PWS-6 REPORT

For

Clearview Heights Homeowners
Public Water System

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Contact Person:
David McLellan
Clearview Heights Homeowners
250 Clearview Heights
Polson, MT 59860
406.883.5932

SCHWARZ
ARCHITECTURE &
ENGINEERING
100 FINANCIAL DRIVE, SUITE # 120, KALISPELL, MT 59901
TEL 406.755.1555 www.schwarzae.com FAX 406.755.1310

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Introduction
This Delineation and Assessment Report is intended to meet the technical requirements of the Montana Source Water Protection Program (DEQ, 2001) and the federal Safe Drinking Water Act (SDWA) Amendments of 1996 (P.L. 104-182). Schwarz Architecture & Engineering, Inc. (SAE) prepared this report.

Information on land use and potential contaminant sources comes from a variety of sources including a preliminary land cover data layer produced by the United States Geological Survey (USGS), DEQ Public Water Supply files (including sanitary surveys), and other public sources of information. A web-based GIS application was also used to query and generate maps to support writing the report. This application is found at the Montana State Library Natural Resources Information System's (NRIS) website called the Source Water Protection Program Query System and is available at the following URL: http://nris.mt.gov/wis/swap/swapquery.asp. The application was developed by the DEQ Source Water Protection Program (SWPP) and NRIS to provide access to data from the U.S. EPA, DEQ, Montana Bureau of the Mines and Geology (MBMG) and other sources.

Purpose
The purpose of the Source Water Delineation and Assessment Report is to assess the degree of susceptibility to significant potential contaminant sources at the Clearview Heights Homeowner's public water supply. The Clearview Heights Subdivision will then be able to use this analysis to make informed decisions about protecting the public water supply to ensure the continued delivery of high quality water. It should be noted that the purpose of this assessment is to protect the public drinking water supply from contaminants by being aware of possible sources and ensuring that reasonable and protective management practices are applied; it should not be assumed that listed potential contaminant sources are actively contaminating groundwater in the Clearview Heights Subdivision.

This assessment utilized information obtained from the Clearview Heights Subdivision Sanitary Survey Inspection completed by Lake County Environmental Health in Polson, Montana.

Delineation is a process whereby areas that contribute water to aquifers or surface waters used for drinking water are identified on a map and are referred to as source water protection areas. Assessment involves identifying locations or regions in source water protection areas or vicinities where contaminants may be generated, stored or transported and then estimating the potential for contamination of drinking water by these sources.

Delineation and assessment is the foundation of source water protection planning for public water systems and 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 Clearview Heights Homeowners water operator and the community to be involved in source water protection planning that meets their specific needs.

The Community
The Clearview Heights Homeowners PWS is located about 1 mile southeast of Polson on the Polson Moraine (Figure 1). Polson, population 4,316, is a recreational and retirement community located on the southern end of Flathead Lake. Polson serves as a local center for small manufacturing and agriculture in the surrounding 30-mile radius. Highway 93, the primary

transportation route between Kalispell and Missoula, passes through Polson. Kerr Dam, a hydropower generating facility, is located approximately five miles southeast of Polson on the Lower Flathead River. The Flathead Indian Reservation encompasses much of Lake County and includes an area of about 1,950 square miles. The Confederated Salish and Kootenai Tribal (CSKT) Headquarters are located in Pablo, Montana.

Residents within the Clearview Heights Homeowners rely on a public water supply (PWS) and individual domestic septic systems. The public water supply provides potable water from a system of two wells and an associated storage tank/distribution system.

Area Geography and Geology

The Clearview Heights Homeowners is located on a terminal moraine (Polson Moraine) that forms the prominent hill just south of Flathead Lake and Polson (Figure 4). The Polson Moraine is an east-west elongated glacial feature formed at the end of the Pleistocene Glacial Epoch by the receding valley glacier. The Flathead River and its tributaries drain the entire area (USGS hydrologic unit code 17010208). The Flathead River flows from the south end of Flathead Lake at Polson along the west side of the Mission Valley until its confluence with the Clark Fork River. Pablo Reservoir/Pablo National Wildlife Refuge, a lake with wetlands providing habitat for birds, is located approximately two miles south of Polson.

Mean annual precipitation in the valley generally ranges from 11 to 16 inches, whereas the annual precipitation in the Mission Mountains, which forms the eastern boundary of the Flathead Valley, is almost 100 inches. Most of the precipitation in the mountains occurs as snow with about 50 percent of the precipitation in the valley occurring as rain. The mean annual temperature in the valley is 45° F, but the temperature at the higher altitudes is much cooler as indicated by the presence of glaciers and permanent snowfields.

Source water for the Clearview Heights Homeowners Association Water System is from two wells that derive groundwater from a semi-confined to confined aquifer found in alluvium buried by lacustrine deposits within the Polson Moraine. Recharge to the aquifers occurs from infiltration of snowmelt and rainfall in the mountains to the east.

Driller's log (Appendix A) supports the assessment that the aquifer may act as a semi-confined aquifer; water was encountered at 395' below ground surface (BGS) and rose in the casing to 188'. For the purposes of this source water assessment. the aquifer tapped by the well is considered to be locally semi-confined.

Groundwater recharge occurs primarily where bedrock is exposed at the surface, at higher elevations to the east of the wells. No information is available regarding seasonality in groundwater flows. However, given the hydrogeologic setting and the depth of the wells it is unlikely that water table elevations or flow directions vary appreciably from season to season.

Public Water Supply Information

The Clearview Heights Homeowners PWS. in Lake County. is one mile southeast of Polson on U.S. Highway 93. The wells are located at approximately 47° 40.895' N latitude 14° 6.955' W longitude and 47° 40.876' N latitude 14° 6.935' W longitude. This community PWS serves about 35 persons in the Clearview Heights subdivision.

There are two wells (source ID numbers WL002 and WL003) for the Clearview Heights Homeowners (Figure 2). Both wells are located on Lot 11 in the Clearview Heights subdivision. Only one well (well #2) has a well log although it is not recorded in the GWIC database. Both wells are believed to have been drilled in the late 1970's or early 1980's. Well # 1 is about 280 ft deep and had produced approximately 40 gpm. Well #2 is about 400 ft deep and produces about 25 gpm. The source is groundwater and neither well is subject to flooding. Both well casings extend at least 18" above ground level and use 6" steel.

Well #1 is equipped with a 3hp submersible pump at an unknown capacity while Well #2 uses a 5hp 3-phase submersible with a 15-20 gpm capacity. Intakes on both wells are open-ended and are both below the maximum drawdown. Entry points for both wells are the pumphouses.

Drawings of the pump house and storage facilities prepared by the Lake County Environmental Department are included in Appendix C.

Delineation
Two management areas are defined for the Clearview Heights Homeowners public water supply. The first is a 100 foot fixed radius from the well known as the control zone. The second is a fixed 1 mile radius to delineate the inventory region. Both areas define the source water protection area (Figure 3). The control zone is the most critical from which direct introduction of contaminants into the well or the immediate area can occur. The inventory region encompasses the area from which water or contaminants can flow into the HOA's public water supply over a period of several months to years. A fixed radius approach is used in confined settings for simplicity where aquifer sensitivity is low.

Inventory
The Montana Source Water Protection Program (Montana DEQ, 1999) requires that land uses and all potential sources of nitrate, microbial pathogens, and organic chemicals within the control zone and inventory region be identified.

Susceptibility Assessment
Susceptibility is the potential for a public water supply to draw water contaminated by inventoried sources at concentrations that would pose a health threat. Susceptibility is assessed in order to prioritize potential pollutant sources for management actions by local entities, in this case the Clearview Heights Homeowners.

The goal of Source Water Management is to protect the source water by 1) controlling activities in the Control Zone, 2) managing significant potential contaminant sources in the Inventory Region, and 3) ensuring that major land use activities in the Recharge Region pose minimal threat to the source water. Management priorities in the Inventory Region are determined by ranking the significant potential contaminant sources identified in the previous section according to susceptibility. Alternative management approaches that could be pursued by the Clearview Heights Homeowners to reduce susceptibility are recommended.

Hazard, Barrier, and Susceptibility Determination
The susceptibility of the Clearview Heights Homeowners production well to contamination is assessed in this section. The proximity of a significant potential contaminant source to the well,

or the density of potential non-point contaminant sources determines the threat of contamination, referred to here as hazard. Barriers are natural or man-made attributes of the well or of the well setting that tend to inhibit movement of regulated contaminants into the aquifer or well.

The groundwater source intake is greater than 50 feet below the mean water table and the unsaturated thickness is greater than 100 feet, which provides a good barrier to surface contaminants.

Susceptibility is assessed through consideration of the hazard of each significant potential contaminant source relative to identified barriers (see Table 1). It should be remembered that the purpose of this assessment is to protect the public drinking water supply from contaminants by being aware of possible sources and ensuring that reasonable and protective management practices are applied.

Septic Density-is shown as low for areas up gradient from the PWS in Figure 2. This map was generated from available data at the NRIS web site. Additional septic density data was requested from the Lake County GIS department, however this data is yet to be compiled. Considering the potential of future growth in the area, a medium septic density is reasonable for the area.

Irrigated Crop Land-Hazard for fertilizer. nitrate. or pesticide leaching into ground water is ranked low because irrigated cropland occupies less than 5% of the inventory region. Susceptibility is also ranked low because the aquifer is confined and the well depths are 410 and 900 feet.

Table 1. Susceptibility Assessment

		Description	**Hazard Rating**	**Barriers**	**Susceptibility**
1. Agricultural Crop/ Grazing	SOC. Nitrate	Less than 5%	Low	Semi-Confining Leaky Aauitard	Low
2. Septic Density	Pathogens & Nitrates	Medium	Moderate	Semi-Confining Leaky Aauitard	Moderate
3.UST	Diesel! Gasoline	Permanently out of use	Low	Semi-Confining Leaky Aauitard	Low
4. Highways and Railroads	Hazardous Materials VOC. SOC	U.S. Hwy 93. Clearview Road. Montana Rail Link	Low	Semi-Confining Leaky Aquitard	Moderate

Management Options
Proper maintenance of septic systems can help maintain high quality groundwater. Community education intended to limit the disposal of household chemicals into septic systems and septic tank maintenance by routine sludge removal is recommended.

Monitoring Waiver Potential
The 1986 Amendments to the Safe Drinking Water Act require that community and non-community PWS's 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 PWS's 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.

For the purposes of the Clearview Heights Homeowners Source Water Assessment, the aquifer has been considered a locally confined setting with low sensitivity. However, it is important to note that a discrete and extensive clay confining layer has not been identified so any waiver consideration would be based on chemical use and not on aquifer susceptibility.

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 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. Analytical monitoring history of the PWS well and those nearby should be provided as well.

Waiver Recommendation
Based on past monitoring results and the susceptibility assessment of the Clearview Heights Homeowners PWS wells, the PWS appears to be eligible for additional monitoring waivers. Clearview Heights may be eligible for a monitoring waiver for Phase II inorganic chemicals (barium, cadmium, chromium, fluoride, mercury, and selenium) and for a Phase V inorganics

monitoring waiver (antimony, thallium, beryllium, and nickel), as well as volatile organics and semivolatile organics waivers. For further monitoring waiver consideration, the PWS should submit a letter to DEQ requesting these monitoring waivers. The PWS also would need to provide additional information to DEQ regarding chemical use within the inventory region.

References:

EPA US (2001) Protect our Health from Source to Tap. Report No. EPA 816-K-01-001

Lake County Environmental Health (2002) Clearview Heights Homeowners Sanitary Survey Inspection-PWS ID #MT0003103. DEQ Permitting and Compliance Division

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

(NRIS) MSL-NRIS (2000) 1:24,000 compressed quadrangle, national land cover dataset and various shape files. USGS

LaFave, J.I., 2000, Potentiometric surface map of the southern part of the Flathead Lake Area, Missoula, Lake, and Sanders counties, Montana (open-file version), Montana Bureau of Mines and Geology Ground-water Assessment Atlas 02B-04, scale 1:100,000.