



The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner



November 12, 2021

Board of Commissioners
Merrimack Village District
VIA EMAIL ONLY

via email to: ron.miner@mvdwater.org

Subject: Merrimack Village District (PWS #1531010)
Sanitary Survey 9/23/21

Dear Members of the Board:

On September 23, 2021, I performed a sanitary survey on the Merrimack Village District (MVD) water system. 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, for his 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, including lead and copper action levels, with the exception of PFAS. Levels of PFOA in Wells 2, 3, 7, and 8 exceed the NH state maximum contaminant level (MCL) of 12 ng/L. MVD is currently constructing GAC treatment systems for Wells 2, 7 and 8, and is permitting a new well, Well 9, so Well 3 can be used only as an emergency source.

MVD is undertaking a major capital improvement program to construct PFAS treatment for all its wells, for which we commend the District.

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. Continue implementing the asset management program.
2. Begin developing a service line material inventory and document water service pipe materials at every opportunity (i.e. replacing meters, repairing or replacing curb stops, etc.).

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 6,894 metered service connections throughout the Town of Merrimack for a total population served of approximately 25,000 people. The MVD also serves water to several water systems owned and operated by Pennichuck Water. Reported average daily water production for 2020 was 2.3 million gallons per day (mgd). Average daily demand for the month of June 2020 was 3.7 mgd.

Water Sources

The system derives all of its water from wells which pump into the low pressure zone. Active water sources in the system are as follows:

Source	DES Data Base 1531010-	Location	Well Depth (ft)	Permitted Production Volume (gpd)	Current Pumping Capacity (gpm) ¹
GPW 2A	008	Berry Lane	96	2,160,000 (1,500gpm @ 24h/d)	1,100 to 1,150
GPW 3	003	Camp Sargent	68	1,368,840 (950 gpm @ 24h/d) ²	700
GPW 4R	011	Twin Bridge	55	311,040 (216 gpm @ 24h/d)	410
GPW 5	005	Twin Bridge	65	600,000 (417 gpm @ 24h/d) ²	625
GPW 7	007	Witches Brook	52	720,000 (500 gpm @ 24h/d)	500
GPW 8	009	Witches Brook	57	1,080,000 (750 gpm @ 24h/d)	750

¹ As reported by 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.

MVD has drilled a new production well (Well 9) and is currently pursuing permitting with NHDES. Once the supply capacity from Well 9 is available, MVD intends to use Well 3 only as an emergency source due to its levels of iron, manganese, and PFAS.

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.

The MVD has an agreement to purchase up to 1 mgd from Pennichuck Water Works (PWW) through a connection along Route 101A in South Merrimack. This connection is typically used every year during flushing and is available during seasonally high demand or emergencies. 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

Existing Well 2A facilities consist of a well house and lime feed building. The well house includes a vertical turbine well pump and chemical feed for disinfection (calcium hypochlorite tablet chlorinator) and corrosion control (blended phosphate from 55-gallon drums). Lime is added at the lime feed building for pH adjustment. Powdered lime is mixed with water to form a slurry, which is injected into the process water. The facility has a connection for a portable generator. MVD is currently constructing a new WTP to treat Well 2A for PFAS. The WTP will be sized to also treat Well 9, which is currently being permitted.

The Well 3 facilities contain all the same components as Well 2A. A former propane-fired auxiliary drive has been disconnected.

MVD constructed a new water treatment facility to treat Wells 4 and 5 for PFAS, which went into service in 2020. As part of the project, the old Well 4 and Well 5 well houses were demolished, submersible well pumps with pitless adapters were installed in both wells, and new chemical feed systems and controls were constructed in the

new WTP. Well water is treated for PFAS using granular activated carbon (GAC). Chemical feed is provided for pH adjustment (caustic soda bulk storage), disinfection (calcium hypochlorite tablet chlorinator), and corrosion control (blended phosphate from 55-gallon drums). The facility is equipped with a permanent propane-fired standby generator.

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, and the combined flows of Wells 7 and 8 receive further treatment at a water treatment plant constructed in 2016. The Well 8 well house includes a vertical turbine pump and VFD. The Well 7 well house includes a vertical turbine pump for Well 7 and caustic soda feed (bulk storage) for pH adjustment of water from both wells, which was installed in 2020 to replace a former lime feed system. At the WTP, combined flow is fed sodium hypochlorite (bulk storage) for oxidation of iron and manganese before filtration in pressure filters containing anthracite and Greensand Plus. 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 and with 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.

Pumps, Pumping Facilities, and Controls

All wells 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.

The Turkey Hill booster station pumps water from the low elevation zone, defined by the Turkey Hill tank, to the high elevation zone, now defined only by the Hutchinson tank. The booster pumps are controlled automatically by tank levels in the Hutchinson tank via SCADA. In 2020-21 MVD constructed a new packaged pumping station to replace the former below grade station. We commend the District for undertaking this upgrade, which greatly improves operator safety and the reliability of the station, which is the only means of supplying water to the high elevation zone.

The Belmont Hill booster station serves a small independent pressure zone for approximately 42 homes. This last pressure zone is isolated from the distribution net through the use of swing check valves on three mains leading into the area. Fire flow can be supplied to this area as high demand causes the isolation check valves to open.

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	2019
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. However, this tank is activated from time to time for use when the Hutchinson tank is out of service for maintenance. In 2020 it was used for about three months during the Turkey Hill booster station upgrade.

Distribution System

The distribution system consists of an extensive network of piping from 2 to 24 inches in diameter in two primary pressure zones. The network serves nearly all populated areas of the Town of Merrimack with the exception of the southeasterly zone, which is franchised to Pennichuck.

The MVD service area is fully metered and is divided into 3 meter zones, each of which is read and billed on a rolling quarterly basis. MVD has a meter testing and replacement program. In 2019, 326 meters were replaced (about 5% of the total), which is typical. In 2020, only 155 meters were replaced due to Covid-19. There are about 600 testable backflow prevention devices, which are tested annually by MVD staff. Mains are flushed annually. Non-revenue water in 2020 was estimated at 16%, and water losses (real and apparent) were estimated at 12%, which is within industry goals for New England but up slightly from 10% in 2019. 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, including lead and copper action levels, with the exception of PFAS. Levels of PFOA in Wells 2, 3, 7, and 8 exceed the NH state maximum contaminant level (MCL) of 12 ng/L. MVD is currently constructing GAC treatment systems for Wells 2, 7, and 8, and is permitting a new well, Well 9, so Well 3 can be used only as an emergency source.

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. MVD is currently in the process of incorporating an update to vertical assets. We commend the managers for undertaking this initiative and 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
Stephen Chase	2608	I	I
James Colburn	2206	I	I
David Fredrickson	2943	II	III
Brian Hieken	2945	II	II

Jacob Howe	3889	I	I
Edward Lambert	2308	I	I
Jill Lavoie	3382	I	I
Ronald Miner, Jr.	2690	III	III
Heinz Smith	2987	-	I
Daniel Steagald	3824	I	I
James Young	1597	II	II

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

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. Instituting rate increases to maintain a rate structure that is sustainable and consistent with the true cost of service.
3. Constructing water treatment facilities to treat for PFAS at all wells.
4. Pursuing 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 System Management and Operation

1. The proposed federal Revised Lead and Copper Rule (RLCR) is expected to require 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). We advise the MWD to begin developing a service line material inventory and document water service pipe materials at every opportunity (i.e. replacing meters, repairing or replacing curb stops, etc.).

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, David Fredrickson, Jill Lavoie, MVD