LDS Church- Forsyth

Source Water Delineation and Assessment Report

Public Water Supply: **LDS Church- Forsyth (PWSID #MT0003583)**
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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, 1999) and the federal Safe Drinking Water Act (SDWA) Amendments of 1996 (P.L. 104-182). Jim Stimson, Hydrogeologist with the Montana Department of Environmental Quality (DEQ) prepared the final report with assistance from intern Shonna Jorgensen. 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 this report. This application is called the Source Water Protection Program Query System and is available at the following web address or URL: http://nris.state.mt.us/wis/swap/swapquery.asp. The application was developed by the DEQ Source Water Protection Program (SWPP) and provides access to data from the U.S. EPA, DEQ, Montana Bureau of Mines and Geology (MBMG) and other sources.

Purpose

The purpose of this delineation and assessment report is to assess threats to the Forsyth LDS Church water supply using information obtained from personnel managing the site, the most recent sanitary survey, which was completed in March 2001 by The Cadmus Group, Inc., a contractor for the Montana Department of Environmental Quality (available from DEQ upon request), and from published reports. Delineation is a process whereby areas that contribute water to aquifers or surface waters used for drinking water are identified on a map. These areas are referred to as 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.

Public Water Supply Information

The LDS Church is located approximately 2 miles northwest of Forsyth (Figure 1). The water source for the church appears to be a single well located behind, and adjacent to,

the building. There is one active connection that serves a transient population of 35 to 50 people. Because the water supply does not regularly serve the same 25 persons for at least six months a year, it is classified as a transient, non-community public water supply. Water demand is approximately between 1,750 and 2,500 gallons per day assuming water use is 50 gallons per day per person (EPA, 1991).

According to the sanitary survey there are two wells connected to the building's plumbing. The main well has a 6-inch diameter and draws water from 180 feet. The casing is terminated with a sanitary well seal and a ½ horsepower submersible pump provides pressure at about 30 to 50 psi. The second well was used for drinking water in the past, however, is now used entirely for irrigation. There is a backflow preventer installed on the piping from this well and it also has a sanitary well seal. However, the plastic plug on the top is broken. The water from the church's well system is not treated in any way and there is no bulk storage. Rather, a hydro-pneumatic water tank provides short-term storage. This tank is used to maintain pressure within the distribution system and to prevent well pumps from cycling too frequently. The water is distributed through a single pipe from the main well to the church.

Several recommendations were made during the sanitary survey to help improve the quality of the public water system. The well used for irrigation should be disconnected from the drinking water piping if it is not intended for use. If it is intended for use, the sanitary well seal should be repaired. Also, a pressure relief valve should be installed on the interior-piping manifold (DEQ Permitting and Compliance Division, 2001).

According to the well log for the church's well, source water originates from a sandstone bed about 200 feet below the land surface. The well is screened between 200 to 240 feet below land surface. There is a substantial shale layer above the producing sandstone that acts as a confining unit. According to the Source Water Protection Program, a deep consolidated sandstone aquifer is assigned a low sensitivity rating to potential contaminant sources at the land surface. However, no information could be found pertaining to the lithology of the surrounding wells and whether or not the confining layer extends beyond the LDS Church well. Therefore, we must assume that the church's well is completed in a locally, or semi-confined aquifer, and treat it as such. According to the Source Water Protection Program, a well completed in a semi-confined aquifer is assigned a moderate source water sensitivity.

The Forsyth LDS Church is required to test for microbiological contaminants and nitrate. The well system must complete monthly bacteriological samples, as well as an annual nitrate sample. During routine monitoring of the well system in the last five years, no bacteria detects occurred and the nitrate levels were significantly below the maximum concentration level of 10mg/L set by the U.S. Environmental Protection Agency (EPA).

Delineation

Three source water protection zones are delineated for the Forsyth LDS Church. They include a 100-foot radius control zone, a one-mile radius inventory region (Figure 1) and a surface water buffer zone. The control zone is the most critical area from which direct

introduction of contaminants into the well or immediate area can occur. The inventory region encompasses the area from which water or contaminants can flow into the church's water supply over a period of months to years. The surface water buffer zone is not shown in Figure 1 because potential contaminant sources do not appear to exist up gradient from the source water.

Inventory

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

Analysis of the area surrounding the LDS Church reveals that the predominant land covers include ag-land (40%), grassland (33%), and fallow (17%). Other land covers in the region include shrubland (8%), wetland (1%), and commercial/industrial (1%). The amount of agricultural land present in this region poses a possible threat to the Forsyth LDS Church's water supply. The concern is the potential for mismanagement or over-application of fertilizers and/or pesticides on the ag-land that occupies such a large portion of the inventory region.

Susceptibility Assessment

Susceptibility to potential contaminant sources is assessed for the public water supply well. 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 flow to the PWS well. According to the Montana Source Water Protection Program criteria, aquifers consisting of semi-confined alluvium have a moderate sensitivity to potential contaminant sources (Montana DEQ, 2000, Table 2).

The LDS Church well system is susceptible to nitrate and bacterial contaminants. The location of the septic system with respect to the well is unknown. Due to their location, it is unlikely that the church would be on a community sewer system. Rather, they probably have an on-site, large capacity septic system. Septic systems are considered large capacity when they serve more than 20 people per day. Also, 40% of the land cover surrounding the LDS Church is used for agricultural purposes. There is potential for mismanagement or over-application of fertilizers and/or pesticides on the ag-land. Because of the high percentage of ag-land present in the inventory region and the uncertainty of the location of the septic system, the well is assigned a high hazard. Also, no known barriers were identified resulting in very high susceptibility to nitrate and pathogens.

References:

DEQ Permitting and Compliance Division, 2001. Sanitary Survey for the Forsyth LDS Church. PWS_ID #03583

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