



Executive Summary

As outlined in Phase IA of the Water Facilities Planning and Jackson Springs Water Treatment Facility Reconstruction Project (W04-1425/CIP No. 50570), Burns & McDonnell and Ferber Engineering have conducted an evaluation of alternatives to determine the best approach to continue to provide service to customers on the Jackson Springs Gallery finished water transmission line. This executive summary serves to briefly describe the evaluation and subsequent report.

ES 1.0 Evaluation Summary

On August 10, 2004, the South Dakota Department of Environmental and Natural Resources (SDDENR) notified the City of Rapid City that the City's Jackson Springs groundwater source was to be reclassified as 'Groundwater Under the Direct Influence of Surface Water' (GWUDI). This determination was based on microscopic particulate analysis (MPA) and field evaluations. State and federal drinking water regulations require that Rapid City modify the treatment methods within 18 months of notification (February 10, 2006) to comply with the Surface Water Treatment Rule (SWTR), or utilize other sources to provide water to their customers. The evaluation included seven alternatives for complying with these regulations. Evaluation components and recommendations are presented as follows.

Alternative 1: Utilize the Cleghorn Springs Fish Hatchery Water Supply

Description:

Utilize the Cleghorn Springs Fish Hatchery (i.e., Fish Hatchery) spring as a water source in lieu of the Jackson Springs Infiltration Gallery. Evaluate pumping options to convey the water from the Fish Hatchery to the Jackson Springs Pump Station and treatment options for supersaturation of nitrogen gas. The Jackson Springs Pump Station would remain in service but would utilize the Fish Hatchery spring as a water source.

Conclusions:

Based on discussions with SDGFP, exchanging water sources is unacceptable to them. They have concerns with the variable temperature of the Jackson Springs water and with the presence of diatoms which can cause disease in fish. This alternative is not feasible and should not be pursued further.

Alternative 2: Utilize the Cleghorn Springs Water Supply

Description:

Utilize the City's Cleghorn Springs Water Supply as a water source in lieu of the Jackson Springs Infiltration Gallery. The Jackson Springs Pump Station would remain in service but would utilize the Cleghorn Springs Water Supply as a water source in lieu of the Jackson Springs Infiltration Gallery. Evaluate pumping options to convey water to the Jackson Springs Pump Station.



Conclusions:

This alternative is feasible, but is not the preferred alternative. The relatively small quantity of water (0.89 cfs) and the cost of conveying water to the Jackson Springs Pump Station make this alternative less favorable.

Alternative 3: Pursue a Short-Term Waiver from SDDENR

Description: Pursue a short-term waiver from SDDENR to accommodate the current project schedule for the evaluation. The Jackson Springs Pump Station would remain in service and continue to use the Jackson Springs Infiltration Gallery as a water source. Note that the pumping rate may be decreased to 1400 gpm.

Conclusions:

Based on conversations with SDDENR and EPA Region VIII there is no reason to believe a short term waiver would be granted. This alternative is not feasible and should not be pursued further.

Alternative 4: Implement Treatment to Meet SWTR Filtration Avoidance Criteria

Description:

Evaluate the Criteria for Filtration Avoidance with ultraviolet disinfection or a package treatment plant as allowed by the Surface Water Treatment Rule. If filtration avoidance is granted, the Jackson Springs Pump Station would remain in service and continue to use the Jackson Springs Infiltration Gallery as a water source. Note that the pumping rate may be decreased to 1400 gpm.

Conclusions:

This alternative is feasible, but not practical due to the regulatory requirement for a watershed protection plan. A watershed control program would need to be developed to minimize the potential for *Giardia lamblia* cysts, viruses, and *Cryptosporidium*. The project team discussed these requirements in detail with SDDENR, Dr. Perry Rahn, USGS, USEPA, and other State regulatory agencies that have allowed filtration avoidance. Studies have shown that the Madison aquifer is hydraulically connected to Spring Creek, Rapid Creek, Boxelder Creek, and the Minnelusa aquifer. All of these sources would most likely need to be incorporated into any watershed management plan. It was agreed by all parties that developing a watershed control program of this magnitude would be a large task and could not be completed within a reasonable amount of time.



Alternative 5: Jackson Springs Water Main Extension

Description:

Evaluate extending a water main from the Canyon Lake High Zone to Cleghorn Canyon. Existing customers on the Jackson Springs transmission main would be reconnected to the new main.

Conclusions:

Extending the water main from the Canyon Lake High Level water main to Cleghorn Canyon is a feasible option, but is not a preferred short-term option. Since it is doubtful that the existing piping could handle the necessary increase in pressure, installing a new main would be necessary. The cost and timing of installing a new main make this alternative less favorable. However, due to the age/type of pipe and to provide additional operator flexibility in the system, this project should be considered in the future.

Alternative 6: Reconfiguration of Distribution System

Description:

Evaluate reconfiguring the distribution system by installing an altitude valve in or near the Sioux San Pump Station, closing the isolation valve near the Sioux San Booster Pump Station, and continuing to use Well No. 1 and Well No. 4. Also evaluate connecting Pinedale Pump Station suction into Canyon Lake High Level Zone.

Conclusions:

This alternative is feasible and is the preferred option if conducted in combination with other recommendations outlined below. The altitude valve should be installed to provide adequate flow and pressure from the South Canyon Zone. The Pinedale #2 Pump Station should be connected to the Canyon Lake High Level Zone with the ability to pump from either zone.

Alternative 7: Combination of Alternative 5 and 6

Description:

Evaluate a combination of Alternative 5 and Alternative 6. Extend the water main to Cleghorn Canyon and reconfigure the distribution system.

Conclusions:

There is no advantage to combining these two alternatives since water can be provided to the Jackson Springs water customers at adequate pressure using only Alternative #6. It is preferred that Alternative #6 be implemented in combination with the other recommendations outlined below.



ES 2.0 Recommendations

After extensive evaluation, the project team recommends the City pursue the following course of action:

- Discontinue use of the Jackson Springs Facility prior to February 10, 2006.
- Continue operation of Wells #1 and #4 at maximum capacities allowed by well conditions.
- Isolate the Jackson Springs line by closing all valves connecting this line to the Low Level Zone. Close the control valve located near the Sioux San Booster Pump Station.
- Install an altitude valve at the Sioux San Booster Pump Station to allow water from the South Canyon Zone to flow into the Jackson Springs line. This will provide additional water when needed and ensure adequate pressure is maintained in the Jackson Springs water line.
- Install approximately 200 feet of 12-inch piping to close the ‘gap’ in the distribution system between Range Road and South Street along Sioux San Drive. This recommendation is taken from FMG’s Preliminary Report for Reroute/Replace 10” & 12” Water Mains on Camp Rapid and suggested for immediate installation.
- Proceed as scheduled with the 14-inch water main replacement also recommended in FMG’s Preliminary Report for Reroute/Replace 10” & 12” Water Mains on Camp Rapid.
- Prepare to operate the water treatment plant as necessary to provide additional water to the South Canyon Zone and Low Level Zone. To minimize the demand on the water treatment plant, consider the following options:
 - Increase impeller size of the pump in Well #5 to increase the capacity from 2.37 MGD to 2.88 MGD.
 - Make operational changes including increasing usage of Girl Scout Wells for limited periods.
 - Ensure diurnal demands on the system are met by filling tanks during low demand periods.
 - Investigate implementing stricter conservation measures for outside watering and possibly switching some of the treated water irrigation supply points to raw water.
- Implement a hydrant flushing program for areas of low water use including Cleghorn Canyon.
- Install piping/valves to allow the Pinedale #2 Pump Station to draw water from the Canyon Lake High Level Zone to reduce demand on the Jackson Springs line.

Details and supporting information are provided in the final report titled ‘Evaluation Report, Phase 1A, Existing Jackson Springs Infiltration Gallery Customer Water Supply’.