



SECONDARY WATER QUALITY TREATMENT SYSTEM REQUEST

Sawyer's Mill Well #10

NC 43-92-216

WSF ID No: P03

AQUA NORTH CAROLINA, INC.

A. EXECUTIVE SUMMARY

The Sawyer's Mill (SM) Master Water System is comprised of 3 approved and active wells, Sawyer's Mill #4, 8 and 10, and two points of entry (POE), P03 and TM1. Well #8 is a satellite well that combines with well #4 at TM1 before entering a 5,400-gallon pressure storage tank and entering the distribution system. Well #10 is a single POE that enters a 5,400-gallon pressure storage tank before entering the distribution system. Well #6 was previously drilled and approved by the State but was later capped after water quality testing revealed detection of toluene in the raw source water.

The latest Mn concentration at Sawyer's Mill Well #10 was 0.519 mg/L on 4/19/2022 which makes it one of Aqua's Group 1 Priority Secondary Water Quality Projects as per the Water Quality Plan. The combined POE of Sawyer's Mill Wells #4 and 8 is a Group 4 Priority Secondary Water Quality Project and does not require filtration. Loading rates are normalized based on a 12-hour per day well runtime.

In terms of installing an interconnect with a local municipality to supply system demand with purchased water (PW) versus installing a filter at Well #10, the system is not close enough to any local town municipalities (Cary) to make purchased water a viable option. The Town of Cary is closest at ~4,300 feet. See attached vicinity map. Moreover, Aqua has previously analyzed PW for systems of this magnitude and filtration is preferable in this situation.

In terms of interconnecting to another adjacent Aqua system in order to keep well #10 in backup mode and avoid filtration, all the surrounding systems also face major secondary water quality issues and filtration would still be required after interconnecting. Also, with Well #10 in backup mode, the system no longer meets the State's minimum design standard for supplying 0.555 GPM per connection. See attached water system capacity calculations.

Capex and Opex estimates are given below in Section D.2.

Aqua proposes installing an oxidation-filtration system at Sawyer's Mill Well #10 in order to remove Fe/Mn below the sMCLs. At least two, clean sources of supply are required since the connections are over 49.

PROPOSED SYSTEM REQUIRING TREATMENT

1. System Name:	<u>Sawyer's Mill Well #10</u>
2. PWS ID:	<u>NC 43-92-216</u>
3. No. Active Residential Connections, as of April 2022:	<u>140</u>
4. No. Permitted Residential Connections:	<u>141</u>

5. List of DEH/PWSS Approved Wells and Storage

TABLE 1: Approved and Active Wells in Proposed System***

Well Name and No.	Capacity (GPM)			Max, Avg., Min Pump Runtime from Past 12 Months (hrs./day)	Latest POE Inorganic Sampling Results							
	APPC**	Max, Avg, Min from Past 12 Months			Fe (mg/L)*	Mn (mg/L)	Fe/Mn Loading Rate (lbs./day)	Fe/Mn Loading Rate (lbs./yr.)	Average Fe/Mn Loading Rate Per Residential Customer (lbs./yr.)			
Well #4	65	39	34	14	6	4	< 0.022	0.00843	0.0	4	0.0	
Well #8	31	42	33	17	12	6	4	-	-	-	-	-
Well #10	17	0	0	0	0	0	0	0.05	0.519	0.1	21	0.2

*Raw samples are taken directly at the wellhead before chemical treatment and point of entry (POE) samples are taken after chemical injection and treatment but before the tank and distribution system

**APPC = Approved Pumping Capacity

***Well #10 operating in backup mode due manganese concentrations above the EPA HAL of 0.3 mg/L. Loading calculations based on APPC and 12-hour per day runtime.

TABLE 2: Existing Storage at Well Sites

Well Name and No.	Storage Description		Most Recent Cleaning Date
	Type	Gallons	Dist. System
Sawyer's Mill Well #4	Hydro	5,400	Mar. 2022
Sawyer's Mill Well #10	Hydro	5,400	Mar. 2022

*No tank located at Well #8

6. Past Three (3) Years Flushing Occurrences, list month/year:

Response: Jan. 2019, Mar. 2021, Mar. 2022

7. Next Planned Distribution System Flushing Occurrence:

Response: This water system will be flushed again by Mar. 2023 and on an ongoing annual basis. Disclaimer: Flushing does not completely remove the mineral accumulation in the distribution mains when utilizing water with exceptionally high levels of iron and manganese in the source water.

8. List of chemicals being used:

TABLE 3: Existing Chemicals Used at Well Site

Well Name and No.	State Approved Treatment			
	Disinfectant	Caustic	Sequestrant	Fe/Mn Filter
Well #4	X	N/A	X	N/A
Well #8	X	X	N/A	N/A
Well #10	X	N/A	X	Proposed

9. Current description of the water treatment system for each well over the past three (3) years, including specific names of chemicals and dates of changes:

Response: Harmsco cartridge filter installed at P03 in 2017. Started feeding Seaquest at wells #4/8 and 10 in August 2015.

10. Planned changes (if any) for chemical treatment within the next six (6) months:

Response: None.

11. Comments on Approved/Current Well Capacity.

Response: None.

B. CURRENT SECONDARY WATER QUALITY CONCERNS

- 1. How many wells require treatment? 1
- 2. Can system operate with single well offline? No*

*The system requires the production from all three wells to meet the State min design standard of 0.555 GPM/connection. See attached capacity calculations. Moreover, well #10 cannot remain in backup mode for the long term and needs to be filtered when required to run when Well #4/8 goes down for maintenance or there is high demand in the system due to irrigation or possible main breaks.

- 3. Are combined Fe/Mn concentrations above 1 mg/L? No*

*However, the latest POE Mn concentration from P03 is over 0.3 mg/L (0.519 mg/L)

- 4. Date of most recent POE Fe/Mn sampling results 4/19/2022

See attached for past three years of Fe/Mn analyses at each POE

5. Describe previous actions to improve secondary water quality and describe results (i.e., installation of particulate filters and sequestering agents).

Response: Aqua flushes the water mains annually in this system. Started feeding Seaquest at wells #4/8 and 10 in August 2015. Harmsco cartridge filter installed at P03 in 2017. No cleaning or rehab has been completed on this well to date.

UTILITY COMMISSION REQUIRED INFORMATION

1. Well Location Map Attached
2. DEH/PWS Approval Letter Attached
3. Original 24 hr. Pump Status Report Attached
4. Past 36 months of pump status reports Attached
5. Inorganic Analysis Report submitted to DEH for well approval Attached
6. Past 6 yrs. inorganic analysis from each wellhead Attached
7. Past 3 yrs. Fe/Mn analyses, both soluble and insoluble. Attached

Note: For item (6) above, provide information on baseline (w/o treatment – raw samples taken at the well head) and point of entry (after treatment).

C. CUSTOMER COMPLAINT DATA

1. Total number of customer complaints in past 6 months 0
2. Total number of customer complaints in past 12 months 0
3. For past 6 months, do customer secondary water complaints exceed 10% of the number of active customers? No
4. Provide 12-month list of all water quality complaints None
5. Provide 12-month list of all completed water quality work orders None
6. Describe most common customer complaint over the past 12-month period relating to secondary water quality, i.e.; discolored water, taste, or odor.

Response: No water quality complaints in the past 12 months.

D. PROPOSED SECONDARY WATER QUALITY TREATMENT

1. Proposed treatment recommendation: Oxidation-Filtration Treatment System
2. System Capex Estimate:

Filter Capex					
	APPC =	17	GPM		
TASK	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL
1	Filter Skid, no recycle, sludge management systems required	1	EACH	\$ 123,500	\$ 123,500
2	Backwash Supply System	1	EACH	\$ 25,800	\$ 25,800
3	Freight (estimate from AdEdge)	1	EACH	\$ 4,700	\$ 4,700
4	Engineering Design, Permitting, Bidding, & CA/CO (based on design costs of similar size filters)	1	EACH	\$ 21,410	\$ 21,410
6	Construction Bonding, Mobilization and Demobilization	1	EACH	\$ 2,000	\$ 2,000
7	Site Clearing, Grubbing, Grading, Gravel, Erosion Control	1	EACH	\$ 10,000	\$ 10,000
8	Existing Well House Piping Modifications	1	EACH	\$ 3,000	\$ 3,000
9	Filter Equipment Installation-Including but not limited to all water piping, water treatment filter installation, and necessary appurtenances, within the existing filter building. Also includes all extension piping near filter building	1	EACH	\$ 15,000	\$ 15,000
10	Filter Building Construction-Including but not limited to concrete floor slab, well house erection, finishing, and necessary appurtenances	1	EACH	\$ 50,000	\$ 50,000
11	Backwash Supply Tank Installation: Including but not limited to all piping from 12" above grade to 4" air gap, concrete pad, tank setting, electrical, and necessary appurtenances.	1	EACH	\$ 15,000	\$ 15,000
12	Yard Piping-Including but not limited to all underground pipe, fittings, and valve	1	EACH	\$ 10,000	\$ 10,000
13	Electrical/Controls-Including but not limited to all electrical power and controls wiring, conduit, panels, fixtures, electric heaters, thermostats, junction boxes, control equipment not provide by filter manufacturer, and miscellaneous appurtenances	1	EACH	\$ 15,000	\$ 15,000
14	Contingency @	10%			\$ 29,541
TOTAL COST/TREATED GPM:					\$ 20,000
TOTAL ESTIMATED PROJECT COSTS:					\$ 330,000

Note: The above information is for planning purposes only and is subject to change based on further engineering evaluations, water quality analyses, site conditions, and other site-specific discoveries and information

3. Opex Estimate: \$10,000