

WYOMING WATER ASSESSMENT AND PROTECTION PROGRAM (SWAP)



SOURCE WATER ASSESSMENT PROGRAM EXECUTIVE SUMMARY

Source Water Assessment Prepared For:
Riverton

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SOURCE WATER ASSESSMENT SUMMARY FOR Riverton

PWS Source Water Assessment Summary

The City of Riverton maintains a community water system serving a population of 9,800 residents through 3,500 service connections on a year round basis. Riverton obtains source water for the community from both groundwater and surface water sources.

During the summer months (May through September), water is obtained from a surface source, the Wind River via the LeClair Canal which is also used as an agricultural supply canal. This water is treated using a conventional water treatment plant, including pre-sedimentation, rapid mix, flocculation, sedimentation, and filtration. Disinfection is accomplished using sodium hypochlorite. Treated water is directed to a two million gallon storage tank, which provides adequate contact time. Four additional storage tanks are located at strategic locations around the city.

The surface water source supplements water obtained from an extensive wellfield that is located throughout the city. The wellfield consists of 13 deep wells that obtain water from the Wind River Aquifer, and that pump directly into the distribution system. Each well is equipped with a chlorination system.

Generally, the susceptibility of Riverton's surface and groundwater sources varies by both location and water source type. The City's surface water source generally received high susceptibility ratings for land use, transportation corridor, and point source contaminants due to urban land use; a state highway; and several underground storage tanks and an oil and gas well. Riverton's groundwater sources received mixed susceptibility ratings that reflected the general location of each well. Due to their location on the hill west of town, both Airport wells received low land use, point source, and transportation corridor susceptibility ratings due to the general lack of contaminant sources in the source water areas. In contrast, wells that are located within the vicinity of the City generally received high susceptibility ratings for land use, point source, and transportation corridor contaminant sources. These high ratings reflected the fact that these wells are located in an urbanized area where underground tanks, hazardous wastes sites, highways, and railroads present a threat to many of the wells. Despite the high susceptibility ratings associated with these contaminant sources, the overall vulnerability of the wells to these sources is less likely due to the fact that these wells are completed in a confined aquifer.

Delineation Methods

Because the City of Riverton obtains water for its community water system from both surface and groundwater sources, Lidstone conducted a conjunctive delineation using surface and groundwater delineation methods. For the City's wells, Lidstone used the U.S. EPA's Wellhead Analytic Element Model (WhAEM) to delineate the source water areas. Surface water delineation methods were used to identify associated source water areas for Riverton's surface water intake. The source water area delineation maps for each of Riverton's sources are attached to this report.

source water areas for the City of Riverton's wells because groundwater flows to these wells under porous media conditions. 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 this 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

Riverton obtains its municipal groundwater supply through 13 wells that are completed in the Wind River Aquifer in the south central Wind River basin. With the notable exception of the two wells constructed at Riverton's regional airport and one well at the Honor Farm, the City's wells lie within or along the perimeter of the town. The Wind River Aquifer forms the uppermost aquifer in the basin and is the principal water source for domestic and municipal use. This aquifer is composed of saturated and permeable sandstone and conglomerate of the Wind River Formation. Although these lenticular sandstone and conglomerate beds are difficult to correlate, aquifer tests of the Riverton Municipal wellfield and the Fremont Minerals deep well have revealed the entire sandstone, siltstone, and shale sequence of the Wind River Formation is sufficiently hydraulically connected. The presence of interbedded shales and siltstones has resulted in a series of semi-confined and confined sandstone subaquifers.

The yields of Riverton's wells and the hydrogeologic properties of the Wind River Aquifer vary according to lithology, tectonic deformation, and sedimentary deposition. Gores and Associates reported on the basis of others' work that transmissivities in the aquifer range from 2,000 to 12,000 gallons per day per foot. The Wyoming Water Research Institute reported storage coefficients range from 0.0001 to 0.000021. Depths to water in the Wind River Aquifer are variable, but in wells completed to depths in excess of 100 feet, the USGS reported the median depth to water is generally 45 feet. Gores and Associates reported the primary source of recharge to the confined portions of the Wind River Aquifer is the Little Wind River where it crosses sandstone outcrops of the Wind River Formation approximately 5 miles west of Arapahoe. Groundwater generally moves through this aquifer as porous media flow. Gores and Associates reported all thirteen of Riverton's municipal supply wells are completed in the middle member of the Wind River Formation to depths between 600 and 1,823 feet, and yield between 150 and 535 gpm based on adjudicated water rights. Additional details on each of the City's wells are included on the enclosed Well Information Sheets.

Water levels and groundwater flow through the Wind River Aquifer have been altered as a result of groundwater production from the City of Riverton's wellfield. Based on modeling, Gores and Associates reported that groundwater in the aquifer prior to development generally flowed from the southwest to the northeast along the Wind River. The USGS reported that artesian flows of up to 300 gpm were initially encountered in wells ranging in depth from 225 to 450 feet near Arapahoe and Riverton. Due to increased well drilling, well interference, and water demand, groundwater levels in the Riverton vicinity have fallen such that many once flowing wells no longer flow. Gores and Associates reported that water levels today are well below those initially reported in the 1940's, and are generally 30 feet lower throughout the Riverton area.

Groundwater now flows toward the cone of depression centered on Riverton.

As shown on the enclosed source water area delineation maps, contaminant inventory zones for each of Riverton's wells generally reflect hydrogeologic conditions in the Wind River Aquifer within the immediate vicinity of the wellhead. Zones 2 and 3 for these wells are essentially centered around the well. Individual differences in the size and shape of the source water areas are directly related to differences in pumping rates between the wells, aquifer transmissivity, and groundwater flow directions.

Surface Water Sources

The City of Riverton obtains its municipal surface water from the Wind River via the LeClair Canal. Water from this source is used to supplement the City's groundwater sources, and is only available between May and September of each year when the canal is also used to supply irrigation water to local ranches. This surface water is delivered to the treatment plant where it is treated using conventional methods. Additional information on this surface water source is included on the attached Surface Water Information Sheets.

As shown on the attached source water area delineation maps, Lidstone identified contaminant inventory Zones 2 and 3 that include both the LeClair Canal and the Wind River. Zone 2 extends upstream from the surface water intake on the canal a distance of 15 river miles and includes a 1,000 foot wide buffer zone on both sides of the canal and river. Zone 3 includes the remaining watershed for the Wind River upstream from the intake.

Integrity Summary

The City of Riverton supplies its municipal system with groundwater obtained from 13 Wind River Aquifer wells and surface water obtained from the Wind River. The integrity of the wells and intake associated with these sources is described below according to the source type and location.

Riverton currently obtains its primary water supply from wells. With the exception of the Honor Farm Well and Airport #3, Riverton's wells were completed prior to 1983 when less stringent construction standards were required by the State of Wyoming. Available records indicated that each of the wells that are currently in use was completed with both surface and annular seals. Access to these wells is also generally restricted and all the wellheads are protected from flooding. As shown on the Integrity Summary Table, the Honor Farm Well and Airport #2 received integrity scores of 1 and 4, respectively, while each of the other wells received an integrity score of 3. While the Airport wells received higher scores due to their long conveyance length to the City, the scores for the other wells solely reflected the well completion dates.

At an intake on the LeClair Canal, the Town obtains surface water from this diversion off the Wind River. The intake was constructed before 1983, when less stringent construction standards were required by the State of Wyoming. The intake is inspected regularly, screened, and is not easily accessible to the general public. As shown on the Integrity Summary Table, this intake received an integrity score 3 due to its construction date.

Water Source Sensitivity Summary

Riverton obtains water for its municipal system from the confined Wind River Aquifer through 13 wells, and from a surface water diversion of the Wind River. As shown on the Source Sensitivity Summary Table, the groundwater sources received sensitivity scores of 6, while the surface water source received a score of 10.

The wells and intake received an intermediate and maximum sensitivity score, respectively, for two reasons. The wells received a lower score because of the confining conditions associated with the Wind River Aquifer. These conditions generally render it to be less sensitive to contamination. In contrast, surface water obtained from the Wind River is known to be vulnerable to contamination because it is a surface water source. The primary reason for the higher scores for both sources was the fact that laboratory analysis of water samples within the last five years detected several contaminants that are listed on EPA's primary and secondary drinking water standards. These included fluoride and sulfate among others. Despite detection, these contaminants were generally 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. The susceptibility of Riverton's surface and groundwater sources is detailed in the following sections.

The City's surface water source, the Wind River via the LeClair Canal, generally received high susceptibility ratings for land use, transportation corridor, and point source contaminants. The high land use susceptibility ratings reflect the high percentage of urbanized land within Zone 1. The high transportation corridor susceptibility rating resulted from the fact that a state highway that is approved for the transportation of hazardous materials crosses through Zone 2. The intake was assigned a high susceptibility for point source contaminants due to the presence of several underground storage tanks, and an oil and gas well in Zone 2.

Riverton's groundwater sources received mixed susceptibility ratings that reflected the general location of each well. Due to their location on the hill west of town, both Airport wells received low land use, point source, and transportation corridor susceptibility ratings due to the general lack of contaminant sources in the source water areas. In contrast, wells that are located within the vicinity of the City generally received high susceptibility ratings for land use, point source, and transportation corridor contaminant sources. The high land use ratings reflected the fact that these wells are located in an urbanized area. While some of the wells in town did not receive ratings for point source contaminants, those that did generally received their high scores due to the presence of underground tank or hazardous waste sites within their source water areas. Similarly, a few received high ratings for transportation corridor contaminants where state highways or railroads crossed through the source water areas. Despite the high susceptibility ratings associated with these contaminant sources, the overall vulnerability of the wells to these sources is likely less due to the fact that these wells are completed in a confined aquifer. The most likely pathway for many of these contaminant sources to reach the source water is through improperly abandoned wells, and improperly sealed wells. 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 Riverton**

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 Tank	N/A	42	38
Storage Tank	N/A	6	N/A
Sol/Haz Waste Site	N/A	6	1
Oil & Gas Well	N/A	N/A	1

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