

WYOMING WATER ASSESSMENT AND PROTECTION PROGRAM (SWAP)



SOURCE WATER ASSESSMENT PROGRAM EXECUTIVE SUMMARY

Source Water Assessment Prepared For:
Rawlins Water Supply

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SOURCE WATER ASSESSMENT SUMMARY FOR Rawlins Water Supply

PWS Source Water Assessment Summary

The City of Rawlins water system is classified as a community surface water supply and serves a population of 9,730 through 3,888 service connections year round. The City uses a direct DE-filtration technology plant to treat water supplied from three major sources: a surface water intake on the North Platte River, groundwater supplied from several Tertiary springs and Nugget Aquifer wells in the Sage Creek watershed, and surface water reservoirs associated with the delivery of water from the Sage Creek watershed. Water from the reservoirs, intake, springs, and wells is commingled before entering the water treatment plant.

The treatment plant consists of four DE-filters, with the associated pre-coat and body feed tanks, and constant feed water pumps. Water is filtered on demand and stored in a baffled clearwell. Gas chlorine is injected into the filter effluent to the clearwell. The clearwell serves as a contact time (CT) detention tank, and then feeds water to storage or the distribution system. A computerized SCADA System is employed to control, monitor, and provide an early warning system for the treatment plant operation. Following treatment, water is delivered to two storage tanks prior to distribution throughout the system.

With the notable exception of its North Platte River intake, the susceptibility of Rawlin's surface and groundwater sources is generally low with respect to all three types of contaminant sources. The City's surface water sources generally received low susceptibility ratings for land use, point source, and transportation corridor contaminants. However, the North Platte River intake was rated high for land use contaminants due to the presence of forested land along the river. This intake also received high susceptibility ratings with respect to point source and transportation corridor contaminants due to the presence of a wastewater discharge point; and pipelines, an interstate highway, and a railroad. In contrast, Rawlin's Nugget Aquifer wells and Sage Creek basin springs received low susceptibility ratings for land use, point source, and transportation corridor contaminants.

Delineation Methods

The City of Rawlins obtains water for its community water system from both surface and groundwater sources. For this reason, Lidstone conducted a conjunctive delineation using surface and groundwater delineation methods. Lidstone used hydrogeologic mapping techniques and the U.S. EPA's Wellhead Analytic Element Model (WhAEM) to delineate the source water areas associated with the City's springs and wells, respectively. For Rawlins' reservoirs and surface water intakes, Lidstone used surface water delineation methods to identify associated source water areas. The source water area delineation maps for each of Rawlins' 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 because one of the City of Rawlins' water sources is a series of springs. Conduit flow aquifers have extremely variable flow patterns and rates, making

the calculation of time of travel difficult. Due to this fact, 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 the Sage Creek basin 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 to delineate the source water areas for the Nugget Aquifer wells because the City derives this source from a porous media 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

The City of Rawlins currently uses two distinct groundwater sources: at least 22 springs emanating from Tertiary Rocks, and three Nugget Aquifer wells. The springs are located on the eastern side of the Continental Divide approximately 35 miles south of the City in the Sage Creek basin. The Nugget Aquifer wells are located approximately 16 miles south of the City off Wyoming Highway 71 in the same geographic section.

The City's springs are derived from the North Park Formation, which consists of fine- to medium-grained sandstone, tuff, and limestone. Recharge to these springs is derived from infiltrating precipitation and snowmelt in the Sage Creek basin area which flows north and eastward toward the springs through porous media flow. Potential physical yields from these springs and the surrounding basin have been calculated to be 2,633 million gallons per year on average and 1,020 million gallons in a dry year. Essentially, these springs yield quantities of water that are sufficient to supply the City. Additional information on these springs is contained in the attached Spring Information Sheets.

The three Nugget Aquifer wells were drilled in 1984 and 1985, and currently provide a backup supply source for the City. The Nugget Aquifer consists of sufficiently saturated portions of the Jurassic Sundance and Nugget Formations that are composed of fine- to medium-grained sandstone with minor interbedded shale and siltstone. The wells tap into the aquifer along the northwestern limb of the Miller Hill Anticline along the northern margin of the Sierra Madre uplift. All three of these wells yield groundwater under flowing artesian conditions, and are completed to depths in excess of 1,625 feet. Recharge to these wells is derived from infiltrating precipitation where these units are exposed in the area, and potentially from overlying Tertiary formations where the units are in stratigraphic contact. Additional information on these wells is included on the attached Well Information Sheets.

As shown on the enclosed source water area delineation maps, contaminant inventory zones for the springs in the Sage Creek basin were delineated to include areas that could potentially

contribute water to the springs. Considering the quantity of water derived from these springs, the relatively small watershed, and the relative importance of this source to the City, Lidstone combined Zones 2 and 3 for this source.

The source water areas for the City's Nugget Aquifer wells were delineated as shown on the enclosed maps. Zones 2 and 3 generally extend southwest toward the crest of Miller Hill, parallel to the axial crest of the Miller Hill Anticline. Due to their close proximity, and similar completion in the same aquifer, Lidstone combined the yield of all three wells and used the details from one of the wells for data entry purposes in the WhAEM model.

Surface Water Sources

Rawlins currently uses four surface water sources: the North Platte River, and three reservoirs that are linked to the delivery of spring and well water from the Sage Creek basin area. Originally constructed in the late 1890s by Union Pacific, the surface water intake on the North Platte River was recently relocated to deliver water to the City. Rawlins, Atlantic Rim, and Peaking Reservoirs are used to control and supplement the raw water supply from the Sage Creek basin, and are typically used during summer months. The use of these reservoirs, however, has historically resulted in taste and odor problems. Additional information of each of these surface water sources is included on the enclosed the Surface Water Information Sheets.

As shown on the enclosed source water area delineation maps, contaminant inventory Zones 2 and 3 were completed for each surface water source the City uses. For the North Platte River intake, Zone 2 extends 15 river miles upstream from the intake and includes all perennial tributaries above that point, while Zone 3 encompasses the remaining watershed to the Stateline. For Rawlins Reservoir, Zones 2 and 3 were combined and extend upstream from the intake to the western boundary of the Sage Creek watershed due to the high sensitivity of the springs and stream in this area to potential contaminants. For the Atlantic Rim and Peaking Reservoirs, Zones 2 and 3 include the reservoir and immediate surrounding area.

Integrity Summary

The City of Rawlins supplies its municipal system with source water obtained from at least 22 springs, three wells, and four surface water sources. The integrity of the wells, springs, and intakes associated with these sources is described below according to the source type and location.

Rawlins currently obtains its supply water from a number of springs that are located in the Sage Creek watershed. The spring improvements were completed before 1983 when less stringent construction standards were required by the State of Wyoming. Available records indicated that each of the springs is enclosed, but also reported the diversions are not inspected regularly and are accessible to the general public. As shown on the Integrity Summary Table, each of the springs received an integrity score of 8. This score reflects the earlier completion date and long conveyance length of the pipeline in addition to accessibility and lack of regular inspections.

The City obtains its backup supply from three wells that are completed in the Nugget Aquifer. Rawlins Nugget Well Nos. 1-3 were completed between 1983 and 1993 when more stringent construction standards were required by the State of Wyoming. Available records indicated that each of the three wells that are currently in use was completed with both surface and annular seals. Access to each of these three wells is restricted. As shown on the Integrity Summary Table, the wells received integrity scores of 3, which reflects their completion date and long conveyance length to the water treatment plant.

Rawlins obtains its surface water from one intake on the North Platte River and three reservoirs. The North Platte River intake was constructed after 1993, when 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. The three reservoirs were constructed between 1983 and 1993 when less stringent standards were required. Access to these sources is restricted. As shown on the Integrity Summary Table, the North Platte intake received an integrity score of 2, while the Peaking, Rawlins, and Atlantic Rim reservoirs received integrity scores of 4 to 5. The North Platte intake received a low score due to its recent completion date and long conveyance length. The reservoirs received higher scores due to completion date, long conveyance lengths, and lack of regular inspections.

Water Source Sensitivity Summary

Rawlins obtains water for its municipal system from the confined Nugget Aquifer through 3 wells, from at least 22 springs, and from four surface water sources. As shown on the Source Sensitivity Summary Table, the groundwater sources received sensitivity scores of 6, while the surface water sources received sensitivity scores of 10.

The wells and intake received intermediate and maximum sensitivity score for two reasons. The wells received lower scores primarily due to the fact that they are completed in a confined aquifer which is relatively insensitive to contamination. In contrast, the springs and surface water sources scored higher because the North Platte River is known to be vulnerable to contamination, and because the springs are closely related to surface water sources that can easily be contaminated. The additional reason is 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 nitrate, barium, arsenic, 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 Rawlin's surface and groundwater sources is detailed in the following sections.

The City's surface water sources generally received low susceptibility ratings for land use, point source, and transportation corridor contaminants. While Rawlins Reservoir, the Atlantic Rim Reservoir, and the Peaking Reservoir received low land use susceptibility ratings, The North Platte River intake was rated high due to the presence of forested land along the river in Zone 2. This intake also received high susceptibility ratings with respect to point source and transportation corridor contaminants due to the presence of a wastewater discharge point; and pipelines, an interstate highway, and a railroad that cross through Zone 2. Susceptibility ratings for each type of potential contaminant source are summarized on the attached susceptibility tables.

Similarly, Rawlin's groundwater sources received low susceptibility ratings for land use, point source, and transportation corridor contaminants. While many of these contaminants lie within the drainage basin of the North Platte River, non were inventoried within the respective source water areas for the Sage Creek basin springs and Nugget Aquifer 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 Rawlins Water Supply
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
Wastewater Discharge	N/A	N/A	1

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