

To: Stephen P. St. Cyr  
From: Don Vaughan  
Date: 1/4/19  
Subject: Responses pursuant to DW 17-165, order No. 26,205; Regarding Rosebrook Pressure Problem.

In accordance with the above subject, Abenaki Water Company (AWC) herewith responds to the following:

- a. The solutions considered by the Company before contracting with Horizons
- b. The other possible options available to address the water pressure problem; and
- c. The reasons supporting the construction of a new water tank, as proposed by Horizons, as the best and most cost effective solution.

For a better understanding of the Rosebrook Water System and the nature of its attendant pressure problem, the following information should be helpful. Much of what appears in the following has been taken from testimony and responses to data requests previously provided in this docket.

The Rosebrook Water System beginnings date back to the early 1970s. Owing to significant elevation differentials throughout the service area, system static pressures vary from 35 pounds per square inch (psi) at the higher elevations and up to 200 psi along the valley, certain OMNI Hotel properties, other residential homes at lower elevations, as well as AWC's well house and source of supply. As described in the Company's filing of June 21, 2018, and detailed below, these higher (excessive) pressures in the system have led directly to problems associated with wear and tear, water loss, premature failure of valves, fittings, pumps, treatment equipment, and other appurtenances. Together the issues post operational and safety challenges in the day-to-day operation of the system. These higher pressures greatly exceed normally accepted limits and caused F.X. Lyons to refuse to work on the system in August 2018 (See Abenaki's response to Staff Tech 1-4a).

### **Background**

Noteworthy information previously provided, consequential of extreme pressure ranges or directly related effects follow:

- Immediately prior to AWCs acquisition, Rosebrook Water Company was informed that its commercial package and property policy running from 6/23/15 through 6/23/16 would not be renewed. This non-renewal was triggered by an extensive damage claim by Rosebrook following a water hammer incident which flooded several townhouses during a hydrant flushing operation.
- In 2010, a high pressure event during a repair at Abenaki's well house caused major damage to that facility and forced the Mt. Washington Hotel to close for three days.

- In its Sanitary Survey report dated August 4, 2014 NHDES concluded “...pressure in the distribution system, as a result of storage tank elevation, is much higher than necessary for adequate water service and fire flow. This pressure presents serious questions about power consumption and about safety of the operation when making pipe repairs. We urge the system owner to consider alternate ways of using the existing tank and adopting a lower pressure gradient”.
- In January 2017, NHDES stated in a letter to AWC “We are in support of and recommend system modifications which will reduce the public health risk and will maintain pressures within the recommended range. Not only will this provide for a safer and less costly system to operate, it also creates the ability for the company to take back ownership of system maintenance from home and commercial owners who are currently maintaining their own PRVs.”
- The Twin Mountain Fire Department is also concerned about the high pressures. In February, 2017 the department sent a letter to AWC in support of the project to reduce system pressure to a maximum of 100 psi. The department stated that they believe such a project will “...improve safety and reliability of the system.”
- Due to the issues raised by AWC and other parties as described above, the No Action alternative is not viable as a long-term solution.

In order to minimize the reoccurrence of any of the above incidents, the Company determined the optimal solution would result in a maximum system pressure of about 100 psi.

**A. Solutions considered by the Company before contracting with Horizons**

1. Install a single pressure reducing valve (PRV) on the fill/distribution water main to the existing storage tank.  
This solution would require a dedicated main, approximately one mile long from the wells to the storage tank. While reducing pressure to lower elevations, it would also have the same reducing effect or not provide service at all to homes in a higher elevation. Importantly, it would not relieve the excessive pressure at the well house which would remain at 190 – 200 psi. For these reasons, this was not an acceptable solution.
2. Address high pressure at the well house only. The company evaluated this solution aimed at reducing the pressure to about 100 psi at the well house only. Under this solution, a new pump station and a dedicated water main (about ½ the length as in No. 1) would be required. Excessive pressures would still exist at other lower elevations as before. This solution provides the desired relief for the well house but, importantly, ignores regulatory compliance and acceptable operating standards for other parts of the distribution system in addition to not correcting pressure at the lower elevations. Therefore, if mandated to accept this solution, the Company would disclaim responsibility for such incidents as main breaks in areas exceeding 100 psi. While still under consideration, this is not a recommended solution because of the problems noted.

Generally, the Company's engineers considered various configuration scenarios which would accomplish the goal of distributing water system wide pressures ranging between approximately 35 and 100 psi. Because neither of the preceding solutions were either acceptable or optimal, the Company began considering a three pump station solution which included a dedicated length of water main, PRVs, and other fittings as well as a future storage tank.

To that end, in 2016, AWC contacted Horizons Engineering to evaluate the Rosebrook system and develop conceptual improvements for pressure reduction for AWC's consideration. Their report, dated July 7, 2016 (Attachment 1), included a technical analysis and cost estimates for the three pump station solution.

In 2017, AWC contracted Horizons to develop a hydraulic model of the Rosebrook system in order to further refine the three pump station solution. Their report, dated March 20, 2017 (Attachment 2), includes recommendations for additional system improvements to accommodate the pressure reduction scenario.

As the design, contract drawings, specifications, coordination of permits, easements and other particulars were beyond the time available or the scope of resources the Company had at its disposal, Horizons Engineers was preferred to provide the above services. The proposal was preceded by Horizons' 9/5/18 Analysis and Recommendations Summary which was provided in response to Staff Tech 1-4a. (Attachment 3) Horizons has also prepared a previous narrative referencing water hammer and submitted it to the prior owners of the Rosebrook system.

Horizons has a long history of familiarity with Rosebrook since its initial work in 1987.

**B. Other possible options available to address the water pressure problem**

AWC has used the hydraulic model prepared by Horizons to evaluate various pressure reduction alternatives. This evaluation has been ongoing concurrent with the 3 pump station solution referenced earlier. The Company has considered:

- Installation of multiple PRVs at various locations in addition to a pump station(s)
- Looping water mains to potentially reduce the occurrence of water hammer (but not extreme pressure)
- Other engineering designs considering a cost/benefit perspective

**C. Reasons for the construction of a new water storage tank, as proposed by Horizons, as the best and most cost-effective solution**

Although the new water storage tank can help address the pressure problem, it is also needed for non-pressure related reasons.

- The tank is inappropriately located in the middle of intersecting ski trails, thereby making the tank virtually inaccessible by utility trucks and construction equipment in winter snow conditions.
- The tank access trail, under any weather conditions, is very difficult to traverse.

- The new tank would be sited on a designated lot and easily accessed by Company personnel and vehicles.
- The new tank will ensure scalability, accommodate OMNI expansion, and provide more service reliability.
- The existing tank elevation and location actually contribute to extremely high water pressure, thereby warranting relocation.
- Presumably the original location was designed, as the resort was developed, to negate the need for construction of pump stations and related expense. Water systems in nearby ski areas that the Company has observed, have multiple pressure gradients and supporting pump stations.
- A new tank constructed where no ski areas exist on the north side of route 302 (and closer to the OMNI Hotel) and at a lower elevation would immediately reduce pressure to acceptable levels. This would be the last phase of the proposed staged construction schedule.

As a final note, a site visit and inspection of the facilities was conducted on December 14, 2018 accompanied by an OMNI representative and consultant. Much of the above was discussed and a general understanding of the issues and solutions was accomplished.