

WYOMING WATER ASSESSMENT AND PROTECTION PROGRAM (SWAP)



SOURCE WATER ASSESSMENT PROGRAM EXECUTIVE SUMMARY

Source Water Assessment Prepared For:
Bairoil

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SOURCE WATER ASSESSMENT SUMMARY FOR Bairoil

PWS Source Water Assessment Summary

The Town of Bairoil water system is classified as a community groundwater supply, and is located at the Amoco production facility about five miles west of U.S. Highway 287 at Lamont. The system provides water for a resident population of 150 through 65 service connections year round. Source water for the Town is primarily obtained from Abel Springs, which is located about 3.7 miles from the Town. Several deep Battle Springs Formation wells that are owned by Merit Energy are available for backup supply. All water obtained from these sources is stored in a 350,000 gallon steel tank before distribution.

In general, Bairoil's springs received high susceptibility for land use, while its backup supply wells generally received low susceptibility ratings. Able Springs received a high land use susceptibility rating because much of the source water area is forested. With the exception of Water Supply Well #1, the water sources generally received low susceptibility ratings for point source and transportation corridor contaminants. This well received a high rating due to a pipeline that crosses through its source water area.

Delineation Methods

Because the Town of Bairoil obtains water for its community water system from groundwater sources, Lidstone used groundwater delineation methods. Hydrogeologic mapping techniques were used to map the source water area for the Town's springs, while the WhAEM method was used to develop those associated with its deep Battle Springs Formation wells. The source water area delineation maps for Bairoil's sources are attached to this report.

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.

U.S. EPA's Wellhead Analytic Element Model or WhAEM method was used for community water systems that derive their sources from alluvial or shallow bedrock aquifers. The WhAEM model uses well and limited hydrogeologic data to estimate time-of-travel capture zones in relatively simple hydrogeologic settings for either confined or unconfined aquifers. For the source water assessment, the WhAEM model was used to develop two year and five year groundwater capture zones. Due to this methodology, the delineated source water areas may be larger than the true capture zones for each well. However, use of this method typically results in

source water protection areas that can be used to more reliably protect the water supply.

Groundwater Sources

Bairoil's springs are located in the headwaters of Abel Creek just south of Whisky Ridge along the southeastern flank of Green Mountain. Recharge for the spring originates as infiltrating precipitation on the Battle Springs Formation/Alluvial outcrops to the north and flows south to the spring. Additional information on this spring is included on the enclosed Spring Information Sheet.

Six of Bairoil's wells are located on the southeastern flank of Green Mountain and obtain water from the Battle Springs Aquifer. The wells range in depth from 2,002 to 2,084 feet. The Battle Springs Formation is composed of permeable lenses of sandstone and conglomerate that are interbedded with mudstone and shale. Outcrops to the north provide ample recharge area for the aquifer through the direct infiltration of precipitation. Groundwater flows through these sandstone beds to the wells under confined artesian conditions through porous media. Additional information on Bairoil's Battle Springs Aquifer wells is included on the attached Well Information Sheets.

As shown on the attached source water area map, contaminant inventory zones were developed to encompass those areas most likely to contribute water to the springs and wells. For Able Springs, Zone 2 only includes the drainage contributing water to Abel Creek. Zone 3 includes the area between Reeds Meadow Creek on the west, and the Little Camp Creek drainage to the east. For the Battle Springs wells, the contaminant inventory zones encompass areas immediately adjacent to and north of the wells. Zones 2 and 3 were delineated as narrow, elongated areas that extend northeastward toward Green Mountain.

Integrity Summary

The Town of Baroil obtains its source water from Able Springs and six Battle Springs Formation wells to supply its system. The principal source, Able Springs was improved prior to 1983, when less stringent construction standards were required by the State of Wyoming. Available records indicate that the spring was properly enclosed to protect against the surface infiltration of potential contaminants. As shown on the Integrity Summary Table, each of the three spring points received an integrity score of 8. This score is primarily due to the fact that the spring was improved before 1983, is not inspected regularly, and is accessible to the general public.

The six wells that are owned by Merit Energy are used as a backup water source. These wells were all constructed prior to 1983, when less stringent construction standards were required by the State of Wyoming. Nevertheless, available records indicated these wells were properly sealed to protect against surface infiltration of potential contaminants. As shown on the Integrity Summary Table, each well received an integrity score of 6, which reflects the well completion date, potential for the flooding, and wellhead accessibility.

Water Source Sensitivity Summary

Baroil obtains its source water from three springs and six wells. As shown on the Source Sensitivity Summary Table, the springs received sensitivity scores of 10, while each of the wells received a score of 6.

The springs received the maximum sensitivity score for two reasons. The first reason is that it obtains water from a spring. Springs are known to be more sensitive due to their close connection to surface water. The wells received a score of 6 because the source water is obtained from a confined aquifer which is known to be relatively insensitive to contamination. The second reason is that laboratory analysis of water samples from the Town within the last five years detected a few contaminants that are listed on EPA's primary and secondary drinking water standards. These included nitrate and fluoride among others. 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, Bairoil's Abel Spring #1, #2, and #3 score high for land use susceptibility because much of the land surrounding the water sources is forested. The presence of a pipeline in the vicinity of Water Supply Well #1 resulted in a high transportation corridor susceptibility ranking for that well. For the backup groundwater wells, the overall susceptibility was generally rated low due to the lack of contaminant sources in their source water areas. The 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 Bairoil
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
None Identified	N/A	N/A	N/A

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