



Michael Golden <dynamyt07@gmail.com>

Water Bill for 21 Spring Street #235006

Michael Golden <dynamyt07@gmail.com>
To: Michael Golden <dynamyt07@gmail.com>

Thu, Jun 11, 2020 at 5:18 PM

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From: Golden, Michael <Michael_Golden@LORD.COM>
Sent: Monday, May 11, 2020 2:14:51 PM
To: town@bristolvt.org <town@bristolvt.org>
Cc: Michael Golden <dynamyt07@gmail.com>
Subject: Water Bill for 21 Spring Street #235006

RECEIVED

JUN 16 2020

3:50 pm

Town of Bristol

Good afternoon folks –

I am sending this email in regard to the water bill I received on March 19th for the period of 12/10/19 through 03/10/20 for account 235006. I sent a payment of \$62.50, which was based on the water bill I had received prior this one. I believe there is a gross error in the data collected for that time period. My average use for any month will vary as most do, but it should not be by more than a few gallons. There is only 1 full time occupant in this house, and 1 child 50% of time, and during this time period the house went unoccupied for 8 days as I travelled for work.

The water bill data claims that I used 21,000 gallons. I invited the town water tech, Sylus, to look over the home and find any leaks and allowed him to pour dye into my toilet tank. No leaks were found on the property (I have photos to prove the dye test for over 2 hours, and I did my own test as well for 36 hours). In fact, all the shutoffs and fixtures were replaced by me soon after I purchased the home in 2015 and are in perfect working order. Another tech accompanied Sylus into my home and spoke about washing machines and dish washers using water, which they do, except mine are brand new energy saving units that use very little water. I am happy to state all the water use factors for the home, and I can verify there are no leaks and have not been any leaks of that magnitude since I have lived here. Just for clarity, if you subtract an average 90 day use for a two-person household with both occupants home 100% of the time (~2300 gallons, from Chittenden county water service district data), the remainder would be over 18500 gallons. It would require a water fixture to run wide open (1.5 gal/min, kitchen faucet), with no drainage obstruction, for more than 8.56 days, or 205.55 hours, or 12,333.33 minutes, which is virtually impossible. Even at half of that flow rate (.75 gal/min), the water flow and drainage noise would be heard throughout my home and in my cellar (for approximately 17 days). As I have a shop in my cellar where I work most evenings, which is under the drain lines to my home, it would be impossible for me not hear water flow of that magnitude. Even a leak ¼ of that amount (.375 gal/min) can be heard running through PVC drainage pipe.

I would be willing to work for the town to provide a water flow analysis to prove the water data shown is incorrect and provide a full documentation. I have a registered business and I perform engineering consulting work. I specialize in RCA (root cause analysis) of complex system failures for mechanical and computer automated systems, and I have over 25 years of experience working for several Fortune 100 companies. I would be happy to set up a comparison test for this meter and prove the malfunction using a digital flow meter and 24/7 water usage monitoring and have the data and testing procedures signed by a PE if required. If you require any references, I have several letters of recommendation and my work has been accepted and approved by several government agencies including NASA, the FAA, DoD and DOJ for failure mode analysis and testing. I currently work daily with these agencies and many more to assist their engineers to purchase equipment to assemble and operate systems for data collection and aggregation. I am certain any of them would welcome the opportunity to express their gratitude for my assistance. If you should like my assistance, we can discuss my rate in person, and I would be happy to reduce my fees for the town. I spoke to a couple long-time Bristol residents and it seems this has been an on-going issue for the town for quite some time. If this is a systemic problem, I would suggest getting data and solving the issue.

If the town chooses to change out the water meter with a correctly calibrated unit, I am currently working from home and access would be very easy at the moment. Thank you for your time and please let me know how you would like to proceed with this situation. I am open to any and all suggestions. As I stated earlier, I have provided payment in the amount of \$62.50 based on my previous bill. This should more than cover my water usage for the time period stated on the bill. I apologize for the delay in sending this follow up letter, but we have had a few unexpected family matters that took precedence. Thank you very much for your time and I appreciate the services the town provides.

Enjoy your day,

Michael Golden

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Water Usage Analysis for Property at 21 Spring Street, Bristol, Vt

Purpose:

Determine plausible theories for use of 21,000 gallons of water in the period of 90 days occurring from 12/10/2019 to 03/10/20.

Problem Statement:

Water usage is claimed to be 21,000 gallons for a period of 91 days. This is a logical analysis to show issues within the water system on the property and possible ways water in that amount could be utilized without causing property damage. Conclusions will take the facts and assumptions into consideration to develop any logical theory that could prove or disprove the use of 21,000 gallons of water at the 21 Spring Street property.

Statement of facts:

Number of occupants: One adult male, full time resident
One 10-year-old child, part-time resident (approx. 50%)

Average water usage for 90 days: Approximately 1800 gallons over 90 days using the prior 99 day usage total of gallons that were charged to the property.

Number of water taps in residence: 9

Number used for this test: 7

Bathroom: Sink = 1, Toilet = 1, Shower = 1,

Washing machine: 2

Kitchen: Sink = 1, Dishwasher = 1

- The full-time resident spends many hours each week (after work) in a basement workshop within 12ft of all the water drains, the main sewer drain line, and all water taps installed on the property.
- Water feed lines are copper, no leaks. Water drain lines are PVC, no leaks.
- There is improper venting which causes water to back up in the sinks and shower.
- Line pressure regulator was installed on water feed line in October of 2015, as line pressure was found to be in excess of 100PSI (with higher pulses) and causing leaks in the hot water boiler and water fixtures on the property.
- All daily used water fixtures, attachment lines, and shut-off valves, and new toilet flush valve were installed within the past 5 years.
- All water faucets and shower head are low flow; except for an outside spigot for a hose, which has an interior, in-line shut-off valve that was closed for the duration of time for this analysis.
- Washing machine and dish washer are new within the past 3 years, energy efficient and low water usage rated and shown on provided manuals. Both are in proper working order.

- The outside faucet tap is shut-off during winter months with a cut-off valve inside the residence.
- Resident is an equipment engineer with 28 years of experience in manufacturing, design, failure analysis of systems and mechanical assemblies, and RCCA (Root Cause Corrective Action). Expertise in electronics, programming languages and system controls, mechanical design and fabrication, residential and commercial power and wiring (more than twice the hours for apprentice and master license under the direction of the former Vermont State Electrical Inspector, Richard McGrath, master electrician, BSEE), residential plumbing, residential and commercial energy efficiency studies and corrective actions, residential building and construction practices. Resident has authored, conducted, and certified design and system acceptance testing for several systems and machines for many federal agencies and performs engineering consulting through Post & Beam Equipment Repair. Resident holds a degree in Mechanical Engineering from Vermont Technical College, 1991.

Explanation of data and assumptions:

This analysis will assume the water tap with the highest drain rate that could fail unnoticed, as no water leaks or water damage were found on the property, and none have occurred. Any other water taps on the property are in full view for most of the time the residents occupy the property and would have been shut off immediately. The toilet was leak tested using the die provided by the Town of Bristol water technician, and two water technicians inspected the property upon arrival to check the water meter installed within the residence at 21 Spring Street. The toilet was also leak tested by Michael and Sean Golden using a water mark in the toilet water tank and taking photos over a timed period. No leakage occurred during either test.

The highest water drain rate is the toilet, which is capable of filling at 1gpm (gallon per minute), with a flush rate of 1.6 gpf (gallons per flush). The toilet tank water level is set below the 1.6 gallon volume to conserve water, but this analysis will assume a volume of 1.6gpf. Because the toilet is the only water source capable of a flow and drain rate with enough volume to amass 18,200 gallons that is not in full or partial view to the occupants, the toilet will be used for this analysis.

Assumed hour totals are calculated as a sum only as a means of presentation to develop conclusions. It was not physically possible for either resident to be present for the total number of hours in succession during this 91-day period, and the water did not flow for the total number of hours calculated in succession. Assumed hours are in whole numbers and have been rounded up to determine plausibility. For this volume of water to escape unnoticed, it would require water to have been flowing when no one occupied the residence, or it would have been stopped immediately by the full-time resident, or the part-time resident would have notified the full-time resident of the occurrence. This analysis assumes full water flow rate of the toilet inlet valve, but even partial flow would have caused noise in the drain lines and toilet water tank to alert either resident should this have occurred when either resident was present.

Calculated Assumptions:

Given the average 90-day usage of approximately 2800 gallons for this property:
 21,000 gallons – 2800 gallons = **18,200 gallons** is unaccounted for.

During this 90-day period, the full-time resident was away from the property for 7 consecutive days from February 2nd 2020 through Feb 9th 2020. During this absence there was no access to the property by any persons, so the assumed water usage is zero (0) gallons given no water leaks were discovered on the property. No evidence of water usage on those days was presented to the contrary.

The resident is away from the property approximately 55 hours for work 5 days per calendar week (7 days). The full-time resident is away approximately 10 hours per week (7 days) for miscellaneous (shopping, walking, other errands).

91 days – 7 days absent = 84 days of possible occupancy (during this 91-day period that the full-time resident could be present).

84 days x 24 hours = 1992 hours that the property could be occupied and running water could have been detected by either resident.

Hours absent for work:

- Weekdays during 84-day time period that resident was working = **65 work days**
- 55 hours / 5 days = **11 hours per work day**

Total work hours absent during 84-day period:

65 work days x 11 hours = **715 hours absent for work** for full-time resident.

Hours absent for miscellaneous:

- 10 hours absent each calendar week for miscellaneous errands

Total work hours absent during 84-day period:

10 hours x 13 weeks = **130 hours absent for miscellaneous** for full-time resident.

Total hours absent for full-time resident during 84-day period under analysis:

715 hours + 130 hours = **845 hours absent during 84-day period under analysis.**

The part time resident (10 year-old boy) occupied the property for 28 days during the 84-day period under analysis.

- Absent 8 hours per day for school on weekdays
- Part-time resident occupied the property for
- Present for 3 hours each week when not occupying the residence

Facts:

For the following calculations, the toilet drain is assumed wide open. For this to occur, the flapper valve (or flush valve) would need to be removed completely or supported in some manner to achieve a wide-open flow rate. The flow rate into the water tank from the toilet inlet is assumed at full flow, which was measured at approximately 1gpm by the residents and documented. If the drain rate were lower than the fill rate at full flow, the water tank would overflow and cause flooding within the structure, which did not occur. With these assumptions the following can be assumed true:

Number of gallons per day with flapper valve wide open:

24hours x 60 minutes = **1440 minutes per day**
1440 minutes x 1gpm = **1440 gallons per day** (24 hours)

18,200 gallons / 1440gallons per day = **12.64 days at full flow rate.**

12.64 days x 24 = **303.3 hours at full flow rate**

303.3 hours x 60 = **18,200 minutes at full flow rate**

Because the calculations prove, they are assumed correct.

In the past 90 days, at no time were the resident aware of the toilet running for 18,200 minutes, 303.2 hours, or 12.64 days at full flow rate, and no leaks were discovered on the property. The residents