TOWNSEND WATER DEPARTMENT

540 Main Street West Townsend, Massachusetts 01474

Michael MacEachern, *Chairman* Niles Busler, *Vice-Chairman* Nathan Mattila, *Clerk*
Paul L. Rafuse,
Water Superintendent
(978) 597-2212
Fax (978) 597-5561

WATER COMMISSIONERS MEETING MINUTES

December 14, 2015 - 5:30P.M.

Water Department 540 Main Street, Meeting Room

VOTED MM

I. **PRELIMINARIES:**

1.1 MM called the meeting to order at 5:30 PM, 540 Main Street.

1.2 Roll call showed member present Chairman Michael MacEachern (MM), Vice Chair Niles Busler (NB) and Clerk Nathan Mattila (NM). Guests Present, Paul Rafuse and Brenda Boudreau.

1.3 MM announced that the meeting is being tape recorded

1.4 Chairman's additions or deletions. None

1.5 There were no minutes to approve.

1.6 The Board reviewed the correspondence.

II. **APPOINTMENTS:**

2.1 6 PM Steve Hamilton/Vanvoorhis, 5 Oak Circle RE: High Bill. The Board reviewed his account and found the readings to be accurate on the meter.

III. **MEETING BUSINESS**:

3.1 Discuss request from DPW Committee to meet with the Board of Water Commissioners on Thursday January 7, 2015. Paul will try to schedule the meeting to coincide with a regularly scheduled BOWC meeting if possible.

3.2 Discuss Final Reading Charge. We will inquiry with surrounding water departments to see if they have similar charges for final reading process.

3.3 Approve 1" service to Transformations Inc., 4 Penny Lane, Appl#2015-13, Acct#61651 $2,000.00. **NM made a motion to approve a 1" service to Acct# 61651, 4 Penny Lane. NB seconded. Unanimous vote.**

IV. **COMMISSIONERS UPDATES AND REPORTS.**

4.1 None

V. **WATER SUPERINTENDENTS UPDATES AND REPORTS.**

5.1 Cross St. Well. Paul reported the cost for this extensive testing totaled $1,200.00

5.2 Witches Brook underground power. Paul reported that Mike and Jim have installed 90% the underground pipe and are scheduled to finish shortly.

5.3 Repairs-Upgrades to Fitchburg Rd. Storage Tank. Paul spoke with Stantec about creating an RFP to address the contamination issues.

VI. **OFFICE UPDATES AND REPORTS.**

6.1 The Board reviewed and signed Bills Payable Warrants.

6.2 The Board reviewed payroll.

6.3 The Board reviewed and signed November Schedule of Bills Receivable report.

6.4 The Board reviewed November 2015 Accounts Receivable report.

VII. ADJOURNMENT:

MM made a motion to adjourn the meeting at 6:40 pm and to sign the warrants and reports out of session. NM seconded. Unanimous vote

MM

Submitted by Brenda Boudreau Date 1/11/2016

WATER DEPARTMENT MEETING

DATE: **December 14, 2015**

NAME	ADDRESS	PH/EMAIL
Steve Hamilton	Soda Circle	

1.6

COPY

TOWN OF TOWNSEND
BOARD OF WATER COMMISSIONERS
APPLICATION TO ABATE OR ADJUST CHARGES

Name: John Leahy Account # 60989

Address: 36 Warren Road

Phone # _____ Email Address _____

Billing date 11/20/15

AMOUNT: 154.31 ABATEMENT [ ] ADJUSTMENT [ ] (check one)

REQUESTED BY: CUSTOMER [ ] OFFICE [ ] OTHER [ ] - if other please explain below: CLB

Reasons: (please attached supporting documentation if applicable)

4th Time NSF

151.15 User 061-000-4210

3.16 Late charg 061-000 4231.

154.31

APPROVED [✓] DENIED [ ] (check one)

DATE: _____

TOWNSEND BOARD OF WATER COMMISSIONERS

Paul Raphael

1

Sent email to ACCT + Treasurer letter to Cust.

1.6

011301390
11/25/2015
13000015

This is a LEGAL COPY of your check. You can use it the same way you would use the original check.

RETURN REASON-A
NOT SUFFICIENT FUNDS

000000013055108 011301390 11/20/2015

NSF

JOHN LEAHY
36 WARREN ROAD
TOWNSEND, MA 01469-1392

2888
53-8285/2113
3

10/31/2015 Date

Pay to the Order of Townsend WATER Dept. $154.31

one hundred, FIFTY-FOUR And 31/100 Dollars

IC FEDERAL CREDIT UNION

For

John Leahy

[redacted] [redacted] "0000015431"

Century Bank & Trust Co
Medford MA 02155-6316

NOTICE OF RETURNED DEPOSITED ITEMS

Account 30996 Date 11/25/15

The deposited item(s) listed were returned to us and debited to your account.

MAKER	RETURN REASON	$ AMOUNT
See attached	Not Sufficient Funds	154.31

Total items charged back to your account: 154.31
Please deduct a fee of:

If you have any questions, please call Customer Service at (866) 8 CENTURY.

TOWN OF TOWNSEND
Water Lockbox
MEMORIAL HALL TREASURERS OFFICE
272 MAIN ST
TOWNSEND MA 01469

600984
11/20/15
520

WORKORDER

Work Order #: 20141026 2.1

Townsend Water Department

Issued On: 10/14/2015 **By:** Brenda **To:** Water Tech

Projected Completion Date:

Customer: 3530 VANVOORHIS WENDY STEVE

Location: 5 OAK CIRCLE Rte:1 Seq:3840

Meter S/N: S/N: 3530 RADIO ID: 3530 LAST READING: 1711

Phone: (508) 733-3573 978-460-2981 (978) 300-5327

Description: Install Itron Put in meter

Comment: Monday October 19 @ 3PM

Need bill

Requested by: **Inspected by:** **Approved by:**

JOBCODE	DESCRIPTION	CHARGE
II	Install Itron	0.00
PUM	Put in meter	0.00
	Work Order Total:	0.00

Meter Reading: 0

Meter Make: Hersey

Meter Serial No.: 15383121

Meter Size: 5/8

ITRON # 70097066

OLD READING 1761

2558354

21

Search | History | Balances | Readings | Previous | Next | Print

Acct. Number 3530 ☑ Active ☑ Member ☐ Private Deposit $0.00

FID DLN Gender U Ethn U Race U PW NOT S

First, Middle, Last Name WENDY STEVE VANVOORHIS ☐ Online Bill

☐ Company Name

Bill Address

☑ Bill Here 5 OAK CIRCLE

City, ST, Zip TOWNSEND MA 01469

Home Ph. (508) 733-3573

Fax/Cell Ph. (978) 300-5327

Work/Cell Ph. 978-460-2981

E-mail stevehamilton1975@gmail.com

Service Location Information

Add Other Service Locations

ID 3530 Route 99 Seq # 3840

Access Lat. and Long. in grid below...

Service Address

☐ Bill Here 5 OAK CIRCLE

Dates

In* 3/2/2000 Out

City, ST, Zip TOWNSEND MA 01469

☐ Minimum Bill ☐ Late Chg Exempt

☐ Cutoff Exempt

☑ Currently In Use

MAP County Beat/District

Comment Well

Service Transaction Codes for This Location

	Code	Start Date	Multiplier	Initial Reading	Serial/Unit No.	Machine	Constan
▶	WATR	10/21/2015	1000	0	15383121	70097066—04	1
	WR	03/02/2000	100	0	0		1
*							

Add | Update | Delete | Memo | Save | Exit

Townsend Water Department

PO Box 321 Medford MA 02155-0004 PH: 978-597-2212

CUSTOMER HISTORY 06/05/2000 to 01/01/2016

Acct: 3530 VANVOORHIS WENDY STEVE Home:(508) 733-3573
5 OAK CIRCLE T0WNSEND MA 01469 Current Balance: $631.86 ACTIVE
Loc ID: 3530 @ 5 OAK CIRCLE TOWNSEND
Rte: 99 Seq.# 3840 Mtr S/N: 15383121 Dep:$0.00

Date	Code	Description	Previous	Present	Used	Charge	Payment	Balance
10/14/2015	WATR	Uni-Bank Deposit For $100.00					59.00	561.02
10/14/2015	WR	Uni-Bank Deposit For $100.00					37.50	523.52
10/14/2015	LAT	Uni-Bank Deposit For $100.00					3.50	520.02
10/14/2015	WorkOrd	20141026 Install Itron Put in meter Monday October 19 @ 3PM						520.02
10/21/2015	WATR	Read on 10/21/2015 (X1000) KeyedIn	1,711	1,761	50			520.02
10/21/2015	WATR	Read on 10/21/2015 (X1000) KeyedIn				200.00		720.02
10/22/2015	WATR	Uni-Bank Deposit For $75.00					75.00	645.02
11/5/2015	DEMAN	Added on 11/6/2015				1.00		646.02
11/5/2015	LAT	Added on 11/6/2015				9.53		655.55
11/24/2015	WATR	Uni-Bank Deposit For $125.00					114.47	541.08
11/24/2015	LAT	Uni-Bank Deposit For $125.00					9.53	531.55
11/24/2015	DEMAN	Uni-Bank Deposit For $125.00					1.00	530.55
12/3/2015	LAT	Added on 12/3/2015				7.81		538.36
1/1/2016	WATR	Read on 12/03/2015 (X1000) RemMR		14	14	56.00		594.36
1/1/2016	WR	Unit Charge				37.50		631.86

Townsend Water Department

12/14/2015 PO Box 321 Medford MA 02155-0004 PH: 978-597-2212

CUSTOMER HISTORY 06/05/2000 to 01/01/2016

Acct: 3530 VANVOORHIS WENDY STEVE Home:(508) 733-3573
5 OAK CIRCLE T0WNSEND MA 01469 Current Balance: $631.86 ACTIVE
Loc ID: 3530 @ 5 OAK CIRCLE TOWNSEND
Rte: 99 Seq.# 3840 Mtr S/N: 15383121 Dep:$0.00

Date	Code	Description	Previous	Present	Used	Charge	Payment	Balance
3/10/2015	LAT	Check 1569 for $125.00					2.72	70.72
3/10/2015	DEMAN	Check 1569 for $125.00					1.00	69.72
3/30/2015	LAT	Added on 3/30/2015				0.90		70.62
4/1/2015	WATR	Read on 03/04/2015 (X1000) RemMR	1,544	1,573	29	116.00		186.62
4/1/2015	WR	Unit Charge				37.50		224.12
5/5/2015	LAT	Added on 5/5/2015				3.20		227.32
5/5/2015	DEMAN	Added on 5/5/2015				1.00		228.32
5/22/2015	WATR	Uni-Bank Deposit ACH for $175.00					169.90	58.42
5/22/2015	DEMAN	Uni-Bank Deposit ACH for $175.00					1.00	57.42
5/22/2015	LAT	Uni-Bank Deposit ACH for $175.00					4.10	53.32
6/8/2015	LAT	Added on 6/8/2015				0.65		53.97
7/1/2015	WATR	Estimated on 06/17/2015 (X1000)	1,573	1,627	54	216.00		269.97
7/1/2015	WR	Unit Charge				37.50		307.47
7/6/2015	LAT	Added on 7/6/2015				0.65		308.12
8/4/2015	DEMAN	Added on 8/4/2015				1.00		309.12
8/4/2015	LAT	Added on 8/4/2015				4.45		313.57
8/12/2015	WR	Uni-Bank Deposit For $50.00					37.50	276.07
8/12/2015	WATR	Uni-Bank Deposit For $50.00					10.85	265.22
8/12/2015	LAT	Uni-Bank Deposit For $50.00					0.65	264.57
8/12/2015	DEMAN	Uni-Bank Deposit For $50.00					1.00	263.57
8/18/2015	Update	Changed Acct Name from VANVORICH WENDY to VANVOORHIS WENDY STEVE						263.57
8/31/2015	WATR	ADJ - Unibank Charge 8/11/15				48.35		311.92
8/31/2015	LAT	ADJ - Unibank Charge 8/11/15				1.65		313.57
9/11/2015	LAT	Added on 9/11/2015				4.45		318.02
9/17/2015	WATR	Uni-Bank Deposit For $75.00					63.80	254.22
9/17/2015	LAT	Uni-Bank Deposit For $75.00					11.20	243.02
10/1/2015	WATR	Estimated on 09/14/2015 (X1000) Estimated Bill	1,627	1,711	84	336.00		579.02
10/1/2015	WR	Unit Charge				37.50		616.52
10/6/2015	LAT	Added on 10/6/2015				3.50		620.02

3.3

Office of the
Townsend Water Department
540 Main Street
West Townsend, MA 01474
Tel: 978-597-2212
Fax: 978-597-5611

Application No. 2015-13

Account No. 61651

Date 11/20/2015

APPLICATION FOR WATER SERVICE

Name of Property Owner: Transformation Inc

Service Address: 4 Penny Lane
Townsend MA 01469

Tel No.: Wes 978-877-6415 Cell No. _____

Billing Address:
(If different from service address): ~~8 Coppersmith Way~~ 323 West Main Street
Ayer Ma 01432. - 978.597-0542.

Units (Check all that apply):

X Single Family (If Professional Bldg.) No. of Businesses __
___ Multi Family (Apartment Building) No. Apartments ___
___ Hotel/Motel No. Rooms: ___

Type of Use (Check One):

X Residential ___ Industrial
___ Commercial/Business ___ Municipal
___ Agricultural

Is a sprinkler system required for fire protection? X Yes ___ No
If yes a proposed design plan of the system must be submitted including required flows, required pipe size, and size and backflow prevention device.

Is a flow test/s required? ___ Yes X No
If yes the owner will be billed separately at the current rate per flow test.

Is there an existing or proposed automatic lawn irrigation system? ___ Yes No On separate well

Has a sketch or plot plan been provided showing the location of the septic system, automatic lawn irrigation system and any known or proposed additions to the existing building? ___ Yes ___ No **********Plot Plan Requested

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I, the Owner understand this form is to be completed and all Fees, charges, and required documentation must be received before water service will be turned on. I also understand that I have from April 1st to November 1st of the same calendar year of the application date to complete the installation or this application shall be null and void and the Connection/System Development charge forfeited. In addition, I acknowledge receipt of the Townsend Water Department's current Rules and Regulations

Signature of Owner/Applicant — Date 12/2/15

Agent for Transformations-Inc

BOARD OF WATER COMMISSIONERS

Chairman

Vice Chairman

Clerk

Date Signed by Board of Water Commissioners

5.1.

Water Systems Engineering, Inc.

Date: November 19, 2015

Lab Report No. 20337

Paul Rafuse
Townsend Water Department
540 Main St.
West Townsend, MA 01474

Project Description: Cross Street, Well 026; Samples dated 10/22/15
Complete Well Profile (1)

Test Description:

The Complete Well Profile analysis is designed for comparative analysis of two samples, typically one static and one pumping sample. The Complete Well Profile utilizes a series of inorganic chemical and microbiological tests to identify fouling and corrosion issues with potential impacts on the operation of the sampled well. The tests include a number of inorganic chemical parameters such as pH, total dissolved solids/conductivity, hardness, alkalinity, oxidation reduction potential (ORP), bicarbonate, carbonates, silica, sodium, potassium, chloride, iron, manganese, phosphate, nitrate, sulfate, and total organic carbon (TOC). Biological assessment is designed to quantify the total bacterial population, identify two dominant populations of bacteria, assess anaerobic conditions, and identify the presence of iron related bacteria and sulfate reducing organisms. Also included are tests for Adenosine triphosphate (ATP), heterotrophic plate count (HPC), total coliform and E. coli coliform, and a microscopic evaluation.

Testing Procedures:

All laboratory testing procedures are performed according to the guidelines set forth in *Standard Methods for the Examination of Water and Wastewater* as established by the American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF). Corrosion analyses are performed in accordance with the guidelines as set forth by the National Association of Corrosion Engineers (NACE). In general, these methods are approved by both the Environmental Protection Agency (EPA) and AWWA for the reporting of water and/or wastewater data.

Sample collection and shipment is the responsibility of the customer, performed according to protocol and procedures defined by the laboratory in advance of the sampling event with regards to the specific project and nature of the problem.

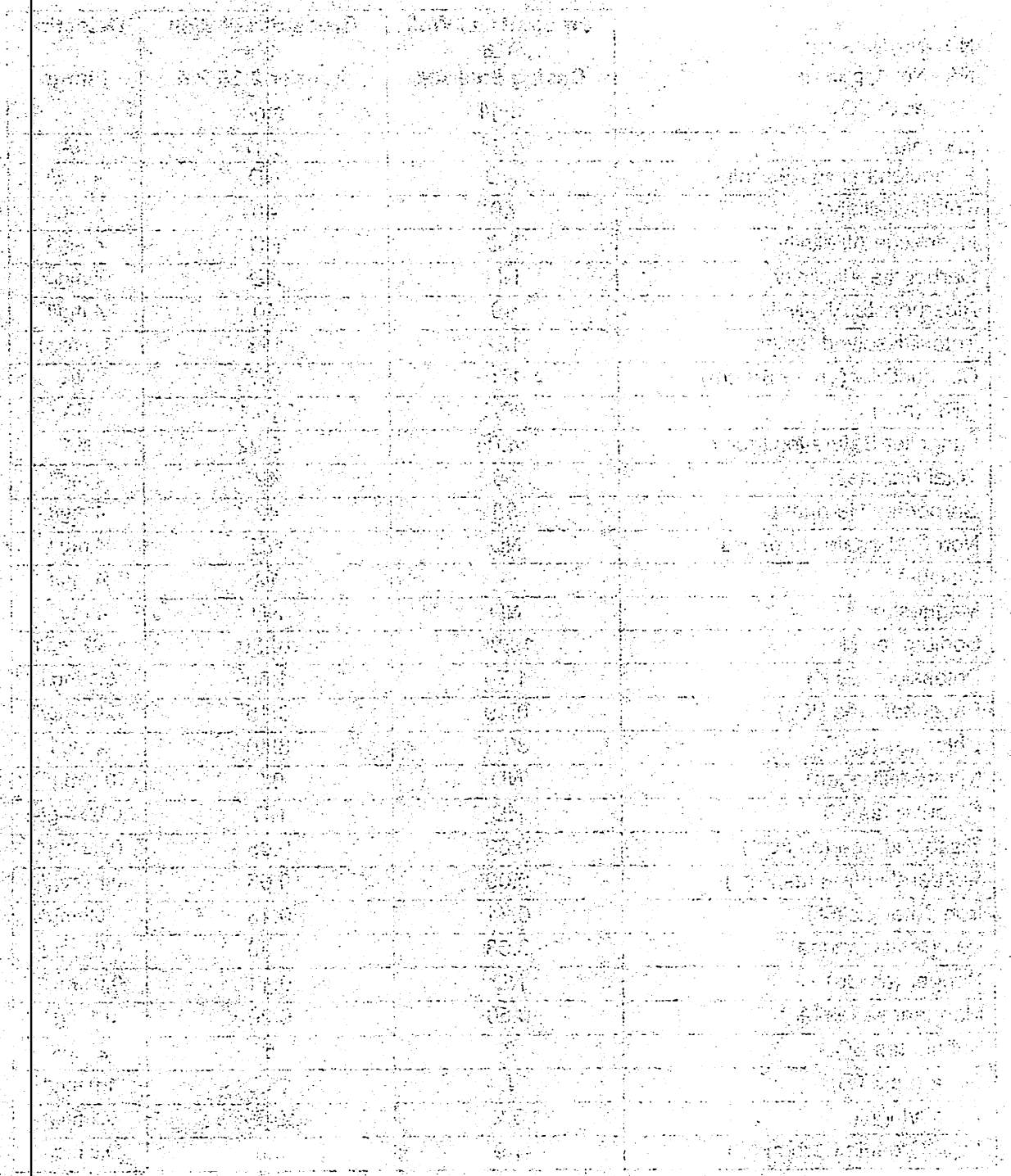
Disclaimer:

The data and interpretations presented are based on an evaluation of the samples and submitted data. Conclusions reached in this report are based upon the data available at the time of submittal and the accuracy of the report depends upon the validity of information submitted. Any recommendations presented are based on laboratory and field evaluations of similar fouling occurrences within potable water systems. Further investigative efforts, such as efficiency testing, site inspection, video survey, or other evaluation methods may offer additional insight into the system's condition and the degree of fouling present.

Client: Townsend Water Department
Date: November 19, 2015
Lab Report No. 20337

Re: Cross Street, Well 026; Samples dated 10/22/15
Complete Well Profile (1)

ND - Not Detected NA - Not Applicable * as $CaCO_3$	**Cross Street Well 026 Casing 9:00 AM** mg/l	**Cross Street Well 026 Aquifer 2:35 PM** mg/l	**Detection Limits**
pH Value	5.84	5.47	NA
Phenolphthalein Alkalinity *	ND	ND	4 mg/l
Total Alkalinity *	40	40	4 mg/l
Hydroxide Alkalinity	ND	ND	4 mg/l
Carbonate Alkalinity	ND	ND	4 mg/l
Bicarbonate Alkalinity	40	40	4 mg/l
Total Dissolved Solids	122	113	1.0 mg/l
Conductivity (µm or µS/cm)	170	157	NA
ORP (mV)	96.9	215.1	NA
Langelier Saturation Index	- 4.03	- 3.92	NA
Total Hardness *	36	42	4 mg/l
Carbonate Hardness	36	42	4 mg/l
Non Carbonate Hardness	ND	ND	4 mg/l
Calcium *	4	12	4 mg/l
Magnesium *	ND	ND	4 mg/l
Sodium (as Na)	19.80	19.80	0.02 mg/l
Potassium (as K)	1.70	1.60	0.1 mg/l
Phosphate (as PO_4)	0.19	0.15	0.06 mg/l
Chlorides (as Cl)	39.2	38.0	2 mg/l
Nitrate (Nitrogen)	ND	0.3	0.3 mg/l
Chlorine (as Cl)	ND	ND	0.02 mg/l
Dissolved Iron (as Fe^{2+})	0.62	0.08	0.02 mg/l
Suspended Iron (as Fe^{3+})	0.09	0.05	0.02 mg/l
Iron Total (as Fe)	0.71	0.13	0.02 mg/l
Iron (resuspended)	3.58	0.36	0.02 mg/l
Copper (as Cu)	ND	0.11	0.04 mg/l
Manganese (as Mn)	0.50	0.20	0.1 mg/l
Sulfate (as SO_4)	3	5	2 mg/l
Silica (as SiO_2)	14.4	15.2	1.0 mg/l
Tannin/Lignin	0.2	0.2	0.1 mg/l
Total Organic Carbon (C)	1.9	3.0	0.0 mg/l



Biological Analysis:

	Cross Street Well 026 Casing 9:00 AM	Cross Street Well 026 Aquifer 2:35 PM	Detection Limit
Plate Count (colonies/ml)	2	1	NA
Anaerobic Growth (%)	<10	<10	NA
Sulfate Reducing Bacteria	Negative	Negative	NA
Fe/Mn Oxidizing Bacteria	Positive	Negative	NA
ATP (cells per ml) Initial	1.5 Million	287,000	NA
ATP (cells per ml) 24 Hour	2.0 Million	739,000	NA
Total Coliform	Negative	Negative	NA
E.coli Coliform	Negative	Negative	NA
Bacterial Identification	*Clavibacter michiganensis*	-	NA
Bacterial Identification	*Gallionella*	-	NA
Bacterial Identification	*Crenothrix*	-	NA

Microscopic Evaluation:

Casing: Heavy visible bacterial activity, very low iron oxide, heavy iron oxide entrained biomass with extremely large number of Gallionella and trace of Crenothrix,

Aquifer: Very low visible bacterial activity.

Observations and Interpretations:

Casing Sample: The chemical analyses found low alkalinity and total hardness. Total dissolved solids were well below the recommended secondary drinking water standard of 500 ppm. The well displayed a slightly acidic pH. The oxidation-reduction potential (ORP) for each sample was indicative of an oxidative condition with a tendency for metal oxide deposition in the presence of metal ions

The Langelier Saturation Index (LSI), which is a calculation of the amount of dissolved calcium carbonate in the water, is used as an indication of the potential for carbonate scale formation or corrosion. The LSI value for both samples were negative, reflecting an under saturated environment with respect to dissolved calcium carbonate. An LSI in this range is an indication of corrosive water with little or no likelihood of calcium carbonate mineral scale deposition, although other non-related mineral scale deposition can take place.

Overall there appears to be a moderate level of dissolved mineral content in the groundwater at this site. Chemicals and compounds found to be present at concentrations above an ideal groundwater concentration included sodium, potassium, and manganese in both samples and dissolved iron, total iron, and resuspended iron in the casing sample only. Resuspended iron accounts for chemically oxidized iron that has become entrapped in biomass as well as iron that has been mobilized by the activity of iron related bacteria. A high resuspended iron concentration can indicate the presence of iron related bacteria as well as the entrapment and accumulation of iron oxide in biomass present within the well system.

Total organic carbon (TOC) was also at a level of concern in both samples. Total organic carbon is the amount of carbon bound up in organic compounds. It is typically derived from decaying organic matter as well as from synthetic sources such as pesticides, herbicides, fertilizers, and detergents. Organic carbon originates at or near the surface in the groundwater recharge area and typically, infiltrates the aquifer over time. High TOC levels are a concern since the carbon provides an excellent food source and stimulates the growth of microorganisms. Tannin and Lignin is an additional indicator of potential surface or active organic layer influence. Tannin and Lignin was present in each of the samples.

Adenosine triphosphate (ATP), a component of cellular material and a means of evaluating the total bacterial population present, both aerobic and anaerobic, was at an extremely high level of concern in the samples with 1.5 million cells per milliliter in the casing sample and 287,000 in the aquifer sample. ATP levels for a properly functioning well system not experiencing biofouling typically fall within the range of 20,000 to 60,000 cells per milliliter. In general, any concentration in excess of 100,000 cells is of concern for bacterial congestion and biofouling. Microbial growth was limited on the culture plates at only two colony forming units (CFUs), although this may not be an accurate determination of the level of bacterial population present since over 95% of all microorganisms do not grow on culture media under laboratory conditions. Anaerobic growth represented less than 10% of the total microbial growth in the samples. No sulfate reducing bacteria were detected.

Testing for total coliform bacteria including *E. coli* specific coliform was negative for each of the Well 026 samples.

The dominant organisms identified within the sample were species of *Clavibacter,* and the iron oxidizing bacteria *Gallionella* and *Crenothrix.*

Clavibacter michiganensis is an aerobic, gram-positive bacterium. Mostly known for their damaging effects to plants and crops, these bacteria are commonly found in soil environments throughout North America and Europe.

Gallionella are naturally occurring, iron-oxidizing chemolithotrophic bacteria that have been identified in a variety of different aquatic habitats, including groundwater. *Gallionella* are a generally aerobic group of bacteria that utilize iron as an energy source and secrete an iron-oxy-hydroxide byproduct. This secretion is often responsible for accumulations of iron oxide in wells and piping systems. *Crenothrix* are a genus of sheathed bacteria that oxidize iron and manganese. *Crenothrix* cells are non-motile and can generally be found in a variety of aquatic environments with sufficient organic matter present. Oxidation, resulting from aeration including cascading water or rapid recharge, can stimulate the growth and activity of these bacteria. *Crenothrix* are commonly found associated with other iron and manganese oxidizing bacteria such as *Gallionella* and *Leptothrix.* As a result of the oxidation of both iron and manganese, *Crenothrix* sheaths are encrusted with iron and manganese oxides, resulting in a very effective fouling mechanism.

The microscopic evaluation of the casing sample found a heavy level of visible bacterial activity with a heavy concentration of iron oxide entrained biofilm, a low concentration of iron oxide as such, and a heavy population of the iron oxidizing organism *Gallionella* and a very low number of *Crenothrix.*

The microscopic evaluation of the aquifer sample observed a trace level of visible bacterial activity with no observable biofilm or iron and manganese oxidizing organisms.

Recommendations:

The stated problems of taste, odor, and red water are consistent with the heavy bacterial congestion identified in the analysis. Heavy populations of bacteria often cause a musty odor in water. The iron and manganese oxidizing bacteria are most likely the cause of the noted discoloration which is oxidized iron, a byproduct of their metabolic activity. There appear to be two major factors contributing to the problems associated with the well. The first is the corrosive nature of the groundwater. The metallic components in the well and pump are being attacked by the naturally corrosive water chemistry, in turn releasing iron ions into the environment which provide a nutrient source for the iron oxidizing organisms. The bacteria themselves can also attack the steel directly causing microbially induced corrosion, adding to the problem. A second factor is the presence of organic carbon providing an additional and on-going food source.

The analysis shows a higher concentration of iron and manganese in the casing samples as compared to the aquifer sample. This is due to the water sitting within the well casing having time to attack the steel and release ions, as well as the activity of the bacteria, concentrating the problem. Idle periods also allow time for the bacterial populations to increase undisturbed. The recent cleanings appears to have been successful in removing rust buildup and scale but may have not been totally successful in reducing the bacterial population.

Conducting a thorough cleaning and disinfection targeting the high level of bacterial congestion should reduce the bacterial related problems.

The process should begin with pulling the pump and mechanically scrubbing the interior of the well using a surge block or brush. This will help remove loose scale, rust deposits, and biofilm which can provide a protective environment for microorganisms. Once the entire column has been scoured, bail or pump the disrupted material and any fill from the well, starting at the bottom.

Chemical treatment should begin by placing a solution of 4% phosphoric acid combined with 2% dispersion polymer such as Johnson Screen's NW-310 biodispersant below the static water level and aggressively swabbing or surging it into the producing zones for approximately two hours. The recommended biodispersant is NSF approved for use in potable wells and is recommended to enhance the activity of the acid in cleaning biomass and extending the efficiency of the acid in attacking mineral scale. The use of phosphoric acid is recommended over hydrochloric acid since phosphoric acid is less aggressive than hydrochloric acid but will achieve the same level of reaction. This produces less reaction with the steel well and pump components resulting in fewer iron ions being released which can provide a food source for iron oxidizing organisms. Also, phosphoric acid will have a less violent reaction than hydrochloric acid with any carbonates that may be present in the well. The acid and biodispersant solution will aid in breaking down the biofilm that surrounds and protects the organisms, allowing for better penetration of the disinfection solution as well as removing any mineral scale present.

During surging, monitor the pH and maintain a pH of 3 or less. Following surging, purge the well until visual turbidity is absent, the pH has returned to normal background levels, and the conductivity has returned to a normal, pre-treatment range.

Once the well has been effectively purged of all acid residue and is pumping clear of visible turbidity, disinfection should be carried out utilizing a pH adjusted chlorination at a 300 ppm chlorine level with a targeted pH range of 6.5 to 7.0. The treatment volume of the disinfection solution should be equivalent to 3 times the well volume and evenly distributed throughout the producing zones. This larger volume is utilized to flood the borehole with the disinfection

solution in order to increase the effectiveness of treatment as well as the effective treatment zone. Utilization of a chlorine enhancing chemistry such as Johnson's NW-410 for pH control is strongly advised to improve the biocidal action of the disinfection chemicals.

The disinfection solution should be surged into the well for approximately 2 hours. Monitor the chlorine level during disinfection and add additional chlorine to maintain at least a 100 ppm chlorine level during disinfection.

It is highly advisable to repeat the disinfection phase a second time to further penetrate the gravel pack and formation. This should provide an even greater reduction in bacterial population and greater longevity before regrowth reaches a level where production is affected.

Based on information provided, the following volumes are necessary for each step of the recommended treatment process:

Rehabilitation		
	Phosphoric Acid (85% strength)	30 gallons
	NW-310 Biodispersant	17 gallons
	Potable water for blending	1,000 gallons
Disinfection		
	Sodium Hypochlorite (12% strength)	5 gallons
	NW-410 Chlorine Enhancer	1.5 gallons
	Potable Water for blending	2,000 gallons

For acid treatments, mix the chemicals in this order: water, acid, biodispersant. Mix lightly. If during acid treatment, the pH rises to a level above 3.0, add additional acid and water at the rate of 2 gallons acid and 1 gallon water. No additional dispersant should be needed.

For the chlorine treatment, mix the chemicals in this order: water, chlorine enhancer, check the pH (below 5.5), add chlorine. Mix lightly. During disinfection, if the chlorine residual has dropped to below 100 ppm, add additional sodium hypochlorite in increments of 0.12 gallon to raise it to that level.

It is recommended that the well be put into operation as soon as possible and pumped on a regular schedule to inhibit the regrowth of microorganisms. Also, it would be advisable to conduct a periodic monitoring analysis to monitor bacterial regrowth since there is an ongoing source of nutrients available.

If you have any questions regarding the analyses or the information presented, please contact our office.

Paul D. Buozis
Professional Geologist

TOWNSEND WATER DEPARTMENT

540 Main Street West Townsend, Massachusetts 01474

Michael MacEachern, *Chairman* Niles Busler, *Vice Chairman* Nathan Mattila, *Clerk*
Paul L. Rafuse,
Water Superintendent
(978) 597-2212
Fax (978) 597-5611

NO. 16-5

11/30/2015

SCHEDULE OF BILLS RECEIVABLE

To the Accountant:
Treasurer:

The following bills, amounting in the aggregate to

ELEVEN THOUSAND THREE HUNDRED TWENTY-THREE AND 9/100********** Dollars

are herewith committed for collection.

DATE	USER CHARGES	SERVICE CHARGES	CONN CHARGES	BACK FLOW	LATE CHARGES
11/30/15	1,153.50	2,450.03	2,000.00	3,250.00	2470.38

BOARD OF WATER COMMISSIONERS

Michael MacEachern, Chairman

Niles Busler, Vice-Chairman

Nathan Mattila, Clerk

FISCAL YEAR 16 SUMMARY

TOWNSEND WATER DEPARTMENT - ACCOUNTS RECEIVABLE

November 30, 2015

UNCOLLECTED FROM JUNE 30, 2015				**75,812.05**
CHARGED 07/01/14- 11/30/15	**11/30/2015**	**Previous Balance**	**Total**	
USER CHARGES	1,153.50	558,836.50	559,990.00	
SERVICE CHARGES	2,450.03	16,153.82	18,603.85	
CONNECTION CHARGES	2,000.00	12,000.00	14,000.00	
LATE CHARGES	2,470.38	6,341.42	8,811.80	
BACKFLOW	3,250.00	2,275.00	5,525.00	
SUBTOTAL	**11,323.91**			
TOTAL CHARGES				**606,930.65**
				682,742.70
RECEIVED 07/01/14- 11/30/15	**11/30/2015**			
USER CHARGES	51,524.08	457,758.59	509,282.67	
SERVICE CHARGES	2,397.35	15,028.03	17,425.38	
CONNECTION CHARGES	2,000.00	12,000.00	14,000.00	
LATE CHARGES	1,319.61	4,426.46	5,746.07	
BACKFLOW	2,250.00	2,170.00	4,420.00	
SUBTOTAL	**59,491.04**			
TOTAL RECEIPTS				**550,874.12**
SENT TO LIEN				0.00
LIENS COLLECTED				0.00
ABATEMENTS				35.00
ADJUSTMENTS				90.67
UNCOLLECTED				**131,742.91**
				682,742.70

OUTSTANDING:

USER CHARGES	$	**119,110.11**
SERVICE CHARGES		3,298.98
CONNECTION CHARGES		0.00
LATE CHARGES		8,128.82
BACKFLOW		1,205.00
TOTAL OUTSTANDING	$	**131,742.91**