



The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner



December 20, 2024

Board of Commissioners
Merrimack Village District
VIA EMAIL ONLY

via email to: ron.miner@mvdwater.org

Subject: Merrimack Village District (PWS #1531010)
Sanitary Survey 10/23/24

Dear Members of the Board:

On October 23, 2024, I performed a sanitary survey of the Merrimack Village District (MVD) water system accompanied by representatives of USEPA Region 1. The purpose of the survey was to review the capacity of the water system's sources, treatment, distribution, and management to continually produce safe drinking water. I would like to thank Ron Miner, Superintendent, and Brian Hieken, Operations Manager, for their time and assistance in conducting this survey.

SUMMARY

The MVD is operated in a professional manner and staff is very knowledgeable of the components and operation of the water system. The most recent water quality monitoring records show that the system is currently in compliance with all water quality standards.

This sanitary survey did not identify any significant deficiencies. 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. Develop a long-term plan for Well 3.
2. Disconnect small diameter water piping between the Well 2 pumphouse and abandoned lime feed building.
3. Continue updating your service line material inventory and document water service pipe materials at every opportunity (i.e. replacing meters, repairing or replacing curb stops, etc.) to eliminate unknowns.
4. Implement the recommendations of your cybersecurity assessment and continue to keep cybersecurity processes and equipment up-to-date.

A more descriptive discussion on each of these issues is included below under "Recommendations".

SYSTEM DESCRIPTION

General

The Merrimack Village District (MVD) water system provides domestic water and fire protection to 7,047 metered service connections throughout the Town of Merrimack for a total population served of approximately 25,500 people. The MVD also serves water to several water systems owned and operated by Pennichuck Water. Reported average daily water production for 2021 to 2023 was approximately 2.2 million gallons per day (mgd). Average daily demand for the maximum month for 2021 to 2023 was approximately 3.8 mgd.

Water Sources

Active groundwater sources in the system are as follows:

Source	DES Database #1531010-	Location	Well Depth (ft)	Permitted Production Volume (gpd)	Current Pumping Rate (gpm) ¹
Well 2A	008	Berry Lane	96	2,160,000 (1,500 gpm @ 24h/d)	1,000
Well 4R	011	Twin Bridge	55	311,040 (216 gpm @ 24h/d)	150
Well 5	005	Twin Bridge	65	600,000 (417 gpm @ 24h/d) ²	350
Well 7	007	Witches Brook	52	720,000 (500 gpm @ 24h/d)	150 to 400
Well 8	009	Witches Brook	57	1,080,000 (750 gpm @ 24h/d)	200 to 500
Well 9	012	Berry Lane	106	1,440,000 (1,000 gpm @ 24h/d)	1,000

¹ As reported by the operator during the survey.

² Well was constructed prior to current well siting and large groundwater withdrawal rules, so a permitted production volume has not been established. The yield noted here is the wellhead protection area volume listed in the NHDES database.

All wells are located in the low pressure zone and are controlled by SCADA based on Turkey Hill Tank level. Wells 7 and 8 are cleaned and surged annually due to high levels of iron and manganese.

Well 9 was permitted and constructed in 2022 and placed into service in 2023. At that time, MVD deactivated Well 3 due to its levels of iron, manganese, and PFAS. Well 3 was not decommissioned and is available for emergency use, if required; however, MVD would need to request and receive approval from NHDES prior to pumping Well 3 into distribution.

MVD also has approval from the Community Well Siting program and a Large Groundwater Withdrawal Permit for the Mitchell Woods Well, but this well is not connected to the distribution system. If MVD decides to construct the infrastructure to connect the Mitchell Woods well, design review approval would be required from the DWGB Engineering Section.

MVD has an agreement to purchase up to 0.5 mgd from Pennichuck Water Works (PWW) through a connection along Route 101A in South Merrimack. MVD also maintains separate emergency connections with PWW along Route 3 and with Manchester Water Works (MWW). However, use of the MWW emergency connection is complicated by the fact that MWW uses chloramine as a residual disinfectant and MVD uses free chlorine.

Treatment

In 2024 MVD completed a multi-year program to install PFAS treatment for all of its wells. NHDES commends MVD for being proactive by securing funding and beginning construction prior to state and federal PFAS maximum contaminant levels (MCLs) being finalized.

All treatment facilities include granular activated carbon (GAC) for PFAS treatment, caustic soda for pH adjustment, blended phosphate for corrosion control, and hypochlorite for disinfection. The target chlorine residual entering distribution is approximately 0.8 mg/L and pH is 7.2. All treatment facilities have continuous

online analyzers for pH and chlorine residual entering distribution. Alarms are issued via SCADA for high and low pH and chlorine, and wells and treatment are shut down in the event of high pH or chlorine.

A new PFAS treatment facility for Wells 2 and 9 was constructed near the Well 2 pump house off Berry Lane and placed into service in 2023. It is sized to treat the full permitted production volume of Wells 2 and 9 combined (2,000 gpm) and has a natural gas generator that can provide backup power for the treatment facility and both wells.

The treatment facility for Wells 4 and 5 is located off Front Street and went into service in 2020. The facility is equipped with a permanent propane-fired standby generator. In response to some vandalism of the building exterior MVD added security measures including a security camera and fencing around the wells.

Wells 7 and 8 are located near each other along Witches Brook in the Town of Hollis. Well 8 water is pumped to the Well 7 well house, which includes caustic soda feed (bulk storage) for pH adjustment of water from both wells. The combined flows of Wells 7 and 8 receive further treatment at a water treatment facility constructed in 2016. Sodium hypochlorite (bulk storage) is added for oxidation of iron and manganese before filtration in pressure filters containing anthracite and Greensand Plus followed by GAC adsorption in pressure vessels. Online analyzers for pH, chlorine, and iron post-greensand (pre-GAC) are used to help optimize treatment. Filtered water enters a clearwell, from which it is pumped to distribution. Prior to leaving the WTP, it is treated with blended phosphate (55-gallon drums) for corrosion control, caustic soda (bulk storage) for additional pH adjustment, and sodium hypochlorite (bulk storage) for additional disinfection as required. Filter backwash enters recycle basins, from which supernatant is recycled to the head of the plant and residuals are pumped to onsite infiltration basins. According to the operator, the supernatant is not currently being recycled.

Although Well 3 has been formally deactivated and disconnected from the distribution system, MVD is maintaining the Well 3 chemical feed facilities in order to have the well available as an emergency backup source. Well 3 was not visited on this sanitary survey. As noted above, MVD would need to request and receive approval from NHDES prior to pumping Well 3 into distribution.

Pumps, Pumping Facilities, and Controls

Wells 2, 7 and 8 are located in well houses with vertical turbine pumps. Wells 4, 5 and 9 have submersible pumps with pitless adapters. All well pumps are controlled by the level in the Turkey Hill water storage tank through SCADA. The operator adjusts the start/stop setpoints for each well to select which well(s) will operate as lead and lag. All well pumps have variable frequency drives (VFDs), and the operator can adjust the flow rate setpoints.

The Turkey Hill booster station pumps water from the low elevation zone, defined by the Turkey Hill tank, to the high elevation zone, defined by the Hutchinson tank. The booster pumps are controlled automatically by tank levels in the Hutchinson tank via SCADA. The station has a natural gas generator for backup power.

The Belmont Hill booster station serves a small independent pressure zone for approximately 42 homes. Fire flow can be supplied to this area as high demand causes isolation check valves to open. This station does not have SCADA or a backup generator. In the event of power failure, residences do not lose water completely, but pressures are below required levels.

Finished Water Storage

The water storage tanks are summarized as follows:

Tank	Material	Year Online	Capacity (MG)	Elevation Zone	Last Inspected
Turkey Hill	Gunite concrete	1978	4.0	low	2020
Hutchinson Rd	Welded steel	1987	1.0	high	2023
Lake Rd / Parker	Welded steel	1988	0.75	high	(1)

¹ Parker tank is rarely used (see text). In addition, cell phone and other antenna lessees are required to have an inspection performed on the tank interior and exterior whenever performing work on equipment mounted to the tank.

Dome repairs were made to the Turkey Hill tank, and a mixer was installed as part of the Turkey Hill booster station upgrade project in 2020. Repairs were recently made to the Hutchinson tank including hatch, ladder, interior spot repairs, and interior and exterior full blast and recoat.

The Lake Road (aka “Parker”) tank has been taken out of service because of stagnant water issues, which occur especially in warm weather, and poor hydraulic connectivity with the Hutchinson tank. The Lake Road tank was not visited during this sanitary survey.

Distribution System

The distribution system contains approximately 171 miles of water main from 2 to 24 inches in diameter in two primary pressure zones. The distribution network serves nearly all populated areas of the Town of Merrimack with the exception of the southeasterly zone, which is franchised to Pennichuck. Pipe material is primarily asbestos cement and ductile iron with some cast iron and PVC.

The MVD service area is fully metered and is divided into 3 meter zones, each of which is read (drive-by) and billed on a rolling quarterly basis. MVD has a meter testing and replacement program. Each year approximately 200 meters are replaced (about 3% of the total). There are approximately 600 testable backflow prevention devices, which are tested annually by MVD staff. Mains are flushed annually. Leak detection is performed on approximately one third of the system each year. We note that year-round odd/even restrictions on outdoor water use are incorporated into bylaws.

Monitoring, Reporting, and Data Verification

The most recent water quality monitoring records show that the system is currently in compliance with all water quality standards.

A trend of increasing chloride levels has been observed in the wells. MVD tracks chloride levels at least quarterly and has a Chloride Management Plan. Chloride has a secondary (aesthetic) maximum contaminant level (SMCL) based on taste. It can also increase the corrosivity of water and promote leaching of lead, copper, and other metals from distribution piping and premise plumbing under certain conditions. In addition, sodium, although not regulated by USEPA or NHDES, can pose a health risk for vulnerable populations with high blood pressure.

Water System Management and Operation

MVD has implemented a comprehensive asset management program. This program includes an asset inventory, GIS mapping, evaluation of the condition of assets, distribution system CIP planning, updating the master plan, and a rate model update. We commend the managers for continuing to support an ongoing asset management program.

Staffing and Operator Certification

MVD is required to retain an operator certified at the Grade 2 treatment level and the Grade 3 distribution level. The following operators are listed as operators for this system:

Operator	Certificate No.	Treatment Level	Distribution Level
Nicholas Baxter	4002	I	I
Jason Bellemore	4138	-	II
Stephen Chase	2608	I	I
James Colburn	2206	I	I
John Foss	3361	-	I
Brian Hieken	2945	II	II
Jacob Howe	3889	I	II
Nemanja Jankovic	3977	I	II
Edward Lambert	2308	I	I
Jill Lavoie	3382	I	I
Ronald Miner, Jr.	2690	III	III
Curtis Morrow	3953	-	I
Heinz Smith	2987	-	I

The current operators are qualified for operation of this water system.

According to the operator, MVD has an operations staff of 12, including 3 treatment operators. All treatment facilities are visited 7 days per week.

ACKNOWLEDGEMENTS

The following are among the positive features noted during this survey and for which we commend the MVD and its staff:

1. Maintaining an active Asset Management program.
2. Being proactive with cybersecurity including assessments, implementation, policy, and training.
3. Constructing water treatment facilities to treat for PFAS at all wells.
4. Completing installation of an additional supply well (Well 9) as a cost effective alternative to treating Well 3 for iron, manganese, and PFAS, so Well 3 can be used only as an emergency source.

RECOMMENDATIONS

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 and Treatment – Well 3

1. Well 3 has been formally deactivated and disconnected from the distribution system, but MVD is maintaining the Well 3 chemical feed facilities in order to have the well available as an emergency backup source. Over time, keeping up with maintenance of the well and facilities to keep them operational could become costly. We encourage the managers to develop a long-term plan for Well 3.

Pumping Facilities – Well 2 Pumphouse

2. As part of the project to construct the new Well 2 PFAS treatment facility, prior chemical feed systems at the Well 2 pumphouse were removed. However, small diameter water piping was observed between the

Well 2 pumphouse and the abandoned lime feed building. This piping should be disconnected to eliminate a potential cross connections and reduce the risk of contamination.

Water System Management and Operation – Lead Service Line Inventory

3. The federal Lead and Copper Rule Revisions (LCRR) required all community water systems to prepare an inventory of all water service materials on both the public side (main to curb stop) and private side (curb stop to meter). MVD met the deadline to submit the initial inventory. However, it includes “unknowns” meaning the material could not be confirmed on the public or private side of the service, or both. We advise MVD to continue to document water service pipe materials at every opportunity (i.e. replacing meters, repairing or replacing curb stops, etc.) in order to eliminate unknowns.

Water System Management and Operation - Cybersecurity

4. Sufficient cybersecurity is a critical tool to prevent unauthorized personnel from controlling the water system or holding it ransom. We understand MVD has conducted a cybersecurity assessment, has a cybersecurity policy, and conducts semi-annual cybersecurity training. We commend MVD for being proactive with cybersecurity. Cybersecurity will be part of the sanitary process going forward, since the risks to both public health and the system’s financial assets are substantial. An assessment should be performed every few years and cybersecurity policies and process kept current. Feel free to contact Brenda Leonard at brenda.j.leonard@des.nh.gov to learn more about NHDES’s cybersecurity initiatives.

If you have any questions, please contact me at Michael.Unger@des.nh.gov or (603) 271-0779.

Sincerely,



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

ec: Ronald Miner, Jr., Brian Hieken, Jill Lavoie, MVD