

WYOMING WATER ASSESSMENT AND PROTECTION PROGRAM (SWAP)



SOURCE WATER ASSESSMENT PROGRAM EXECUTIVE SUMMARY

Source Water Assessment Prepared For:
S. Big Horn County JPB

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SOURCE WATER ASSESSMENT SUMMARY FOR S. Big Horn County JPB

PWS Source Water Assessment Summary

The South Big Horn County Water Supply-Joint Powers Board (JPB) water system is classified as a community groundwater supply. The JPB is composed of the Town of Basin, Manderson, and the South Big Horn County Water District, and supplies water to a population of approximately 2,084. The Town of Manderson (PWS #5600204) and Town of Basin (PWS #5600004) are a consecutive distribution systems to the JPB. Source water is obtained from the Madison formation through two flowing artesian wells. The artesian water is delivered to a 100,000 gallon storage tank that lies within a half mile of both wells. Gas chlorine is injected just prior to the water entering the storage tank. From the storage tank, water is transmitted down to the distribution systems by gravity flow.

In general, the JPB water sources rated high for land use susceptibility. The high ratings occurred because much of the land within the source water area is forested. The point source susceptibility scores medium due to an underground injection point in the delineation zones.

Delineation Methods

The JPB maintains a community water system that obtains its water supply from fractured and cavernous limestone bedrock. Hydrogeologic mapping techniques were consequently used to identify source water areas for the wells.

Hydrogeologic mapping techniques use surface observations in combination with subsurface geologic and hydrogeologic data to identify aquifer boundaries and areas that contribute water to the aquifer. These techniques were used when a PWS's source was derived from a spring, fractured bedrock, or from a limestone or dolomite aquifer. Conduit flow aquifers have extremely variable flow patterns and rates, making the calculation of time of travel difficult. In some instances, only one contaminant inventory zone was identified beyond Zone 1 due to the inherent difficulty in attempting to assign a particular time of travel to a given area. Because of this issue, aquifer vulnerability mapping techniques were also used as part of the hydrogeologic mapping effort to identify and delineate vulnerable areas. These areas (faults, fractures, exposed bedrock, etc.) are anticipated to be more susceptible to the rapid infiltration of contaminants released at the ground surface.

Groundwater Sources

The JPB's two wells are completed in the Madison Limestone to depths ranging from 5,430 and 5,361 feet. Sufficiently saturated portions of the Madison Limestone and Bighorn Dolomite in this area form one of the most prolific aquifers in Wyoming, the Madison Aquifer. Where permeable fractures and caverns have been encountered in wells drilled into these formations, flowing artesian well yields have approached 14,000 gpm. Recharge for the aquifer originates as infiltrating precipitation on Madison Limestone and Bighorn Dolomite outcrops to the east and flows westward to the wells under artesian conditions through fracture and conduit flow. Additional information of each of these two wells is included on the enclosed Well Information

Sheet.

As shown on the attached source water area map, contaminant inventory zones for the JPB's wells were developed to encompass those areas that contribute water to the Madison Limestone and Bighorn Dolomite. Between groundwater divides in the Madison Aquifer, that were inferred from Jarvis' thesis mapping, Zone 2 includes outcrops of the Madison Limestone and Bighorn Dolomite that are exposed in the Bighorn Mountains to the east of the wells. Upstream from Zone 2, Zone 3 includes drainages that deliver water to the Madison and Bighorn outcrops.

Integrity Summary

The JPB uses two wells to supply water to the system. The wells, Manderson Wild Horse #1 and Wild Horse #2, were constructed after 1993, when more stringent construction standards were required by the state of Wyoming. Records show that the wells were properly sealed to protect against surface infiltration of potential contaminants and flooding around the wellheads. As shown on the Integrity Summary Table, the wells received integrity scores of 2, which is a direct reflection of the well completion date and the conveyance structure length.

Water Source Sensitivity Summary

The JPB obtains water from two wells that are completed in the confined Madison Limestone. As shown on the Source Sensitivity Summary Table, the wells received sensitivity scores of 10.

These wells received the maximum sensitivity score for two reasons. First, the Madison Limestone is known to be vulnerable to contamination because of high velocities associated with water flowing through fractures and caverns. The second reason is that laboratory analysis of water samples from the JPB within the last five years detected a few contaminants that are listed on EPA's primary and secondary drinking water standards. These include nitrate, gross alpha, radium 226, and sulfate. Despite detection, these contaminants were detected at concentrations below the EPA's maximum contaminant levels.

Water System Susceptibility Rating

Susceptibility is defined as the potential for a public water supply to draw water contaminated at concentrations that would pose a threat or concern to human health. In general, the JPB scores high for land use susceptibility because much of the land within the source water area is forested. The point source susceptibility scores medium due to an underground injection point in Zone 3. Susceptibility ratings for each type of potential contaminant source are summarized on the attached susceptibility tables.

A review of your PWS's routine water analysis results revealed that one or more chemicals that are considered contaminants in drinking water were detected at some time within the last five years. Chemical detections have a large impact on your PWS's sensitivity score because it may indicate that there is a pathway for contaminants to reach the water supply. However, it is likely that these chemicals are present only in small amounts and are not a danger to your health. Some of these chemicals may also occur naturally in water.

For more information about which chemicals were detected, please contact the PWS for a copy of the most recent Consumer Confidence Report or water analysis results. Chemical detections at levels that are a concern to human health are reported on the EPA's website: http://www.epa.gov/enviro/html/sdwis/sdwis_query.html. To see if your PWS has exceeded the federal primary or secondary drinking water standards, just click on the State of Wyoming and then type in the name of your PWS. Consumer Confidence Reports are prepared by the PWS on a yearly basis. The reports should include information about any chemicals found in the water, even those found at very low levels. Please contact Kim Parker at DEQ, 307-777-7781, or WARWS for assistance. You may also contact EPA to find out what contaminants were detected. You may have to fill out a Freedom of Information Act request to obtain the water test results for your PWS. Please call EPA's Safe Drinking Water Hotline at 1-800-426-4791.

**POINT SUSCEPTIBILITY SUMMARY TABLE
FOR S. Big Horn County JPB
Point Source Susceptibility Summary**

It may appear from the results of this point source susceptibility summary table that your system has too many PSOCs influencing the final ratings. In some cases, a specific PSOC falls within a specific contaminant inventory zone shared by multiple wells or intakes. When this is the case, that PSOC will be scored for each intake. For example, an underground storage tank may appear within a contaminant inventory zone shared by four different wells. This would cause that single storage tank to be entered into the table four times, or once for each well or intake.

Point Source Type	Low	Medium	High
Underground Injection	N/A	2	N/A

- * Illustrates the number of PSOCs in a particular rating class for all water sources
- * N/A - Not Applicable