The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner

October 23, 2020
rev. November 9, 2020

VIA ELECTRONIC MAIL

Board of Commissioners
Rye Water District
PO Box 156
Rye, NH 03870

Subject: Rye Water District – PWS #2041010
Sanitary Survey 9/23/20

Dear Members of the Board:

This letter contains revisions to the original sanitary survey letter issued October 23, 2020 based on comments provided by the Rye Water District and supersedes the earlier version. Revisions are indicated by ~~strikethrough~~ and ***bold italics***.

The writer, representing the New Hampshire Department of Environmental Services (NHDES) Drinking Water and Groundwater Bureau (DWGB) conducted a remote sanitary survey of the Rye Water District water system on September 23, 2020. The purpose of the survey was to review the capacity of the systems' sources, treatment, distribution and management to continuously produce safe drinking water. I would like to thank Arik Jones, Superintendent, for his assistance in conducting this survey.

SUMMARY

In general, the water system is operated in a professional manner, and the operators are very knowledgeable of the components of the water system and water industry practices. Water quality monitoring records show that the system is in compliance with all current water quality standards, including bacterial standards and action levels for lead and copper as determined from samples taken at individual taps.

This sanitary survey did not identify any significant deficiencies. However, the following is a list of issues that we recommend the managers of the water system consider to maintain compliance and continue to provide an acceptable level of service to the system's customers:

1. Conduct a comprehensive engineering evaluation of the condition of the Portsmouth interconnection and begin planning for capital improvements needed to make it a reliable emergency supply.
2. Perform heterotrophic plate counts (HPC) monitoring in the distribution system to evaluate the occurrence of positive total coliform samples.
3. Continue to regularly monitor water being supplied to users for manganese to ensure concentrations are below the US EPA health advisory levels of 0.3 mg/L for infants up to 6 months of age and 1.0 mg/L for the general population.
4. Consider options to reduce peak water use demands in summer months.
5. Implement the District's asset management program to maximize the benefits associated with it.

SYSTEM DESCRIPTION

General

The Rye Water District (RWD) provides domestic water and fire protection to approximately 1,702 service connections for a total population served of 4,300 people. The District encompasses most of the Town of Rye. About 87 customers are served water from the Portsmouth Water Department via master meters on Wentworth Road, Elizabeth Lane and Frontier Road. An additional 71 residential customers are seasonal. Rye provides water to the Portsmouth Water Department at a wholesale meter, which Portsmouth uses to serve approximately 10 customers in the Breakfast Hill area of Greenland.

The water system consists of two bedrock wells, one gravel packed well, associated pump houses, three storage tanks having a total capacity of 2.35 million gallons, and an interconnection with Portsmouth Water Works.

Water Sources

Following is a summary of active water sources:

NHDES Database Source ID#	Source Name	Well Type	Year Installed	Well Completion Report #	Depth[1]	Yield[1]	Current Production[2]
001	Garland Well	Gravel Packed	1977	N/A	49 feet	365 gpm[3]	400 to 475 gpm
006	Bailey Brook Well	Bedrock	1984	N/A	545 feet	335 gpm[3]	335 gpm
007	Portsmouth Water Dept.	Inter-connection	1963	N/A	N/A	N/A	Emergency Only
008	Cedar Run Well	Bedrock	2004	WRB #207.0068	437 feet	325 gpm[4]	325 gpm

[1] Listed in NHDES database.
[2] Reported by water system operator during this sanitary survey.
[3] These wells pre-date current well siting rules and do not have permitted production volumes.
[4] Permitted production volume per Large Groundwater Withdrawal Permit.
gpm = gallons per minute

Garland Well is located west of Garland Road. This well was installed in 1977. Its yield in the NHDES database is listed as 365 gallons per minute (gpm), but according to the operator, it produces 400 go 475 gpm regularly and can produce up to 575 gpm for shorter durations. The well is housed in the Garland station, a single story block building, and is equipped with a vertical turbine motor and controls. The well does not currently have a level transducer. Operators monitor drawdown with an air pump daily, but a transducer will be installed as part of an ongoing upgrade/rehabilitation project. The well was last cleaned in 2016, and the well pump was replaced at that time.

Cedar Run and Bailey Brook Wells are located off of Garland Road and are controlled from a common control building near ~~Cedar Run~~ ***Bailey Brook*** Well. The Cedar Run bedrock well is located approximately 1,800 feet from the control building and is enclosed in a small block structure with no controls. Well level is monitored continuously with a pressure transducer. The well was inspected with a camera in 2014, and the pump was replaced at that time. Due to elevated levels of iron, manganese, and total organic carbon (TOC) in the Cedar Run

well, the District has not used it since October 2018 except for brief periods in the summer of 2020 to meet peak demand. The District is currently investigating a replacement well for Cedar Run.

The Bailey Brook bedrock well is located approximately ~~225~~ ***75*** feet from the control building. This control building is a ~~two~~ ***single*** story block building housing electrical controls and instrumentation on the first floor, and meters and valves for both wells in the lower level, and emergency generator hookup. This facility is completely fenced in. A well level transducer is installed in an adjacent monitoring well, and RWD plans to install a transducer in the well the next time the pump is pulled. The well was inspected with a camera in 2011 or 2012, and a new well pump was installed at that time. RWD intends to install a permanent standby generator for the control building this year. RWD has drilled and air tested a backup well for Bailey Brook.

The bedrock wells have elevated levels of iron and manganese (see summary below) and have the potential to cause aesthetic problems. The Garland Road gravel packed well is routinely operated simultaneously with bedrock well operation to mitigate this problem. In addition, any time that disinfection is needed, such as when water mains are flushed, sodium hypochlorite is injected at the Garland Well, and operation of the bedrock wells is suspended.

The District is monitoring the iron and manganese levels on a monthly basis. A summary of iron and manganese concentrations measured in the wells follows:

Well	Historical Average Iron since 2000[1]	2020 Iron[2]	Historical Average Manganese since 2000[1]	2020 Manganese[2]
Garland	0.17 mg/L	Non-detect	Non-detect	Non-detect
Bailey Brook	0.53 mg/L	0.19 to 0.50 mg/L	0.08 mg/L	0.04 to 0.06 mg/L
Cedar Run	0.50 mg/L	2.17 to 3.96 mg/L	0.06 mg/L	0.18 to 0.34 mg/L

[1] Per NHDES records.
[2] Provided by RWD.

We note that the results for 2020 in Cedar Run are higher than the average of the past fifteen years and are reportedly increasing year-to-year. The current drinking water standards for iron and manganese are 0.3 mg/L and 0.05 mg/L, respectively. These are secondary maximum contaminant levels established based on aesthetic concerns, not health impacts. However, the USEPA has set a health advisory for manganese (see "Recommendations" below).

RWD can also receive water from the Portsmouth Water Department via an interconnection equipped with three parallel 160 gpm booster pumps located adjacent to the District office on Sagamore Road. The interconnection is used rarely only when needed to supplement supply from the Rye wells. Portsmouth's water is chlorinated, which can cause colored water due to oxidation of iron and manganese from Rye's wells. According to the operator, the pumps are exercised regularly by flushing to waste but have not been tested against system pressure in several years. The station was constructed in the 1950s and reportedly requires upgrades to the pumps, motors, and electrical system to operate reliably and meet current codes. RWD has included these upgrades in the Capital Improvement Plan.

The average daily water production for 2019 was approximately 411,000 gallons per day (gpd) as reported by the system to the NHDES water use and reporting program. The reported maximum day in 2019 occurred in July at approximately 990,000 gpd, resulting in a calculated maximum-to-average day ratio for 2019 of 2.4. In NHDES's experience with systems this size, the ratio is typically between 1.5 and 2.0, indicating Rye has unusually high summer water use, which may be attributable to non-essential outdoor use such as lawn watering.

The reported peak day in 2020 was June 20, 2020 at 1,089,000 gpd. We note the region was experiencing drought at that time, and water use was abnormally high due to many residents working from home during the Covid-19 pandemic. We note that this is the amount of water reported from the District's existing sources. Reported water use for the services provided by Portsmouth was approximately 18,000 gpd.

Treatment Facilities

The Garland Well station is a single story block building housing the well, vertical turbine pump and motor, and controls. In addition, a chemical feed area includes dual 1,100-gallon bulk tanks for caustic potash (KOH), transfer pumps to a day tank with LMI feed pump, emergency shower and chemical handling safety equipment. In the event of high pH, an alarm is transmitted to the on-call operator, and the KOH feed and well pump are automatically locked out to prevent chemical overfeed. Garland station also includes equipment for feed of sodium hypochlorite disinfectant, which is used only when staff is flushing distribution mains. Though not applied directly to the discharge from the bedrock wells, disinfectant is not applied at the gravel packed well when the bedrock wells are operating because of the iron and manganese oxidation products that are produced. The main area of the station is partially used for storage of maintenance materials. Garland Well station has a backup generator to power all equipment. RWD is currently upgrading and rehabilitating Garland station as part of a NH Drinking Water and Groundwater Trust Fund project.

Bailey Brook and Cedar Run Wells receive no treatment.

The District's consultant recently completed a design for a centralized treatment facility, which would provide iron and manganese treatment for all of the wells and naturally raise the pH of the water to eliminate the addition of potassium hydroxide. Although RWD does not intend to construct the treatment facility at this time, they have a complete design ready to be implemented. We commend the managers for being proactive with this issue.

Distribution System

The distribution system is mostly 6- to 12-inch ductile iron. There are small quantities of PVC and asbestos cement piping in the system. There are about ~~200~~ ***300*** fire hydrants, and flushing is performed routinely twice a year. Residential service connections are fully metered and equipped with dual check valve backflow preventers. District personnel are responsible for all backflow testing of testable devices.

The Rye Water District encompasses most of the Town of Rye with water service extending up to Foyes Corner to the north, along Breakfast Hill Road to the west, south along West Road to South Road, and east along Route 1A. The water distribution system ends approximately 50 feet north of Aquarion Water Company distribution system to the south.

Finished Water Storage

Water storage tanks and their associated pressure zones are summarized as follows:

Tank	Zone (Overflow, MSL)	Zone Charged By	Construction (year, if known)	Capacity (gal)	Last Inspected
Washington Road 1	Low (171 ft.)	Well Stations in Low Zone	Welded Steel (1963)	650,000	2020
Washington Road 2	Low (171 ft.)	Well Stations in Low Zone	Welded Steel (1984)	500,000	2020
Breakfast Hill	High (251 ft.)	Washington Road Booster Station	Welded Steel (1996)	1,200,000	2020

The newer Washington Road tank was completely refinished in 2002, while the older 1963 tank was refinished in 2003. The Breakfast Hill tank was painted in 2010. All of the storage tanks were inspected in 2020. RWD contributes annually to a tank maintenance capital reserve fund to plan for future maintenance.

A tank mixer was installed in the Breakfast Hill tank in 2020.

Pumps, Pump Facilities and Controls

Water from the wells flows into the Washington Road storage tanks and then is pumped into the high elevation zone via the booster station adjacent to the Washington Road tanks. This station is equipped with two 650 gpm pumps. Water from the high elevation zone can be back-fed into the low elevation zone by manually changing valves outside the station. Run status at this station is transmitted to the Breakfast Hill tank and then to the Garland Road control panel. Pressures in the low zone range from 48 to 70 psi. For the high zone pressure ranges from 56 to 82 psi.

Garland Road station serves as the communications hub for the system, receiving information from the Washington Road booster and Bailey Brook Well stations and dialing out alarm conditions to the operators.

Monitoring, Reporting and Data Verification

Water quality monitoring records show that the system is currently in compliance with water quality standards including lead and copper. However, in each of the last three years, a Level 1 or 2 Assessment has been triggered under the Revised Total Coliform Rule due to positive total coliform bacteria results in the distribution system. NHDES recommends RWD conduct additional distribution system sampling to investigate these bacteria results (see "Recommendations" below).

Water System Management and Operation

District operations are funded through a combination of user fees and a District tax.

The District has received a Water System Asset Management grant from NHDES to initiate an asset management program. We commend the system managers for taking this initial step, and we strongly recommend the District use the program to maximize the benefits associated with it. In order for this program to be reliable and useful, it must become part of the culture and embedded within the daily routine activities of the entire water system as well as rate-setting and short- and long-term capital planning.

STAFFING AND CERTIFIED OPERATOR VERIFICATION

The Rye Water District water system is required to maintain an operator certified at the Grade I treatment and Grade II distribution level. The following certified operators are listed in the DWGB database:

Operator	Certificate No.	Treatment Level	Distribution Level
Arik Jones	3054	II	II
Darren Prince	3256	I	II

At the present time, the operators associated with the water system meet the qualifications.

RWD hired an operator-in-training in 2019. We commend the managers for taking this step to assist with knowledge transfer and mentoring, continuity of operations, and eventual succession planning.

ACKNOWLEDGMENTS

The following are among the positive features which were noted during this survey and for which we commend the system:

1. Regularly funding a water storage tank maintenance capital reserve fund.
2. Designing a water treatment facility as a proactive measure in the event treatment is required in the future.
3. Investigating additional sources of supply to improve water quality and meet current and future demands.
4. Initiating an asset management program.
5. Hiring an operator-in-training.

RECOMMENDATIONS

No significant deficiencies were identified as part of this sanitary survey. However, below are areas where improvements or operating adjustments are recommended, some of which could lead to significant deficiencies in the future if not addressed:

Water Sources – Portsmouth Interconnection

The interconnection with Portsmouth was constructed in the 1950s and reportedly requires upgrades to the pumps, motors, and electrical system to operate reliably and meet current codes. NHDES recommends the District conduct a comprehensive engineering evaluation of the condition of the Portsmouth interconnection and begin planning and budgeting for capital improvements needed to make it a reliable emergency supply.

Treatment Facilities – Bacterial Water Quality

Positive total coliform samples in the distribution system can be in indicator that potentially more harmful bacteria can thrive in that environment. We recommend the operators perform heterotrophic plate counts (HPC) monitoring in the distribution system. HPCs should be sampled at several sites in addition to regular monthly bacteria sites to evaluate whether coliform bacteria are present throughout the distribution network or the past positive results are isolated to the specific sampling sites.

Currently, the District does not disinfect on a continuous basis but provides disinfection during flushing and other unusual circumstances as a precautionary measure. At this time, NHDES is not mandating disinfection. Be advised that if the water system incurs chronic positive total coliform results, we recommend an investigation and analysis of this issue, which may conclude disinfection is needed on a full-time basis for public health protection.

Treatment Facilities – Manganese

The USEPA recommends that infants up to 6 months of age should not be given water with manganese concentrations greater than 0.3 mg/L for more than a total of 10 days per year, nor should the water be used to make formula for more than 10 days per year. The USEPA further recommends that the general population should not ingest water with manganese concentrations greater than 1 mg/L for more than a total of 10 days per year.

As a precaution, the general population should consider limiting their consumption of drinking water when levels of manganese are above the USEPA health advisory to decrease their exposures and to decrease the possibility of adverse neurological effects.

Recently, the USEPA is recommending that states require notification similar to this to protect formula fed infants from manganese exposure. NHDES is currently evaluating this recommendation and will develop specific language, which can be communicated to water customers for water systems with elevated manganese that

choose to be proactive. Please contact us for specific notification language if you decide to perform voluntary notification.

We encourage RWD to continue regular monitoring of treated water for manganese and compare concentrations to the health advisories.

Much lower manganese levels in water can result in noticeable staining and taste complaints. It is for this reason that USEPA has a "*secondary*" drinking water guideline of 0.05 mg/L.

Water System Management and Operation – Water Conservation

As noted above, Rye Water District has unusually high summer water use for a system its size, which may be attributable to non-essential outdoor use such as lawn watering. NHDES strongly recommends the District consider options to promote water conservation and lower peak demands, which could mitigate or delay the need to develop an additional supply source and reduce reliance on lower-quality supplies. A wide range of tools are available in addition to voluntary and mandatory water use restrictions. The NHDES Water Conservation Program is available to assist the District with these efforts. Please visit www.nhdes.gov and search for "Water Conservation" or contact Kelsey Vaughn at 603-271-0659 or Kelsey.Vaughn@des.nh.gov with any questions.

Water System Management and Operation – Asset Management

We commend the system managers for taking initial steps in developing a water system asset management program, and we strongly recommend the District use the program to maximize the benefits associated with it. In order for this program to be reliable and useful, it must become part of the culture and embedded within the daily routine activities of the entire water system as well as rate-setting and short- and long-term capital planning.

As a general reminder, RSA 485:8 states that no new construction, addition, or alteration involving the source, treatment, distribution, or storage of water in any public water system or privately owned redistribution system shall be commenced until the plans and specifications have been submitted to and approved in accordance with rules adopted by the department; except, if such construction, addition, or alteration is exempted by the department because it will have no effect on public health or welfare, then such submission and approval is not required.

I can be reached at 271-0779 or at michael.unger@des.nh.gov if there are any questions about this letter.

Sincerely,

Michael C. Unger, P.E.
Drinking Water and Groundwater Bureau

ec: Arik Jones, Primary Operator