

***SOURCE WATER DELINEATION AND
ASSESSMENT REPORT***

**Clinton School
Public Water System**

PWSID # 00824

Date of Report: 6/30/03

Darren Eichenlaub
Certified Operator
P.O. Box 250
Clinton, MT 59825

(406) 825-3113

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ACKNOWLEDGMENTS

This Delineation and Assessment Report for the Clinton School PWS (source #00824) was completed by Michelle Hutchins, Jon Harvala and Travis Ross, Environmental Health Specialists with the Missoula Valley Water Quality District. Clinton is located in Missoula County. The system can be contacted through Mark Lattrielle (406) 825-3113.

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.

AST Aboveground storage tank.

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.

HazMat Hazardous Materials Response Team.

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.

MGWPCS Montana Ground Water Pollution Control System.

MPDES Montana Pollution Discharge Elimination System.

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.

NOAA National Oceanic and Atmospheric Administration.

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.

NPL National Priority List (Superfund).

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.

SDWA Safe Drinking Water Act.

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.

UST Underground storage tank.

Volatile Organic Compounds (VOC) Any organic compound that evaporates readily to the atmosphere.

MWQA Montana Water Quality Act.

WQD Missoula Valley Water Quality District.

* 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 Clinton School PWS 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 Clinton School PWS. 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. Clinton School 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 Clinton School PWS operator and the community to complete a source water protection plan that meets their specific needs.

CHAPTER 1: BACKGROUND

The Community

Clinton is located on the Clark Fork River, approximately 15 miles upstream from the City of Missoula ([Figure 1](#)). The population of the Clinton area is 549 (U.S. Census 2000). The population of Missoula County in 2000 was 95,802 with 57,053 people living in the city of Missoula (Census 2000). Interstate 90 runs along the northern edge of Missoula and along the northeastern side of Clinton ([Figure 2](#)). A significant portion of the Clinton population works in Missoula. Major Missoula area employers include the University of Montana, and the two local hospitals, each employing more than 1000 people. Stimson Lumber operates a lumber and plywood mill in the Bonner area, and employs 450 people. Other economic contributors include Smurfit-Stone Container, several transportation companies, as well as tourism, small businesses and outlying agriculture and timber operations.

Clinton residences and businesses currently rely upon onsite septic systems for sewage treatment; drinking water is supplied by private and small public supply wells.

Geographic setting

Clinton is located in the upper Clark Fork Valley, upstream of Missoula, Montana, on the Clark Fork River. Milltown Dam and Milltown Reservoir are located downstream from Clinton, at the confluence of the Clark Fork and Blackfoot Rivers. Clinton is approximately 3470 feet above sea level. The Valley is bordered on the south/west by the Sapphire Range, and on the north/east by the Garnet Range. The annual average precipitation is approximately 12.6 inches (43 inches of snow); the annual average temperature is 44°F with highest average maximum temperatures (83°F) occurring in July and lowest average minimum temperatures (12°F) occurring in January (estimates based on NOAA data).

General description of the Source Water

The Clinton School PWS is a non-transient, non-community water system that obtains water from one well finished in the Clark Fork Valley aquifer. The aquifer consists of unconsolidated alluvial sand, gravel and cobbles with a many lenses of clay and is recharged mainly by underflow from the Clark Fork Valley and leakage from the Clark Fork River.

The Public Water Supply

The Clinton School PWS obtains water from one well finished in the alluvial aquifer. The well is located at 19075 East Mullan Road in Missoula County. The well draws from an approximate depth of 50 feet below the ground surface. The Clinton School PWS currently serves an estimated population of 250 people with 1 active service connection. The location of the well is shown in [Figure 2](#). The well links to two captive air tanks prior to distribution. The tanks are located in a room adjacent to the boiler room. There is currently an ion exchange water softening treatment prior to distribution. A general plan showing the layout of the distribution system is presented in Appendix A, with a copy of the sanitary survey and the driller's well log.

Water Quality

Every PWS is required to perform monitoring for contamination to their water supply. Water is typically monitored for total coliform and fecal coliform bacteria, nitrates and metals. 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. The Clinton School PWS #824 had a reported non-acute violation of total coliform bacteria MCLs in September of 2002.

Table 1 shows typical chemical constituents of groundwater in this area, and Table 2 shows average chemical analysis data for the Clinton School PWS and a neighboring well.

Portions of the upper Clark Fork watershed are on the National Priority List (NPL) under the Comprehensive Environmental Response, Compensation and Liability Act (Superfund). Historic mining activity resulted in the release and deposition of toxic mine tailings, and contamination of large areas along and within the river course. Some of these contaminated sediments accumulated behind Milltown Dam, approximately ten miles downstream from Clinton, and contaminated groundwater in the Milltown area with arsenic and other metals. The contamination for which the EPA has proposed remediation lies upstream and downstream of the Clinton area, and does not appear to significantly impact PWS 824. Analytic results from this and nearby wells support this conclusion. Arsenic and other metals levels measured in samples from the Clinton School PWS have been consistently below water quality standards. Cleanup of the upper Clark Fork, mandated by the Environmental Protection Agency, will further minimize this threat.

Table 1. Sample water quality data for the upper Clark Fork aquifer, Turah/Clinton Area (Juday and Keller, 1978; Nimick, 1993).

Sample date	Well #/ Location	PH	Ca Mg/L	Mg Mg/L	Na Mg/L	SiO ₂ Mg/L	SO ₄ Mg/L	NO ₃ Mg/L	P Mg/L	Cl Mg/L	HCO ₃ Mg/L	TDS Mg/L	Fe Mg/L	K Mg/L	As Mg/L
1978 (Ave.)	#210, 211 Turah	7.4	49	15.9	8.5	15.3	68.3	0.18	0.024	3.8	163	327	--	2.6	--
1987	12N17W 18ADDB01	7.3	59	13	9.1	19	45	0.29	<0.1	3.1	210	253	<2	2.0	.0011

(-- = not tested for this analyte)

Table 2. Water quality data for Clinton School and neighboring well (MDEQ, PWS analytical results, 1995-2001).

Sample Date	Well #/ Location	Ba (Mg/L)	Sb (Mg/L)	SO ₄ (Mg/L)	Cd (Mg/L)	NO ₃ (Mg/L)	As (Mg/L)	Fl ⁻	Organic Contaminants
1995-2001 (Ave.)	PWS #824 T12N, R17W, 27 AACD	0.11	0.0012	44	.00017	0.67	0.0015	0.29	None Detected
1995-2001 (Ave.)	PWS #370, 20½ Clarkston St. Clinton	0.05	<.0005	28	<.0005	0.24	<.0005	0.3	None Detected

CHAPTER 2: DELINEATION

The source water protection area, the land area that contributes water to Clinton School PWS, is identified in this chapter. Four management areas are identified within the source water protection area: the control zone, inventory region, surface water buffer zone 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 surface water buffer zone is delineated based on standard distance criteria of 10 miles upstream from the ground water inventory zone and encompasses ½ mile width of land area on each side of the drainages. The recharge region represents the entire portion of the aquifer that contributes water to the Clinton School water system.

Hydrogeologic Conditions

Geologic and hydrogeologic studies of the upper Clark Fork Valley are listed in Table 3, with a summary of maps listed in Table 4. The following description is derived from these reports.

Faulting and folding along the Lewis and Clark Lineament has shaped the upper Clark Fork Valley's complex geologic structure. Precambrian metasedimentary rocks of the Belt Supergroup, and a few interspersed Mesozoic and Paleozoic sedimentary rocks surround the valley, with peaks of 5000 to 7000 feet elevation. This relatively impermeable and deeply eroded landscape was partially filled with Tertiary and Quaternary alluvium. Portions of the Tertiary sediments were scoured from the valley during the repeated draining of Glacial Lake Missoula approximately 12,000 to 15,000 years ago, during the Wisconsin glacial stage, and were replaced with layers of coarse-grained sand, gravel and cobbles, deposited during these catastrophic events. Lenses of silt and clay residue from the glacial lakebed remain, but yield little water.

The upper Clark Fork Valley aquifer is predominantly unconfined and composed of unconsolidated Quaternary alluvium, with Tertiary alluvium in some areas. In this area there are many lenses of clay interbedded with sand and gravel units. Depth to the water table ranges from approximately 6 feet to 70 feet below land surface. The seasonal fluctuation of the groundwater table is approximately 5 feet. The lateral extent of the aquifer varies from about 0.6 miles near Turah, to approximately one mile wide just downstream from Clinton. The aquifer has high source water sensitivity because it is unconfined and comprised of relatively coarse-grained material. Groundwater flows generally northward through Clinton, roughly paralleling the flow of the Clark Fork River, and joins the Missoula Valley Aquifer near the mouth of Hellgate Canyon, approximately 18 miles downstream from Clinton. The Missoula Valley Aquifer has been designated a "Sole Source Aquifer" by the U.S. EPA. A geologic map of the Clinton area is presented in [Figure 3](#). [Figure 4](#) represents a generalized ground water flow map. Geologic cross sections are shown in [Figure 5](#).

Table 3. List of geologic and hydrogeologic investigations in the upper Clark Fork area.

Title of Project	Reference	Area Covered	Project Purpose.
Preliminary Groundwater Modeling To Estimate Effects of Dam and Sediment Removal on the Alluvial Aquifer in Milltown, Montana	Christine Brick, 2003	East Missoula to Piltzville	Likely hydrogeologic impact of removing Milltown Dam
Hydrogeology and water resources of the Missoula Basin, Montana	A.L. Geldon, 1980	Missoula Basin	To determine the storage potential of the basin
The Interaction of the Clark Fork River and the Hellgate Valley Aquifer Near Milltown, Montana.	S.L. Gestring, 1994	Hellgate Canyon, Missoula, Montana	To quantify the interaction between the Clark Fork River and the Hellgate Valley Aquifer
Geographic, Geologic, and Hydrologic Summaries of Intermontane Basins of the Northern Rocky Mountains, Montana	Kendy and Tresch, 1996.	Intermontane basins of the northern Rocky Mountains	Summarize the geographic, geologic and hydrologic characteristics of the Rocky Mountain region in western Montana.
Geology and Ground-water Resources of the Missoula Basin, Montana	McMurtrey, et. al, 1965	Missoula Basin	Summary of geology and hydrogeology
Hydrology and Water Chemistry of Shallow Aquifers Along the Upper Clark Fork, Western Montana	D.A. Nimick, 1993	Upper Clark Fork region	Analyze hydrology of bedrock and unconsolidated Tertiary and Quaternary deposits
A Depth to Bedrock Model of the Hellgate Canyon and Bandmann Flats area, Western Montana using Constrained Inversion of Gravity Data	D.L. Nyquest, 2001	Hellgate Canyon/Bandmann Flats	Characterize subsurface topography of bedrock underlying aquifer

Table 4. List of geologic or hydrogeologic maps available for the upper Clark Fork area.

Title or Description	Area Covered	Reference
Water table map from measured values; Distribution of hydraulic conductivity in the calibrated model	Hellgate Canyon, Missoula County	Brick, C., 2003. Preliminary Groundwater Modeling To Estimate Effects of Dam and Sediment Removal on the Alluvial Aquifer in Milltown, MT
Geology of the Bonner Quadrangle Montana	Missoula to east of Bonner Montana	Nelson, W.H., and Dobell, J.P., 1961. Geologic Map and Sections of the Bonner Quadrangle, Montana. USGS Bulletin 1111 - F
Generalized geologic map of the Butte 1 X 2 degree quadrangle, Montana	Approximately 100 X 70 mi. area of Missoula, Powell, Lewis & Clark and Deer Lodge Counties	Wallace, C.A., 1987, USGS Miscellaneous Field Studies Map MF-1925
Geology of the Bonner Quadrangle Montana	Missoula to east of Bonner Montana	Nelson, W.H., and Dobell, J.P., 1961. Geologic Map and Sections of the Bonner Quadrangle, Montana. USGS Bulletin 1111 - F

Conceptual Model and Assumptions

A conceptual hydrogeologic model is a simplified representation of the hydrogeologic system. This section describes the conceptual model used for this report.

The ground water in the upper Clark Fork Valley is predominantly unconfined and occurs in unconsolidated sand and gravel units beneath the valley floor, which are laterally and basally bounded by the relatively impermeable bedrock. Fractured bedrock yields small quantities of water in some areas. Recharge is derived from the Clark Fork River, underflow from the Clark Fork Valley, and from tributary drainages and excess irrigation and precipitation. The Clark Fork River loses water to the aquifer along some stretches and gains water from the aquifer along other stretches of its path through the Clark Fork Valley (Nimick, 1993). Ground water flows generally north northwestward through the Clinton area, flowing the same overall direction as the Clark Fork River ([Figure 5](#)).

Methods and Criteria

The Montana Department of Environmental Quality specifies the methods and criteria used for source water protection zone delineation for the Clinton School (DEQ, 1999). Because the upper Clark Fork aquifer communicates with the Clark Fork River and tributary streams in the area, Surface Water Buffer Zones were applied to the Clark Fork River and tributary drainages. Time-of-travel calculations were completed for the ground water system using the uniform flow equation (EPA, 1991). Using field investigation and published reports, estimates of the aquifer properties were made and are discussed in the following section. 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 drainages.

Well(s) Information

The well is located at 19075 E. Mullan Road in Missoula County. The well draws from an approximate depth of 50 feet below the ground surface. Table 5 is a summary of the well information and Appendix B contains copies of the driller's well log.

Table 5. Source well information for Clinton School PWS.

Information	Well #1
PWS Source Code	00824 - 002
Well Location (T, R, Sec or lat, long)	Lat: 46.7728 Long: - 113.7132
MBMG#	66693
Date Well was Completed	1/1/1906
Total Depth	50 ft
Perforated Interval	--
Static Water Level	30 ft
Pumping Water Level	unknown
Drawdown	unknown
Test Pumping Rate	unknown
Specific Capacity	unknown

Model Input

Time-of-travel input values are conservative assumptions made to identify areas that potentially impact source water for the Clinton School PWS. 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 112,500 ft²/day (T = Kb, where K = hydraulic conductivity = 1500 ft/day; b = aquifer thickness = 75 ft).

Thickness: The value for the thickness of the aquifer is estimated at 75 ft, inferred from well log data for this area.

Hydraulic Conductivity: A value for hydraulic conductivity is estimated to be 1500 ft/day, based upon an aquifer test conducted approximately 6 miles downstream at Turah, which yielded an estimated conductivity of 289 feet per day (Land and Water, 1997); by groundwater modeling of the area upstream of the Milltown Dam (Brick, 2003), which provided an estimate of 2500 feet per day; and typical hydraulic conductivities of unconsolidated alluvial deposits. We have chosen a value that should provide a conservative estimate of time-of-travel distances.

Hydraulic Gradient: The hydraulic gradient was determined by measuring groundwater and surface water elevations in Clinton, and is estimated at .0037 (WQD, 2003).

Flow Direction: The estimated average flow direction for the purposes of this study is slightly west of north (337 degrees), which follows the general direction of the Clark Fork River in this area; [figure 4](#) is a potentiometric surface map based on measured groundwater and surface water elevations (WQD, 2003).

Porosity: The value for effective porosity is estimated at 25%. The estimated value is considered representative of unconsolidated sand and gravel, and is between two published estimates of 20% (Clark, 1986) and 40% (McMurtrey et al., 1965).

Pumping Rate: The estimated pumping rate was based on 25 gallons per day, per person (Salvato, 1992).

Time-of-Travel Calculation

Travel distances for 100 days, one year and three years are calculated based on input parameters summarized below. 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 100 day, one- and three-year times-of-travel (Table 4). Aquifer flow properties estimated are hydraulic conductivity, aquifer thickness, and effective porosity. An average estimated hydraulic conductivity (K) value of 1500 ft/day is used to delineate the inventory region based upon measured and modeled values downstream (Land & Water, 1997; Brick, 2003), and upon typical values for unconsolidated alluvial deposits (Fetter, 1980; Freeze and Cherry, 1979). Transmissivity was estimated at 112,500 ft.²/day by assuming an aquifer thickness of 75 ft. Effective porosity, the percent of a rock or sediment volume occupied by interconnected voids, is estimated at 25%.

The ground water near the Clinton School PWS flows north northwestward, generally following the flow of the Clark Fork River (WQD, 2003). Finally, the pumping rate of the well is based on 25 gallons per day, estimated use per person.

Table 6. Estimates of input parameters used to delineate the Clinton School source water protection area.

Input Parameter	Range of Values	Values Used
PWS Source Code		00824-002
Transmissivity	1000 – 312,500 ft²	112,500 ft²/day
Thickness	50 – 125 ft.	75 ft.
Hydraulic Conductivity	20 – 2500 ft/day	1500 ft/day
Hydraulic Gradient	0.0035 0.0037	0.0037
Flow Direction		337
Effective Porosity	20 – 40%	25%
Pumping Rate	2.8 – 5.6 gpm	3.5 gpm
100-day TOT		2225 ft 0.42 miles
1-Year TOT*		8100 ft 1.53 miles
3-Year TOT*		24300 ft 4.60 miles

*Time of Travel

Delineation Results

The results of the calculations indicate an estimated average distance of 2225 feet (0.42 miles) for a 100-day time of travel (TOT), an average distance of 8100 feet (1.53 miles) for a one-year TOT and an average distance of 24,300 feet (4.60 miles) for a three-year TOT. The delineated inventory zones are depicted in Figure 6 for the Clinton School PWS. The surface water buffer zone for the Clark Fork River is shown in Figure 7. The recharge region for the aquifer comprises the aquifer upgradient from the supply wells, delineated in the inventory zone. A 45-degree range of groundwater flow directions was used to define the lateral boundaries of the inventory region (Figure 6).

Limiting Factors

This delineation is based on estimated aquifer properties, pumping conditions and groundwater flow conditions, and assumes uniform flow in a homogeneous aquifer. 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, and the actual transient flow and heterogeneous stratigraphy can only be roughly approximated by the above assumptions. Time-of-travel distances are estimates based on available data. We have chosen input parameter values that will give us conservative but reasonable estimates of capture zones. This should provide a protective margin for inaccuracy inherent in calculations of this nature.

CHAPTER 3: INVENTORY

An inventory of potential sources of contamination was conducted for the Clinton School PWS within the control and inventory regions. Potential sources of all primary drinking water contaminants and pathogens were identified, however, only significant potential contaminant sources were selected for detailed inventory. The significant potential contaminants in the Clinton School PWS inventory region are nitrate, pathogens, fuels, solvents, herbicides, pesticides, and metals. The inventory for the Clinton School PWS 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.

Inventory Method

Available databases were searched to identify businesses and land uses that are potential sources of regulated contaminants in the inventory region. A “windshield survey” was conducted to obtain additional information for this assessment. 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 was identified from boundaries of sewer coverage obtained from municipal wastewater utilities. Septic system density outside of the sewered area was evaluated using the Montana Department of Revenue Computer Assisted Mass Appraisal (CAMA) database.

Step 2: EPA's Envirofacts System was queried to identify EPA regulated facilities located in the Inventory Region. 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.

Step 3: The Permit Compliance System (PCS) was queried using Envirofacts to identify Concentrated Animal Feeding Operations 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.

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

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.

Step 6: A “windshield survey” was undertaken to identify additional potential contaminant sources not listed in the databases.

Step 7: Major road and rail transportation routes were identified throughout the inventory region.

Step 8. 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.

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.

Table 7. Land Use Types and Map Codes.

Land Use Type	Map Code	Land Use Type	Map Code
Sewered residential	SR	Industrial	I
Sewered commercial	SC	Railroad right-of-way	RRW
Sewered mixed	SM	Highway right-of-way	HRW
Unsewered residential	UR	Agricultural dryland crop	ADC
Unsewered mixed	UM	Agricultural irrigated crop	AIC
Unsewered commercial	UC	Agricultural irrigated pasture	AIP
		Agricultural dryland pasture	ADP
		Forest	F

Inventory Results/Control Zone

The area immediately surrounding the well is the schoolyard, parking and residential neighborhood.

Inventory Results/Inventory Region

Significant potential contaminant sources for the Clinton School PWS include nearby septic systems -- particularly the school's onsite septic system, which is located approximately 350 feet upgradient from the PWS well; fuel and chemical spills along transportation routes and pipelines; and agricultural land uses. Septic system density is approximately 109/mi² in the 1-year time-of-travel and 11.3/mi² in the 3-year time-of-travel zones. Clinton School is approximately 300 feet from the railroad line, 500 feet from I-90, and 850 feet from the petroleum pipeline.

Inventory Results/Surface Water Buffer Zones

Significant potential contaminant sources for the surface water buffer zone are pathogens and nitrates from sewage disposal systems ([Figure 9a](#)) ([Figure 9b](#)) and agricultural land use (which may also contribute pesticides and herbicides to surface waters), and chemicals from toxic release sites. Septic system density is approximately 1.6/mi² in the surface water buffer zone. There are no permitted confined animal feeding units in the Clinton area. Clinton School is approximately 1/3 mile from the Clark Fork River, and 500 feet from an irrigation canal.

Inventory Results/Recharge Region

The land use in the recharge area is primarily evergreen forest (70%), crop/pasture (17%), and grass/rangeland (4%). Potential hazards and general land uses for the area are depicted in [Figure 8](#).

The significant potential contaminant sources within the inventory zone are listed in Table 8. The general locations of these sources are shown in [Figure 10](#).

Table 8. Significant Potential Contaminant Sources for PWS #824 Inventory Region

Facility ID #	Map ID #	Facility Name	Address/Location	Type of Facility	Potential Contaminants
3-211093	1	Rock Creek Lodge	I-90 and Rock Creek Rd.	USTs	Fuel
	2	Clinton School	19075 E. Mullan Rd.	public septic system	Pathogens, nitrate
	Labeled	I-90/Hwy 12; Montana Rail Link		Transportation routes	Fuel, spills of chemicals
	Labeled	Yellowstone Pipeline		Petroleum pipeline	Petroleum products

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 information provided by state and federal databases. The windshield survey provides a level of quality assurance that the information presented reflects actual conditions. The inventory is also limited by the accuracy of the delineation, which is discussed above.

CHAPTER 4: SUSCEPTIBILITY ASSESSMENT

The susceptibility of Clinton School wells to significant potential contaminant sources is assessed in this chapter. 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 9). Hazard ratings are determined by the proximity of a potential point-source contaminant or the density of non-point source potential contaminants to the well. For the Clinton School 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. The susceptibility is then determined based upon the hazard and any barriers that mitigate the hazard. Barriers can be engineered structures, management actions and/or natural conditions. Spill catchments for fueling facilities and leak detection for underground storage tanks are examples of engineered barriers. Emergency planning and availability of trained hazardous materials response team, and best management practices are examples of management barriers. Clay soils, deep wells and a thick layer of substrate above an aquifer can be considered natural barriers.

Table 9. 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 7 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 inventory region, the relative hazard assigned is moderate.

For non-point sources, the relative hazard is assigned based on the following table:

Table 10. 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 11. Susceptibility assessment for significant potential contaminant sources in the Control Zone and Inventory Region.

Map ID#	Facility Name	Contaminant	Hazard	Barriers	Susceptibility	Management
Labeled	I-90/Hwy 12; Montana Rail Link	Fuel/chemicals	High		Very high	
Labeled	Yellowstone Pipeline	Petroleum products	High		Very high	
2	Clinton School septic system	Pathogens & nitrate	High	350 ft. separation	High	
Non-point	Septic density of 109/mi ²	Pathogens & nitrate	Moderate		Moderate	
1	Rock Creek Lodge USTs	Fuel	Moderate		Moderate	Leak prevention and detection

The susceptibility assessment indicates that the potential contaminant sources most likely to impact Clinton School water quality are transportation routes, the Yellowstone Pipeline, septic systems and underground storage tanks.

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APPENDIX A

PWS System Layout and Sanitary Survey

APPENDIX B

Well Log for PWS

**Montana Bureau of Mines and Geology
Ground-Water Information Center Site Report
CLINTON SCHOOL**

[Plot this site on a topographic map](#)
[View Hydrograph for this Site](#)
[View Water Quality for this Site](#)

Location Information

GWIC Id: 66693	Source of Data: LOG
Location (TRS): 12N 17W 27 ACD	Latitude (dd): 46.7728
County (MT): MISSOULA	Longitude (dd): -113.7132
DNRC Water Right: W049074	Geomethod: NAV-GPS
PWS Id: 00824002	Datum: 1927
Block:	Certificate of Survey:
Lot:	Type of Site: WELL
Addition:	

Site Notes: TURN SOUTH OFF OF CLINTON EXIT - EAST ONTO FRONTAGE ROAD - SCHOOL IS ON SOUTH SIDE OF ROAD - 1 MILE - GATED ENTRANCE ON EAST SIDE OF SCHOOL GAINS ACCESS TO BACK PARKING AREA. WELL IS IN LARGE CEMENT PLANTER SURROUNDED BY SHRUBS - FROST-FREE HYDRANT ADJACENT.

Well Construction and Performance Data

Total Depth (ft): 50.00	How Drilled:
Static Water Level (ft): 30.00	Driller's Name:
Pumping Water Level (ft):	Driller License:
Yield (gpm):	Completion Date (m/d/y): 1/1/1906
Test Type:	Special Conditions:
Test Duration:	Is Well Flowing?:
Drill Stem Setting (ft):	Shut-In Pressure:
Recovery Water Level (ft):	Geology/Aquifer: 112ALVM
Recovery Time (hrs):	Well/Water Use: PUBLIC WATER SUPPLY
Well Notes:	

Hole Diameter Information

No Hole Diameter Records currently in GWIC.

Casing Information¹

From	To	Dia	Description
0.0	50.0	0.0	

Annular Seal Information

No Seal Records currently in GWIC.

Completion Information¹

No Completion Records currently in GWIC.

Lithology Information

No Lithology Records currently in GWIC.

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

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

APPENDIX C

MBMG-GWIC Well Logs for Area

Ground Water Information Center
Wells Report

The following data were returned from the GWIC databases for the area you requested. For a more detailed description of the data view the [GWIC Metadata report](#). If you notice data entry errors or have questions please let us know by clicking [here](#) to send us an E-mail. If you wish to view a one page report for a particular site, click the hyperlinked **Gwic Id** for that well. Scroll to the right of your screen to view all the data.

Retrieval Statistics *				
Field	Max	Min	Count	Avg
Total Depth	99.00	20.00	53	54.40
Pumping Water Level	60.00	2.70	32	31.48
Static Water Level	86.00	4.50	43	23.78
Yield (gpm)	750.00	2.00	41	56.26

* These statistics do not take any geographic, topographic, or geologic factors into consideration. Negative swl values are reported for water levels that are above land surface.

Gwic Id	DNRC WR	Site Name	Location	Ver?	Type	Td	Pwl	Swl	Yield	Date	Use
66677		BLACKFOOT TELEPHONE	12N17W27	NO	WELL	70.00	43.00	30.00	30.00	11/7/1984	DOMESTIC
66669	17158	CANNON RICHARD	12N17W27	NO	WELL	60.00	45.00	32.00	55.00	6/23/1977	DOMESTIC
66672		CLINTON WOMENS CLUB INC.	12N17W27	NO	WELL	40.00				1/1/1900	PUBLIC WATER SUPPLY
128974		HEATH JIM	12N17W27	NO	WELL	60.00	50.00	30.00	50.00	8/11/1992	DOMESTIC
66675		HENDERSON FREIDA DOUGLAS	12N17W27	NO	WELL	60.00		60.00		1/1/1956	DOMESTIC
66671		LARSON RACHEL A.	12N17W27	NO	WELL	35.00		35.00	2.00	1/1/1945	DOMESTIC IRRIGATION
66674		LARSON RACHEL A.	12N17W27	NO	WELL	86.00		86.00		1/1/1949	DOMESTIC
66676		LEISCHNER ALLEN	12N17W27	NO	WELL	32.00	2.70	11.00	15.00	12/4/1973	DOMESTIC
66678		LUBDERS JOHN	12N17W27	NO	WELL	60.00	40.00	32.00	50.00	1/19/1987	DOMESTIC
126225		OCEAN WEST ARIZONA CO.	12N17W27	NO	WELL	61.50	40.00	30.00	50.00	10/4/1989	DOMESTIC
66673		ROWE MARTIN	12N17W27	NO	WELL	51.00	50.00	7.00	75.00	9/5/1980	DOMESTIC
66670		SMITH RALPH T. & JOSEPH M.	12N17W27	NO	WELL	20.00		10.00	30.00	1/1/1954	DOMESTIC
66680		CLINTON COMMUNITY	12N17W27A	NO	WELL	55.00	45.00	22.00	60.00	10/27/1973	PUBLIC WATER SUPPLY

	LEONARD									
<u>66697</u>	HEDGER CLIFFORD M. & BETTY J.	12N17W27DA	NO	WELL55.00	22.50				DOMESTIC IRRIGATION	
<u>66696</u>	NORTON DON H. & LUCILLE G.	12N17W27DA	NO	WELL50.00	750.00	1/1/1950			DOMESTIC	
<u>143728</u>	TAYLOR JAMES B. JR.	12N17W27DA	NO	WELL60.00	50.00	4.50	75.00	8/4/1994	DOMESTIC	
<u>706164</u>	UNNAMED WELL FROM GWSI	12N17W27DAAB	NO	WELL				1/1/1932	DOMESTIC	
<u>706165</u>	GONSTAD	12N17W27DABA	NO	WELL				1/1/1997	DOMESTIC	
<u>706166</u>	UNNAMED WELL FROM GWSI	12N17W27DABA	NO	WELL				5/13/1952	DOMESTIC	
<u>706167</u>	UNNAMED WELL FROM GWSI	12N17W27DACA	NO	WELL				1/1/1997	DOMESTIC	
<u>706168</u>	UNNAMED WELL FROM GWSI	12N17W27DACA	NO	WELL				1/1/1966	DOMESTIC	
<u>706169</u>	UNNAMED WELL FROM GWSI	12N17W27DACD	NO	WELL				1/1/1997	DOMESTIC	
<u>167743</u>	CLINTON FARMS LORENZO DAVID	12N17W27DAD	NO	WELL60.00	57.00	28.00	60.00	8/6/1998	IRRIGATION	
<u>706170</u>	UNNAMED WELL FROM GWSI	12N17W27DADC	NO	WELL				1/1/1997	DOMESTIC	
<u>706171</u>	UNNAMED WELL FROM GWSI	12N17W27DADD	NO	WELL				1/1/1997	DOMESTIC	
<u>66699</u>	DRINVILLE CHARLES	12N17W27DB	NO	WELL56.00	26.00	21.00	50.00	7/29/1966	DOMESTIC	
<u>66700</u>	WARD RALPH S. & JANET L.	12N17W27DD	NO	WELL43.00	40.00	25.00		5/5/1971	DOMESTIC	
<u>137495</u>	DAVIS ROSANNA & TOBY	12N17W27DDA	NO	WELL45.00	7.50	6.00	25.00	9/19/1993	DOMESTIC	
<u>154066</u>	SHELDON RAY & DOROTHY	12N17W27DDA	NO	WELL39.00	6.00	5.00	50.00	8/30/1995	DOMESTIC	
<u>154068</u>	SHELDON RAY & DOROTHY	12N17W27DDA	NO	WELL41.50	8.00	6.00	50.00	8/30/1995	DOMESTIC	
<u>706173</u>	AILPORT BOBBY	12N17W27DDAB	NO	WELL				1/1/1997	DOMESTIC	
<u>706172</u>	UNNAMED WELL FROM GWSI	12N17W27DDAB	NO	WELL				1/1/1997	DOMESTIC	
<u>706174</u>	AGARD LISA	12N17W27DDAC	NO	WELL				1/1/1997	DOMESTIC	
<u>706175</u>	HAWLEY JUDY	12N17W27DDAC	NO	WELL				1/1/1977	DOMESTIC	
<u>136391</u>	SATHER KEVIN & JOE	12N17W27DDAC	YES	WELL44.00	8.00	7.00	25.00	8/18/1993	DOMESTIC	
<u>706176</u>	SPATZIERATH MARY	12N17W27DDAD	NO	WELL				1/1/1997	DOMESTIC	
<u>167603</u>	AGARD RICK	12N17W27DDD	NO	WELL47.00	9.00	8.00	40.00	4/2/1998	DOMESTIC	
<u>154069</u>	SHELDON RAY & DOROTHY	12N17W27DDD	NO	WELL40.00	8.00	6.50	50.00	9/5/1995	DOMESTIC	

706178	GOVER VERNON	12N17W27DDDANO	WELL40.00	1/1/1997DOMESTIC
706177	UNNAMED WELL FROM GWSI	12N17W27DDDANO	WELL	1/1/1997DOMESTIC
706179	UNNAMED WELL FROM GWSI	12N17W27DDDANO	WELL	1/1/1997DOMESTIC
706180	WHEELER NANCY	12N17W27DDDDNO	WELL60.00	1/1/1997DOMESTIC

End of Report. **75** record(s) listed.

This report is restricted to site types of **WELL, BOREHOLE, SPRING, and COAL BED METHANE WELL.**

Explanation of Columns: **Td** = Total depth of well in feet below ground

Pwl = Pumping water level in feet below ground

Swl = Static water level in feet above/below ground - Negative values are reported for water levels that are above land surface.

Yield = Yield in gallons per minute

Date = Completion date of well/borehole

Use = Reported use of water

Ver? = Was location verified?

The preceding materials represent the contents of the GWIC databases at the Montana Bureau of Mines and Geology at the time and date of the retrieval. The information is considered unpublished and is subject to correction and review on a daily basis. The Bureau warrants the accurate transmission of the data to the original end user at the time and date of the retrieval. Retransmission of the data to other users is discouraged and the Bureau claims no responsibility if the material is retransmitted.



GWICWEBDATA V9.1.0 1998-2003

Any questions or comments can be e-mailed to [GWIC WebMaster](#)

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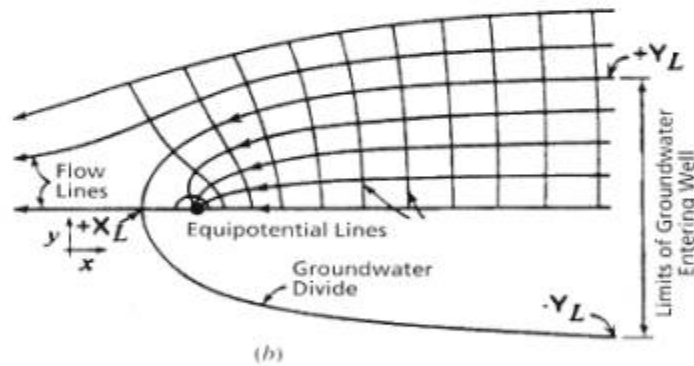
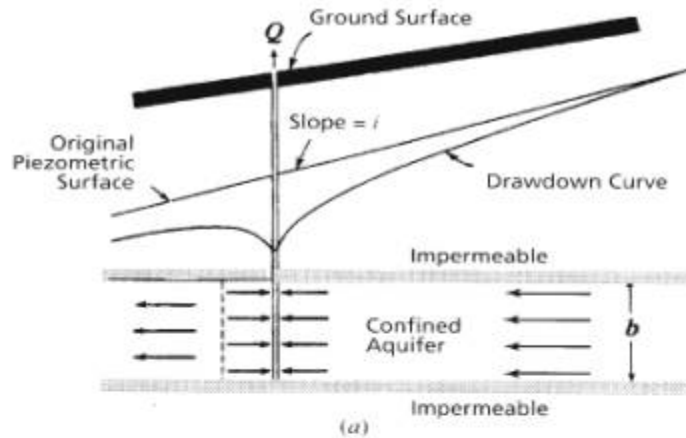
[Privacy Policy](#)

APPENDIX D

Time of Travel Calculations

UNIFORM GROUNDWATER FLOW EQUATION

Flow to a well penetrating a confined aquifer having a sloping plane piezometric surface - vertical section and plan view (Todd, 1980).



$$\frac{-Y}{X} = \tan\left(\frac{2\pi Kbi}{Q} Y\right)$$

Uniform-Flow Equation

$$X_L = -\frac{Q}{2\pi Kbi}$$

Distance to
Down-Gradient
Null Point

$$Y_L = \pm \frac{Q}{2Kbi}$$

Boundary Limit

Legend:

- Pumping Well

Where:

Q = Well Pumping Rate
 K = Hydraulic Conductivity
 b = Saturated Thickness
 i = Hydraulic Gradient
 $\pi = 3.1416$

TIME-OF-TRAVEL CALCULATION METHOD

The time of travel for water to move along a line parallel to the hydraulic gradient, from a point to a pumping well (EPA 1991).

$$T_x = \frac{n}{Ki} \left[X_L - \frac{Q}{2\pi Kbi} \ln \left(1 + \frac{2\pi Kbi}{Q} X_L \right) \right]$$

T_x	=	travel time from point x to a pumping well
n	=	porosity
X_L	=	distance from pumping well over which groundwater travels in T_x
Q	=	discharge
K	=	hydraulic conductivity
b	=	aquifer thickness
i	=	hydraulic gradient

APPENDIX E

Inventory Sheets

APPENDIX F

Checklist

*Department of Environmental Quality
Source Water Protection Program*

CERTIFICATION CHECKLIST

***Source Water Delineation and Assessment Reports (SWDAR)
For Community and non-community non-transient PWSs***

The following items represent the minimum requirements for certification of a completed SWDAR for Community and non-community non-transient PWSs. The SWDAR represents the technical component of the SWPP, and must be completed per the 1996 amendments to the Federal Safe Drinking Water Act. This checklist should be used in conjunction with the information and general format provided in the template for preparing SWDAR documents. While the format of the template may be modified as needed, all requested information should be included for certification.

For any items that are not applicable or information is not available, note in checklist column and provide an explanation. Attach additional sheets for explanation, if necessary.

Name of System:	Clinton School
PWS #:	824
Date Submitted:	June 30, 2003
Operator Name:	Darren Eichenlaub
SWPP Contact:	Mark Latrielle P.O. Box 250 Clinton, MT 59825 (406) 825-3113
Person Preparing	Name: Michelle Hutchins, Environmental Health Specialist
Plan Contact:	Address: Missoula City County Health Department 301 W. Alder Missoula, MT 59802 Phone: (406) 523-4890

The following summary checklist is derived from the Source Water Delineation and Assessment Report template document. The completed plan should include summary discussions, when appropriate, for each listed item. Indicate the page and/or section number where this information is, or indicate not applicable (n/a) when appropriate. For items indicated as not applicable, the text should indicate why.

Introduction

Page

Person who prepared document	iv
Name of system and county located in	iv
PWS Identification Number	iv
PWS contact person, with address and phone number	cover

Chapter 1 – Background

This section provides background information on the community served by the PWS.

Page

1. The Community:	1
• Population	1
• Economic base	1
• Major water users	1
• Major waste generators	1
• Domestic sewage treatment and disposal	1
2. Geographic Setting	1
• Geographic setting, including surrounding area	1
• Physiographic features	1
• Streams and lakes	1
• Climate information (including annual precipitation and temperatures)	1
• A vicinity map at appropriate scale	Fig. 1

For surface water sources, or ground water systems influenced by surface water

• 8 and 11 digit USGS Hydrologic Units	n/a
• Montana Watershed Management Region	n/a
3. General Description of Source Water	1

Description of PWS system, including:

- Source of water (number of wells, depths, etc.) 1
- Well lithology and construction logs (in appendix) Appx B
- Distribution system 2, Appx A
- Number of connections and users 2
- PWS Treatment System 2

- Copy of latest Sanitary Survey (in appendix) Appx A
- A map indicating the general layout of the PWS. Appx A

4. Water Quality:

- Summarize enforcement actions in the past 5 years 2
- Describe background/regional water quality 2
- Table summarizing background water quality 3

For surface water sources, or ground water systems influenced by surface water

- Use classification n/a
- Threatened or impaired streams in watershed n/a
- TMDL development prioritization and status n/a

Chapter 2 – Delineation

This section provides information on the hydrogeology of the water supply for the PWS. Background information on the hydrogeologic setting should be assembled into a *Hydrogeologic Conceptual Model* that summarizes the ground water system in a simplified manner. The background information should support the process to delineate management areas.

	<u>Page</u>
1. Hydrogeologic Conditions	4
• Identification of references for hydrogeologic information	4
• Summary tables of hydrogeologic studies and maps for area	5-6
• Summary of wells in area from GWIC database	Appx C
• Geologic map(s) included (if not, valid justification for omission)	Fig. 3
• Geologic cross section(s) included	Fig. 5
For ground water systems:	
• Identify aquifer	4
• Geologic setting of aquifer	4
• Aquifer properties (lithology, boundaries, etc.)	4
• Aquifer type (confined, unconfined, semi-confined)	4
• Connection with surface water	4
• Classify sensitivity of hydrogeologic setting of source water	4
For surface water sources, or ground water systems influenced by surface water	
• Hydrogeologic setting of PWS watershed	n/a
• Identification of references for hydrogeologic information	n/a
• Stream flow characteristics	n/a
2. Conceptual Model and Assumptions	6
• Seasonal trends in system	4
• Assumptions made to simplify model	9
For ground water systems:	
• Aquifer boundaries	4
• Aquifer recharge areas	6
• Ground water flow direction	6
• Communication with surface water	6
For surface water sources, or ground water systems influenced by surface water	
• Relationships of surface water with ground water system	n/a
3. Well (or source) Information	
For ground water systems:	

- Well depths, construction details 7
- Well locations described 7
- Summary table of source information 7
 [Source information to include: PWS Source Code, Well Location, MBMG (GWID) No., MT Water Right No., Date Well completed, total depth, perforated interval, static water level, pumping water level, drawdown, test pumping rate, and specific capacity]

For surface water sources, or ground water systems influenced by surface water

- Description of source water intake system n/a
- Streamflow data, if available n/a

4. Delineation Methods and Criteria

- Overview of approach used for delineation 6

5. Model Input

For ground water systems:

- Identify analytical method used, with source reference 6
- Values of hydraulic parameters identified, with ranges 9
- Identify hydrogeologic parameter values used, with rationale 7-8
- Summary table of input values for model 9
- Reference and justification for assumed values 7-8
- Time of travel equations or model specifications 7-8

For surface water sources, or ground water systems influenced by surface water

- Time of travel calculations for surface water body n/a
- Summary of ranges for streamflow parameter values n/a
- Identify streamflow parameter values used with rationale n/a
- Summary table of input values for model n/a

6. Delineation Results

- Travel time calculation results, or computer model calibration criteria 9
- Management zones identified on map(s) Figs. 6 & 7
- Delineated areas reflect seasonal variations in hydrologic systems 9

7. Limiting factors

- Identify uncertainties in delineation approach based on assumptions 11
- Identify how uncertainties may effect delineated areas 11

Chapter 3 – Inventory

This section identifies all known and potential contaminant sources that may affect the PWS.

1. **Inventory methods identified** 10-11
2. **Appropriate databases searched, with potential sources identified** 10-11

For ground water systems:

- **Control zone** 11-12

Description of land uses
 Description of potential contaminant sources
 Worksheets completed for significant potential sources
 Potential contaminant sources summarized in a table
 Potential contaminant sources located on a base map

- **Inventory Region** 11-12

Description of land uses
 Description of potential contaminant sources
 Worksheets completed for significant potential sources
 Potential contaminant sources summarized in a table
 Potential contaminant sources located on a base map

Fig. 10

- **Surface Water Buffer** 11-12

Description of land uses
 Description of potential contaminant sources for pathogens (acute health hazards)

- **Recharge Region** 11-12

Description of land uses
 Description of large potential contaminant sources
 Large potential sources and land use shown on a map

For surface water sources, or ground water systems influenced by surface water

- **Spill Response Region** n/a

Description of land uses
 Description of potential contaminant sources
 Worksheets completed for significant potential sources
 Potential contaminant sources summarized in a table
 Potential contaminant sources located on a base map

- **Watershed Region** n/a

Description of land uses
 Description of large potential contaminant sources
 Map of watershed region showing significant potential contaminant sources
 (e.g. MPDES permitted discharges, to the extent practical with existing databases)

For all systems

- Inventory update – procedures to update every five years 12

- Inventory limitations identified

12

Chapter 4 – Susceptibility Assessment

This section evaluates the potential for the PWS water supply to be contaminated by the significant potential sources of contamination identified in Chapter 3. This information can be used by local officials to prioritize management actions for the delineation control and inventory zones. Worksheets to be considered when completing each task are listed with each topic.

Attach completed worksheets as Appendices to final document

- | | | |
|----|---|-------|
| 1. | Hazard of potential contaminant sources identified | 13-14 |
| 2. | Barriers for each potential contaminant sources identified and evaluated | 14 |
| 3. | | |
| 4. | Supporting information for identification of features as barriers | 13-14 |
| • | | |
| 5. | Threats from significant potential contaminant sources ranked | 14 |
| 6. | | |

References

All technical references are listed in the appropriate format 15-16

Appendices

All necessary supporting information is included in Appendices yes

List any Deficiencies: none

APPENDIX G

Letter of Concurrence

Source Water Protection Section
Department of Environmental Quality
POB 200901
Helena, MT 59602-0901

RE: Source Water Delineation & Assessment Report

To Whom It May Concern:

The Clinton School public water system has reviewed the source water delineation and assessment report (SWDAR) dated June 2003. We concur that the delineation component appears to describe current conditions at the water system based on reasonably available information and that the susceptibility assessment identifies the origins of regulated contaminants to the extent practical.

We understand that the Clinton School PWS SWDAR will be made available to the public by DEQ as described in the Montana Source Water Protection Program. Also, we will make a copy of the report available for the public to view during our normal office hours and describe the results in subsequent releases of our consumer confidence report.

Signed,

Signature

Title and Date

Figures