



April 22, 2019

City of Denmark
Attn: Dr. Gerald Wright
4768 Carolina Hwy
Denmark, SC 29042

RE: Follow-Up Sanitary Survey – City of Denmark
Public Water System # 0510002

Dear Dr. Wright:

On January 15, 2019, a sanitary survey was conducted on the public water system serving the City of Denmark. At the time, the City of Denmark received an overall rating of Needs Improvement and a follow-up inspection was scheduled. The follow-up survey was conducted on April 2, 2019. The intent of the follow-up sanitary survey is to evaluate the public water system's ability to provide a continuous supply of safe drinking water to its customers and to ensure that water system returns to compliance after deficiencies were documented in previous sanitary survey.

The City of Denmark received an overall rating of **Unsatisfactory**. This rating is the direct result of an Unsatisfactory rating for an item considered to be a significant deficiency; therefore, the City will be automatically referred to the Department's Enforcement Section.

Enclosed is a copy of the survey and a report, which includes a description of the public water system, specific findings made during the sanitary survey, and recommendations for correcting any deficiencies. This survey and the report should be kept on file for no less than ten (10) years and be made available to the public or DHEC upon request. It is requested that all parties responsible for the operation and maintenance of the water system review this report promptly.

If you have any questions or if I can be of any assistance, please call me at the numbers below.

Sincerely,

Crystal L. Robertson
Bureau of Environmental Health Services
Aiken Environmental Affairs Office
(O) 803-642-1637 (C) 803-522-4905
robertc2@dhec.sc.gov

cc: Marty Chaney, Bureau of Water

**SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
AIKEN ENVIRONMENTAL AFFAIRS OFFICE**

SANITARY SURVEY REPORT

*City of Denmark
Public Water System # 0510002
Bamberg County*

Introduction

The South Carolina Department of Health and Environmental Control (Department) recently conducted a follow-up sanitary survey of the City of Denmark's public water system. This survey consisted of a review of the system's files and an on-site inspection by Department personnel on April 2, 2019. The following persons participated in the on-site inspection:

Charles Michael Shugart	City of Denmark – Public Works Director
Tim Freeman	City of Denmark
Jimmie Shepherd	City of Denmark
Janine Morris	US Environmental Protection Agency (USEPA), Region 4
Josh Yon	SCDHEC – Aiken Environmental Affairs Office
Crystal Robertson	SCDHEC – Aiken Environmental Affairs Office

System Description

The City of Denmark owns and operates a groundwater facility and associated potable water distribution system that serves a population of approximately 3,500 residents and approximately 2,116 students and staff at Voorhees College and Denmark Technical College by 1,502 service connections. The system has a current rated capacity of 943,200 gallons per day. Information on the system's wells is given in the table below.

Well	Type	Horsepower (HP)	Yield (GPM)	Regulated Capacity	Treatment
Well 1 – Brooker Ctr	Disconnected				
Well 2 – Voorhees	Turbine	60	330	316.80 TGD	Gaseous Chlorine
Well 3 – Legare Street	Disconnected				
Well 4 – Cox Mill	Off-Line				
Well 5 – Acacia Street	Submersible	40	403	386.88 TGD	Gaseous Chlorine
Well 6 – W. Voorhees	Submersible	40	325	312.00 TGD	Gaseous Chlorine

Well 1 – Brooker Center and Well 3 – Legare Street are no longer in service and have been physically disconnected from the system. Well 4 – Cox Mill has been valved off and no longer feeds the Denmark water system. Treatment at all active wells consists of the addition of

gaseous chlorine for disinfection. The system has two 50-Kilowatt generators stationed at Well 5 – Acacia Street and Well 6 – W. Voorhees that are capable of running these wells during an emergency. In addition, the system maintains an emergency connection with Bamberg Public Works (System #0510001).

Three elevated storage tanks, with a total volume of approximately 575,000 gallons, serve the City of Denmark. The City Hall Tank was taken offline and physically disconnected from the system in 2011. Information on the system’s tanks is given in the table below.

Location	Capacity (Gallons)
Nibco Tank	250,000
Voorhees Tank	125,000
Bamberg County - Industrial Park Tank	200,000

Currently, the City of Denmark’s public water system operators are:

Name	License	Certification #	Class
Charles Shugart	Treatment	4873	A
	Distribution	907	D
Tim Freeman	Treatment	6651	D
	Distribution	1830	G
Travis Clark	Distribution	3889	D

Findings and Recommendations

1. The system received a **Satisfactory** rating for Protection from Contamination. The purpose of this item is to ensure that all ground water sources are properly protected from contamination due to surface water runoff, local ground contamination, and/or contamination due to animals or insects. As mentioned in the previous survey, the casing of Well 2 – Voorhees Well needs to be extended to a height at least 12 inches above the surface of the concrete pad. The City of Denmark should budget to upgrade the well by raising the casing to meet the current regulations. As discussed, the Department also recommends cleaning and repainting the wellhead piping at all active wells by the next survey.

The design standards for well construction require a 100-foot pollution free radius around all public supply well. As noted in the previous survey, Well 2 – Voorhees Well has an active gravity sewer line within the 100-foot radius; however, it was determined by SCDHEC’s Bureau of Water that the line poses very little threat to the well’s water quality. The City of Denmark was not advised to relocate the sewer line at that time, but was asked to begin weekly inspections of the manholes immediately upstream and downstream of the well and

to collect bacteriological samples of the well's raw water quarterly. The City of Denmark has complied with these requests and documentation of weekly inspections and quarterly samples were available for review during the survey. No issues have been noted. Please continue to conduct this routine monitoring and maintain the documentation.

2. The system maintained a **Satisfactory** rating for Water Quality. The purpose of this item is to ensure that a water system consistently produces water which complies with established water quality standards. Routine sampling continues to show that the City of Denmark's water meets the National Primary Drinking Water Standards. The Department conducted investigative sampling in January 2018, December of 2018 and January 2019. After each event, the results and recommendations were sent to the City of Denmark. The City has complied with the Departments recommendations and documentation was available for review during the inspection. Additional sampling was conducted by Department staff as well as USEPA staff in conjunction with this follow-up survey. These sample results will be shared once they are finalized. Considering the history of discolored water complaints in Denmark, this item will continue to be closely evaluated during each subsequent Sanitary Survey.

3. The system received an **Unsatisfactory** rating for Cross Connection Control. The purpose of this item is to ensure that the water system has a program in place to identify and eliminate cross-connections between the water system and possible sources of contamination. The system has 65 cross connections protected by testable backflow prevention devices. These devices are tested annually by O'Neal Plumbing; however, approximately 14 locations were overlooked and not tested in 2018 or 2019. The system was asked during January's survey to have the devices tested and to submit the results to the Department by March 4, 2019. Prior to the follow-up survey approximately nine of these locations either had their device tested or were determined to be not in service. Following the survey, two more locations had devices tested or devices installed and tested. To date the Department has not received the results for Subway, Olar-Denmark Middle School, and the 5 devices at Voorhees College. Please have these results submitted to the Department by May 30, 2019 (Fax 803-643-4027 or Email robertc2@dhec.sc.gov). This rating will be re-evaluated once these devices have passed testing or are installed and pass testing.

In addition, the system has created a master list of all low hazard connections, such as residential in-ground sprinkler systems. The system should create a replacement schedule for these non-testable backflow prevention devices immediately. Please submit this schedule to the Department by May 30, 2019 (Fax 803-643-4027 or Email robertc2@dhec.sc.gov).

4. The system received a **Needs Improvement** rating for Valve and Hydrant Maintenance. The purpose of this item is to ensure that a system's valves and hydrants are being maintained such that they can be located and operated as needed. The City of Denmark has approximately 180 hydrants that are maintained in conjunction with Fire Flow testing. Maintenance needs were noted for each hydrant at the time of fire-flow testing. The system must address these maintenance needs and update the documentation by the next

sanitary survey. Please note this item was noted in the previous survey. The City of Denmark has approximately 225 valves. As recommended, the system has created a list of critical valves that are exercised annually, while all other valves are exercised every three years. Documentation showed that all valves were exercised during November and December 2018.

5. The system received a **Needs Improvement** rating for Flushing Program. The purpose of this item is to ensure that the system's routine flushing program is adequate to help maintain a disinfectant residual throughout the system, as well as, to help prevent water quality issues associated with stagnant, discolored, and sediment laden water. Two types of flushing programs are recommended for public water systems: 1) a system-wide flushing, where scouring velocities are maintained to clean the water lines, and 2) low velocity flushing used to maintain chlorine residuals in the distribution system.

As noted in the past, the system has a rigorous low velocity flushing program that is conducted weekly and is well documented. Despite this strong program, the investigative sampling events conducted in January 2018, December 2018, and January 2019 revealed no chlorine residual at one sample site located on Voorhees Road. The Department has recommended incorporating this area into your routine flushing program to maintain the chlorine residual; however, the system has stated that this area is on the Voorhees College master meter. The City maintains multiple hydrants on Voorhees Road and has the access needed to flush this main line. As discussed, the City must develop an agreement with Voorhees College that establishes the roles and responsibilities of each entity for the distribution lines in this area. In addition, the Department recommends that the system develops a high-velocity, unilateral flushing program.

6. The system received an **Unsatisfactory** rating for Storage Maintenance. The purpose of this item is to ensure that the water system's storage tanks are properly maintained to guarantee their good working condition. Specifically, Regulation 61-58 7.E states "*All elevated, hydropneumatic and ground storage tanks shall be inspected at a minimum of once a week for the purpose of checking on the security of the tank(s) and insuring that proper air/water ratios are being maintained in hydropneumatic storage tanks. Vent screens, hatches and other openings on atmospheric tanks must be inspected annually to ensure sanitary protection.*" The Department also recommends a comprehensive exterior and interior inspection of elevated storage tanks every three years at a minimum. An example log for weekly inspections was sent with the last two sanitary surveys. Records of weekly inspections were available for the Voorhees and Nibco Tanks, but not the Industrial Park Tank.

As requested in the 2018 survey, the Voorhees and Nibco Tanks had comprehensive inspections in April 2018 by SE Diving Services, LLC. The inspections confirmed some of the nuisance and maintenance problems noted in the survey. The system was asked to develop a plan of action to address the recommendations made by SE Diving Services, LLC, as well as the continuing nuisance problems and other maintenance issues; and to submit that plan to the Department by March 4, 2019. A plan was not submitted. Annual tank inspections were conducted again on March 29, 2019 and some minor improvements were made at that time. The hatches were locked, the ladders were secured, and temporary

screens were placed over the deteriorating vents and screens. Again the inspection reports showed vultures are a nuisance at both tanks, both screens and vents need replacing, the level indicator and pressure gauge at the Nibco Tank need replacing, and the Voorhees Tank's "coating system is beyond its protective life-cycle and is in need of renovating". These repairs were put out for bid immediately after the follow-up survey. The system should continue to work with an engineering firm to further develop the specifications, receive bids, and follow through with the repair work.

The Bamberg County – Industrial Park Tank is owned by Bamberg County; however, it serves the City of Denmark's public water system. As noted in the past two survey reports, it is unclear which entity is responsible for the maintenance of this tank or how the two entities work together. This tank appears to be in poor condition. The tank is lacking a sample tap, working pressure gauge, and a protective flapper/screen on the overflow pipe. In addition, the tank and its appurtenances are exhibiting significant signs of exterior rust. Exterior deterioration is a strong indication that the interior is also severely corroded, both of which pose a contamination risk. Again during the survey, it was stated that Bamberg County had the tank inspected and cleaned in 2018; however, to date documentation of this has not been provided to the Department. As requested, the system has added a routine sample location in the distribution area near the tank; however, the tank has not been incorporated into any of the City's Standard Operating Procedures (system overview, weekly tank inspections, etc.), Emergency Procedures, or other documentation.

As stated in the past two surveys, the City of Denmark must work with the tank owner, Bamberg County, to determine the roles and responsibilities for the tank. The City was asked to develop a plan of action for this tank, detailing how the City will address the tank's maintenance needs and establishing a reasonable timeframe to address those needs. To date, a plan has not been submitted. Following the follow-up survey, an email was submitted to the Department indicating that the City had communications with Bamberg County about possibly applying for various grants; however, there were no indications of confirmed plans or timelines. The City must develop a plan of action and submit it to the Department by May 30, 2019 (Fax 803-643-4027 or Email robertc2@dhec.sc.gov). In addition, the tank must be incorporated into all of the City's operating procedures and plans for the water system.

7. The system received a **Satisfactory** rating for Emergency Plan. The purpose of this item is to ensure that the system has a current and readily accessible plan addressing who to contact and arrangements that would be necessary in the event that there is an emergency involving the facility or distribution system. The City of Denmark should routinely update their plan as changes occur. All contact information was updated as requested. As discussed, the emergency plan should also include detailed instructions for starting and stopping each well and steps to be taken in the event of an emergency. Please continue to update the plan as changes occur and add the needed information prior to the next survey.
8. The system received an **Unsatisfactory** rating for Corrections from Previous Surveys. The purpose of this item is to make sure that water systems return to compliance after deficiencies have been documented on previous sanitary surveys. The deficiencies listed

under Cross Connection Control and Storage Maintenance have been noted in the past two surveys. Most concerning are the tank maintenance issues that have been rated Unsatisfactory for more than a year, with only minor improvements. The Department understands that there has been turnover recently in personnel; however, the City has an obligation to address noted deficiencies despite changes in personnel. The Department does appreciate recent efforts, but items above must be addressed to improve this rating.

Please note this item is considered a Significant Deficiency Item pursuant to the Ground Water Rule. An "unsatisfactory" rating of this category will result in an overall "unsatisfactory" rating and a subsequent referral to the Department's Drinking Water Enforcement section.

Conclusions

The City of Denmark public water system received an overall **Unsatisfactory** rating. **Subsequently the City is being referred to the Department's Enforcement Section to ensure the public water system is brought back into compliance.** The Department would like to thank Charles Shugart, Tim Freeman, and Jimmie Shepherd for their assistance in conducting the sanitary survey. The Department looks forward to working with the water system in the future to ensure that the residents continue to receive the highest quality of drinking water.