



C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

September 23, 2011

Town of Denmark
Attn: Jimmie Shepherd
4768 Carolina Highway
Denmark, SC 29042

RE: Sanitary Survey
System # 0510002

Dear Mr. Shepherd:

On September 20, 2011, a sanitary survey was conducted on the public water system serving the Town of Denmark. The intent of the sanitary survey is to evaluate the public water system's ability to provide a continuous supply of safe drinking water to its customers.

The Town of Denmark public water system received an overall rating of **Unsatisfactory**. 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 (803) 641-7670.

Sincerely,

Brooke Davis
Environmental Health Manager
EQC Region 5- Aiken

cc: Marty Chaney, Bureau of Water

An emergency connection exists with the Town of Bamberg.

Storage Capacity

Tank	Capacity (gallons)
City Hall Elevated Tank (offline)	100,000
Nibco Elevated Tank	250,000
Voorhees Elevated Tank	125,000

Currently, the Town of Denmark public water system has the following operators:

Operator	License	Certification #	Class
Tim Freeman	Treatment	6651	D
	Distribution	1830	G
Jimmie Shepherd	Treatment	7449 (lapsed)	T
	Distribution	931 (lapsed)	G
Travis Clark	Treatment	8674	T

Findings and Recommendations

1. The system received an **Unsatisfactory** rating for Chemical Feed. The purpose of this item is to ensure that the water system's chemical feed system is properly installed, maintained, and housed to provide adequate treatment, to prevent the potential for contamination, and to provide operator and public safety. Chemical feed lines at all wells must be labeled to include contents and the direction of flow. Also, current operators are unfamiliar with the function of the HaloSan iron bacteria removal system, designed by Berry systems, at the Cox Mill Well. A daily flow meter reading is the only monitoring provided for the treatment system. The system is designed to perform a self-check and provide information on run time, frequency of injection, etc. This information is not documented. A HaloSan residual test kit is commercially available but is not utilized by the system.

In addition, Well #5 and Well #6 have been placed into operation since the last survey. These new wells were permitted to feed phosphate at the treatment plants. It was stated during the survey that the system stopped feeding phosphate earlier this year. Please note that it is a violation of the Operating Permit to cease or commence treatment not defined by the Permit. A review of the laboratory analyses shows that water quality is such that the addition of phosphate is not necessary. This treatment requirement will therefore be removed from the Operating Permit. However, the system must obtain written approval from the Department in the future prior to adding or removing any chemical treatment process.

Please note this item is considered a Significant Deficiency Item pursuant to the Ground Water Rule.

2. The system received an **Unsatisfactory** rating for Chemical Storage and Handling. The purpose of this item is to ensure that a sufficient supply of chemicals are available on-site and that these chemicals are properly stored and handled. The Cox Mill Well has been out of service for

several weeks due to an electrical problem. The gaseous chlorine alarm system cannot function with a disruption to the power supply. Unless electricity is restored immediately, chlorine cylinders should be relocated and appropriately stored, as chlorine gas poses a significant public health risk.

3. The system received a **Satisfactory** rating for Chemical Injection Points. The purpose of this item is to confirm that chemical injection points are properly located to feed the chemical in a safe manner and do not interfere with other chemical additions. The chlorine injection point at the Voorhees Well could not be located. During the survey, Jimmie Shepherd stated that it was likely underground. As discussed, should problems associated with the chemical feed system arise in the future, or if maintenance requires excavation, the injection point should be placed and maintained within a vault box.
4. The system received a **Needs Improvement** rating for Water Quality. Although the town still has periodic discoloration issues, the Department and the town have received less citizen complaints. A vigorous system wide flushing sequence was completed last year throughout the town. Since this initial flushing, however, little documentation of flushing has been recorded. Records are difficult to follow, and the system has failed to develop and implement a detailed plan of how flushing should be conducted.

Please note this item is considered a Significant Deficiency Item pursuant to the Ground Water Rule.

5. The system received an **Unsatisfactory** rating for Cross Connection Control. Many service connections requiring testable backflow prevention devices have not been tested within the past year or failed initial testing and have not been repaired. Facilities are currently responsible for maintaining their backflow prevention device. However, the system has failed to provide adequate follow-up to ensure that each device is appropriately maintained. The Department requests that all facilities be brought into compliance within 30 days of the date of this report. Documentation showing that all facilities have been successfully tested within the last year must be faxed to (803) 641-7675.
6. The system received a **Needs Improvement** rating for Valve/Hydrant Maintenance. The town has a total of 185 fire hydrants. Thirty hydrants have been replaced during 2010 and 2011 and the town has eight more that will be installed in the near future.

Though the written plan states that all hydrants and valves are exercised on a yearly basis, records were difficult to follow. Recent records show adequate hydrant maintenance has been completed but indicate that only valves used during a repair have been exercised. According to the written procedure, all hydrants and valves must be exercised by the end of the year. The system must develop a detailed and systematic approach to ensure all hydrants and valves are exercised. As discussed during the survey, the frequency of exercise should be determined by the system, based on the role the valve plays in system operation. Critical valves should be exercised at a greater frequency than less integral valves. The system must maintain a more organized account of maintenance and exercise in adherence to the written program.

At a minimum, the valve program should include:

- An updated system map indicating the location and identification of all valves

- A schedule for regular exercise and routine maintenance
- Documentation of valve type, date of last exercise, number of turns to close, and a record of routine maintenance for each valve
- Documentation that valves are being exercised in accordance with the plan and that necessary maintenance is being performed

The hydrant program should include:

- An updated system map indicating the location and identification of all hydrants
- A schedule for flow testing and performing routine maintenance
- Documentation of hydrant type, date of installation, and a record of maintenance work performed for each hydrant
- Documentation indicating that maintenance and exercise is being performed in accordance with the plan

7. The system received an **Unsatisfactory** rating for Flushing Plan. 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.

Since 2009, the town has conducted system wide flushing once. As noted in the last survey report, a more detailed and comprehensive written program must be developed and implemented. This procedure is vital, as system wide and dead-end flushing must be conducted on a routine basis.

The Department strongly encourages the system to utilize AWWA or South Carolina Rural Water Association guidelines to create and implement a rigorous, unidirectional, system-wide flushing program. As noted above, detailed records of each event must be maintained and the volume of water used should be incorporated into the water audit. System wide flushing may be combined with yearly hydrant maintenance. However, records should also include the date, time, location, velocities, total flushing time, time to clear, volume of water used, and chlorine residual. This item has been noted in numerous past surveys as well as in Consent Order 10-001-DW, yet the system has failed to adequately and consistently address this deficiency.

8. The system maintained an **Unsatisfactory** rating for Leak Detection and Repair. Water line leaks and breaks are repaired quickly and the actions are being recorded in a log. However, at the time of the survey, a water audit was still not available for review. The water audit should include water used for flushing, fire fighting, leak loss, etc. An example audit is enclosed.

The Department recommends all water systems strive for an unaccounted water loss of 10% or less, and a direct comparison of gallons produced to gallons sold yields an extremely high volume of unknown water loss of approximately 52%. In addition to this volume of loss being unacceptable, the fact that the loss is unexplainable poses a contamination risk. The system should review the data it has obtained for billing and meter readings, as errors were apparent upon review and city personnel were unable to explain significant fluctuations in billing records. As discussed during the survey, the Department encourages the system to make every effort to

rectify this loss, including contacting Rural Water Association for possible assistance in uncovering the origin of this discrepancy. This deficiency has been noted in past surveys.

The Department recommends the system establish and implement a meter replacement policy. The policy should identify aging and nonfunctional meters, describe an ongoing systematic approach to replacing meters in the future, and the installation of meters at all locations where water use is currently estimated, such as sprinkler systems utilized by the town.

9. The system received a **Needs Improvement** rating for Storage Maintenance. The Town Hall tank is currently valved off from the system. It was stated during the survey that the city does not intend to refurbish this tank and place it back into operation. Therefore, the tank must be physically capped and disconnected from the distribution system to protect against contamination.

In addition, the concrete pad at the base of the Voorhees storage tank is deteriorating. Pursuant to correcting deficiencies noted in Consent Order 10-001-DW, all tanks were inspected within the past two years. During the survey, the reports from these inspections were requested. However, as of the date of this report, this documentation has not been received.

10. The system was downgraded to an **Unsatisfactory** rating for Operation and Control. The purpose of this item is to ensure that the water system is operated in a manner that provides safe, reliable water to the customers. In response to Consent Order 10-001-DW, the system devised and implemented several plans to correct noted deficiencies. A review of paperwork since this time showed the system initially followed the plans, but did not continue as the plan dictated. Though the system has improved many of the items noted in Consent Order 10-001-DW, this rating is a direct result of high water loss, failure to appropriately maintain records, failure to monitor the treatment system at the Cox Mill Well, failure to store gaseous chlorine in safe manner, and a continuing lack of a proactive approach to system operation and maintenance. This rating will be reevaluated as the system devises and implements procedures necessary for operational vitality.
11. The system received a **Needs Improvement** rating for Sample Siting Plan. As discussed during the survey, the system should reevaluate the bacteriological sampling locations. Sites should represent all areas of the system where bacteriological contamination may persist, such as areas of low usage, low pressure, or dead end locations. The plan should include a map of the distribution system and a detailed description of how the sampling will be conducted.
12. The system received an **Unsatisfactory** rating for Monitoring/Record Keeping. As noted above, the system has failed to maintain complete and adequate documentation of flushing, valve/hydrant exercise and maintenance, and implement a water audit. It was noted in the 2010 survey report that new record keeping methods were in developmental stages. These changes were not apparent during the current survey as partial records were located in several different logbooks. As stated in previous surveys, the system should employ a more consistent, complete, and organized method of record keeping.

As noted above, current operators are unfamiliar with the operation and maintenance of the HaloSan iron bacteria removal system at the Cox Mill Well. The system is designed to perform a self-check and provide information on run time, frequency of injection, etc. This information

is not monitored or recorded by system personnel. Daily checks of this system should include meter readings, information provided from the system self-check, chemical residuals, and chemical addition.

At this time, the Department strongly encourages that the system contact Berry Systems to request an instructional review session for the proper operation and maintenance of this treatment system. It is requested that the system inform the Department of the date and time of this meeting to ensure Department attendance.

Please note this item is considered a Significant Deficiency Item pursuant to the Ground Water Rule.

13. The system received an **Unsatisfactory** rating for Corrections from Previous Survey. 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 in this report are items cited in previous reports and include Flushing Program, Valve and Hydrant Maintenance, Leak Detection and Repair, and Water Quality.

Please note this item is considered a Significant Deficiency Item pursuant to the Ground Water Rule.

14. The system received an **Unsatisfactory** rating for Procedures Manual. The purpose of this item is to ensure that a water system maintains written procedures for the operation and maintenance of its system. At the time of the survey, no organized compilation was available, and many procedures existed in duplicate or triplicate, making it difficult to distinguish past practices from current procedures. The system needs to organize its procedures manual such that it may function appropriately as a useful reference tool. This item has been noted in past surveys.
15. The system received a **Satisfactory** rating for Certified Operator. Please note, a licensed operator must make daily well visits and only an operator of the appropriate grade shall make any adjustments to chemical feed systems. At this time, Tim Freeman is the only licensed operator employed by the system, as licenses held by Jimmie Shepherd lapsed many years ago.
16. The system was downgraded to a **Needs Improvement** rating for Staffing. The purpose of this item is to ensure that all water systems employ adequate staff to properly operate and maintain the system. The downgraded rating is a direct result of failure to continuously manage system maintenance in a proactive manner, adhere to established maintenance schedules, and provide appropriate and organized documentation of maintenance.

Conclusions

Due to the significant nature of the items listed above, the system has been referred to the Department's Drinking Water Enforcement section. The Department is committed to working with the water system to ensure that the residents of Denmark receive safe and reliable drinking water.

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