corridors pose a threat to the water supply if accidents or spills occur that could introduce contaminants into the water source. A petroleum pipeline is located within the watershed about 3 miles from the wells. The pipeline represents a significant potential contaminant source because it transports large volumes of petroleum products up-gradient ([Figure 8](#)). In the event that breaks in pipelines are not detected immediately, they can result in large volume releases that could threaten the public water supply. Several oil and gas test holes and wells are located in the Recharge Region, primarily in the distal portions. They are few in number near the wells and are not considered a threat to the public water supply.

Other businesses and landuses in and around Plevna are within the Recharge Region. Some of them are considered as potential sources of contamination due to the nature of the business. Potential contaminant sources down-and cross-gradient of the subdivision are not considered to pose a threat to the public water supply. This includes the municipal sewer discharge lagoon and the oil and gas wells in the eastern part of the Recharge Region ([Figure 4](#), and [Figure 8](#)). A full listing of businesses in and

around Plevna, based on the Standard Industrial Codes (SIC) codes, is presented in Appendix A. None of the businesses appear to be significant potential contaminant as the business names do not suggest that they use, transport or store larger volumes of potential contaminants.

Table 6 below lists the significant potential contaminant sources identified in the Recharge Region.

Table 6. Significant potential contaminant sources in the Watershed Region Plevna PWS

Potential Source	ID Number on Maps	Potential Contaminants	Hazard
Petroleum pipelines	1	Pesticides, fertilizers, VOCs, other	Spills, storm water runoff, infiltration into ground water. River Crossings are a concern.
Cultivated Cropland	Not Numbered	Fertilizers, pesticides, pathogens, nitrate	Spills, over application, surface runoff
Railroad right-of-way	9	VOCs, SOCs, petroleum hydrocarbons, metals, pathogens, nitrate	Accidents or spills, infiltration into groundwater
Highway 12	Not numbered	VOCs, SOCs, petroleum hydrocarbons, metals, pathogens, nitrate	Accidents or spills
Class V Injection Wells (existence and locations are not known)	Not Numbered	VOCs, SOCs, petroleum hydrocarbons, metals, pathogens, nitrate	Leaks, spills, improper handling and disposal/discharge of chemicals used by various businesses and are released to systems that allow infiltration of contaminants to the subsurface or to the storm water system

From the above list of potential contaminant sources, some are considered significant based upon the following factors: volume of potential releases, the volume of hazardous materials typically handled, the potential of the released materials to impact nearby surface water or groundwater, and the proximity of the sources to surface water intakes.

Inventory Update

To make this SWDAR a useful document in the years to come, the owners, manager, or the certified water system operator(s) for the public water supply of Plevna should update the inventory for their records every year. Changes in land uses or potential contaminant sources should be noted and additions made as needed. The complete inventory should be submitted to DEQ at least every 5 years to ensure that this report/plan stays current in the public record.

Inventory Limitations

The extent of the potential contaminant source inventory is limited in several respects. The inventory is based on data readily available through state documents, published reports, and GIS data. Documentation may not be readily available on some potential sources. As a result, all potential contaminant sources may not have been identified. In some instances, inadequate location information precluded the inclusion of potential sources in the inventory.

CHAPTER 4 SUSCEPTIBILITY ASSESSMENT

Susceptibility of the Town of Plevna PWS's source water is determined by two factors: the potential of a contaminant reaching the wells and the resulting health hazard. Susceptibility is assessed in order to prioritize potential pollutant sources in the Inventory and Recharge regions in order to guide management actions undertaken by the subdivision and local entities, in this case the town of Plevna and Fallon County.

The goal of source water management is to protect the source water, manage significant potential contaminant sources in the Inventory Region, and ensure that land use activities in the Recharge Region pose minimal threats to the source water. Management priorities in the Inventory Region are determined by ranking the significant potential contaminant sources identified in the previous chapter according to susceptibility. Alternative management approaches that could be pursued by the Plevna PWS operators, city and county officials, and the community to reduce susceptibility are also included in this section of the report.

Susceptibility is determined by considering the hazard rating for each potential contaminant source and the existence of barriers that decrease the likelihood that contaminated water will reach the PWS wells. The proximity of a potential contaminant source to the PWS wells or the density of non-point potential contaminant sources determines the threat of contamination, referred to here as hazard. Hazard ratings for point and non-point sources are assigned based on criteria listed in Table 6.

Information from the sanitary survey suggests that the town's three wells are properly constructed and sealed through the confining layer above the water producing sandstone. However, information is not available on other wells within the inventory region and as a result, the center column of Table 7 is used to assess the hazard of potential contaminant sources within the Inventory and Recharge Regions.

Table 7. CONFINED AQUIFERS: Hazard of potential contaminant sources.

Potential Contaminant Sources	The PWS well is not sealed through the confining layer	Other wells in the inventory region are not sealed through the confining layer	All wells in the inventory region are sealed through the confining layer
Point Sources	High	Moderate	Low
Septic Systems (# per square mile)	High > 300 Moderate: 50 to 300 Low: < 50	Moderate: > 300 Low: < 300	Low
Sanitary Sewer (% land use)	High: > 50 Moderate: 20 to 50 Low: < 20	Moderate: > 50 Low: < 50	Low
Cropland (% land use)	High: > 50 Moderate: 20 to 50 Low: < 20	Moderate: > 50 Low: < 50	Low

Barriers to contamination can be anything that decreases the likelihood that contaminants will reach a spring or well. Barriers can be engineered structures, management actions, or natural conditions. Examples of engineered barriers are spill catchment structures for industrial facilities and leak detection for underground storage tanks. Emergency planning and best management practices are considered management barriers. Thick clay-rich soils, a deep water table or a thick saturated zone above the well intake can be natural barriers.

Table 8. Susceptibility of Source Water Based on Hazard rating and the Presence of Barriers

	High Hazard Rating	Moderate Hazard Rating	Low Hazard Rating
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

Susceptibility ratings are presented individually for each significant potential contaminant source and each associated contaminant on the following page (Table 9). Note that ID numbers are assigned to some of the potential contaminant sources. Those numbers appear on the maps included in this report and point to at least one or more locations (but not all) where that type of contaminant source is present. Other sites where the potential contaminants are located are shown by the presence of the appropriate map.

Susceptibility Assessment Results

Table 9. Susceptibility Assessment for Significant Potential Contaminant Sources in the Inventory Region for Plevna PWS Wells.

Inventory Region							
Source	ID Number on Maps	Contaminant	Hazard	Hazard Rating	Barriers	Susceptibility	Management Recommendations
Municipal Sewer Mains	2	Pathogens, nitrate, and other household hazardous wastes	Infiltration into shallow ground water and possible discharge to surface water.	Moderate	-Aquifer depth >100 feet -Substantial upward gradient (one well is flowing)	Low	Support the city's efforts for ongoing testing and maintenance of lines and system, replacement of old lines, compliance with current regulations for discharges
Railroad right-of-way	9	VOCs, SOCs, metals, petroleum hydrocarbons, fertilizers, pathogens	Accidents or spills, infiltration into groundwater	Moderate	-Aquifer depth >100 feet -Substantial upward gradient (one well is flowing)	Low	Remain vigilant to accidents on the tracks, especially involving tank cars
Irrigation Canal	3	Pathogens, nitrate, VOCs, SOCs, and other potential contaminants	Infiltration into shallow ground water	Moderate	-Aquifer depth >100 feet -Location relative to active wells -Substantial upward gradient (one well is flowing)	Very Low	Encourage canal owners/operators to line the canal to reduce water loss and infiltration to shallow ground water
Sewage Disposal /Wastewater Discharge Site	5	Pathogens, nitrate, VOCs, SOCs	System failure, exceeding effluent limits	Moderate	-Aquifer depth >100 feet -Cross-gradient location -Substantial upward gradient (one well is flowing)	Very Low	Ensure proper maintenance and operation of system; monitor leaks in system; develop an alternative treatment plan in the event of system failure.

Table 9 - Continued. Susceptibility Assessment for Significant Potential Contaminant Sources in the Recharge Regions for Plevna PWS Wells.

Recharge Region							
Source	ID Number on Maps	Contaminant	Hazard	Hazard Rating	Barriers	Susceptibility	Management Recommendations
Railroad right-of-way	9	VOCs, SOCs, petroleum hydrocarbons, metals, pathogens, nitrate	Accidents or spills, infiltration of contaminants into groundwater	Moderate	-Aquifer depth >100 feet -Substantial upward gradient (one well is flowing)	Low	Remain vigilant to accidents and spills on the railroad, especially those involving tank cars.
State Highway 12	Not numbered	VOCs, SOCs, petroleum hydrocarbons, metals, pathogens, nitrate	Accidents or spills, infiltration of contaminants into groundwater	Moderate	- Aquifer depth >100 feet - -Substantial upward gradient (one well is flowing)	Low	Remain vigilant to accidents and spills on the highway, especially those involving tanker and stock trucks.
Petroleum Pipelines	1	Petroleum Products	Spills, leaks, and releases	Moderate	- Leak detection - Emergency Response -Aquifer depth >100 feet -Substantial upward gradient (one well is flowing)	Low	Support the county's effort to maintain preparedness of local emergency personnel through active training, storm water diversion
Cultivated Cropland (36% of region)	Not Numbered	Fertilizers, pesticides, pathogens, nitrate	Spills, over application, surface runoff adjacent the Yellowstone River and larger tributaries	Low	-Dilution -Aquifer depth >100 feet -Substantial upward gradient (one well is flowing)	Low*	Support efforts to provide educational information, materials and resources to land owners on the proper application and storage of pesticide and fertilizers; implement agricultural BMPs
Class V Injection Wells	Not Numbered	VOCs, SOCs, pathogens, nitrate	Infiltration of contaminants into aquifer	Unknown	-Unknown	Unknown	Encourage EPA to complete Class V inventory and Provide educational information, materials and resources to business owners and the public on proper waste disposal and recycling

* An exception to the suggested susceptibility rating in Table 7. Susceptibility is rated as low instead of very low due to the relative amounts of agricultural land near the wells.

The susceptibility assessment results for each significant potential contaminant source identified is described below:

Municipal Sewer System – Municipal sewer mains are present and constitute almost 100% of the inventory region. Some of the mains may be located relatively close to the town’s wells. Aquifer depth is interpreted to be a barrier to leaks from the mains and lowers the potential for contamination. The potential hazard imposed by pathogens and nitrate originating from municipal sewer system is moderate. With multiple barriers identified, susceptibility is rated as low.

Railroad Right-of-Way – Because the railroad tracks are less in close proximity and up-gradient to the town’s active wells, hazard is rated as moderate in both the inventory and recharge regions. With multiple barriers identified, susceptibility is rated as low.

Irrigation Canal – Hazard for the canals within the inventory region is assigned as moderate due to the distance and cross-gradient location relative to the active wells. Multiple barriers have been identified and susceptibility is very low.

Cultivated Croplands – The potential hazard agri-chemicals, nitrate and pathogens originating from agricultural lands is low due to the relative percentage of the landuse in the recharge region ([Figure 7](#)). However, there is a significant amount of agricultural land near the wells which reduces the effectiveness of the barriers identified. As a result susceptibility is rated as low.

Petroleum Pipeline – With the petroleum pipeline about 3 miles cross-gradient of the public water supply, the potential hazard represented by releases, spills, and leaks from the pipeline is moderate. Leak detection, emergency response, and well depth are listed as barriers. Susceptibility to the pipeline within the Inventory Region is low.

Sewage Disposal / Wastewater Discharges - The potential hazard from VOCs, SOCs, pathogens, and nitrate originating from wastewater discharges is moderate as the lagoons are located south of the wells ([Figure 4](#)). Susceptibility of the PWS wells to contaminants originating from these sources is very low with multiple barriers identified.

Class V Injection Wells – The potential hazard imposed by VOCs, SOCs, pathogens, nitrate, and other contaminants originating from the class V injection wells cannot be determined due to the fact that no inventory of Class V well is complete for most of Montana or the current inventory is inadequate. The susceptibility of the intake to contaminants originating from this source is unknown.

Management Recommendations

It should be noted that even small releases of some chemicals in close proximity to a public water supply well can have significant negative impact on water quality, and is therefore a significant threat to the public water supply. Steps can be taken to reduce the likelihood of releases in the source water for the PWS or in the vicinity of the sources. Some of these steps (considered management recommendations) are listed below.

Some management recommendations are also included in the susceptibility table for the Plevna PWS (Table 8). If these, and other, management recommendations are implemented; they may be considered additional barriers that will reduce the susceptibility of the intake to specific sources and contaminants.

Management recommendations fall into the following categories:

- Municipal sewer extension
- Agricultural best management practices
- Stormwater management
- Proper disposal and monitoring of oil and gas production wastewater
- Education
- Emergency Response Planning

Sewer Extension – Installation of advanced septic treatment systems such as sand filters can limit contamination from new rural residential development, however, annexation and extension of sewers is the only way to reduce contamination from existing unsewered developments.

Agricultural and silvicultural best management practices (BMPs) – BMPs that address application and mixing of fertilizer and pesticides are a viable alternative to prohibition of their use. BMPs may also be utilized to minimize surface runoff and soil erosion on cultivated fields. Erosion control, selective logging, and other silvicultural practices (essentially BMPs) should be considered on a countywide basis. BMPs are generally voluntary but their implementation can be encouraged through education and technical assistance. County planning can help promote the implementation of BMP on lands that are outside city limits but indirectly affect the city PWS.

Education - Educational workshops provided to the general public by the city, county, or state promote safe handling and proper storage, transport, use, and disposal of hazardous materials. Ongoing training provided to designated emergency personnel will promote the efficiency and effectiveness of emergency responses to hazardous material spills. Likewise, educational workshops provided to rural homeowners will promote the proper maintenance and replacement of residential septic systems. The EPA and the State of Montana can provide educational materials on these topics.

Hazardous Materials Collection Days – Several counties in the state that have vulnerable water supplies have implemented scheduled days for the collection of hazardous wastes from the public. These vary in the inclusiveness of what materials are collected, how the materials are handled, and how they are disposed of, but they all act to reduce the amount of unauthorized or improper disposal of these wastes. Used motor oil collection station could be established and available to the public on a regular basis.

Emergency Response Plan – Several counties have compiled Emergency Response Plans that were then adopted by the local communities. The usefulness and effectiveness of a

response plan are maximized if it contains a clear listing of all emergency contacts, emergency numbers, and resources available within the county to respond to an emergency situation, such as a hazardous material spill. Emergency plans are not difficult to develop or distribute, but have a significant benefit to the citizens and municipalities within the county.

CHAPTER 5 MONITORING WAIVERS

Waiver Recommendation

The town of Plevna does not appear to have any monitoring waivers. Because of the available well logs, a susceptibility waiver may be warranted based on the fact that the wells are reported as deep and completed in a confined sandstone bedrock aquifer. Before a susceptibility waiver is requested, the PWS Operators are encouraged to carefully review the following section on Monitoring Waiver Requirements for confined aquifers. If after reviewing this section it is determined that an additional waivers are feasible, the Town of Plevna PWS should submit a letter with the proper documentation to DEQ requesting monitoring waivers. Table 9 shows how identified potential contaminant sources affect the eligibility for monitoring waivers.

Table 10. Susceptibility Assessment as it relates to waiver eligibility for significant potential contaminant sources in the Inventory Region.

Source	Contaminant	Susceptibility	Waiver Eligibility
Municipal Sewer Mains (>50% of inventory region)	VOCs, SOCs, metals, pathogens, nitrates, others	Low	Waivers are not available for pathogens and nitrate The number of sources in the Plevna area likely precludes a waiver
Railway	Pesticides, fertilizers, VOCs, SOCs, other	Low	Chemical use in the areas likely precludes waivers for some chemicals
Irrigation Canal	Pathogens, nitrate, VOCs, SOCs, and other potential contaminants	Very Low	Chemical use likely precludes waivers for some chemicals. Waivers are not available for pathogens and nitrate
Sewage Disposal/Wastewater Discharge Site	Pathogens, nitrate, VOCs, SOCs	Very Low	Waivers are not available for pathogens and nitrate

Monitoring Waiver Requirements

The 1986 Amendments to the Safe Drinking Water Act require that community and non-community PWSs sample drinking water sources for the presence of volatile organic chemicals (VOCs) and synthetic organic chemicals (SOCs). The US EPA has authorized states to issue monitoring waivers for the organic chemicals to systems that have completed an approved waiver application and review process. All PWSs in the State of Montana are eligible for consideration of monitoring waivers for several organic chemicals. The chemicals diquat, endothall, glyphosate, dioxins, ethylene dibromide (EDB), dibromochloropropane (DBCP), and polychlorinated biphenyls are excluded from monitoring requirements by statewide waivers.

Use Waivers

A Use Waiver can be allowed if through a vulnerability assessment, it is determined that specific organic chemicals were not used, manufactured, or stored in the area of a water source (or source area). If certain organic chemicals have been used, or if the use is unknown, the system would be determined to be vulnerable to organic chemical contamination and ineligible for a Use Waiver for those particular contaminants.

Susceptibility Waivers

If a Use Waiver is not granted, a system may still be eligible for a Susceptibility Waiver, if through a vulnerability assessment it is demonstrated that the water source would not be susceptible to contamination. Susceptibility is based on prior analytical or vulnerability assessment results, environmental persistence, and transport of the contaminants, natural protection of the source, wellhead protection program efforts, and the level of susceptibility indicators (such as nitrate and coliform bacteria). The vulnerability assessment of a surface water source must consider the watershed area above the source, or a minimum fixed radius of 1.5 miles upgradient of the surface water intake. PWSs developed in unconfined aquifers should use a minimum fixed radius of 1.0 mile as an area of investigation for the use of organic chemicals. Vulnerability assessment of spring water sources should use a minimum fixed radius of 1.0 mile as an area of investigation for the use of organic chemicals. Shallow groundwater sources under the direct influence of surface water (GWUDISW) should use the same area of investigation as surface water systems; that is, the watershed area above the source, or a minimum fixed radius of 1.5 miles upgradient of the point of diversion. The purpose of the vulnerability assessment procedures outlined in this section is to determine which of the organic chemical contaminants are in the area of investigation.

Given the wide range of landforms, land uses, and the diversity of groundwater and surface water sources across the state, additional information is often required during the review of a waiver application. Additional information may include well logs, pump test data, or water quality monitoring data from surrounding public water systems; delineation of zones of influence and contribution to a well; Time-of-Travel or attenuation studies; vulnerability mapping; and the use of computerized groundwater flow and transport models. DEQ's PWS Section and DEQ's Source Water Protection Program will conduct review of an organic chemical monitoring waiver application. Other state agencies may be asked for assistance.

Susceptibility Waiver for Confined Aquifers

Confined groundwater is isolated from overlying material by relatively impermeable geologic formations. A confined aquifer is subject to pressures higher than atmospheric pressure that would exist at the top of the aquifer if the aquifer were not geologically confined. A well that is drilled through the impervious layer into a confined aquifer will enable the water to rise in the borehole to a level that is proportional to the water pressure (hydrostatic head) that exists at the top of a confined aquifer.

The susceptibility of a confined aquifer relates to the probability of an introduced contaminant to travel from the source of contamination to the aquifer. Susceptibility of an aquifer to contamination will be influenced by the hydrogeologic characteristics of the soil,

vadose zone (the unsaturated geologic materials between the ground surface and the aquifer), and confining layers. Important hydrogeologic controls include the thickness of the soil, the depth of the aquifer, the permeability of the soil and vadose zones, the thickness and uniformity of low permeability and confining layers between the surface and the aquifer, and hydrostatic head of the aquifer. These factors will control how readily a contaminant will infiltrate and percolate toward the groundwater.

The Susceptibility waiver has the objective of assessing the potential of contaminants reaching the groundwater used by the PWS. A groundwater source that appears to be confined from surface infiltration in the immediate area of the wellhead may eventually be affected by contaminated groundwater flow from elsewhere in the recharge area. Contaminants could also enter the confined aquifer through improper well construction or abandonment where the well provides a hydraulic connection from the surface to the confined aquifer. The extent of confinement of an aquifer is critical to limiting susceptibility to organic chemical contamination. Regional conditions that define the confinement of a groundwater source must be demonstrated by the PWS in order to be considered for a confined aquifer susceptibility waiver. Confinement of an aquifer can be demonstrated by pump test data (storage coefficient), geologic mapping, and well logs. Site-specific information is required to sufficiently represent the recharge area of the aquifer and the zone of contribution to the PWS well. The following information should be provided:

- Abandoned wells in the region (zone of contribution to the well),
- Other wells in the region (zone of contribution to the well),
- Nitrate/Coliform bacteria analytical history of the PWS well,
- Organic chemical analytical history of the PWS well,

Susceptibility Waiver for Unconfined Aquifers

Unconfined aquifers are the most common source of usable groundwater. Unconfined aquifers differ from confined aquifers in that the groundwater is not regionally contained within relatively impervious geologic strata. As a result, the upper groundwater surface or water table in an unconfined aquifer is not under pressure that produces hydrostatic head common to confined aquifers.

Unconfined aquifers are usually locally recharged from surface water or precipitation. In general, groundwater flow gradients in unconfined aquifers reflect surface topography, and the residence time of water in the aquifer is comparatively shorter than for water in confined aquifers. Similar water chemistry often exists between unconfined groundwater and area surface water, and physical parameters and dissolved constituents can be an indicator of the hydraulic connection between groundwater and surface water. Consequently, unconfined aquifers can be susceptible to contamination by organic chemicals migrating from the ground surface to groundwater.

The objective of the susceptibility waiver application is to assess the potential of organic chemical migration from the surface to the unconfined aquifer. The general procedures make use of a combination of site-specific information pertaining to the location and construction of the source development, monitoring history of the source, geologic characteristics of the unsaturated soil and vadose zones, and chemical characteristics of the organic chemicals

pertaining to their mobility and persistence in the environment. The zone of contribution of the unconfined groundwater source must be defined and plotted. This should describe the groundwater flow directions, gradients, and a 3-year time-of-travel. All surface bodies within 1,000 feet of the PWS well(s) must be plotted. Analytical monitoring history of the PWS well and those nearby should be provided as well.

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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.

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.

Delineation. A process of mapping source water management areas.

Effective Porosity. The percent of soil, sediment, or rock through which fluids, such as air or water, can pass. Effective porosity is always less than total porosity because fluids can not pass through all openings.

Hardness. Characteristic of water caused by presence of various salts. 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 an area expected to contribute water to a public water supply well within a fixed distance or a specified groundwater time-of-travel distance.

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 nitrates are septic tanks, feed lots and fertilizers.

Nonpoint-Source Pollution. Pollution sources 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. A bacterial organism or virus 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.

Porosity. The percent of soil, sediment, or rock filled by air, water, or other fluid.

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

SIC Code. The U.S. Standard Industrial Classification (SIC) Codes classify categories of businesses. SIC Codes cover the entire range of business categories that exist within the economy.

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.

Susceptibility (of a PWS). The potential for a PWS to draw water contaminated 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). Man made organic chemical compounds (e.g. 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.

Total Maximum Daily Load (TMDL). The total pollutant load to a surface water body from point, non-point, and natural sources. The TMDL program was established by section 303(d) of the Clean Water Act to help states implement water quality standards.

Turbidity. The cloudy appearance of water caused by the presence of suspended matter.

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 (e.g. fuels and solvents).

Recharge Region / Watershed. The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common delivery point.

* Definitions taken from EPA's Glossary of Selected Terms and Abbreviations and other sources.

APPENDICES

APPENDIX A – SIC Data for the Plevna area

NAME	ADDRESS	CITY	STATE	ZIP	PHONE	SIC1	LATITUDE	LONGITUDE	PRECISION	COUNTYNAME
Kinsey Auction Co		Plevna	MT	59344	406-772-5812	738901	46.388760	-104.64708	4	Fallon
Plevna High School	327 N Main St	Plevna	MT	59344	406-772-5666	821103	46.388760	-104.64708	4	Fallon
Plevna Volunteer Fire Hall		Plevna	MT	59344	406-772-5530	922404	46.388760	-104.64708	4	Fallon

Appendix B DEQ PWS's Database Output- Embedded in Text on Page 4.

Inorganic Water Quality Sampling Results – Town of Plevna PWS

PWSID#	ANALYTE	CONCENTRATION	UNITS	COLLECTION DATE
MT0000307	1,1,1-TRICHLOROETHANE	0		30-Jul-93
MT0000307	1,1,1-TRICHLOROETHANE	0		19-Dec-96
MT0000307	1,1,1-TRICHLOROETHANE	0		23-Jun-97
MT0000307	1,1,1-TRICHLOROETHANE	0		20-Oct-98
MT0000307	1,1,1-TRICHLOROETHANE	0	MG/L	26-Sep-01
MT0000307	ANTIMONY	0		20-Oct-98
MT0000307	ANTIMONY	0	MG/L	26-Sep-01
MT0000307	ANTIMONY	0	MG/L	19-Aug-02
MT0000307	ARSENIC	0		25-May-77
MT0000307	ARSENIC	0		16-Apr-80
MT0000307	ARSENIC	0		25-May-83
MT0000307	ARSENIC	0		19-Jun-86
MT0000307	ARSENIC	0		27-Apr-89
MT0000307	ARSENIC	0		14-May-92
MT0000307	ARSENIC	0		30-Jul-93
MT0000307	ARSENIC	0		20-Oct-98
MT0000307	ARSENIC	0		26-Sep-01
MT0000307	ARSENIC	0		19-Aug-02
MT0000307	BARIUM	0		25-May-77
MT0000307	BARIUM	0		16-Apr-80
MT0000307	BARIUM	0.06	MG/L	25-May-83
MT0000307	BARIUM	0.06	MG/L	19-Jun-86
MT0000307	BARIUM	0.057	MG/L	27-Apr-89
MT0000307	BARIUM	0.065	MG/L	14-May-92
MT0000307	BARIUM	0.066	MG/L	30-Jul-93
MT0000307	BARIUM	0.06	MG/L	20-Oct-98
MT0000307	BARIUM	0	MG/L	26-Sep-01
MT0000307	BARIUM	0	MG/L	19-Aug-02
MT0000307	BERYLLIUM	0		20-Oct-98
MT0000307	BERYLLIUM	0	MG/L	26-Sep-01
MT0000307	BERYLLIUM	0	MG/L	19-Aug-02
MT0000307	CADMIUM	0		25-May-77
MT0000307	CADMIUM	0		16-Apr-80
MT0000307	CADMIUM	0		25-May-83
MT0000307	CADMIUM	0.002	MG/L	19-Jun-86
MT0000307	CADMIUM	0		27-Apr-89
MT0000307	CADMIUM	0		14-May-92
MT0000307	CADMIUM	0		30-Jul-93

MT0000307	CADMIUM	0		20-Oct-98
MT0000307	CADMIUM	0	MG/L	26-Sep-01
MT0000307	CADMIUM	0	MG/L	19-Aug-02
MT0000307	CHROMIUM	0		25-May-77
MT0000307	CHROMIUM	0		16-Apr-80
MT0000307	CHROMIUM	0		25-May-83
MT0000307	CHROMIUM	0		19-Jun-86
MT0000307	CHROMIUM	0		27-Apr-89
MT0000307	CHROMIUM	0		14-May-92
MT0000307	CHROMIUM	0		30-Jul-93
MT0000307	CHROMIUM	0		20-Oct-98
MT0000307	CHROMIUM	0	MG/L	26-Sep-01
MT0000307	CHROMIUM	0	MG/L	19-Aug-02
MT0000307	DINOSEB	0		30-Jul-93
MT0000307	DINOSEB	0		20-Oct-98
MT0000307	DINOSEB	0	MG/L	26-Sep-01
MT0000307	FLUORIDE	0.8	MG/L	25-May-77
MT0000307	FLUORIDE	0.94	MG/L	16-Apr-80
MT0000307	FLUORIDE	0.89	MG/L	25-May-83
MT0000307	FLUORIDE	0.89	MG/L	19-Jun-86
MT0000307	FLUORIDE	0.95	MG/L	27-Apr-89
MT0000307	FLUORIDE	0.88	MG/L	14-May-92
MT0000307	FLUORIDE	1	MG/L	30-Jul-93
MT0000307	FLUORIDE	0.92	MG/L	20-Oct-98
MT0000307	FLUORIDE	0.95	MG/L	26-Sep-01
MT0000307	FLUORIDE	0.99	MG/L	19-Aug-02
MT0000307	MERCURY	0		25-May-77
MT0000307	MERCURY	0		16-Apr-80
MT0000307	MERCURY	0		25-May-83
MT0000307	MERCURY	0		19-Jun-86
MT0000307	MERCURY	0		27-Apr-89
MT0000307	MERCURY	0		14-May-92
MT0000307	MERCURY	0		30-Jul-93
MT0000307	MERCURY	0		20-Oct-98
MT0000307	MERCURY	0	MG/L	26-Sep-01
MT0000307	MERCURY	0	MG/L	19-Aug-02
MT0000307	NICKEL	0		20-Oct-98
MT0000307	NICKEL	0	MG/L	26-Sep-01
MT0000307	NICKEL	0	MG/L	19-Aug-02
MT0000307	NITRATE+NITRITE (AS N)	0.04	MG/L	25-May-77
MT0000307	NITRATE+NITRITE (AS N)	0.25	MG/L	16-Apr-80
MT0000307	NITRATE+NITRITE (AS N)	0.24	MG/L	25-May-83
MT0000307	NITRATE+NITRITE (AS N)	0		19-Jun-86
MT0000307	NITRATE+NITRITE (AS N)	0.02	MG/L	27-Apr-89
MT0000307	NITRATE+NITRITE (AS N)	0.02	MG/L	14-May-92
MT0000307	NITRATE+NITRITE (AS N)	0.03	MG/L	30-Jul-93

MT0000307	NITRATE+NITRITE (AS N)	0.03	MG/L	04-Feb-94
MT0000307	NITRATE+NITRITE (AS N)	0.01	MG/L	05-Dec-95
MT0000307	NITRATE+NITRITE (AS N)	0		17-Dec-96
MT0000307	NITRATE+NITRITE (AS N)	0.09	MG/L	23-Jun-97
MT0000307	NITRATE+NITRITE (AS N)	0.02	MG/L	20-Oct-98
MT0000307	NITRATE+NITRITE (AS N)	0		04-Nov-99
MT0000307	NITRATE+NITRITE (AS N)	0		05-Dec-00
MT0000307	NITRATE+NITRITE (AS N)	0.09	MG/L	26-Sep-01
MT0000307	NITRATE+NITRITE (AS N)	0		19-Aug-02
MT0000307	OXAMYL (VYDATE)	0		30-Jul-93
MT0000307	OXAMYL (VYDATE)	0		20-Oct-98
MT0000307	OXAMYL (VYDATE)	0	MG/L	26-Sep-01
MT0000307	POLYCHLORINATED BIPHENYLS (PCB)	0		30-Jul-93
MT0000307	POLYCHLORINATED BIPHENYLS (PCB)	0		20-Oct-98
MT0000307	POLYCHLORINATED BIPHENYLS (PCB)	0	MG/L	26-Sep-01
MT0000307	SELENIUM	0		25-May-77
MT0000307	SELENIUM	0		16-Apr-80
MT0000307	SELENIUM	0		25-May-83
MT0000307	SELENIUM	0		19-Jun-86
MT0000307	SELENIUM	0		27-Apr-89
MT0000307	SELENIUM	0		14-May-92
MT0000307	SELENIUM	0		30-Jul-93
MT0000307	SELENIUM	0		20-Oct-98
MT0000307	SELENIUM	0	MG/L	26-Sep-01
MT0000307	SELENIUM	0	MG/L	19-Aug-02
MT0000307	SIMAZINE	0		30-Jul-93
MT0000307	SIMAZINE	0		20-Oct-98
MT0000307	SIMAZINE	0	MG/L	26-Sep-01
MT0000307	THALLIUM	0		20-Oct-98
MT0000307	THALLIUM	0	MG/L	26-Sep-01
MT0000307	THALLIUM	0	MG/L	19-Aug-02

Bacteriological Sampling Data - Town of Plevna PWS

PWSID#	COLLECTION DATE	SAMPLE CODE	PRESENCE OR ABSENCE	CODE	ANALYTE NAME
MT0000307	7/9/2003	RP	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	7/9/2003	RP	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	7/9/2003	RP	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	7/9/2003	RP	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	7/7/2003	RT	A	3014	COLIFORM, E. COLI
MT0000307	7/7/2003	RT	P	3100	COLIFORM, TOTAL (TCR)
MT0000307	6/3/2003	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	5/5/2003	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	4/1/2003	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	3/3/2003	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	2/10/2003	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	1/7/2003	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	12/3/2002	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	11/4/2002	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	10/1/2002	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	9/3/2002	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	8/5/2002	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	7/9/2002	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	6/3/2002	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	5/7/2002	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	4/2/2002	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	3/6/2002	RT	A	3100	COLIFORM, TOTAL (TCR)

Town of Plevna
SWDAR

MT0000307	2/19/2002	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	1/14/2002	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	12/10/2001	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	11/13/2001	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	10/29/2001	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	9/5/2001	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	8/7/2001	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	7/9/2001	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	6/6/2001	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	5/14/2001	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	4/2/2001	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	3/6/2001	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	2/6/2001	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	1/8/2001	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	12/12/2000	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	11/13/2000	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	10/2/2000	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	9/11/2000	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	8/28/2000	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	7/10/2000	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	6/12/2000	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	5/9/2000	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	4/11/2000	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	3/1/2000	RT	A	3100	COLIFORM, TOTAL (TCR)

Town of Plevna
SWDAR

MT0000307	2/1/2000	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	1/18/2000	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	12/6/1999	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	11/15/1999	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	10/18/1999	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	9/20/1999	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	9/15/1999	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	9/13/1999	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	8/2/1999	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	7/7/1999	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	6/2/1999	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	5/5/1999	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	4/7/1999	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	3/3/1999	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	2/3/1999	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	1/6/1999	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	12/2/1998	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	11/23/1998	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	10/15/1998	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	10/13/1998	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	9/2/1998	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	8/5/1998	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	7/1/1998	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	6/3/1998	RT	A	3100	COLIFORM, TOTAL (TCR)

Town of Plevna
 SWDAR

MT0000307	5/6/1998	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	4/1/1998	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	3/4/1998	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	2/3/1998	RT	A	3100	COLIFORM, TOTAL (TCR)
MT0000307	1/7/1998	RT	A	3100	COLIFORM, TOTAL (TCR)

APPENDIX C - Sanitary Survey

APPENDIX D - Concurrence Letter & Other Correspondence