



## COLORADO

Water Quality Control Division

Department of Public Health & Environment

Dedicated to protecting and improving the health and environment of the people of Colorado

November 30, 2018

Peter Brixius, City Manager  
City of Craig  
300 W 4<sup>th</sup> Street  
Craig, CO 81625

Re: City of Craig Project Needs Assessment (PNA) Review and Approval Letter and Grant  
Recommendation of \$300,000  
Project No. 140521D-Q

Dear Mr. Brixius:

The Water Quality Control Division (division) has reviewed the Drinking Water Revolving Fund (DWRf) PNA prepared by SGM, and dated August 2018 for the City of Craig (city). The June 2018 report titled *Minimum Chlorine Residual Rule Compliance Report* prepared by SGM was also reviewed.

At the time of the eligibility assessment, the applicant had not selected the final treatment alternative. Therefore, the project costs were based on the most expensive alternative (i.e. \$11 million). After further evaluation, the applicant appears to have selected a less expensive alternative to meet the minimum disinfection residual requirements for the distribution system, which includes switching the secondary disinfectant to chloramines and making various distribution upgrades. The estimated cost of this alternative is \$5.2 million, and the project components are still in line with the 2018 Intended Use Plan (IUP). The applicant plans to fund the project through a combination of funds including money from City's reserves, a possible grant through the Colorado Department of Local Affairs (DOLA) Energy/Mineral Impact Assistance Fund (EIAF) program, and a loan through the SRF program. The goal is to decrease the necessary SRF loan amount to less than \$3 million.

The Colorado Department of Public Health and Environment, Water Quality Control Division, has determined the city's PNA, through substantial review, is hereby approved for the suggested project(s) and recommended to move forward in the SRF process.

The Technical, Managerial and Financial components were evaluated and there are no outstanding issues.

The environmental review is still under evaluation. Construction cannot begin until the environmental review is completed with the publication of a Categorical Exclusion or a Finding of No Significant Impact and submitting documentation of the public meeting.

#### Project Components:

- New valve vault near highway 40 and 7.
- New bleeder valve vault in the Pine Ridge Subdivision.
- Monochloramine boosting station at the Round Bottom Storage Tank.
- Water Treatment Plant improvements (internal to plant).

#### Final Environmental Determination

##### **CATEGORICAL EXCLUSION**

The State Environmental Review Process (SERP) specifically states that Categorical Exclusions may be granted for projects where no federal cross-cutters are impacted, there are no known or expected Extraordinary Circumstances and the facilities planning are solely directed toward construction of additional facilities adjacent to existing facilities which do not affect the degree or capacity of treatment by more



than 30 percent of the existing populations, and minor upgrades and expansions of existing water systems in communities of 10,000 population or less (distribution line extensions are not included.) **The project is eligible for a Categorical Exclusion, however, the project will be required to undergo a State Register Act Review with History Colorado, and provide documentation of no negative effects to federally listed threatened and endangered species prior to finalization of the environmental decision.**

In addition to the above PNA comments, please hold a public meeting to inform the citizens in the affected area of the proposed drinking water project to comply with the Federal public participation requirement. The meeting must be noticed in the local newspaper at least 30 days prior to the scheduled meeting date, and should include a discussion of project alternatives, the preferred alternative, any projected rate increases, and construction related and/or environmental impacts of the project. A sample legal notice is available upon request. An affidavit of publication, responsiveness summary, meetings minutes, and a list of attendees must be submitted to the division.

**Technical, Managerial, Financial (TMF) capacity review**

The TMF Capacity Review of the city has been completed. Funding through DWRF is recommended with the following requirements:

No issues were identified at this time.

**Design and Engineering Grant recommendation**

It was determined that this project met the eligibility criteria for \$300,000 in design and engineering grant funds to assist with the costs of completing the necessary design and engineering of the proposed project. This funding may be used for the development of required submittals or documents to bid and construct the project (i.e, basis of design report, process design report, site application, permits, plans and specifications). Please note that this review letter does not commit the funds as this will originate from the Colorado Water Resources and Power Development Authority. Pending confirmation of available funding, a representative from the authority will be in contact to begin drafting the grant agreement.

**Design Review**

If the city receives funding through the State Revolving Fund (SRF) program, the SRF Required Specifications will need to be included in the bid package. You can find the bid specifications on our website. The specifications identify requirements with Davis-Bacon Act and the use of American Iron and Steel. According to Section 436 of H.R. 3547 Consolidated Appropriations Act, 2014, all iron and steel products purchased using DWRF monies must be produced in the United States unless the project or a portion of the project is waived from this requirement.

The DW PNA indicates that applicant does not intend to self-certify any components of the proposed project. Thus, the applicant is required to submit a Drinking Water Design Submittal form, Basis of Design Report, and engineering plans and specifications with the necessary State Revolving Fund (SRF) documents.

If the project scope changes, the city must submit an amended PNA for approval. Project amendments may result in environmental and/or design approval changes.

Questions can be directed to me via telephone at 303-692-2203, or via e-mail at randi.johnson-hufford@state.co.us.

Sincerely,



Randi Johnson-Hufford  
Project Manager  
Grants and Loans Unit  
Water Quality Control Division

ec: Rick Huggins, Consulting Engineer  
Mike Emming, WQCD Engineer  
Desi Santerre, DOLA Representative  
Beth Fox, Authority



## 1.0 Executive Summary

### ***Project Purpose***

This report has been prepared for the City of Craig (City), PWSID# CO0141188, to document the results of a feasibility study undertaken to identify a preferred compliance strategy for meeting the Colorado Department of Public Health and Environment (CDPHE) minimum distribution system chlorine residual rule.

### ***Background***

In January of 2016 the City was granted a four (4) year extension to the April 1, 2016 compliance deadline issued by CDPHE for compliance with the minimum distribution system chlorine residual rule. In this rule, the Water Quality Control Division (Division) raised the minimum distribution system chlorine residual standard from “detectable” to 0.2 mg/L in at least 95 percent of monthly samples. The City’s current compliance deadline is April 1<sup>st</sup>, 2020 per the CDPHE-approved compliance extension.

The City and SGM then began work to identify a compliance path with the new rule. As the City’s engineer, SGM performed testing, evaluation, planning, and preliminary design efforts for improvements to both the City’s Water Treatment Plant (WTP) and water distribution system. During preliminary engineering work SGM found that the application of typical distribution system residual maintenance strategies, such as chlorine boosting, would pose a compliance risk with respect to CDPHE’s disinfection byproduct rule (DBPR) due to the nature of the City’s source water and the high reaction time within the City’s treated water distribution system. Specifically, we believe that it will be difficult for the City to meet TTHM and HAA5 maximum contaminant levels (MCLs) if distribution system chlorine boosting is implemented alone. In addition, the City operates a large distribution system which exhibits high water age; this limits the effectiveness of water age management (storage reduction, automatic flushing hydrants, etc.) as a tool to be used in isolation or only with chlorine boosting – the reason is that when water age is already excessive, large water age reductions will only yield a small change in disinfection byproduct formation and chlorine decay due to the nature of the associated reaction kinetics. SGM recommended to the City that a comprehensive technology assessment be performed to identify paired distribution system/WTP upgrades with the capacity to achieve compliance with both minimum distribution system disinfectant residual and disinfection byproduct rules. Additional dissolved organic carbon (DOC) removal or a switch to chloramines as a secondary disinfectant were deemed to be necessary to achieve reliable simultaneous compliance.

### ***Decision Criteria***

Through discussions with City staff, SGM has developed the following vision for ranking and evaluating technological improvements for the City. The primary decision criterion for the City is reliability; the solution must offer a safe, consistent, and easy to manage compliance strategy that is expected to perform consistently under a variety of operational, environmental, source water quality, economic, managerial, and future regulatory conditions. Second, the cost of the selected alternative must be reasonable and judged to be able to be borne by the City’s water customers; if two alternatives are viewed as being equally reliable, the lesser cost option will be selected. The third decision criteria acknowledges that the City is comprised of many long-term residents with an interest in City governance and service. Therefore, the selected alternative must be perceived by the public as a good decision where this last criterion must not seriously conflict with criterion 1 or 2.



**Inherent in these decision criteria is the understanding that at best, the City should expect to select an alternative that excels in two of the three criteria, while it may only meet the third in a minimal sense.** Some alternatives are very reliable and cost effective but will pose certain public relations challenges. Likewise, other alternatives that may at first be more readily accepted by the public may be more expensive. The decision criteria are summarized again below for emphasis.

1. Reliable: Dependable performance and easy to use
2. Cost Effective: Least cost option is preferred
3. Public Perception: Public perception must not be a barrier

### ***Comparison of Top Three Performing Alternatives***

During our evaluation, three of the five water treatment plant improvement alternatives considered were identified as warranting further consideration (each was paired with a set of recommended water distribution system alternatives):

1. Switch to chloramines (from free chlorine) for secondary disinfection
2. Construct a magnetic ion exchange (MIEX) pretreatment process for DOC removal
3. Construct a nanofiltration (NF) treatment process, located after the existing filters, for DOC removal

**Table 1-1** summarizes the estimated monthly water bill increase per tap expected for each of the three alternatives, and discusses some of the primary challenges associated with each alternative. SGM estimates that the average monthly water bill for a residential customer will increase by \$5.10 if the City switches to chloramines and implements associated water distribution system improvements. The average monthly water bill increase is expected to be \$17.20 for MIEX and \$26.70 for NF. Note that these calculations assumed a SRF loan will be used to fund the project, with a 20 year repayment term, 2.5% interest, and a \$2,000,000 “down payment” contribution from the Water Enterprise Fund, and that annual costs would be spread out over 3,600 taps. The City also qualifies for SRF loans under the 30 year repayment term, and may choose to self-fund more or less of the total project costs. Additional information summarizing anticipated costs, risks, public perception challenges, and outcomes for the three selected alternatives is shown in **Table 1-1** which also include costs for distribution system improvements.

### ***Regulatory Uncertainty***

Municipal water works and associated infrastructure often have operable lifetimes of 20-60 years, a span of time which is large enough for the regulatory environment to appear fluid. Given our current assessment of the regulatory framework around disinfection byproducts (related to chloramines), and industrial discharge permits (related to MIEX and NF) SGM believes that there is a real risk of noncompliance with future regulations associated with each of the three alternatives, but that the level of risk is acceptable. These risks should be carefully considered prior to identifying a preferred compliance path, and they are discussed below:

- **Chloramines:** Chloramines are associated with formation of N-Nitrosodimethylamine (NDMA) which is a nitrogen based DBP that is currently regulated by the State of California at 10 nanograms/L. NDMA is not currently regulated nationwide, and it is unknown if the US EPA will promulgate new regulations on this compound. Industry research indicates that between 20% and 30% of public water systems using



chloramines show NDMA concentrations in excess of the California MCL. That means that 70% - 80% of public water systems would be compliant with the California MCL. Regulations for NDMA and other nitrogenous DBP's have not been recommended by the EPA at this time, however, the EPA is conducting a comprehensive review of microbial and disinfection byproduct regulations and a final decision on NDMA would be expected after that process has been completed. SGM believes that enforcement of any such ruling would likely be 15-25 years in the future.

- **MIEX:** The MIEX process will produce approximately 3,000 gallons of waste brine that will need to be discharged to the Yampa River either through the City's existing WWTF, or through a separate industrial discharge permit. At this time, SGM recommends the latter (industrial permit) and the use of a river diffuser. The City's WTP is located just upstream of a threatened and endangered species river segment and being in the Colorado River watershed, is also impacted by Colorado Basin salinity controls. SGM believes that the City can successfully obtain an industrial discharge permit, but it is unclear what discharge limits that permit will be subject to in another 20 years.
- **NF:** NF treatment will also produce a waste brine that will need to be discharged into the Yampa, although a river diffuser should not be needed. The comments discussed above for MIEX treatment apply to NF treatment as well, however, SGM believes that the waste stream from NF treatment will be easier to manage and permit in the future as it will be much less concentrated with salts.

### ***Recommendations***

**SGM recommends that the City switch from free chlorine to chloramines for distribution system disinfectant residual maintenance because this option satisfies the first two decision criteria to a high degree.**

- ***Reliability:*** Chloramines is one of the most well documented and commonly used compliance techniques for maintaining minimum distribution system residual and disinfection byproducts compliance. Also, switching to chloramines could readily be completed within the City's current compliance schedule.
- ***Cost:*** Chloramines is the most cost-effective option available to the City by a significant margin.
- ***Public Perception:*** It is likely that there will be some public opposition to any technology selected by the City. However, chloramines will likely present a unique public relations challenge that is greater in magnitude than other options:
  - Water customers will need to be notified of the switch to chloramines.
  - The City will need to make a special effort to notify residents using City water in fish aquariums and in kidney dialysis machines.
  - The local hospital should be consulted and brought onboard.
  - Issues around NDMA and regulatory uncertainty may arise. Discourse with the public should include a hypothetical regulatory schedule, project costs in comparison to other alternatives, and overall lifespan of the project weighted against costs, loan repayment, and existing WTP health and lifespan.

**SGM recommends that the City proceed with a variety of distribution system improvement projects intended to reduce extreme water ages (as well as average water age) in the City's treated water distribution system as follows:**

- Increase recirculation of water in the distribution system between the Roundbottom and Barclay pressure zones by installing and operating various control valves (as

discussed in this report). Control valves to include three downloading dump valves (at Barclay BPS, Finley Ln BPS, new location near HWY 40/13 intersection) and one bleeder valve (near Pineridge Dr).

- Install booster chloramination systems at the Roundbottom Tank and the Sandrock Tank. If the City chooses to continue achieving secondary disinfection with free chlorine then chlorine boosting will need to be installed at 5 booster pump sites.
- Install mechanical tank mixers (PAX Corp, or similar) in Roundbottom, West, Sandrock, and Glen Erie No. 1 and No 2. Tanks.
- Implement a unidirectional flushing (UDF) program to reduce the effect of microbial growth on pipe walls within the distribution system and to remove debris prior to changing the flow of water in the system as recommended herein. This will minimize colored water episodes, improve chlorine/chloramine residuals, and reduce DBPs.
- If the City decides to stay with free chlorine in the distribution system and to implement MIEX or NF, make improvements to the Barclay pressure zone as described in this report to allow operating the Pine Ridge Tank at lower water levels in order to further reduce water age.

**If the City does not wish to switch to chloramines** due to challenges associated with public perception, or risks related to future regulation, then SGM recommends that the City further evaluate of MIEX pretreatment, and/or post filter NF treatment. The recommended first step would be to apply to the State for preliminary effluent limits (PELs) for a waste brine discharge to the Yampa River from a MIEX process.

**SGM also recommends that the City work with the Colorado River District** to evaluate water quality in Elkhead Reservoir, and to utilize the reservoir's multi-depth intake structure to potentially reduce DOC contributions to the Yampa from this source.

### **Schedule**

**Table 1-2** presents anticipated completion dates for project milestones related to switching to chloramines at the plant. Distribution improvements would be completed simultaneously.