VILLAGE OF WILLIAMS BAY

250 Williams Street | PO Box 580 | Williams Bay | WI | 53191 | williamsbay.org
Phone: 262-245-2700

NOTICE

VILLAGE BOARD OF TRUSTEES MEETING
MONDAY, NOVEMBER 21, 2022 AT 6:30 PM

AGENDA

The following agenda items may be considered for Discussion, Consideration, or Action

I. Call to Order

II. Roll Call

III. Pledge of Allegiance

IV. Minutes

- **A.** Village Board Meeting Minutes of November 7, 2022

V. Consent Agenda

- **A.** Walworth County P25 Radios
- **B.** Chaplain Approval
- **C.** Request from Geneva Lake Astrophysics and STEAM
- **D.** Baxter & Woodman Corrosion Controls Study and Ammonia Reduction Action Plan

VI. Presentation of accounts and petitions

- **A.** Payroll ending 11-04-2022 in the amount of $49,022.48
- **B.** Prepaids dated 11-15-2022 in the amount of $2,361.00
- **C.** Library Accounts Payable dated 11-16-2022 in the amount of $5,129.86
- **D.** Accounts Payable Unpaids dated 11/18/2023 in the amount of $522,730.71

VII. Plan Commission

- **A.** APPLICANTS Jack Kirkwood, 203 Elmhurst Williams Bay, LLC (Owner)
  TAX KEY WSS 00032 and WSS 00033
  STREET ADDRESS 203 Elmhurst Ct, Williams Bay, WI. 53191
  The applicant is requesting approval of a site plan for commercial development in the Village Center District per Section 390-1206 *Site Plan* and Section 390-0705 *VCO Village Center Design Overlay District*.

VIII. Joint Extraterritorial Zoning Committee: pursuant to section 18.171F(A)

- **A.** None

IX. PUBLIC COMMENTS

X. President's Remarks

- **A.** Referendum thank you
- **B.** Winter Parking Rules Reminder
- **C.** Kudos to Public Works
- **D.** Thank you to all involved in Halloween Events

XI. Ordinances and Resolutions

- **A.** First Reading - 2022-18 Ordinance - Creating Sec. 253-5 M - Public Nuisances Affecting Peace and Safety (Harboring of Uncontrolled Animals)
- **B.** Resolution R-30-22 Joint Barrett Memorial Library and Village Board Resolution regarding Library Reserves
- **C.** Resolution R-31-22 Committment of 2022 Fund Balance
- **D.** Resolution R-32-22 Establishing Wages and Salaries for 2023

XII. Committee Reports

A. Finance & Personnel, Trustee Wright - Chair

1. Resolution R-30-22 Joint Barrett Memorial Library and Village Board Resolution regarding Library Reserves

2. WEDC Community Development Investment Grant Program

3. Purchase of New Ambulance

B. Protective Services, Trustee Vlach - Chair

1. Original, Renewal, or Temporary Operator License Applications

C. Parks & Lakefront, Trustee D'Alessandro - Chair

1. No Report

D. Building, Zoning, & Ordinance, Trustee Jaramillo - Chair

1. No Report

E. Water & Sewer, Trustee Umans - Chair

1. 2023 Water Utility & Sewer Utility Budgets

F. Streets & Highways, Trustee Stanek - Chair

1. No Report

XIII. Public Comments

XIV. Other Items for Discussion, Consideration, or Action

XV. Adjournment

Requests from persons with disabilities, who need assistance to participate in this meeting or hearing, should be made to the Village Clerk's office in advance so the appropriate accommodations can be made.

Posted: 11/18/2023 5:00 PM

VILLAGE OF WILLIAMS BAY

250 Williams Street | PO Box 580 | Williams Bay | WI | 53191 | williamsbay.org
Phone: 262-245-2700

UNOFFICIAL MINUTES
VILLAGE BOARD 11/07/22 MEETING
MONDAY, NOVEMBER 7, 2022 AT 6:30 PM

I. Call to Order

President Duncan called the meeting to order at 6:30pm.

II. Roll Call

Present: Bill Duncan, Jim D'Alessandro, Lowell Wright, Robert Umans
Also Present: Administrator Tobin, Treasurer Peternell, Police Chief Timm, Director of Public Works Edwards and Larry Larkin; Geneva Lake Level Corporation
Excused: Matt Stanek, George Vlach, Adam Jaramillo

III. Pledge of Allegiance

IV. Minutes

A. Village Board Meeting Minutes of October 17, 2022

The motion to Approve the Village Board Meeting Minutes of October 17, 2022 with corrections of the candidate name and race under Public Comments was initiated by Robert Umans and seconded by Lowell Wright. Unanimously carried.

V. Consent Agenda

The motion to Approve the Consent Agenda was initiated by Lowell Wright and seconded by Robert Umans. Unanimously carried.

A. Marra Memorial Bench Application

B. Schaffer Memorial Bench Application

VI. Presentation of accounts and petitions

A. Payroll ending 10-21-2022 in the amount of $47,177.75

The motion to Approve the Payroll ending 10-21-2022 in the amount of $47,177.75 was initiated by Lowell Wright and seconded by Robert Umans. Unanimously carried.

B. Library Accounts Payable dated 10-17-2022 in the amount of $4,302.31

The motion to Approve the Library Accounts Payable dated 10-17-2022 in the amount of $4,302.31 was initiated by Lowell Wright and seconded by Robert Umans. Unanimously carried.

C. Library Accounts Payable dated 10-25-2022 in the amount of $348.51

The motion to Approve the Library Accounts Payable dated 10-25-2022 in the amount of $348.51 was initiated by Lowell Wright and seconded by Robert Umans. Unanimously carried.

D. Accounts Payable Prepaids dated 10-31-2022 in the amount of $985.42

The motion to Approve the Accounts Payable Prepaids dated 10-31-2022 in the amount of $985.42 was initiated by

Lowell Wright and seconded by Robert Umans. Unanimously carried.

E. Accounts Payable Unpaids dated 11-4-2022 in the amount of $145662.92

The motion to Approve the Accounts Payable Unpaids dated 11-4-2022 in the amount of $145662.92 was initiated by Lowell Wright and seconded by Robert Umans. Unanimously carried.

F. October EFT Payments in the amount of $81,310.37

The motion to Approve the October EFT Payments in the amount of $81,310.37 was initiated by Lowell Wright and seconded by Robert Umans. Unanimously carried.

G. Month end Financial Statements

The motion to Approve the Month end Financial Statements was initiated by Lowell Wright and seconded by Robert Umans. Unanimously carried.

VII. Plan Commission

A. None

VIII. Joint Extraterritorial Zoning Committee: pursuant to section 18.171F(A)

A. None

IX. PUBLIC COMMENTS

X. President's Remarks

B. Geneva Lake Dam Repairs

Larry Larkin was present to discuss the Geneva Lake Dam repairs that are expected to be completed towards the end of 2023. Engineering estimates are $365,000 and, based on the Intergovernmental agreement, the Village's portion would be $65,700. D'Alessandro requested that a study be done to determine what stakeholders benefit from the dam, to determine who else should be paying for future repairs and/or new dam. Larkin stated that he contacted Ayers & Associates and was provided an estimate of $100,000 to do a study to get the information requested. Larkin stated they are actively pursuing donations and grants to help with repair costs. D'Alessandro stated that Lake Geneva's attorney has written a legal opinion on potentially utilizing room tax for structures that promote tourism.

XI. Ordinances and Resolutions

A. Second Reading - Ordinance 2022-14 Fishing Tournaments

The motion to Approve the Second Reading - Ordinance 2022-14 Fishing Tournaments was initiated by Lowell Wright and seconded by Robert Umans. Unanimously carried.

B. Adopt Ordinance 2022-14 Fishing Tournaments

The motion to Approve the Adopt Ordinance 2022-14 Fishing Tournaments was initiated by Lowell Wright and seconded by Robert Umans. Unanimously carried.

C. Resolution R-29-22 Intent to Reimburse from Safe Drinking Water Fund Loan

The motion to Approve the Resolution R-29-22 Intent to Reimburse from Safe Drinking Water Fund Loan was initiated by Robert Umans and seconded by Lowell Wright. Unanimously carried.

XII. Committee Reports

A. Finance & Personnel, Trustee Wright - Chair

1. No Report

B. Protective Services, Trustee Vlach - Chair

1. Original, Renewal, or Temporary Operator License Applications

The motion to Approve the following Original Operator License Applications was initiated by Robert Umans and seconded by Jim D'Alessandro. Unanimously carried.

Kaitlyn Kraayeveld 231 N Third Street Darien, WI 53114 Big Bay LLC PASS
Steven Bray Clark N1754 Linn Road Lake Geneva, WI 53147 Big Bay LLC PASS
Dianne Watson 670 Southwind Drive Apt. 207 Lake Geneva, WI 53147 Green Grocer PASS
Jamie Sitter N2383 Shore View Drive Lake Geneva, WI 53147 Café Calamari/Harpoon Willies PASS
Tetyana Hynd P.O. Box 252 Williams Bay, WI 53191 Big Bay (Café Calamari) PASS

C. Parks & Lakefront, Trustee D'Alessandro - Chair

1. No Report

D. Building, Zoning, & Ordinance, Trustee Jaramillo - Chair

1. No Report

E. Water & Sewer, Trustee Umans - Chair

1. No Report

F. Streets & Highways, Trustee Stanek - Chair

1. No Report

XIII. Public Comments

XIV. Other Items for Discussion, Consideration, or Action

A. Update on EMS Referendum Marketing

Tobin stated that all items have been completed.

C. Williams Bay Domain Name Change

Tobin stated that the State of Wisconsin has required municipalities to change their domains because .org is not as secure as.gov domains. The Village received a $600 grant for expenses related to conversion.

D. GLEA Aquatic Invasive Species Control Grant

Umans discussed GLEA's intent to apply for an Aquatic Invasive Control Grant in the amount of $12,500 for their Clean Water, Clean Boat initiative. They would be replacing the current equipment that they are not able to utilize at all launches due to the size of the equipment. GLEA would also need the Village to designate a spot to store the equipment year round. Wright requested an agreement be provided stating what GLEA will be responsible for and the Village will decide where the equipment will be stored.

The motion to Approve President Duncan signing a letter of support for the GLEA Aquatic Invasive Species Control Grant was initiated by Jim D'Alessandro and seconded by Robert Umans. Unanimously carried.

XV. Adjournment

The motion to adjourn was initiated by Jim D'Alessandro and seconded by Robert Umans at 7:34pm. Unanimously carried.

/s/ Lori Peternell, Village Treasurer

Hi Chief and Becky,

I'm sending this to both of you so that you'll both be able to look at these quotes when you have time.

I've configured the radios for Williams Bay per your specifications. All the radios can be upgraded in the future if you'd like to add more frequency bands.

These quotes are good through December 15th, 2022. After that date, the extra discounting (see quotes) will be void and the manufacturer may raise their prices. Keep in mind that if you place an order today, you don't pay today. You pay when the radios are delivered. And....you designate the delivery date. Deliver date can be immediately, it can also be in springtime of the year 2024 when the radio system goes "live", or anywhere in-between. As long as the quotes are signed before December 15th and in my possession (which I will confirm with you), you'll get all the discounts.

I apologize that it took a few weeks to get these in your hands. Every municipality is having me build custom quotes to their needs.

Scott W. Smith
Radicom Wisconsin Manager
12130 W Carmen Ave.
Milwaukee Wisconsin 53225

Radicom
Business Communications Systems
2604 N Chapel Hill Rd, McHenry, IL 60051
WWW.RADICOM.COM | 815-385-4224

SALES QUOTE

Sales Quote No: DQM1279
Date: 10/24/2022
Account No: 11987
Sale Rep: Scott Smith

Bill To: Williams Bay Police Dept
65 Geneva Street
Williams Bay, WI 53191

Ship To: Williams Bay Police Dept
65 Geneva Street
Williams Bay, WI 53191

Project: XL-200 portable single band - upgradable

REMARKS
Radio is customized for Williams Bay police. This radio can be upgraded in the future into a multi-band radio for an additional cost. ***NOTE***...this quote expires on December 15th, 2022. There is no charge for reprogramming to the new P25 radio system if the radio is purchased prior to December 15th, 2022. Radios will be invoiced upon delivery. Williams Bay will set the delivery date/year. Due to ongoing chain supply and cost increases from manufacturers, there may be future price changes from the manufacturer after December 15th, 2022.

ITEM	DESCRIPTION	QTY	UNIT PRICE	AMOUNT
	Radio			
XL-PPM1M-NA	L3 PORTABLE, XL-200P, PKP, BLK, US, NA	10	$2,945.00	$29,450.00
XL-PL4L	Harris Feature, 700/800 Band, 764-862 mHz	10	$0.01	$0.10
XL-NC8D	L3 Harris ANTENNA, WHIP, 1/2 WAVE 762-870 MHZ	10	$45.00	$450.00
XL-PKGPT	Harris Feature Package, P25 Trunking	10	$1,600.00	$16,000.00
XL-PL4U	Harris Feature, Single Key DES, Encryption	10	$0.01	$0.10
XL-PL9E	Harris, feature, single-key AES encryption	10	$0.01	$0.10
XL-PL8Y	Harris Encryption Feature Lite for XL-200P	10	$0.01	$0.10
XL-FW2X	Harris Operation, Load NIFOG Personality	10	$0.01	$0.10
XL-PL4F	Harris Feature, P25 Phase 2 TDMA	10	$250.00	$2,500.00
XL-PA4K	L3Harris Battery, Li-Ion, Hi-Capacity 4800 mAh, XL-200P	10	$175.00	$1,750.00
XL-CH6A	L3 Harris Charger, 1-Bay	10	$180.00	$1,800.00
XL-AE4B	Harris Storm speaker Microphone, XL-200P, Emergency Button	10	$225.00	$2,250.00
XL-HC3L	Harris Belt Clip, Metal	10	$30.00	$300.00
	Discounts			
Discount	Walworth County Discount	10	($1,437.45)	($14,374.50)
Discount	Special 2022 discount if purchased before December 15th, 2022	10	($250.00)	($2,500.00)
	Labor – Non-Discountable			
LABOR-PROGR-EA	Labor Programming Radio -Each Unit	10	$45.00	$450.00

LABORSERV-MCH	Labor - radio template building	1	$750.00	$750.00

Quote Expires: 12/15/2022

SUBTOTAL	$38,826.00
TAX	$0.00
TOTAL	**$38,826.00**

Returns & exchanges are accepted within 30 days of purchase and require an RMA Number. Items must be in unused condition and in original packaging. Special order items are non-returnable and may not be canceled once shipped from vendor.

Unless otherwise specified, shipping and handling charges are not included and will be added to the associated invoice.

Quote Accepted By:_____ Date:_____

Radicom
Business Communications Systems

2604 N Chapel Hill Rd, McHenry, IL 60051
WWW.RADICOM.COM | 815-385-4224

SALES QUOTE

Sales Quote No: DQM1280
Date: 10/24/2022
Account No: 11987
Sale Rep: Scott Smith

Bill To: Williams Bay Police Dept
65 Geneva Street
Williams Bay, WI 53191

Ship To: Williams Bay Police Dept
65 Geneva Street
Williams Bay, WI 53191

Project: XL-200 Police Mobile - Single Band - upgradable

REMARKS
Radio is customized for Williams Bay police. This radio can be upgraded in the future into a multi-band radio for an additional cost. ***NOTE***...this quote expires on December 15th, 2022. There is no charge for reprogramming to the new P25 radio system if the radio is purchased prior to December 15th, 2022. Radios will be invoiced upon delivery. Williams Bay will set the delivery date/year. Due to ongoing chain supply and cost increases from manufacturers, there may be future price changes from the manufacturer after December 15th, 2022.

ITEM	DESCRIPTION	QTY	UNIT PRICE	AMOUNT
	Mobile Radios			
XZ-MPM1M-NA	L3 Harris Mobil XL-200M, Multiband, LTE, NA	3	$3,815.00	$11,445.00
XZ-PL4L	Harris Feature, 700/800 MHZ Band	3	$550.00	$1,650.00
XZ-AN8D	L3 Harris ANTENNA, ELEMENT, 700/800, 3DB	3	$100.00	$300.00
XZ-AN6U	Harris Antenna, Base, STD Roof Mount Low Loss	3	$80.00	$240.00
XZ-PKGPT	Harris Feature Package, P25 Trunking	3	$1,600.00	$4,800.00
XZ-PL4F	Harris Feature, Phase 2 TDMA	3	$250.00	$750.00
XZ-PL4U	Harris Featire, XL200M Single Key DES Encryption	3	$0.01	$0.03
XZ-PL8Y	Harris Feature, Encryption Lite	3	$0.01	$0.03
XZ-PL9E	Harris Feature, XL200M Single Key AES Encryption	3	$0.01	$0.03
XZ-CP6A	Harris Control Unit, XL-CH	3	$1,650.00	$4,950.00
XZ-MC6A	Harris Microphone, XL, Standard Mobile (14050-6010-01)	3	$105.00	$315.00
XZ-MA4A	Harris Kit, Mounting XL-Mobile Universal	3	$600.00	$1,800.00
	Discounts			
Discount	Walworth County Discount	3	($2,187.50)	($6,562.50)
Discount	Special 2022 discount if purchased before December 15th, 2022	3	($400.00)	($1,200.00)
	Labor and Installation – Non-Discountable			
LABOR-PROGR-EA	Labor Programming Radio -Each Unit	3	$45.00	$135.00
LABORSERV-MCH	Labor - radio template building	1	$750.00	$750.00

LABORINSTALL	Installation Labor Dash Mount radio including optional removal of old radio	3	$250.00	$750.00
MobZone6	Mobilization 6	1	$185.00	$185.00

Quote Expires: 12/15/2022

SUBTOTAL	$20,307.59
TAX	$0.00
TOTAL	**$20,307.59**

Returns & exchanges are accepted within 30 days of purchase and require an RMA Number. Items must be in unused condition and in original packaging. Special order items are non-returnable and may not be canceled once shipped from vendor.

Unless otherwise specified, shipping and handling charges are not included and will be added to the associated invoice.

Quote Accepted By:_____ Date:_____

Radicom
Business Communications Systems

2604 N Chapel Hill Rd, McHenry, IL 60051
WWW.RADICOM.COM | 815-385-4224

SALES QUOTE

Sales Quote No: DQM1283
Date: 10/26/2022
Account No: 11987
Sale Rep: Scott Smith

Bill To: Williams Bay Police Dept
65 Geneva Street
Williams Bay, WI 53191

Ship To: Williams Bay Police Dept
65 Geneva Street
Williams Bay, WI 53191

Project: Mobile Dual Head Multiband Fire Radio

REMARKS

Radio is customized for Williams Bay police/rescue as a dual-band 700/800-VHF radio for Walworth County and MABAS

This radio can be upgraded in the future into a tri-band radio (adding UHF) for an additional cost.

NOTE...this quote expires on December 15th, 2022.

There is no charge for reprogramming to the new P25 radio system if the radio is purchased prior to December 15th, 2022.

Radios will be invoiced upon delivery. Williams Bay will set the delivery date/year.

Due to ongoing chain supply and cost increases from manufacturers, there may be future price changes from the manufacturer after December 15th, 2022.

Installation is not included on this quote

ITEM	DESCRIPTION	QTY	UNIT PRICE	AMOUNT
	Radio			
XZ-MPM1M	Harris Mobile, XL-200M Multiband	1	$3,815.00	$3,815.00
XZ-PL4J	Harris Feature, VHF Band	1	$550.00	$550.00
XZ-PL4L	Harris Feature, 700/800 MHZ Band	1	$550.00	$550.00
XZ-AN8A	Harris Antenna, Element, Flexible, V/U/700/800	1	$210.00	$210.00
XZ-AN6U	Harris Antenna, Base, STD Roof Mount Low Loss	1	$80.00	$80.00
XZ-PKGPT	Harris Feature Package, P25 Trunking	1	$1,600.00	$1,600.00
XZ-PL4U	Harris Featire, XL200M Single Key DES Encryption	1	$0.01	$0.01
XZ-PL9E	Harris Feature, XL200M Single Key AES Encryption	1	$0.01	$0.01
XZ-PL8Y	Harris Feature, Encryption Lite	1	$0.01	$0.01
XZ-PL4F	Harris Feature, Phase 2 TDMA	1	$250.00	$250.00
	Dual Control Head components			
XZ-CP6A	Harris Control Unit, XL-CH	2	$1,650.00	$3,300.00
XZ-MC6A	Harris Microphone, XL, Standard Mobile (14050-6010-01)	2	$105.00	$210.00
XZ-MA4A	Harris Kit, Mounting XL-Mobile Universal	2	$600.00	$1,200.00
XZ-LS6A	Harris Speaker External Mobile	2	$60.00	$120.00
XZ-CA6F	L3 Harris Cable, XL Mobile, Speaker Accy	2	$222.00	$444.00

	Discounts			
Discount	Walworth County Discount	1	($3,082.25)	($3,082.25)
Discount	Special 2022 discount if purchased before December 15th, 2022	1	($400.00)	($400.00)
	Programming			
LABORSERV-MCH	Labor Multi-Band template development	1	$750.00	$750.00
LABOR-PROGR-EA	Labor Programming Radio -Each Unit	1	$45.00	$45.00

Quote Expires: 12/15/2022

SUBTOTAL	$9,641.78
TAX	$0.00
TOTAL	**$9,641.78**

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Unless otherwise specified, shipping and handling charges are not included and will be added to the associated invoice.

Quote Accepted By:_____ Date:_____

Radicom
Business Communications Systems

2604 N Chapel Hill Rd, McHenry, IL 60051
WWW.RADICOM.COM | 815-385-4224

SALES QUOTE

Sales Quote No: DQM1282
Date: 10/25/2022
Account No: 11987
Sale Rep: Scott Smith

Bill To: Williams Bay Police Dept
65 Geneva Street
Williams Bay, WI 53191

Ship To: Williams Bay Police Dept
65 Geneva Street
Williams Bay, WI 53191

Project: XL-200 Control Station and installation

REMARKS
Radio is customized for Williams Bay police.
This radio can be upgraded in the future into a multi-band radio for an additional cost.
NOTE...this quote expires on December 15th, 2022.
There is no charge for reprogramming to the new P25 radio system if the radio is purchased prior to December 15th, 2022.
Radios will be invoiced upon delivery. Williams Bay will set the delivery date/year.
Due to ongoing chain supply and cost increases from manufacturers, there may be future price changes from the manufacturer after December 15th, 2022.
NOTE: a small magnetic mount antenna is part of this package. The mag-mount antenna will be mounted above the ceiling. If there are any radio reception/propagation issues, an full antenna system would need to be quoted separately for this control station.
This quote does not contain a programming template charge. The same programming template would be used from the mobile squad radios.

ITEM	DESCRIPTION	QTY	UNIT PRICE	AMOUNT
	Radio and Control Station Components			
XZ-MPM1M-NA	L3 Harris Mobil XL-200M, Multiband, LTE, NA	1	$3,815.00	$3,815.00
XZ-PL4L	Harris Feature, 700/800 MHZ Band	1	$550.00	$550.00
XZ-AN8D	L3 Harris ANTENNA, ELEMENT, 700/800, 3DB	1	$100.00	$100.00
G	PCTEL PL259 - installed RG58A/U 12 ft Magnetic Mount	1	$44.81	$44.81
XZ-PKGPT	Harris Feature Package, P25 Trunking	1	$1,600.00	$1,600.00
XZ-PL4U	Harris Featire, XL200M Single Key DES Encryption	1	$0.01	$0.01
XZ-PL9E	Harris Feature, XL200M Single Key AES Encryption	1	$0.01	$0.01
XZ-PL8Y	Harris Feature, Encryption Lite	1	$0.01	$0.01
XZ-PL4F	Harris Feature, Phase 2 TDMA	1	$250.00	$250.00
XZ-CP6A	Harris Control Unit, XL-CH	1	$1,650.00	$1,650.00
XZ-MA4C	Harris Bracket Mounting, XL Control Head	1	$68.00	$68.00
XZ-CA6L	L3 Harris CABINET, XL DESKTOP Includes desktop cabinet and power supply.	1	$650.00	$650.00
XZ-CA6M	Harris CABLE, XL DESKTOP, ACCESSORY	1	$250.00	$250.00
XZ-MC6C	L3Harris XL-200M Desk Mic, XL-Mobile, Desktop	1	$245.00	$245.00
XZ-CA6R	L3 Harris CABLE, POWER, Y-SPLIT, DESKTOP	1	$175.00	$175.00

XZ-LS6A	Harris Speaker External Mobile	1	$60.00	$60.00
XZ-CA6F	L3 Harris Cable, XL Mobile, Speaker Accy	1	$222.00	$222.00
XZ-CA6A	Harris CABLE, XL-MOBILE, ETHERNET, 45CM	1	$16.00	$16.00
	Discounts			
Discount	Walworth County Discount	1	($2,423.96)	($2,423.96)
Discount	Special 2022 discount if purchased before December 15th, 2022	1	($400.00)	($400.00)
	Programming			
LABOR-PROGR-EA	Labor Programming Radio -Each Unit	1	$45.00	$45.00
	Installation			
LABORSERV-MCH	Control Station installation labor	2	$125.00	$250.00
MobZone6	Mobilization 6	1	$185.00	$185.00

Quote Expires: 12/15/2022

SUBTOTAL	$7,351.88
TAX	$0.00
TOTAL	**$7,351.88**

Returns & exchanges are accepted within 30 days of purchase and require an RMA Number. Items must be in unused condition and in original packaging. Special order items are non-returnable and may not be canceled once shipped from vendor.

Unless otherwise specified, shipping and handling charges are not included and will be added to the associated invoice.

Quote Accepted By:_____ Date:_____

Police Radios

Single Band Portable Radios	10	$38,826.00
Single Band Mobile Radios	3	$20,307.59
Control Station	1	$7,351.88
Total		**$66,485.47**

Dual Band Mobile Radio	1	$9,641.78

*This radio is for the Emergency Management Vehicle and has already been calculated into the total cost of the vehicle.

Radicom
Business Communications Systems

2604 N Chapel Hill Rd, McHenry, IL 60051
WWW.RADICOM.COM | 815-385-4224

SALES QUOTE

Sales Quote No: DQM1319
Date: 11/11/2022
Account No: 11031
Sale Rep: Scott Smith

Bill To: Williams Bay Fire Dept
5 E Geneva St
Williams Bay, WI 53191

Ship To: Williams Bay Fire Dept
5 E Geneva St
Williams Bay, WI 53191

Project: XL-200 Fire Mobile Dual-Band

REMARKS
Radio is customized for Williams Bay Fire as a dual-band radio for Walworth County. ***NOTE***...this quote expires on December 15th, 2022. There is no charge for reprogramming to the new P25 radio system if the radio is purchased prior to December 15th, 2022. Radios will be invoiced upon delivery. Williams Bay will set the delivery date/year. Due to ongoing chain supply and cost increases from manufacturers, there may be future price changes from the manufacturer after December 15th, 2022.

ITEM	DESCRIPTION	QTY	UNIT PRICE	AMOUNT
	Radio			
XZ-MPM1M	Harris Mobile, XL-200M Multiband	7	$3,815.00	$26,705.00
XZ-PL4J	Harris Feature, VHF Band	7	$550.00	$3,850.00
XZ-PL4L	Harris Feature, 700/800 MHZ Band	7	$550.00	$3,850.00
NMO150/450/758	Pulse Larsen Antenna, Tri-band, 150&450&748MHz, NMO	7	$88.64	$620.48
XZ-AN6U	Harris Antenna, Base, STD Roof Mount Low Loss	5	$80.00	$400.00
XZ-AN6W	Antenna Base, Thick Roof Mount Low Loss	2	$85.00	$170.00
XZ-PKGPT	Harris Feature Package, P25 Trunking	7	$1,600.00	$11,200.00
XZ-PL4U	Harris Featire, XL200M Single Key DES Encryption	7	$0.01	$0.07
XZ-PL9E	Harris Feature, XL200M Single Key AES Encryption	7	$0.01	$0.07
XZ-PL8Y	Harris Feature, Encryption Lite	7	$0.01	$0.07
XZ-PL4F	Harris Feature, Phase 2 TDMA	7	$250.00	$1,750.00
XZ-CP6A	Harris Control Unit, XL-CH	7	$1,650.00	$11,550.00
XZ-MC6A	Harris Microphone, XL, Standard Mobile (14050-6010-01)	7	$105.00	$735.00
XZ-MA4A	Harris Kit, Mounting XL-Mobile Universal	7	$600.00	$4,200.00
XZ-LS6A	Harris Speaker External Mobile	7	$60.00	$420.00
XZ-CA6F	L3 Harris Cable, XL Mobile, Speaker Accy	7	$222.00	$1,554.00
	Discounts			
Discount	Walworth County Discount	7	($2,386.30)	($16,704.10)
Discount	Special 2022 discount if purchased before December 15th, 2022	7	($400.00)	($2,800.00)

	Programming			
LABORSERV-MCH	Programming Template Development	1	$750.00	$750.00
LABOR-PROGR-EA	Labor Programming Radio -Each Unit	7	$45.00	$315.00
	Installation			
LABORSERV-MCH	Installation Labor for Apparatus	3	$695.00	$2,085.00
LABORSERV-MCH	Installation Labor for standard vehicle	4	$450.00	$1,800.00
MobZone6	Mobilization 6	4	$185.00	$740.00

Quote Expires: 12/15/2022

SUBTOTAL	$53,190.59
TAX	$0.00
TOTAL	**$53,190.59**

Returns & exchanges are accepted within 30 days of purchase and require an RMA Number. Items must be in unused condition and in original packaging. Special order items are non-returnable and may not be canceled once shipped from vendor.

Unless otherwise specified, shipping and handling charges are not included and will be added to the associated invoice.

Quote Accepted By:_____ Date:_____

Radicom
Business Communications Systems

2604 N Chapel Hill Rd, McHenry, IL 60051
WWW.RADICOM.COM | 815-385-4224

SALES QUOTE

Sales Quote No: DQM1320
Date: 11/11/2022
Account No: 11031
Sale Rep: Scott Smith

Bill To: Williams Bay Fire Dept
5 E Geneva St
Williams Bay, WI 53191

Ship To: Williams Bay Fire Dept
5 E Geneva St
Williams Bay, WI 53191

Project: XL-200 Fire Portable dual band

REMARKS
Radio is customized for Williams Bay Fire as a dual-band radio for Walworth County.
NOTE...this quote expires on December 15th, 2022.
There is no charge for reprogramming to the new P25 radio system if the radio is purchased prior to December 15th, 2022.
Radios will be invoiced upon delivery. Williams Bay will set the delivery date/year.
Due to ongoing chain supply and cost increases from manufacturers, there may be future price changes from the manufacturer after December 15th, 2022.

ITEM	DESCRIPTION	QTY	UNIT PRICE	AMOUNT
	Radio			
XL-PPM1P-NA	L3 Harris PORTABLE,XL-200P,PKP,PGRN,US,NA	10	$2,945.00	$29,450.00
XL-PKGF3	Harris Feature Package, Dual Band VHF 7/800	10	$1,100.00	$11,000.00
XL-NC5Z	Harris Antenna, Flex, Helical, 136-870 MHz	10	$110.00	$1,100.00
XL-PKGMR	Harris XL-200 Immersible Radio Operation	10	$250.00	$2,500.00
XL-PKGPT	Harris Feature Package, P25 Trunking	10	$1,600.00	$16,000.00
XL-PA4L	L3 Harris BATT, LION, 4800, HI-CAP, HAZLOC RADIO C1D2	10	$260.00	$2,600.00
XL-PL4U	Harris Feature, Single Key DES, Encryption	10	$0.01	$0.10
XL-PL9E	Harris, feature, single-key AES encryption	10	$0.01	$0.10
XL-PL8Y	Harris Encryption Feature Lite for XL-200P	10	$0.01	$0.10
XL-FW2X	Harris Operation, Load NIFOG Personality	10	$0.01	$0.10
XL-PL4F	Harris Feature, P25 Phase 2 TDMA	10	$250.00	$2,500.00
XL-CH6A	L3 Harris Charger, 1-Bay	10	$200.00	$2,000.00
XL-AE2W	Harris Speaker Mic, 500F, XL-200P	10	$399.00	$3,990.00
XL-HC3L	Harris Belt Clip, Metal	10	$30.00	$300.00
14035-1948-30	Harris KIT,GLOVE FRIENDLY KNOB COVER-VOL	10	$25.00	$250.00
XL-PA4M	Harris Li-Ion, Hi Capacity 4800 mAh, C1D2, **Spare**, Does not produce a HazLoc radio	10	$205.00	$2,050.00
	Discounts			
Discount	Walworth County Discount	10	($1,792.26)	($17,922.60)
Discount	Special 2022 discount if purchased before December 15th, 2022	10	($250.00)	($2,500.00)

	Programming			
LABORSERV-MCH	Programming template development dual band	1	$750.00	$750.00
LABOR-PROGR-EA	Labor Programming Radio -Each Unit	10	$45.00	$450.00

Quote Expires: 12/15/2022

SUBTOTAL	$54,517.80
TAX	$0.00
TOTAL	**$54,517.80**

Returns & exchanges are accepted within 30 days of purchase and require an RMA Number. Items must be in unused condition and in original packaging. Special order items are non-returnable and may not be canceled once shipped from vendor.

Unless otherwise specified, shipping and handling charges are not included and will be added to the associated invoice.

Quote Accepted By:_____ Date:_____

Fire Radios

Dual Band Portable Radios Fire	10	$54,517.80
Dual Band Mobile Radios Fire	7	$53,190.59
Total		**$107,708.39**

Hi Becky and Tom

Thank you for taking the time to see me last week, and allowing me to discuss our water quality/environmental student project with you both.

It was decided at the meeting that I should send you a brief outline, which could be sent on for further consideration.

The variance request is for the duration of one year.

Outline:

This is a Science, Technology, Engineering and Math (STEM) project and we are seeking to place a floating sensor housing in Williams Bay, which can be tethered to an existing buoy.

The sensor housing, sensor systems, and analytics, will all be designed, built, and configured by students. We anticipate that half the project effort will be spent on understanding the problems, making prototype units, and testing sensors out in the field. The other half will be understanding the environmental challenges such as the impact of algae and weeds growing on sensors, weather challenges, the frequency of cleaning and level of maintenance required.

The outcomes/deliverables of the project will be:

Demonstration of the working prototype.
Report back on our findings (what worked, what didn't, the lessons learned, the skills learned, and any recommendations for future improvements).
Outreach educational materials to create the awareness of the importance of water quality, which will be used at public events.
Public presentations at local libraries around the lake.

We would prefer that the sensor buoy be attached to the last swim buoy on the East side Williams Bay (if at all possible).
Students will use a kayak rented from the Village, and paddle around the swim area, to the last buoy. Retrieve the tethered sensor housing and paddle it to shore, where cleaning, updating, and data retrieval will take place.
Sensors will measure the following:
Temperature of the water (at various depths).
Ambient air temperature.
Turbidity.
Wind speed.
Total dissolved solids.
Analog ph sensor.
Boat wake monitoring and/or regular wave monitoring. This is a challenge activity which requires students to utilize their STEM education :)

Skills that students will learn are real world practical design of systems, programming, capturing data, analyzing data, and reporting findings.

I am very happy to answer any questions, or meet and discuss this project with any parties that would like to know more about it.

Many thanks
Kind regards

Chris Kirby

--
Geneva Lake Astrophysics and STEAM

DRAFT

VILLAGE OF WILLIAMS BAY
Corrosion Control Study and Ammonia Reduction Action Plan
Engineer's Report
November 16, 2022

Background and Purpose

- The Village is required to provide a final report optimizing copper corrosion control in the water system no later than December 30, 2022. The final report will consist of this engineer's report, a Corrosion Control Desktop Study with Test Results (Study) dated November 11, 2022, prepared by Andy Jacque PhD, PE, at Water Quality Investigations, Inc. (WQI)
- The Study concludes that the copper corrosion in the water system is caused by an elevated amount of ammonia present in the source water. The last page of this engineer's report is a sketch showing the 3 distribution system sampling sites used in the Study.

Recommended Plan

- The recommended plan is to add chlorine within the water treatment plant to convert the ammonia to nitrogen gas and to modify the existing operations, so water flows systematically through the distribution system to gain better control of the water age and allow for the future removal of the older water towers in the low zone. This plan will require an addition to the existing chlorine room and replacement of the non-compliant service booster pumps at the water plant. The Village filed an Intent to Apply filed through the Safe Drinking Water Loan Program.
- Two projects were placed on hold pending the Study findings due to the possibility of more extensive water treatment modifications, including replacement of the pump in Well 2 and cleaning of the lime reactor. Both projects should resume immediately so they can be done by Memorial Day of 2023.

Water System Information for the WQI Study
System Overview

The Village of Williams Bay's water system consists of three wells, one centrally located water treatment plant, four elevated storage tanks, and over 30 miles of water main. The water system currently provides approximately 0.33 MGD of water on an average day to nearly 3,000 residents. This volume of water supply increases to nearly 0.65 MGD during summer months.

Water Supply

The Village's well supply comes from a mixture of deep sandstone and shallow sand and gravel aquifers. The availability and capacity for sand and gravel wells is strongly dependent on where you drill the well, as the sand and gravel aquifer locations and aquifer formations are extremely variable. In contrast, it is possible to drill a deep well at virtually any location in Williams Bay.

Aquifer Source and Well Capacities

Well No.	Aquifer Source	Well Depth (feet)	Current Capacity (GPM)
1	Sand and Gravel	255	500
2	Sand and Gravel	293	500
3	Deep Sandstone	1,515	1,000
Total			**2,000**

BAXTER & WOODMAN Consulting Engineers

The Wisconsin Department of Natural Resources (WDNR) looks at firm well capacity when evaluating the availability of water supply to meet expected maximum day demand. Firm well capacity is the resulting capacity when the largest well is assumed to be out of service. For Williams Bay, the largest well is Well No. 3 with a capacity of 1,000 gpm. This leaves 1,000 gpm, or 1.44 MGD, available as raw water supply without considering combined water treatment backwashing and distribution flushing.

Well Capacity Original vs. Current

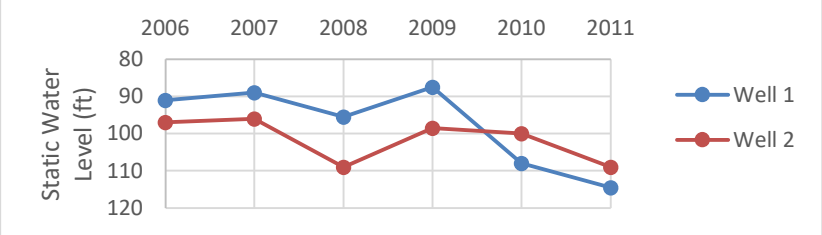
Well No.*	Year Constructed	Original Design Capacity (gpm)	Current Capacity (gpm)
1	1930	800	500
2	1951	800	500
3	1998	1,150	1,000
Total Well Capacity		2,750	2,000
Firm Well Capacity		1,600	1,000

The table and exhibit below show the static water levels at Wells 1 and 2. In 2014 the new submersible pump was installed at Well No. 1 and a Variable Frequency Drive (VFD) was installed on the pump. Well No. 1 was designed to produce 500 GPM when operated alone or with Well No. 2 and 200 GPM when run with Well No. 3. Well No. 2 should undergo the same modification as Well No. 1 soon.

Static Water Levels (ft)

Year	Well 1	Well 2
2006	91	97
2007	89	96
2008	92-99	103-115
2009	85-90	95-102
2010	106-110	98-102
2011	113-116	106-112

Static Water Level



Water Treatment Facility

The Village of Williams Bay's water treatment plant is located along Elkhorn Road approximately 800 feet north of Geneva Street; the plant was originally constructed in 1930. Additions and modifications were made to the facility in 1951, 1984, and 1986. The treatment plant utilizes lime and alum for treatment of the raw water. The plant is started up and operated once per day (batch process). The run time necessary to provide the average day demand is approximately five hours. The Village's goal for the treatment facility is to operate a maximum of 16 hours per day.

Aerator

Raw water is pumped from the wells to an aluminum, induced draft aerator that is located on top of the recarbonation tank. The aerator is sized to handle a throughput of 800 gpm to 1,400 gpm. The aerator is furnished with a 4,900 cubic foot per minute blower and has sufficient capacity to: (1) reduce the free carbon dioxide concentration, (2) eliminate the hydrogen sulfide odor, and (3) oxidize most of the of iron in the raw water.

Eliminating the hydrogen sulfide and oxidizing the iron improve the taste and remove the odor from the raw water. The carbon dioxide concentration is reduced so that less lime is needed in the downstream lime softening reactor to raise the pH of the water. In the lime softening process it is necessary to raise the pH in the reactor above 10 to convert bicarbonate ions to carbonate form.

Lime Softening Reactor

Aerated water flows by gravity to the lime softening reactor. The lime softening reactor is a 134,500-gallon concrete basin. The basin contains a metal cone which separates the inner mixing and flocculating zones from the outer clarification zone. Calcium and magnesium hardness are removed by precipitation with calcium hydroxide, Ca(OH)2, which is made by slaking quicklime with water. The reaction is indicated in the following equations:

Calcium:

$$Ca^{2+} + 2HCO_3^- + CA\,(OH)_2 \rightarrow 2CaCO_3(s) + 2H_2O$$

Magnesium:

$$Mg^{2+} + 2HCO_3^- + 2Ca(OH)_2 \rightarrow 2CaCO_3(s) + Mg(OH)_2(s) + 2H_2O$$

Additional lime is required to neutralize the free carbon dioxide remaining in the water after aeration. The neutralization reaction that occurs is indicated in the following equation:

$$H_2CO_3 + Ca(OH)_2 \rightarrow CaCO_3(s) + 2H_2O$$

Alum is added to help form and settle the floc particles. This settling occurs in the clarification zone outside of the cone. The softened water is collected in the effluent launders and flows by gravity to the recarbonation basin.

The sludge level in the reactor is monitored by three sludge sample lines. The three lines draw samples from 3, 6, and 9 feet above the tank bottom. Additional monitoring of the reactor is provided by a sample line in the effluent launder. This allows a sample of treated water to be taken before recarbonation.

Recarbonation Tank

Water flows by gravity from the lime softening reactor to the recarbonation tank. The pH of the softened water leaving the reactor is typically above 10.5. The pH must be lowered to stabilize the water and to prevent deposition of hard carbonate scale on the filter sand and distribution piping. Recarbonation is used to lower the pH at the Williams Bay Water Treatment Plant.

Carbon dioxide gas is stored at the plant in a 14.5-ton bulk storage tank. The gas is mixed with water in a 1,500 lb/d Wallace & Tiernan V-Notch carbon dioxide feeder located in the Fluoride/CO2 room of the service building. The resulting mixture (carbonic acid) is pumped through 2-1/2-inch diameter piping to the effluent launder. The carbonic acid is discharged into the effluent launder just upstream of the recarbonation tank. The feed rate is adjusted automatically in response to a signal received from a continuous reading pH meter submerged in the recarbonation basin. The carbonic acid redissolves calcium carbonate and the carbonate ions are converted to bicarbonate ions as described in the following equations:

$$CaCO_3(s) + H_2O + CO_2 \leftrightarrow Ca^{2+} + 2HCO_3^-$$

$$Mg^{2+} + CO_3^{2-} + CO_2 + H_2O \leftrightarrow Mg^{2+} + 2HCO_3^-$$

The recarbonation tank is a 13,000-gallon concrete structure. The tank provides a detention time of approximately 13 minutes at the normal 1,000 gpm production rate. The pH is reduced to approximately 7.8 in the tank.

The stabilized water is treated with chlorine and fluoride as it exits the recarbonation tank. Discharge from the tank flows by gravity to the four rapid rate sand filters. The tank also includes piping which allows samples to be taken of raw water (prior to its entering the aerator), aerated water, and treated water after it has been recarbonated. A chlorine solution line in the tank provides pre-chlorination of the water before it enters the aerator.

Filters

Stabilized water from the recarbonation basin flows by gravity to four rapid rate gravity filters in the original service building. The filters remove suspended particulate material from the water through a series of mechanical and chemical interactions with the filter media.

Each of the filters are 12 feet by 12 feet, with a total surface area of 144 square feet. The filters consist of 24 inches of silica sand over 9 inches of supporting gravel. The filtration rate with all filters in service is 1.74 gpm per square foot. With one filter out of service for backwashing, the rate becomes 2.31 gpm/sq. ft. Standard design filtration rates for rapid sand filters range from 2 to 5 gpm/sq. ft. It should be noted that in 1993 the filtration rate listed previously was allowed. The filters would now be classified as a single media filter with a maximum filtration rate of 2 gpm/ sq. ft.

The filters are backwashed once per week. Assuming 5 hours/day water production, the average run time of the filters is approximately 35 hours (5 hrs./day x 7 days/wk.). Typical run times for rapid sand filters vary with influent water quality, desired finished water quality, acceptable headloss through the filter and production rate, and may range up to 42 hours in length. Backwash water is provided from a dedicated pump in the filter building (Pump No. 6) which draws water from the clearwell water transfer/ suction pipe. A rotating surface wash unit helps break up the top of the filter bed during the backwash cycle to increase cleaning efficiency.

The filters are operated by the constant rate control method with the effluent control valves automatically adjusted so that each filter treats approximately the same amount of water. The filters discharge to the two clearwells located at the treatment plant.

Sludge Thickener Tank

Sludge is collected in the lime softening reactor by two rotating collector arms. The sludge is periodically removed from the reactor to the sludge thickener tank via 3-inch diameter piping.

Sludge conveyed from the reactor is approximately 3% by weight. The sludge thickener increases the solids concentration to approximately 15% by weight. The sludge thickener tank is constructed of reinforced concrete and has a volume of approximately 45,000 gallons. Thickened sludge is pumped from the tank every two weeks and disposed of by a private contractor. Effluent from the thickener discharges to the sanitary sewer system.

Chemical Feed Systems

Liquid Chlorine:

When the water treatment plant is out of service for emergency repairs or routine maintenance, chlorination is provided from a liquid chlorine system located in the high-lift pump room of the filter building. The system uses a LMI metering pump to feed 12.5% sodium hypochlorite solution directly to the raw water as it is pumped to the clearwell. The metering pump can supply a maximum chlorine dosage of 5.4 lbs. chlorine per hour.

Fluoride (Hydrofluosilicic Acid)

Fluoride, in the form of Hydrofluosilicic Acid, is added at the discharge of the recarbonation basin. The undiluted acid solution is stored in a polyethylene tank located in the Fluoride/CO2 Room of the Service Building. The solution is pumped to the recarbonation basin by an LMI chemical feed pump. The pump is manually controlled. A scale is provided to measure chemical usage.

The chemical reaction that occurs in fluoridation is:

$$H_2SiF_6 = 2HF + SiF_4$$

$$SiF_4 + 2H_2O = 4HF + SiO_2$$

$$SiF_4 + 3H_2O = 4HF + H_2$$

Lime

Powdered lime is stored in a 2,000 cubic foot silo located east of the service building. The lime is transferred to a 16 cubic foot dry hopper located on the second floor of the service building by means of a horizontal screw conveyor. A Wallace & Tiernan helical screw type feeder conveys the powdered lime into an agitated 35-gallon steel slurry tank. The feeder is manually controlled and currently discharges at a rate of 3 gpm (approximately 340 mg/l lime). The slurry is pumped from the tank to the mixing zone of the reactor by means of a peristaltic positive displacement pump. A small hydro-pneumatic tank rides on the pump's discharge to prevent surging. Chemical usage is determined by collection of the powdered lime from the screw feeder in a bucket, comparing the weight of the collected lime to the time necessary for collection and multiplying by the time of daily plant operation.

Alum

Granular aluminum sulfate (Alum) is stored in 50-pound sacks on the second floor of the service building. The alum is manually fed into a 17.4 cubic foot per day hopper in the second-floor room. A Wallace & Tiernan helical screw type feeder conveys the alum to an agitated 35-gallon steel slurry tank. The feeder is manually controlled and currently discharges at a rate of 3 gpm (approximately 16 mg/l alum). The slurry is pumped from the tank to the mixing zone of the reactor by means of a peristaltic positive displacement pump. A small hydro-pneumatic tank rides on the pump's discharge to prevent surging. Chemical usage is measured in a manner like lime.

Plant operations personnel have experienced problems with the alum feed system. The problems are like that described previously for lime.

Service Pump Station

The Village of Williams Bay utilizes five pumps to send the water throughout the high and low pressure zones as well as the four storage towers. The pumps take the water from the clearwells, where it is stored after it has gone through the treatment process, and send it throughout the distribution system. The area the pumps serve as well as their pumping capacities are listed in the table below. Pump No. 2 has the capability to serve either the low or high pressure zone, in Table 15, pump No. 2 was assumed to be serving the Low pressure zone.

High Service Pump Capacities

Service Area	Pump	HSP Design Capacities(gpm)
High Pressure Zone	Pump No. 1	1,100
Low Pressure Zone	Pump No. 5	720
	Pump No. 3	1,000
	Pump No. 4	500
High or Low Pressure Zone	Pump No. 2	400
Total		3,720

High Service Pump Capacities

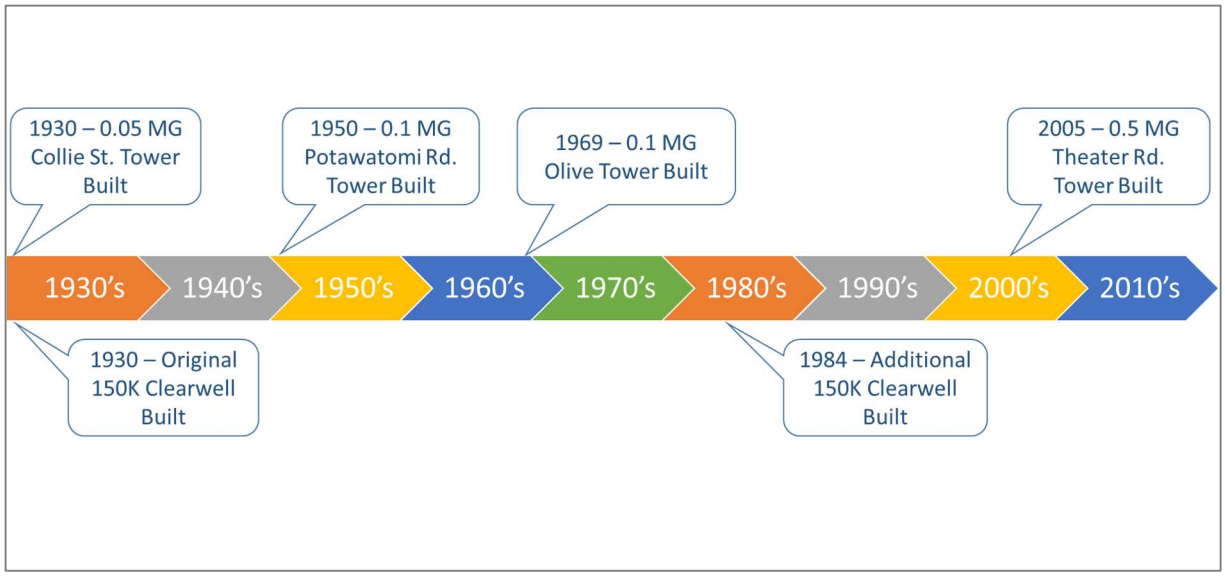
Pressure Zone	Total Capacity (GPM/MGD)	Firm Capacity (GPM/MGD)
High Pressure Zone	1,820/2.62	720/1.04
Lower Pressure Zone	1,900/2.74	900/1.30
Combined Pressure Zones	3,720/5.36	1,620/2.33

Currently, these pumps are turned on automatically in response to the water levels in the elevated storage towers. Pump No. 2 is manually controlled and only operated when required at either the high or low zone. Additionally, Pump No. 6 is in the treatment facility. This pump is used to provide backwash water for the filters; 2,500 GPM is provided.

Water Storage

Water storage in Williams Bay is currently provided as elevated storage and clearwell storage. A historical perspective of when storage was installed is noted below.

Water Storage Construction Timeline



Storage Details

Storage Type	Name/Location	Volume (MG)
Elevated	Collie St. Tower	0.05
Elevated	Potawatomi Rd. Tower	0.10
Elevated	Olive St. Tower	0.10
Elevated	Theatre Rd. Tower	0.50
Ground	Clearwell	0.30
TOTAL	-	1.05

The chart above illustrates the relationship of each storage tower to the total storage volume. The advantage of elevated storage is the ability to instantly respond to changes in demand, without the use of booster pumps, controls, or electrical power.

These towers are strategically located throughout the Village to provide supply to either the higher pressure or low zones of the distribution system. The Olive Street Tower and the Theatre Road Tower provide a combined volume of 0.6 MG to the high zone, while the remaining 0.15 MG of storage volume from the Collie Street Tower and the Potawatomi Road Tower supply the lower pressure zone

Distribution System and Water Transfer Station

The Village's distribution system contains more than 30 miles of publicly owned water mains with diameters ranging between four and twelve inches. A breakdown of pipe lengths by diameter is included in the tables below. The tables also include a summary of the volume of water contained within pipes of each given size. The volume within pipes is an important characteristic which can impact water quality. Water quality tends to decrease as water age increases. Water mains with low usage but high volume often have water quality issues which may trigger customer complaints.

History of Water Main Installation

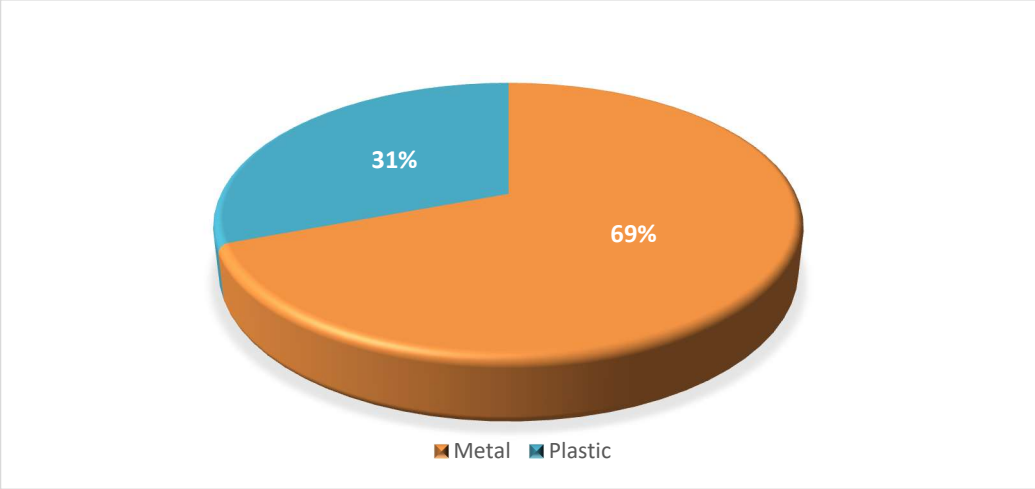
	Feet of Main										
Pipe Size	pre-1900	1901-1920	1920-1940	1941-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2010	2011-2020	Total
6 in	-	-	65,146	26,242	-	-	-	-	-	-	91,388
8 in	-	-	11,167	10,695	-	6,694	-	33,391	-	-	61,947
10 in	-	-	-	-	1,912	4,573	-	3,622	-	-	10,107
12 in	-	-	-	-	-	-	-	-	-	15,427	15,427
Total	-	-	76,313	36,937	1,912	11,267	-	37,013	-	15,427	178,869

Water Main Details

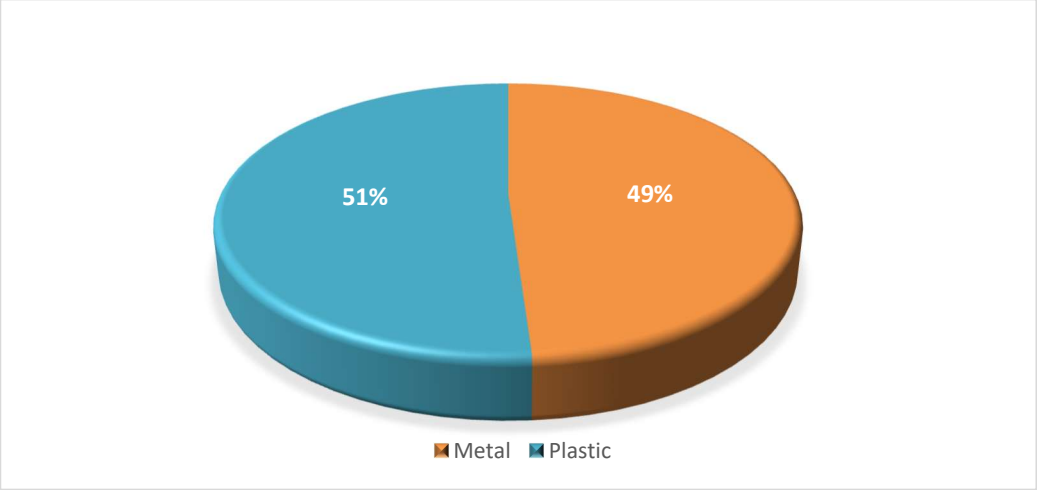
Pipe Material	Main Function	Diameter	Length	Volume (gal)
Metal	Distribution	4	530	86

Metal	Distribution	6	76,813	28,206
Metal	Supply	6	13	5
Plastic	Distribution	6	2,074	762
Metal	Distribution	8	21,173	13,822
Metal	Supply	8	2,594	1,693
Plastic	Distribution	8	12,137	7,923
Metal	Distribution	10	5,535	5,646
Metal	Supply	10	12	12
Plastic	Distribution	10	360	367
Metal	Distribution	12	6,420	9,430
Plastic	Distribution	12	31,640	46,473
Plastic	Supply	12	4,063	5,968
Total			163,364	120,392

Percent Length of Pipe



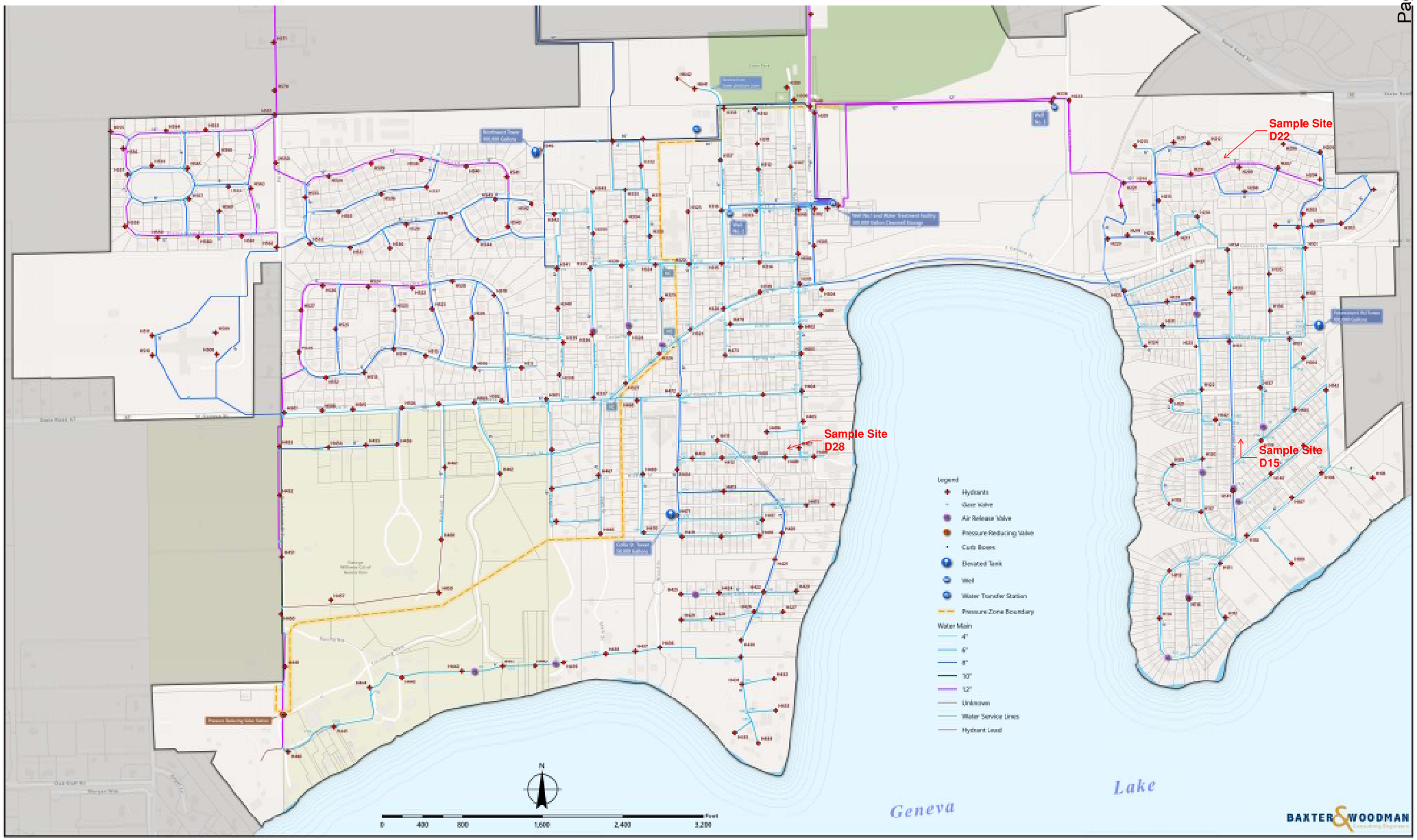
Percent Volume of Water in Main



The Village utilizes a mixture of metal and plastic/non-metal pipe materials throughout its distribution system; 69% of all pipes were metal, while the remaining 31% were constructed of either plastic or non-metal materials. There is a near equal split in volume of the water stored in each pipe material.

The Village of Williams Bay uses a water transfer station constructed by Mercy Hospital in 2012 to provide a second connection point between the high and low zones. Located at the Village Street Department Site, the station consists of two booster pumps, one automatic valve, and a forward and reverse water meter.

The purpose of the station is to allow water that is produced in the low zone to be used in the high zone. It is also used to transfer water stored in the high zone to the low zone. Each booster pump has a rated capacity of 350 gpm, while the automatic valve can transfer up to 3,100 gpm between zones. The valve allows for adjustable flow and the last set point was at 800 gpm.


Sample Site
D22
Sample Site
D28
Sample Site
D15
Legend
Hydrants
Gate Valve
Air Release Valve
Pressure Reducing Valve
Curb Boxes
Elevated Tank
Well
Water Transfer Station
Pressure Zone Boundary
Water Main
4"
6"
8"
10"
12"
Unknown
Water Service Lines
Hydrant Lead
N
0
400
800
1,600
2,400
3,200
Feet
Geneva
Lake
BAXTER & WOODMAN

Water Quality Investigations

Date:	November 11, 2022
Client:	Williams Bay
Project Description:	Corrosion Control Desktop Study

Purpose

Williams Bay is currently under orders from the Wisconsin DNR to complete a Corrosion Control Treatment study (CCT) by December 30, 2022. This order stems from an Action Level Exceedance (ALE) for copper, which occurred during Lead and Copper Rule (LCR) compliance testing in 2017. Williams Bay is currently in compliance with the LCR, though their previous CCT is no longer considered optimized by the Wisconsin DNR.

Water System Background and Chronology

See the separate engineering report by Baxter & Woodman, Inc.

Water Quality Regulations and Corrosion

EPA and Wisconsin DNR regulations impose limits on the amount of acute and chronic hazards that can be present within drinking water. While these regulations are vital for preventing the presence of certain pathogens, chemical contaminants, and undesirable metals in drinking water at the entry point to a water system, they do not guarantee that clean and safe drinking water reaches every consumer, that drinking water will have zero risk of creating a health hazard or that water quality will not change in a drinking water system. Circumstances present in water systems that could adversely affect water quality after the entry point generally include the following:

1) Nutrients. The presence of unregulated nutrients in the source water, including organic carbon, ammonia, proteins and phosphorous, will promote the natural growth of water-based and soil-based microorganisms in a drinking water system, even in the presence of disinfection. An imbalance in the amount of nutrients present, which is a stress condition, will promote the unwanted growth of biofilm in the water system, with greater concentrations of nutrients causing the growth of thicker and more problematic biofilm. Excessive biofilm growth in a water system can cause taste and odor issues, corrosion of equipment and plumbing (lead and copper), increased disinfection demand, and formation of nitrite, nitrate, and disinfection byproducts, which could cause water quality at the tap to be non-compliant with regulations. Nutrient removal and/or nutrient balancing in a water treatment plant will improve biostability of the water at the entry point, which will minimize biofilm growth and related water quality and corrosion issues in a water distribution system.
2) Water stagnancy. It is well documented in literature that water stagnancy can cause loss of disinfection residual and the unwanted growth of naturally occurring biofilm. Stagnancy in water distribution systems and plumbing systems has increased with the increased use of low-flow water-efficient plumbing fixtures. These fixtures cause less water movement in distribution and plumbing systems, and cause lower water flow velocities during normal use. Current plumbing codes do not reflect this more efficient use of water, which means that new plumbing systems and older plumbing systems with retrofitted fixtures are generally oversized and do not routinely see flow velocities that help them to “self-clean”. This scenario means that routine flushing is needed in all plumbing systems, especially complex plumbing systems within commercial buildings, to reduce debris that can promote pitting corrosion and to reduce biofilm that can cause microbiologically influenced corrosion (often called MIC). A flow rate of at least five feet per second in plumbing is needed for self-cleaning and for reducing the potential for MIC.
3) Aggressive water. Water with a low pH, low alkalinity, and a high concentration of chloride and/or nitrate is inherently corrosive towards equipment, fittings, valves, and plumbing. This means that a nitrifying

type of biofilm, which will reduce pH, reduce alkalinity, and increase nitrate, is inherently corrosive towards plumbing.

4) Dead end mains or stagnant loops. Construction of dead-end mains or stagnant loops within a water distribution system will result in areas within the system with high water age. A stagnant loop is a main that loops around a building for fire protection purposes or that connects dead end municipal mains together at the outer edge of a water distribution system to create a loop. These types of mains generally see little water movement or only low water flow velocities, which creates high water age in the mains. High water age is a form of stagnancy, which promotes water stagnancy related issues discussed above.
5) Oversized mains. The presence of oversized water mains with inadequate flushing creates stagnant conditions at the pipe surface. These mains generally see water flow velocities of less than one foot per second, which is far less than the five feet per second flow that is needed for self-cleaning. While these mains are needed for fire protection, they generally are not needed for drinking water purposes. Routine flushing of these mains is needed to reduce the potential for water stagnancy related issues discussed above.
6) Use of a combined water service and fire main for buildings (commercial buildings and large homes). Many buildings with fire suppression systems use a single water service (called a combined service) to connect the building's fire suppression and plumbing systems to the municipal water system. While this is a cost saving measure, it typically results in a flow velocity of less than 0.5 foot per second in the combined service line at peak drinking water usage, which creates stagnant conditions at the pipe surface (termed flowing stagnation), and the inability for the service line to "self-clean". In addition, the oversized service line increases the age of water prior to the building, which promotes water stagnancy issues at the building's entry point. While an oversized municipal water main can be flushed through a hydrant, combined water services generally are not constructed with the ability to be flushed at a high rate to reduce water stagnancy related issues.
7) Use of a recirculated hot water loop (residential and commercial). Commercial buildings generally contain a recirculated hot water loop, which is installed to meet energy efficiency requirements in the plumbing code. Some higher end homes have these systems for convenience. The use of this type of system results in high water age, which promotes water stagnancy related issues in the hot water system. This type of system also promotes the breakdown of disinfection and organic carbon present in the source water, which creates readily useable food for enhanced biofilm growth in the hot water system. Increased biofilm in a hot water loop increases the potential for opportunistic pathogens to be present, including *Legionella*. The use of hot water loops for energy efficiency reasons is a major cause of *Legionella* in commercial buildings, including health care facilities and hotels.
8) Point of use treatment. The addition of a filter or water softener in a building changes the nature of the water, generally for the better. However, if these systems are not properly maintained to control biofilm, water quality and corrosion issues can result.
9) Cross connections. A cross connection creates the potential for contaminated water to enter the water distribution system. Potential cross connections include 1) hose spigots without proper vacuum breaking, 2) plumbing connections for non-potable use without proper backflow prevention, and 3) leaking pipe joints in sewage contaminated soils.

Based on the above, it appears that a more comprehensive approach to water quality management from source to tap is needed to ensure that clean and safe drinking water that enters the water system at the entry point reaches all consumers. Such an approach would identify all issues in the source water that could cause changes to water quality in the system, as well as code, construction, operational, water treatment and maintenance

practices in the source(s), water treatment plant, water distribution system and premise plumbing systems that could adversely affect water quality at the tap. This comprehensive approach would help implement practices that are vitally needed to ensure that drinking water that meets regulations at the entry point will also meet regulations at the consumer tap. This is a departure from how drinking water regulations are currently written, which primarily focus on quality metrics and regulatory limits, ignoring preventative, operational or design measures that are vitally needed to ensure water quality at the tap also meets regulations.

A more comprehensive approach to water quality management for the purpose of reducing corrosion products in drinking water would generally include the following:

1) Assessing sources of lead in the water system per EPA guidance, including the presence of the following:
    a. Lead service lines
    b. Galvanized service lines and plumbing with or without a lead lining
    c. Leaded joints in cast iron pipes (pre 1929 – the year that mechanical joint pipe was introduced)
    d. Leaded brass fixtures (pre 2014 – the year that Reduce Lead in Drinking Water Act of 2011 took effect)
    e. Leaded solder for copper pipe (pre 1987)
    f. Source water metals (seen in some anaerobic waters in contact with lead and/or copper containing geology)
2) Assessing the potential for water to cause electrochemical corrosion per EPA guidance, i.e. water that is acidic or that disrupts scale formation, including assessment of the following parameters:
    a. Alkalinity, pH, and DIC.
    b. Corrosion inhibitors.
    c. Hardness (calcium and magnesium).
    d. Buffer Intensity.
    e. Dissolved oxygen (DO).
    f. Oxidation reduction potential (ORP).
    g. Ammonia, chloride, and sulfate concentrations.
    h. Natural organic matter (NOM) or total organic carbon (TOC) concentrations.
    i. Iron, aluminum, and manganese.
3) Assessing the potential for microbiologically influenced corrosion (MIC) and developing MIC mitigation strategies, which are mentioned but not considered in EPA guidance. This section includes the following:
    a. Characterizing the potential for biofilm to form based on the presence and balance of nutrients present in the source(s) and in the water system. This includes the addition of nutrients such as ammonia (chloramine fed systems) and phosphate (corrosion control), and the degradation of complex nutrients in the water to simpler forms through UV and ozone treatment.
    b. Testing for the presence of biofilm in the source water and in water treatment equipment to assess the potential to introduce biofilm and biofilm related secretions to the water system from the source(s). Biofilm secretions generally include polysaccharides, proteins, organic acids, lipids and enzymes.
    c. Testing for the presence of biofilm and MIC in the water system based on comparison of changes in flowing and stagnation samples collected from LCR sample locations.
    d. Developing plans for nutrient management at the source(s) to minimize biofilm growth and MIC in the system.

e. Developing plans for mitigating growth of naturally biofilm in the source water, water treatment plant, water distribution system and premise plumbing systems to prevent or minimize introduction of biofilm and related biological secretions to the water system. This may include public education to assist property owners with methods that they can use to maintain parts of their plumbing systems that are out of the control of the water utility, which is needed because the water utility is responsible for water quality from source to tap.
f. Operation of water systems in a manner to minimize the presence of biofilm.

4) Developing plans to reduce corrosion caused by electrochemical attack per EPA guidance, which may include one or more of the following:
   a. Removing the sources of lead (find and fix approach)
      i. LSL replacement (municipal systems).
      ii. Water main replacement or lining to remove lead joint pipes (municipal systems).
      iii. Galvanized pipe replacement (internal and water service), which typically contains iron corrosion products that hold onto and then randomly release lead to drinking water (property owner plumbing systems).
      iv. Water fixture replacement programs (all water systems), focusing on replacing lead brass fixtures that were installed prior to 2014 (year that Reduce Lead in Drinking Water Act of 2011 took effect). This follows a find and fix approach that is in the Lead Copper Rule Revision (LCRR).
   b. Advanced water treatment to reduce the potential for electrochemical corrosion and/or MIC in the water system.
   c. Addition of an appropriate corrosion inhibitor to help retain corrosion products within water system scales. An appropriate concentration would be one that improves biostability of the water, not an assumed dose based on sequestration of hardness and metals.

Corrosion Control Study for Williams Bay

This corrosion control treatment study at Williams Bay evaluates the water system as a whole, including source water quality, corrosivity, nutrients, biostability, and biofilm presence, and assesses the best course(s) of action that should be employed by Williams Bay to manage water quality and corrosion in their water system. Much focus is placed on biofilm in this report as it is the underlying cause of corrosion found in most drinking water systems.

Naturally occurring biofilm is present in all water-based systems. Biofilms are naturally occurring polymeric matrices created by microorganisms in response to environmental stress. Conditions of environmental stress include a nutrient imbalance in the water, the use of disinfection, and water heating/cooling. Biofilm growth allows microbial communities to become established within aquifers, wells, water treatment equipment, water distribution systems, and premise plumbing systems, protecting them from stress. The potential for biofilm to grow and whether it will become problematic depends on the amount and type of nutrients present in the water, which generally include organic carbon, nitrate, ammonia, proteins, polysaccharides, phosphorous, and metals. Moderate, managed or balanced biofilm within a water system usually is non-problematic and of low concern. However, the presence of excessive biofilm can have a negative impact on water quality and on water system infrastructure, including causing the issues described in the following sections.

Metal Corrosion

Biofilms contain microorganisms that utilize various metabolisms, many of which are corrosive to metals. Corrosive biofilm types, including nitrifying, sulfur oxidizing, sulfate reducing, acid producing, and fermenting, can

cause corrosion of materials in the aquifer (metals, minerals, and cements), well (casing and column pipe), water distribution systems, and premise plumbing systems. Aside from the economic loss that occurs when corroded plumbing materials need to be replaced or when damage caused by a plumbing leak needs to be repaired, plumbing corrosion has potential health consequences for consumers. Corroded metals can become suspended in the water (lead and copper), leading directly to consumption by the consumer, or they can remain sequestered within the biofilm for later release to drinking water (lead, copper, arsenic, thallium, etc.). Even if suspended metals are present in drinking water at levels lower than regulatory limits, chronic exposure to metals in drinking water can lead to negative health outcomes (radium, gross alpha, thallium, arsenic, manganese, strontium, etc.). Metals sequestered within biofilm can be later released during sloughing events (i.e. caused by flushing of the water system, vibration associated with road construction, pressure transients, changes at the source, etc.) that are not caught by routine sampling or that are accidentally caught and result in an action level exceedance or violation of a regulatory limit.

WQI has repeatedly detected the following metals being released to drinking water as the direct result of a corrosive biofilm being present within a system sampled:

- Lead and copper in plumbing systems, especially in systems with biofilm performing nitrification, sulfur oxidation, acid production, and fermentation.
- Zinc from anode rods, newer brass valves, and galvanized piping, especially in systems with biofilm performing nitrification, sulfur oxidation, acid production, and fermentation.
- Heavy metals from corrosion of aquifer minerals and sandstone cements, including arsenic, radium, uranium, thallium, strontium, barium, cadmium, gross alpha, copper, lead, etc.

Production of Disinfection Byproducts

Disinfection Byproducts (DBPs) are regulated contaminants that are found in certain disinfected drinking waters. DBPs are formed when free chlorine disinfection reacts with organic materials present in drinking water. In systems with excessive biofilm, free chlorine disinfection can react with biofilm secretions, namely fermentation byproducts such as ketones, aldehydes, and organic acids, to caused increased DBP formation. Biofilm sloughing events can cause a release of DBP precursors, which react with free chlorine to cause increased DBPs. While LCR sampling is concerned with consumer exposure to metals in first draw water at the tap, DBP sampling is not, which means that the true consumer exposure to DBPs is unknown. To prevent exposure to DBPs, which are carcinogenic compounds, biofilm within a free-chlorine disinfected water system needs to be mitigated/controlled from source to tap.

Nitrate

Nitrate occurs naturally in groundwater and is the end-product of a biological process called nitrification. Nitrification is the bacterial conversion of ammonia and/or organic nitrogen (proteins and decaying biomass) present in oxygenated water to nitrite and then nitrate (a two-step process). While nitrite and nitrate in drinking water is often attributed to land application of fertilizers, WQI has seen it present at high concentrations in shallow aquifer systems impacted by wetlands and/or in wells with excessive biofilm formation. Nitrite in drinking water is often associated with nitrification occurring within the source or treatment plant when total organic carbon is elevated (competing metabolisms). Nitrite can be formed in the water system with chloramine disinfection if excess ammonia is present. WQI has also seen thick and excessive biofilm in wells remove nitrate from water.

Once ingested, nitrate quickly converts to nitrite and causes adverse health effects in humans, especially in babies and young children. Short term effects of consuming water with high nitrite or nitrate includes

methemoglobinemia, which results in poor transport of oxygen in the blood. Chronic exposure to elevated nitrite and nitrate may have a carcinogenic effect and could result in miscarriages.

Nitrification in the source water generally leads to continued nitrification, biofilm formation, and acid attack/corrosion of metal-based materials used in a water system (lead, copper, steel, zinc, galvanizing, etc.). Nitrification is discussed in the EPA guidance for corrosion control as a potential cause for corrosion, particularly because it will reduce the pH of water and cause acid-like attack of metals. Nitrification can also reduce alkalinity of the water, which makes the water more aggressive, or attack scales to release previously bound metals. Interestingly, the process of nitrification requires dissolved copper to activate required enzymes, which means that copper plumbing systems are more susceptible to corrosion caused by nitrification.

While LCR sampling is concerned with consumer exposure to metals in first draw water at the tap, Nitrite and nitrate sampling is not, which means that the true consumer exposure to nitrite and nitrate is unknown. To prevent exposure to these products, biofilm within a water system needs to be mitigated/controlled from source to tap.

Harboring Pathogens

Pathogens such as coliforms, *E. coli,* and *L. pneumophila* can utilize layers present within biofilm for protection from disinfection and heat, which are two common treatment options for controlling opportunistic pathogens in plumbing systems. With the presence of an adequate disinfection residual and/or heat, pathogens remain hidden within biofilm and generally don't cause issues. However, if these stressors in the water are removed or depleted, biofilm sloughing could occur to release hidden pathogens to drinking water, including *Legionella*. Biofilm sloughing is likely the underlying cause of many bacterial infections that occur in hospital settings. To prevent disease outbreaks caused by pathogenic organisms, water systems and plumbing systems must be operated to minimize the presence of thick biofilms, which will then minimize the potential for exposure to pathogens associated with uncontrollable sloughing events.

Health Implications Summary

It is important to understand that many health and water quality issues can be associated with excessive biofilm in drinking water systems. To prevent corrosion of well and plumbing materials, production of DBPs, harboring of pathogens, and production of nitrite and/or nitrate, biofilm within sources, wells, and water systems must be actively mitigated/controlled. Current practices for water system cleaning and maintenance promoted by the drinking water industry do not adequately address naturally occurring biofilm and the subsequent water quality issues that are caused by them. Each water system must be individually evaluated to determine what actions are needed for optimal biofilm control, which will help provide the best health outcomes for those consuming the water.

Desktop Corrosion Control Study

This CCT study for Williams Bay focuses on areas of concern as described above. The CCT is broken up into the following sections:

1. General water system configuration.
2. An evaluation of raw, entry point, and distribution system water quality data for the determination of key water quality corrosivity parameters and their potential impact on lead and copper release.
3. An evaluation of CCT efficiency that is currently used at Williams Bay, which generally consists of pH adjustment.
4. An evaluation of sources for lead and/or copper in the system, including the following:

   a. Water main and service line materials as a source for lead and copper.
   b. Plumbing fixtures and materials as a source for lead and copper.
5. Review of LCR compliance history to identify potential water quality issues that are contributing to lead and/or copper releases.
6. Evaluation of the efficacy of potential corrosion control treatments described in s. NR 809.543(3), including:
   a. Alkalinity and pH adjustment.
   b. Calcium hardness adjustment.
   c. The addition of a phosphate or silicate-based corrosion inhibitor at a concentration sufficient to maintain an effective residual concentration in all test samples.
7. Consideration of other treatment options that may be more effective at reducing lead and copper for Williams Bay's water system.
8. A discussion of how the selected treatment aligns with EPA guidance.

Section 1: General Water System Configuration and Details

See the separate engineering report by Baxter & Woodman, Inc. for additional information. The source of drinking water for Williams Bay is groundwater. The water system is supplied by three wells, which are constructed as follows:

- Well 1 (WUWN BH196 – installed 1930)
  - 255-feet deep screened well drawing water from an alluvial (sand and gravel) aquifer.
  - Static water level = 80 feet.
  - 18-inch diameter casing installed to a depth of 230 feet.
  - 14-inch diameter liner grouted to a depth of 120 feet (installed 1984). This liner was likely installed to repair casing damage or failure caused by a nitrifying type of biofilm that developed in the well at the air/water interface above the pump.
  - 18-inch diameter screen from 230 to 255 feet.
- Well 2 (WUWN BH197 – installed 1951)
  - 293-feet deep screened well drawing water from an alluvial (sand and gravel) aquifer.
  - Static water level = 30 feet.
  - 14-inch diameter well casing installed to a depth of 268 feet.
  - 14-inch diameter screen from 268 to 293 feet.
- Well 3 (WUWN MK404 – installed 1998)
  - 1515-foot deep well.
  - 16-inch diameter casing grouted to a depth of 340 feet.
  - 15-inch diameter open borehole that is open to limestone and sandstone.

Water from Well 1 and Well 2 is obtained from a shallow sand and gravel aquifer system. Water from Well 3 is obtained from a deep limestone and sandstone aquifer system. Groundwater obtained from the Village's wells has excessive concentrations of ammonia, protein, and organic carbon, which are not regulated. Concentrations of these nutrients are higher in Well 1 and Well 2 compared to Well 3. Shallow groundwater in the vicinity of Well 1 and Well 2 is likely influenced by buried organic materials that were deposited at the end of the last glacial period and/or is influenced by organic laden sediments located below nearby Geneva Lake. Water from Well 3 was of better quality with low ammonia when it was first drilled, but water quality has degraded with usage of the well.

The Village is bounded by Geneva Lake to the south and wetlands to the northeast. Water from Geneva Lake naturally moves to the northeast as groundwater in the vicinity of Williams Bay, discharging to nearby Lake Como. Pumping of Well 1 and Well 2 likely induces groundwater water movement from Geneva Lake towards these wells (form of induced recharge), which likely degrades the quality of water pumped from these wells. The mapped recharge area for Well 1 indicates that the well receives ground water influenced by nearby lake sediments and the wetlands area to the northeast, both of which would be nutrient laden. Well 2 likely experiences the same issue, but to a lesser degree. Geologic maps suggest the presence of bedrock fractures in the vicinity of Williams Bay that could connect the shallow aquifer system with the deep aquifer system. In addition, the protective Maquoketa Shale layer for the deep aquifer system thins out and disappears just to the west of Williams Bay, exposing the deep aquifer system to recharge water from shallow organic rich deposits and/or from nearby Delavan Lake. While Well 3 initially had better water quality when drilled, pumping of the well likely altered groundwater flow patterns and caused shallow nutrient laden water to be pulled down to the deep aquifer system through geologic defects.

Water pumped from the wells is treated for iron and hardness removal via lime softening and alum addition at a central treatment plant located at Well 1. The water treatment plant is operated once per day to refill the storage system with treated water. Water is disinfected via chlorine addition to convert ammonia present in the water to chloramines. Excess ammonia is present in the treated water after chlorine addition, which puts the system at risk for nitrification. The treatment plant contains a dual clearwell with a total capacity of 300,000 gallons. The water system has four elevated tanks with a combined capacity of 750,000 gallons.

Section 2: Water Quality Data

Water from the wells does not exceed primary drinking water regulations but does exceed the secondary limit for iron. Water from the wells does contain elevated concentrations of unregulated nutrients that can promote biofilm growth, nitrification and microbiologically influenced corrosion in the water system, which is further explained in the report titled 2022-09-28 Williams Bay CCT Summary Report. These nutrients include elevated concentrations of organic carbon, proteins, and ammonia, which primarily promote the growth of a nitrifying type of biofilm in the system. This biofilm type results in increased acid presence within biofilm and subsequent corrosion of plumbing materials. This appears to be the underlying cause for lead and copper corrosion in the Williams Bay system.

Water supplied to the distribution system meets primary drinking water standards. Ammonia levels are unregulated by drinking water standards but are elevated from the treatment plant after chlorine addition for disinfection. The presence of elevated ammonia selects for development of a dominant nitrifying type of biofilm in the downstream water system. Nitrifying biofilms produce nitrate and nitrite, which reduce the pH to cause microbial influenced corrosion and pose health hazards. Water quality data obtained from points-of-use throughout the distribution system show **unacceptable** levels of nitrite. This indicates that a nitrifying type of biofilm has become established in the drinking water system and is posing a health risk.

Given the nitrification issue in the water system, treated water was not assessed for corrosivity using the RTW Model. Water system and/or treatment changes that are needed to address the nitrification issue may change water quality and thus make those calculations useless. In addition, the primary cause of copper corrosion in the system appears to be inadequate nitrification control, which should be the issue that gets addressed first.

Section 3: Current Corrosion Control Methods and Efficiency

Williams Bay uses pH adjustment as its primary means for corrosion control. pH has historically been variable at the water system entry point, varying between about 7.5 su and 10 su. While this appears to be the DNR's primary

concern for the cause of elevated copper corrosion in their system, it is not the underlying cause. What this means is that regardless of pH consistency at the entry point, the amount of nitrification and thus amount of corrosion in the water system will likely be unchanged. If anything, better control of the treatment system to reduce pH variability would require the addition of more carbonic acid, which would add more of a required nutrient for nitrification (inorganic carbon in the form of alkalinity is the carbon source for nitrification) and could cause increased nitrification and increased corrosion.

Section 4: Inventory of Sources of Lead and Copper

See the separate engineering report by Baxter & Woodman, Inc.

Section 5: Known Problem Areas and Past Complaints

Williams Bay has a history of nitrite being detected at the entry point to their system, though none of these compliance samples have exceeded the regulatory limit of 1.0 mg/L as N. While this is good from a compliance perspective, it is an indicator of nitrification occurring in the water sources and/or water treatment plant, and a strong indicator of the potential for nitrification to occur in the water distribution system. Unfortunately, drinking water regulations are not adequate to control nitrification in a water system, or to detect whether it is occurring in a system, leaving that determination up to the discretion of the water system. Regulations do not set a limit on the amount of ammonia that can be present in water at the entry point, only the concentration of nitrite and nitrate at the entry point. Regulations also do not require monitoring of nitrite and nitrate in the water system if excess ammonia is present at the entry point, which means that nitrite and/or nitrate could exceed regulatory limits at the consumer tap (seen in Williams Bay's system). In addition, if a water system uses chloramine as its primary disinfectant, there is no requirement to ensure that nitrification is not occurring in the water system or that a proper dose of chloramine with little excess of ammonia is present at the entry point. These issues are addressed in manuals of practice, not in drinking water regulations, which leaves many of these issues unresolved in systems that do not utilize these manuals in their operations. Many small water systems rely upon regulatory code provisions to guide operations and compliance, which means that valuable information and procedures in manuals of practice are deemed optional and not followed until absolutely needed to return to compliance.

The LCR action level exceedance (ALE) for copper from 2017 occurred because of sampling at two locations with extended stagnation (well beyond 6-hours of non-use). Low water usage and extended stagnation in plumbing systems in Williams Bay's system provide an ideal condition for nitrification and corrosion to occur. The ALE that occurred in 2017 was likely caused by nitrification and subsequent corrosion.

Section 6: Potential NR 809.543(3) Corrosion Control Treatments

NR 809.543(3) describes three possible corrosion control treatments that are typically evaluated in corrosion control studies. These corrosion control treatments have been explored at Williams Bay and are discussed below.

NR 809.543(3)(a)1: Alkalinity and pH adjustment

Studies have shown that increasing alkalinity and pH of water may or may not assist in lead and copper corrosion control. Because of the high ammonia concentration at the entry point to the Williams Bay system, an ideal pH that would complement and enhance chloramine disinfection would be in the range of 8.2 su to 8.5 su. Increasing alkalinity through pH adjustment with carbon dioxide would create a more consistent pH at the entry point but would likely increase the potential for nitrification to occur in the water system. Better pH control is needed but must be performed in conjunction with ammonia reduction.

NR 809.543(3)(a)2: Calcium hardness adjustment

According to EPA OCCT guidance data from 2011, raising hardness in system water and the resulting calcium carbonate scale/film formation "only rarely form on lead and copper pipe and are not considered an effective form of corrosion control". Calcium carbonate precipitation is no longer considered an effective corrosion control treatment by the EPA and will be removed from future CCT guidance.

Calcium hardness adjustment is not recommended for Williams Bay due to the biological nature of the issue.

NR 809.543(3)(a)3: The addition of a phosphate or silicate based corrosion inhibitor

Orthophosphate for corrosion control is not currently added to Williams Bay's drinking water. Phosphate is not considered an effective corrosion control treatment technique for Williams Bay for the following reasons:

- Adding phosphate per EPA and DNR guidance has the potential to increase biological activity in the water and thus increase disinfection loss in the distribution system. Data from the CCT study show that copper corrosion is highest in the water system where chloramine disinfection is lowest. Increased disinfection demand with phosphate feed would likely result in increased corrosion of copper plumbing.
- Because microbiologically influenced corrosion caused by nitrification has been established as the primary cause of Williams Bay's lead and copper corrosion issue, nitrification control should be the primary focus.
- If phosphate is ultimately fed to assist with corrosion control, it should be added at a concentration that improves biostability and reduces biofilm stress, not at a theoretical dose that focuses on scale formation.

Section 7: Other Corrosion Control Options

The primary cause of lead and copper corrosion in the Williams Bay water system is nitrification. This issue in the system can be resolved with better ammonia removal at the water treatment plant. Enhanced ammonia removal at the water treatment plant may be achieved through extended aeration/stripping prior to treatment, or through partial or full breakpoint chlorination. Enhanced nutrient and protein removal at the water treatment plant through addition of ferric chloride or the use of a coagulant other than alum may further help to control biofilm and nitrification in the water distribution system.

Ammonia removal can be achieved through partial or full breakpoint chlorination, which would be applied ahead of filtration for enhanced mixing and adequate reaction time prior to distribution. A chlorination trial was performed on settled water to assess the chlorine dose needed for breakpoint chlorination. A chlorine dose of 27 mg/L provides for partial breakpoint chlorination and a monochloramine residual of about 2.5 mg/L whereas a chlorine dose of 31.5 mg/L provides for full breakpoint chlorination and a free chlorine residual of 2.5 mg/L. Results of the chlorine trial are shown in **Figure 1**.

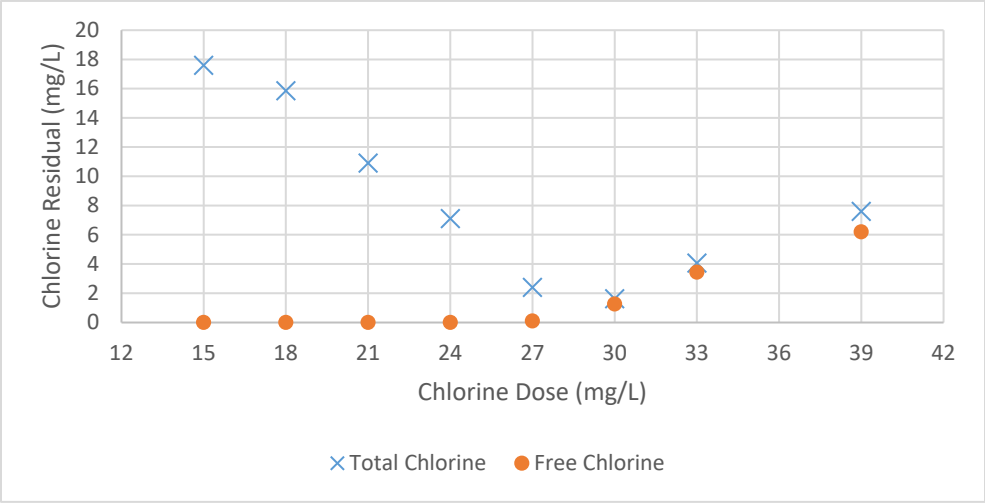


Figure 1. Breakpoint chlorination curve for settled water treated with various doses of chlorine.

Breakpoint chlorination has the potential to increase the formation of disinfection byproducts (DBPs) in water with an elevated organic carbon concentration. To assess whether this would be an issue for Williams Bay, a disinfection byproduct formation potential test (DBPFP) was performed on settled water obtained from the treatment plant. Results for the DBPFP test are shown in **Table 1**. Data show that breakpoint chlorination would not cause violation of the DBP standard but would cause an elevated presence of DBPs. Under current drinking water regulations, partial breakpoint chlorination appears to be a better choice for ammonia removal. However, this may change if new rules regarding nitrogenous disinfection byproducts are implemented because of the EPA's current Microbial and Disinfection Byproducts Rule Revisions process.

Table 1. Disinfection Byproducts Formation Potential Test Results

Parameter Haloacetic Acids	Result	MCL	Units	LOD
Dibromoacetic Acid	2.8	60	ug/L	0.19
Dichloroacetic Acid	14	60	ug/L	0.29
Monobromoacetic Acid	ND	60	ug/L	0.26
Monochloroacetic Acid	ND	60	ug/L	1.9
Trichloroacetic Acid	12	60	ug/L	0.43
Total Haloacetic Acid (HAA5)	29	60	ug/L	
TTHMs				
Bromodichloromethane	10	80	ug/L	0.15
Bromoform	ND	80	ug/L	0.14
Chloroform	57	80	ug/L	0.99
Dibromochloromethane	3.1	80	ug/L	0.18
Total TTHM	70	80	ug/L	

Notes: ND = non-detect, MCL = Maximum Contaminant Level, LOD = Limit of Detection

When ammonia is better controlled at the water treatment plant, naturally present biofilm in the water system will likely become starved, which could cause biofilm sloughing and subsequent release of biofilm-bound metals to drinking water. To address this issue and minimize the potential for water quality issue, the following activities should be included in the Village's approach to corrosion control:

- Implementation of unidirectional flushing (UDF) of the water distribution system. The higher flushing rate associated with this type of flushing provides a better scouring action in the large pipes, which reduces scale and biofilm accumulation in water distribution system. This work, in turn, will help reduce transference of biofilm and biofilm related secretions to plumbing systems and reduce biofilm and microbiologically influenced corrosion of plumbing materials.
- Chemical cleaning of water storage facilities to remove biofilm. A nitrifying type of biofilm is likely present in all water storage facilities in Williams Bay, with much of this biofilm concentrated at the air-water interface in the reservoirs. Chemical cleaning may need to be performed every five years to provide adequate biofilm control.
- Educate water system users on how to flush their plumbing systems to improve water quality. This education will help remove biofilm accumulations and help increase disinfection residuals in premise plumbing systems.

Section 8: Conclusions and Recommendations

Results of the CCT study clearly show that lead and copper corrosion in the Williams Bay water system is caused by biofilm performing nitrification. An elevated ammonia concentration in treated water at the entry point is promoting formation of nitrifying biofilms in the downstream water system. Nitrifying biofilms create nitrite and nitrate, which are acids that promote microbial influenced corrosion of plumbing materials and are contaminants that are hazardous to public health. The source of the ammonia is decaying organic matter that is present in the aquifer(s) connected to the wells, which cannot be controlled in the source. The only solution to this issue is to reduce the concentration of ammonia in water at the entry point through enhanced treatment.

Nitrite levels at many points-of-use in the Williams Bay water system are likely above regulatory limits and pose a public health risk. This occurs because of an elevated ammonia level at the entry point (about 2.9 mg/L as N) and incomplete ammonia oxidation by a nitrifying biofilm because of an elevated total organic carbon concentration in the water (about 1.5 mg/L TOC). Under current regulations, nitrate and nitrite testing is only required at the water system entry point, which causes increased nitrite concentrations in the Williams Bay water system to go undetected.

The following recommendations should be implemented to control corrosion and improve water quality in the Williams Bay water system:

- Implement partial breakpoint chlorination for ammonia removal, which will limit the amount of ammonia available for biological conversion to nitrite in the water system and minimize the amount of DBPs formed. This involves increasing the chlorine dose to convert excess ammonia in the water to nitrogen gas while also creating monochloramine for disinfection. This approach will keep monochloramine addition as the primary disinfectant, which will minimize the potential for biofilm disruption and brown water events in the downstream water system. Data indicate that a chlorine dose of about 27 mg/L will perform partial breakpoint chlorination and achieve a 2.5 mg/L total chlorine residual.
- Investigate whether increased aeration at the water treatment plant will enhance ammonia removal, which would reduce the amount of chlorine needed for partial breakpoint chlorination.

- Investigate whether ferric chloride addition or use of another coagulant would improve protein and organic carbon removal in the treatment plant to produce water with better biostability and reduce the formation of nitrogen-based disinfection byproducts. A ferric chlorine dose of 15 mg/L resulted in an 8% reduction in organic carbon. Higher doses of ferric or the use of a different coagulant may improve organic carbon removal and biostability.
- Investigate the use of other acids in conjunction with carbon dioxide for pH control to minimize the amount of alkalinity added to the water. Increasing alkalinity increases the potential for nitrification and subsequent corrosion to occur in a chloramine disinfected water system. Maintain a pH of 8.2 su to 8.5 su at the entry point for optimal control of disinfection.
- Routinely monitor ammonia in water leaving the treatment plant. Although not required by current regulations, Williams Bay should implement regular testing for nitrite, nitrate, and disinfection residual at points-of-use and at ends of the system to better protect consumers.
- Implement a unidirectional flushing (UDF) of the water distribution system to occur when partial breakpoint chlorination is implemented. The higher flushing rate associated with this type of flushing provides a better scouring action in the large pipes, which reduces scale and biofilm accumulation in water distribution system. This work, in turn, will help reduce transference of biofilm and biofilm related secretions to plumbing systems and reduce biofilm and microbiologically influenced corrosion of plumbing materials.
- Perform chemical cleaning of water storage facilities to remove biofilm, cleaning one or two structures per year. A nitrifying type of biofilm is likely present in all water storage facilities in Williams Bay, with much of this biofilm concentrated at the air-water interface in the reservoirs. Chemical cleaning may need to be performed every five years to provide adequate biofilm control with continued use of monochloramine disinfection.
- Educate water system users on how to flush their plumbing systems to improve water quality. This education will help remove biofilm accumulations and help increase disinfection residuals in premise plumbing systems.

Water Quality Investigations

Project: Williams Bay, Village of - CCT

Analysis Date: **9/28/2022**

Sample Name	Sample Description
W1 2 Hours Aquifer	Sample was collected after indicated time of pumping. Sample represents average quality of untreated water from the **aquifer(s)** connected to the well.
W2 2 Hours Aquifer	Sample was collected after indicated time of pumping. Sample represents average quality of untreated water from the **aquifer(s)** connected to the well.
W3 15 Minutes	Sample was collected after indicated time of pumping. Sample represents average quality of untreated water from the nearby **aquifer(s)** connected to the well.
W3 30 Minutes	Sample was collected after indicated time of pumping. Sample represents average quality of untreated water from the nearby **aquifer(s)** connected to the well.
W3 45 Minutes	Sample was collected after indicated time of pumping. Sample represents average quality of untreated water from the nearby **aquifer(s)** connected to the well.
W3 60 Minutes	Sample was collected after indicated time of pumping. Sample represents average quality of untreated water from the intermediate **aquifer(s)** connected to the well.
W3 75 Minutes	Sample was collected after indicated time of pumping. Sample represents average quality of untreated water from the intermediate **aquifer(s)** connected to the well.
W3 90 Minutes	Sample was collected after indicated time of pumping. Sample represents average quality of untreated water from the intermediate **aquifer(s)** connected to the well.
W3 105 Minutes	Sample was collected after indicated time of pumping. Sample represents average quality of untreated water from the intermediate **aquifer(s)** connected to the well.
W3 2 Hours Aquifer	Sample was collected after indicated time of pumping. Sample represents average quality of untreated water from the **aquifer(s)** connected to the well.
After Sedimentation	Sample was collected at the sedimentation tank discharge. Sample represents average quality of water after sedimentation.
After Filtration	Sample was collected at the filter discharge. Sample represents average quality of water after filtration.
After Clearwell Stagnation	Sample was collected at the stagnant clearwell discharge. Sample represents average quality of water in the clearwell.
From Tower Drain	Sample was collected from the tower drain with all wells off at the Theatre Road Tower (0.5 MG water tower in northwest part of system). Sample represents average quality of water in the water tower.
D15 Mid Service Line	Sample was collected at the mid point of the D15 service line. Sample represents average quality of water from the service line.
D15 System	Sample was collected from the water main supplying water to D15. Sample represents average quality of water from the water main in the vicinity of D15.
D22 Mid Service Line	Sample was collected at the mid point of the D22 service line. Sample represents average quality of water from the service line.
D22 System	Sample was collected from the water main supplying water to D22. Sample represents average quality of water from the water main in the vicinity of D22.
D28 Mid Service Line	Sample was collected at the mid point of the D28 service line. Sample represents average quality of water from the service line.
D28 System	Sample was collected from the water main supplying water to D28. Sample represents average quality of water from the water main in the vicinity of D28.

Project Purpose: Determine the cause of copper corrosion in the water system.
The following report is broken up into the following three sections: Wells, Treatment Plant and Distribution System.

Water Quality Investigations

2581 State Road 92, Suite 2
Mount Horeb, WI 53572
Phone: (888) 499-2507

Project: Williams Bay, Village of - CCT

OVERALL DATA TREND ASSESSMENT AND RECOMMENDATIONS - WELLS

BIOFILM INDICATION TEST® (BIT) DATA & WATER QUALITY DATA

All of the aquifers contain **excessively thick** biofilm with **elevated instability** and **excessive starvation.** This is an undesired condition.

Each well has an **excessive** concentration of nutrients, including ammonia, proteins and total organic carbon, which will promote biofilm growth and cause water quality and corrosion issues in the water system if not properly managed/reduced through treatment. Well 3 appears to have the best quality of the three wells, but is still generally **poor** quality.

Biofilm present in each aquifer has a **moderate** potential to cause biofilm and microbial influenced corrosion in the well and downstream water system, but only if properly maintained and controlled in the wells and treatment plant.

All samples from Well 3 have **similar** EEM products, AOC_S, BCI, and Ammonia levels, which indicates that the near and distant aquifer at Well 3 are of similar quality.

The aquifer beneath Williams Bay is likely impacted by buried organic material, which is being anaerobically degraded by naturally occurring bacteria. This is the underlying cause of ammonia and nutrients in water from the wells.

BIOFILM ACTIVITY TEST® (BAT) DATA

BAT data generally show the following:

- All samples are impacted by biofilm that has an **excessive** need for metals (indicated by Iron/Metals Deficit), which is a condition that causes microbial induced corrosion. Metals are needed as cofactors for many biological reactions.
- All samples have an **excessive** Sulfur MSI, which is usually indicative of the presence of a nitrifying type of biofilm. Nitrification converts ammonia in the source water into nitrate and nitrite, which are acids that are corrosive to metals and minerology.
- All samples have a **moderate to elevated** Simple Organic Acid MSI, which indicates the presence of an organic acid producing biofilm in the aquifer. Organic acids are corrosive to minerals and equipment. Acid production in the aquifer is likely occurring because of a metals deficit and nutrient imbalance in the source water.

Water from the aquifer at each well had a non-detect for copper. Copper is an important metallic cofactor for nitrification, which is the biological conversion of ammonia to nitrate. The **concerning** metals deficit and organic acid results for the wells are likely caused by the lack of copper in the water.

CONCLUSIONS AND RECOMMENDATIONS

The aquifer connected to each well is **excessively** influenced by decaying organic matter. As this organic matter anaerobically decays, it is converted to dissolved organic carbon, proteins and ammonia. While these compounds are not regulated in drinking water, their excessive presence, which we see with all the wells, can cause biofilm, corrosion and water quality issues in the water distribution system if not properly managed at the water treatment plant.

It is unknown if enhanced maintenance of the wells would reduce corrosion in the wells and/or improve water quality in the water distribution system.

Water Quality Investigations

BIT DATA SUMMARY - WELLS

Project: Williams Bay, Village of - CCT

Sample	ME/mL	MBP EEM (FI)	DP EEM (FI)	TP EEM (FI)	BCI	ORP (mV)	p.H. (s.u.)	Specific Conductance (uS/cm)	AOC_S (mg/L)	Nitrate (mg/L as N)	WQI Protein Assay (mg/L)	Spike Recovery	Dis. Cu Est (µg/L)	Filter Color	Heterotroph (organic carbon bacteria)	Nitrification (ammonia bacteria)	Est. Life of 1" copper pipe (years)	Nitrite (mg/L)	Ammonia (mg/L)
W1 2 Hours Aquifer	2,020	1,483,387	5,927,841	7,411,228	18.5	251	7.90	747	2.98	0.00	13.63	142%	229	3	63%	37%	NT	NT	NT
W2 2 Hours Aquifer	1,371	1,360,362	5,491,476	6,851,838	17.0	239	8.01	683	2.84	0.00	11.88	167%	181	3	65%	35%	NT	NT	NT
W3 15 Minutes	NT	1,174,157	4,317,697	5,491,854	14.9	NT	NT	NT	2.89	0.00	NT	NT	122	NT	0%	0%	NT	0.0	3.48
W3 30 Minutes	NT	1,197,869	4,278,433	5,476,302	15.3	NT	NT	NT	3.05	0.00	NT	NT	85	NT	0%	0%	NT	0.0	3.36
W3 45 Minutes	NT	1,203,218	4,370,460	5,573,678	15.3	NT	NT	NT	2.79	0.00	NT	NT	101	NT	0%	0%	NT	0.0	3.20
W3 60 Minutes	NT	1,177,192	4,325,359	5,502,551	15.0	NT	NT	NT	2.91	0.00	NT	NT	111	NT	0%	0%	NT	0.0	3.92
W3 75 Minutes	NT	1,172,000	4,391,507	5,563,507	14.8	NT	NT	NT	2.66	0.00	NT	NT	64	NT	0%	0%	NT	0.0	3.28
W3 90 Minutes	NT	1,143,790	4,364,329	5,508,119	14.4	NT	NT	NT	2.65	0.00	NT	NT	42	NT	0%	0%	NT	0.0	3.44
W3 105 Minutes	NT	1,154,382	4,306,075	5,460,457	14.6	NT	NT	NT	2.78	0.00	NT	NT	93	NT	0%	0%	NT	0.0	3.36
W3 2 Hours Aquifer	1,321	1,192,293	4,669,070	5,861,363	15.0	236	8.01	698	2.26	0.00	10.47	167%	141	2	63%	37%	NT	0.0	3.36

DATA COMPARISON TABLE

Sample	ME/mL	MBP EEM (FI)	DP EEM (FI)	TP EEM (FI)	BCI	ORP (mV)	p.H. (s.u.)	Specific Conductance (uS/cm)	AOC_S (mg/L)	Nitrate (mg/L as N)	WQI Protein Assay (mg/L)	Spike Recovery	Dis. Cu Est (µg/L)	Filter Color	Heterotroph (organic carbon bacteria)	Nitrification (ammonia bacteria)	Est. Life of 1" copper pipe (years)	Nitrite (mg/L)	Ammonia (mg/L)
W1 2 Hours Aquifer	2,020	1,483,387	5,927,841	7,411,228	18.5	251	7.90	747	2.98	0.00	13.63	142%	229	3	63%	37%	NT	NT	NT
W2 2 Hours Aquifer	1,371	1,360,362	5,491,476	6,851,838	17.0	239	8.01	683	2.84	0.00	11.88	167%	181	3	65%	35%	NT	NT	NT
% Change	*-32%*	*-8%*	*-7%*	*-8%*	*-8%*	*-5%*	*-22%*	*-9%*	*-5%*	*unk*	*-13%*	*18%*	*-21%*	*0%*	*3%*	*-5%*	*unk*	*unk*	*unk*
W3 2 Hours Aquifer	1,321	1,192,293	4,669,070	5,861,363	15.0	236	8.01	698	2.26	0.00	10.47	167%	141	2	63%	37%	NT	0	3
W1 2 Hours Aquifer	2,020	1,483,387	5,927,841	7,411,228	18.5	251	7.90	747	2.98	0.00	13.63	142%	229	3	63%	37%	NT	NT	NT
% Change	*53%*	*24%*	*27%*	*26%*	*24%*	*6%*	*29%*	*7%*	*32%*	*unk*	*30%*	*-15%*	*62%*	*50%*	*0%*	*-1%*	*unk*	*unk*	*unk*
W3 2 Hours Aquifer	1,321	1,192,293	4,669,070	5,861,363	15.0	236	8.01	698	2.26	0.00	10.47	167%	141	2	63%	37%	NT	0	3
W2 2 Hours Aquifer	1,371	1,360,362	5,491,476	6,851,838	17.0	239	8.01	683	2.84	0.00	11.88	167%	181	3	65%	35%	NT	NT	NT
% Change	*4%*	*14%*	*18%*	*17%*	*13%*	*1%*	*0%*	*-2%*	*26%*	*unk*	*13%*	*0%*	*28%*	*50%*	*3%*	*-5%*	*unk*	*unk*	*unk*

Note: For a set of samples from a given system, water quality would not change by more than 5% unless biofilm were present.

Water Quality Investigations

Severity Index Scale

0.0			10.0
Low	Moderate	Elevated	Excessive

BAT DATA SUMMARY - WELLS

Project: Williams Bay, Village of - CCT

	Decay Severity SI									Metabolism Severity SI							
Sample	DSI: PO4	DSI: Sulfur	DSI: Complex OA	DSI: Simple OA	DSI: Protein Degrade	DSI: Simple Sugar	DSI: Ammonia and/or Protein	DSI: Biofilm Degrade	DSI: Iron/Metal Deficit	MSI: PO4	MSI: Sulfur	Complex OA	MSI: Simple OA	MSI: Protein Degrade	MSI: Simple Sugar	MSI: Ammonia and/or Protein	MSI: Biofilm Degrade
W1 2 Hours Aquifer	0.0	7.6	2.7	3.0	4.8	7.3	6.0	2.7	10.0	0.6	7.1	5.1	3.9	3.9	0.0	0.0	0.0
W2 2 Hours Aquifer	0.0	7.3	2.6	2.7	4.8	8.3	6.6	4.6	10.0	0.9	8.8	4.5	5.8	4.7	0.0	0.3	0.0
W3 2 Hours Aquifer	0.0	8.6	2.3	2.8	4.3	6.0	6.8	3.0	10.0	0.0	8.2	4.2	4.4	4.1	0.0	0.0	0.0

DATA COMPARISON TABLE

Sample	DSI: PO4	DSI: Sulfur	DSI: Complex OA	DSI: Simple OA	DSI: Protein Degrade	DSI: Simple Sugar	DSI: Ammonia and/or Protein	DSI: Biofilm Degrade	DSI: Iron/Metal Deficit	MSI: PO4	MSI: Sulfur	Complex OA	MSI: Simple OA	MSI: Protein Degrade	MSI: Simple Sugar	MSI: Ammonia and/or Protein	MSI: Biofilm Degrade
W1 2 Hours Aquifer	0.0	7.6	2.7	3.0	4.8	7.3	6.0	2.7	10.0	0.6	7.1	5.1	3.9	3.9	0.0	0.0	0.0
W2 2 Hours Aquifer	0.0	7.3	2.6	2.7	4.8	8.3	6.6	4.6	10.0	0.9	8.8	4.5	5.8	4.7	0.0	0.3	0.0
% Change	*10%*	*-5%*	*-6%*	*-7%*	*-1%*	*14%*	*11%*	*72%*	*-32%*	*54%*	*23%*	*-11%*	*47%*	*22%*	*46%*	*109%*	*34%*
W3 2 Hours Aquifer	0.0	8.6	2.3	2.8	4.3	6.0	6.8	3.0	10.0	0.0	8.2	4.2	4.4	4.1	0.0	0.0	0.0
W1 2 Hours Aquifer	0.0	7.6	2.7	3.0	4.8	7.3	6.0	2.7	10.0	0.6	7.1	5.1	3.9	3.9	0.0	0.0	0.0
% Change	*62%*	*-11%*	*18%*	*6%*	*12%*	*23%*	*-12%*	*-9%*	*124%*	*173%*	*-13%*	*21%*	*-12%*	*-6%*	*-109%*	*-267%*	*-100%*
W3 2 Hours Aquifer	0.0	8.6	2.3	2.8	4.3	6.0	6.8	3.0	10.0	0.0	8.2	4.2	4.4	4.1	0.0	0.0	0.0
W2 2 Hours Aquifer	0.0	7.3	2.6	2.7	4.8	8.3	6.6	4.6	10.0	0.9	8.8	4.5	5.8	4.7	0.0	0.3	0.0
% Change	*65%*	*-15%*	*11%*	*-1%*	*11%*	*39%*	*-3%*	*56%*	*53%*	*213%*	*7%*	*7%*	*29%*	*15%*	*-13%*	*133%*	*-32%*

Note: For a set of samples from a given system, water quality would not change by more than 5% unless biofilm were present.

Water Quality Investigations

Field tests completed by WQI (uncertified results)

WATER QUALITY DATA - WELLS

Client/Project: Williams Bay

	Wells											
Parameter	W1 2 Hours Aquifer	W2 2 Hours Aquifer	W3 15 Minutes	W3 30 Minutes	W3 45 Minutes	W3 60 Minutes	W3 75 Minutes	W3 90 Minutes	W3 105 Minutes	W3 2 Hours Aquifer	**Units**	**LOD**
Aluminum, tot.	ND	ND	NT	NT	NT	NT	NT	NT	NT	ND	mg/L	0.0090
Arsenic, tot.	9.9	13	NT	NT	NT	NT	NT	NT	NT	7.5	ug/L	0.85
Barium, tot.	350	280	NT	NT	NT	NT	NT	NT	NT	350	ug/L	0.20
Cadmium, tot.	ND	ND	NT	NT	NT	NT	NT	NT	NT	ND	ug/L	0.12
Calcium, tot.	65	66	NT	NT	NT	NT	NT	NT	NT	66	mg/L	0.13
Chromium, tot.	ND	ND	NT	NT	NT	NT	NT	NT	NT	ND	ug/L	2.6
Cobalt, tot.	0.16	0.13	NT	NT	NT	NT	NT	NT	NT	0.28	ug/L	0.030
Copper, tot.	ND	ND	NT	NT	NT	NT	NT	NT	NT	ND	ug/L	1.7
Iron, tot.	1.6	1.6	NT	NT	NT	NT	NT	NT	NT	1.0	mg/L	0.044
Lead, tot.	ND	ND	NT	NT	NT	NT	NT	NT	NT	ND	ug/L	0.25
Magnesium, tot.	37	35	NT	NT	NT	NT	NT	NT	NT	39	mg/L	0.069
Manganese, tot.	16	15	NT	NT	NT	NT	NT	NT	NT	9.8	ug/L	1.9
Molybdenum, tot.	1.1	0.92	NT	NT	NT	NT	NT	NT	NT	1.0	ug/L	0.33
Nickel, tot.	ND	ND	NT	NT	NT	NT	NT	NT	NT	ND	ug/L	1.0
Nitrogen, ammonia as N	5.3	5.3	3.5	3.4	3.2	3.9	3.3	3.4	3.4	4.0	mg/L	0.039
Nitrogen, nitrite as N	NT	NT	ND	ND	ND	ND	ND	ND	ND	NT	mg/L	
Nitrogen, NO2 + NO3 as N	ND	ND	NT	NT	NT	NT	NT	NT	NT	ND	mg/L	0.052
Phosphorus, tot.	0.27	0.33	NT	NT	NT	NT	NT	NT	NT	0.10	mg/L	0.0090
Potassium, tot.	2.4	2.0	NT	NT	NT	NT	NT	NT	NT	2.6	mg/L	0.060
Sodium, tot.	23	20	NT	NT	NT	NT	NT	NT	NT	20	mg/L	0.14
Strontium, tot.	670	650	NT	NT	NT	NT	NT	NT	NT	710	ug/L	0.59
Tin, tot.	ND	ND	NT	NT	NT	NT	NT	NT	NT	ND	ug/L	1.5
Total Organic Carbon (TOC)	3.9	3.4	NT	NT	NT	NT	NT	NT	NT	3.3	mg/L	0.39
Zinc, tot.	ND	ND	NT	NT	NT	NT	NT	NT	NT	ND	ug/L	5.4

Project: **Williams Bay, Village of - CCT**
Sample Name: **W1 2 Hours Aquifer**
Sample Lab ID: 2022-09-28_A-01
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *WELL*
Sample Disinfection: *NONE*
Corrosion Control: *NONE*

Severity Index Scale

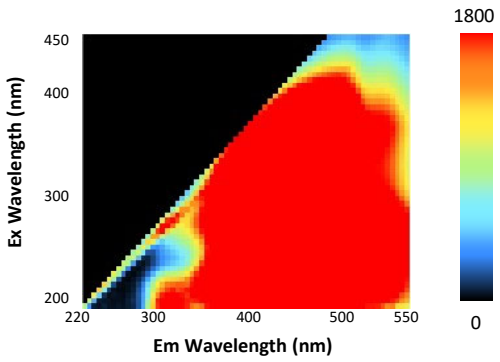
0.0 Low	Moderate	Elevated	10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
8.0	Testing indicates an Excessive magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
6.7	Testing indicates an Elevated potential for reduced biostability in the sample. (water clarity and metals exposure issue)
5.0	Testing indicates a Moderate potential for corrosion of plumbing materials.
10.0	Testing indicates an Excessive potential for DBP formation if chlorinated. (carcinogen potential)
10	Testing indicates an Excessive amount of organic/protein bound metals present in sample. (corrosion cause indicator)
10.0	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
2.8	Not Applicable

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	6

MICROBIAL BALANCE

37%	**Heterotroph (organic carbon bacteria)**
63%	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	2,020	4.0
ORP (mV)	251	2.8
pH (s.u.)	7.9	2.0
Specific Conductance (µS)	747	4.9
AOC_S (mg/L)	2.98	10.0
TP EEM (FI)	7,411,228	10.0
MBP EEM (FI)	1,483,387	10.0
DP EEM (FI)	5,927,841	10.0
Est. Dis. Copper (µg/L)	229	1.8
Nitrate-N (mg/L)	0.00	0.0
Protein Assay (mg/L)	13.63	10.0
BCI (Corrosivity Scale)	18.55	10.0

General BIT Concern(s) Listed by Decreasing Severity

1) AOC is Excessive, which is a food source for certain microbial groups and promotes corrosion.
2) TP EEM is Excessive, which is measure of biofilm stability and starvation.
3) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
4) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
5) Protein is Excessive. Protein is a nutrient source and a cause of corrosion.
6) BCI is Excessive. BCI is an internally generated corrosion risk estimation.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	0.0	0.6
Sulfur	7.6	7.1
Complex Organic Acid	2.7	5.1
Simple Organic Acid	3.0	3.9
Protein Degrade	4.8	3.9
Simple Sugar	7.3	0.0
Ammonia and/or Protein	6.0	0.0
Biofilm Degrade	2.7	0.0
Iron or Metal Deficit	10.0	NA

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

General BAT Concern(s) Listed by Decreasing Severity

1) Patterns show Excessive presence of a biofilm starved of metals needed for metabolism
2) Patterns show Elevated presence of a nitrifying type of biofilm

Project: **Williams Bay, Village of - CCT**
Sample Name: **W2 2 Hours Aquifer**
Sample Lab ID: 2022-09-28_A-02
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *WELL*
Sample Disinfection: *NONE*
Corrosion Control: *NONE*

Severity Index Scale

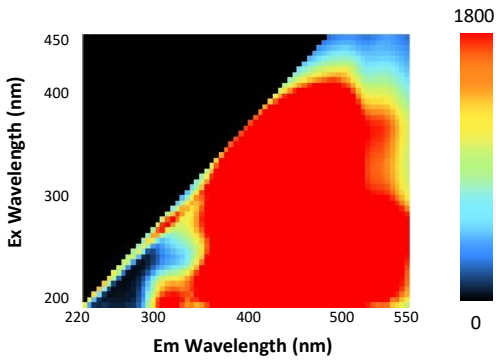
0.0 Low	Moderate	Elevated	10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
7.6	Testing indicates an Excessive magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
6.2	Testing indicates an Elevated potential for reduced biostability in the sample. (water clarity and metals exposure issue)
4.6	Testing indicates a Moderate potential for corrosion of plumbing materials.
10.0	Testing indicates an Excessive potential for DBP formation if chlorinated. (carcinogen potential)
10	Testing indicates an Excessive amount of organic/protein bound metals present in sample. (corrosion cause indicator)
10.0	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
3.2	Not Applicable

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	6

MICROBIAL BALANCE

34%	**Heterotroph (organic carbon bacteria)**
66%	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	1,371	2.7
ORP (mV)	239	3.2
pH (s.u.)	8.01	2.6
Specific Conductance (µS)	683	3.7
AOC_S (mg/L)	2.84	10.0
TP EEM (FI)	6,851,838	10.0
MBP EEM (FI)	1,360,362	10.0
DP EEM (FI)	5,491,476	10.0
Est. Dis. Copper (µg/L)	181	1.4
Nitrate-N (mg/L)	0.00	0.0
Protein Assay (mg/L)	11.88	10.0
BCI (Corrosivity Scale)	16.97	10.0

General BIT Concern(s) Listed by Decreasing Severity

1) AOC is Excessive, which is a food source for certain microbial groups and promotes corrosion.
2) TP EEM is Excessive, which is measure of biofilm stability and starvation.
3) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
4) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
5) Protein is Excessive. Protein is a nutrient source and a cause of corrosion.
6) BCI is Excessive. BCI is an internally generated corrosion risk estimation.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	0.0	0.9
Sulfur	7.3	8.8
Complex Organic Acid	2.6	4.5
Simple Organic Acid	2.7	5.8
Protein Degrade	4.8	4.7
Simple Sugar	8.3	0.0
Ammonia and/or Protein	6.6	0.3
Biofilm Degrade	4.6	0.0
Iron or Metal Deficit	10.0	NA

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

General BAT Concern(s) Listed by Decreasing Severity

1) Patterns show Excessive presence of a biofilm starved of metals needed for metabolism
2) Patterns show Elevated presence of a nitrifying type of biofilm
3) Patterns show Elevated presence of a sulfate reducing biofilm

Project: **Williams Bay, Village of - CCT**
Sample Name: **W3 15 Minutes**
Sample Lab ID: 2022-09-28_A-03
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *WELL*
Sample Disinfection: *NONE*
Corrosion Control: *NONE*

Severity Index Scale

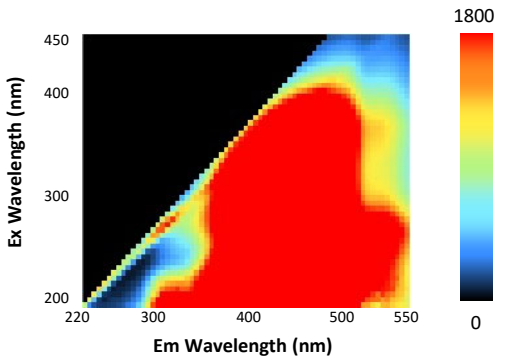
0.0 Low — Moderate — Elevated — 10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
10.0	Testing indicates an Excessive magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
10.0	Testing indicates an Excessive potential for reduced biostability in the sample. (water clarity and metals exposure issue)
5.0	Testing indicates an Elevated potential for corrosion of plumbing materials.
#VALUE!	
10	Testing indicates an Excessive amount of organic/protein bound metals present in sample. (corrosion cause indicator)
10.0	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
NA	Not Applicable

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

NT

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	NA

MICROBIAL BALANCE

NA	**Heterotroph (organic carbon bacteria)**
NA	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	NT	NA
ORP (mV)	NT	NA
pH (s.u.)	NT	NA
Specific Conductance (µS)	NT	NA
AOC_S (mg/L)	2.89	10.0
TP EEM (FI)	5,491,854	10.0
MBP EEM (FI)	1,174,157	10.0
DP EEM (FI)	4,317,697	10.0
Est. Dis. Copper (µg/L)	122	0.9
Nitrate-N (mg/L)	0.00	0.0
Protein Assay (mg/L)	NT	NA
BCI (Corrosivity Scale)	14.93	10.0

General BIT Concern(s) Listed by Decreasing Severity

1) AOC is Excessive, which is a food source for certain microbial groups and promotes corrosion.
2) TP EEM is Excessive, which is measure of biofilm stability and starvation.
3) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
4) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
5) BCI is Excessive. BCI is an internally generated corrosion risk estimation.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	NA	NA
Sulfur	NA	NA
Complex Organic Acid	NA	NA
Simple Organic Acid	NA	NA
Protein Degrade	NA	NA
Simple Sugar	NA	NA
Ammonia and/or Protein	NA	NA
Biofilm Degrade	NA	NA
Iron or Metal Deficit	NA	NA

General BAT Concern(s) Listed by Decreasing Severity

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

Project: **Williams Bay, Village of - CCT**
Sample Name: **W3 30 Minutes**
Sample Lab ID: 2022-09-28_A-04
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *WELL*
Sample Disinfection: *NONE*
Corrosion Control: *NONE*

Severity Index Scale

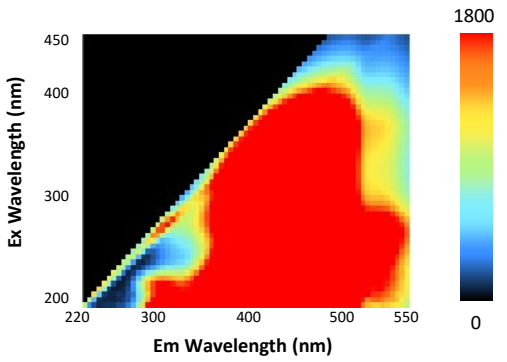
0.0 Low — Moderate — Elevated — 10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
10.0	Testing indicates an Excessive magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
10.0	Testing indicates an Excessive potential for reduced biostability in the sample. (water clarity and metals exposure issue)
5.0	Testing indicates an Elevated potential for corrosion of plumbing materials.
#VALUE!	
10	Testing indicates an Excessive amount of organic/protein bound metals present in sample. (corrosion cause indicator)
10.0	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
NA	Not Applicable

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

NT

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	NA

MICROBIAL BALANCE

NA	**Heterotroph (organic carbon bacteria)**
NA	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	NT	NA
ORP (mV)	NT	NA
pH (s.u.)	NT	NA
Specific Conductance (µS)	NT	NA
AOC_S (mg/L)	3.05	10.0
TP EEM (FI)	5,476,302	10.0
MBP EEM (FI)	1,197,869	10.0
DP EEM (FI)	4,278,433	10.0
Est. Dis. Copper (µg/L)	85	0.7
Nitrate-N (mg/L)	0.00	0.0
Protein Assay (mg/L)	NT	NA
BCI (Corrosivity Scale)	15.33	10.0

General BIT Concern(s) Listed by Decreasing Severity

1) AOC is Excessive, which is a food source for certain microbial groups and promotes corrosion.
2) TP EEM is Excessive, which is measure of biofilm stability and starvation.
3) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
4) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
5) BCI is Excessive. BCI is an internally generated corrosion risk estimation.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	NA	NA
Sulfur	NA	NA
Complex Organic Acid	NA	NA
Simple Organic Acid	NA	NA
Protein Degrade	NA	NA
Simple Sugar	NA	NA
Ammonia and/or Protein	NA	NA
Biofilm Degrade	NA	NA
Iron or Metal Deficit	NA	NA

General BAT Concern(s) Listed by Decreasing Severity

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

Project: **Williams Bay, Village of - CCT**
Sample Name: **W3 45 Minutes**
Sample Lab ID: 2022-09-28_A-05
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *WELL*
Sample Disinfection: *NONE*
Corrosion Control: *NONE*

Severity Index Scale

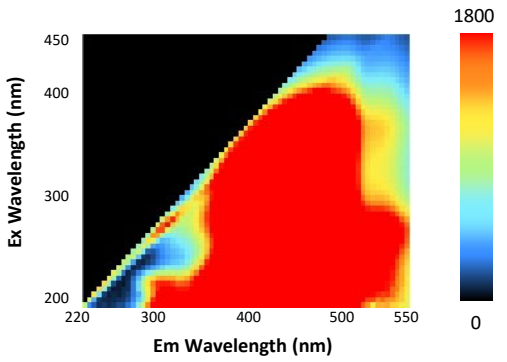
0.0 Low	Moderate	Elevated	10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
10.0	Testing indicates an Excessive magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
10.0	Testing indicates an Excessive potential for reduced biostability in the sample. (water clarity and metals exposure issue)
5.0	Testing indicates an Elevated potential for corrosion of plumbing materials.
#VALUE!	
10	Testing indicates an Excessive amount of organic/protein bound metals present in sample. (corrosion cause indicator)
10.0	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
NA	Not Applicable

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

NT

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	NA

MICROBIAL BALANCE

NA	**Heterotroph (organic carbon bacteria)**
NA	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	NT	NA
ORP (mV)	NT	NA
pH (s.u.)	NT	NA
Specific Conductance (µS)	NT	NA
AOC_S (mg/L)	2.79	10.0
TP EEM (FI)	5,573,678	10.0
MBP EEM (FI)	1,203,218	10.0
DP EEM (FI)	4,370,460	10.0
Est. Dis. Copper (µg/L)	101	0.8
Nitrate-N (mg/L)	0.00	0.0
Protein Assay (mg/L)	NT	NA
BCI (Corrosivity Scale)	15.34	10.0

General BIT Concern(s) Listed by Decreasing Severity

1) AOC is Excessive, which is a food source for certain microbial groups and promotes corrosion.
2) TP EEM is Excessive, which is measure of biofilm stability and starvation.
3) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
4) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
5) BCI is Excessive. BCI is an internally generated corrosion risk estimation.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	NA	NA
Sulfur	NA	NA
Complex Organic Acid	NA	NA
Simple Organic Acid	NA	NA
Protein Degrade	NA	NA
Simple Sugar	NA	NA
Ammonia and/or Protein	NA	NA
Biofilm Degrade	NA	NA
Iron or Metal Deficit	NA	NA

General BAT Concern(s) Listed by Decreasing Severity

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

Project: **Williams Bay, Village of - CCT**
Sample Name: **W3 60 Minutes**
Sample Lab ID: 2022-09-28_A-06
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *WELL*
Sample Disinfection: *NONE*
Corrosion Control: *NONE*

Severity Index Scale

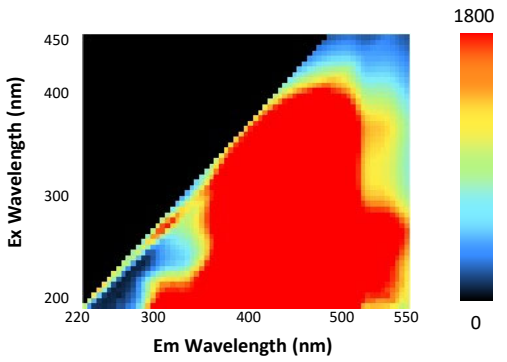
0.0 Low	Moderate	Elevated	10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
10.0	Testing indicates an Excessive magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
10.0	Testing indicates an Excessive potential for reduced biostability in the sample. (water clarity and metals exposure issue)
5.0	Testing indicates an Elevated potential for corrosion of plumbing materials.
#VALUE!	
10	Testing indicates an Excessive amount of organic/protein bound metals present in sample. (corrosion cause indicator)
10.0	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
NA	Not Applicable

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

NT

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	NA

MICROBIAL BALANCE

NA	**Heterotroph (organic carbon bacteria)**
NA	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	NT	NA
ORP (mV)	NT	NA
pH (s.u.)	NT	NA
Specific Conductance (µS)	NT	NA
AOC_S (mg/L)	2.91	10.0
TP EEM (FI)	5,502,551	10.0
MBP EEM (FI)	1,177,192	10.0
DP EEM (FI)	4,325,359	10.0
Est. Dis. Copper (µg/L)	111	0.9
Nitrate-N (mg/L)	0.00	0.0
Protein Assay (mg/L)	NT	NA
BCI (Corrosivity Scale)	14.98	10.0

General BIT Concern(s) Listed by Decreasing Severity

1) AOC is Excessive, which is a food source for certain microbial groups and promotes corrosion.
2) TP EEM is Excessive, which is measure of biofilm stability and starvation.
3) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
4) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
5) BCI is Excessive. BCI is an internally generated corrosion risk estimation.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	NA	NA
Sulfur	NA	NA
Complex Organic Acid	NA	NA
Simple Organic Acid	NA	NA
Protein Degrade	NA	NA
Simple Sugar	NA	NA
Ammonia and/or Protein	NA	NA
Biofilm Degrade	NA	NA
Iron or Metal Deficit	NA	NA

General BAT Concern(s) Listed by Decreasing Severity

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

Project: **Williams Bay, Village of - CCT**
Sample Name: **W3 75 Minutes**
Sample Lab ID: 2022-09-28_A-07
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *WELL*
Sample Disinfection: *NONE*
Corrosion Control: *NONE*

Severity Index Scale

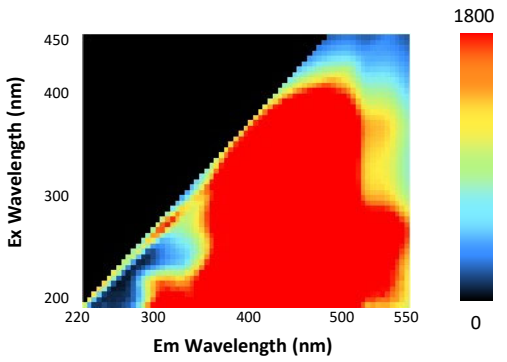
0.0 Low — Moderate — Elevated — 10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
10.0	Testing indicates an Excessive magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
10.0	Testing indicates an Excessive potential for reduced biostability in the sample. (water clarity and metals exposure issue)
5.0	Testing indicates an Elevated potential for corrosion of plumbing materials.
#VALUE!	
10	Testing indicates an Excessive amount of organic/protein bound metals present in sample. (corrosion cause indicator)
10.0	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
NA	Not Applicable

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

NT

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	NA

MICROBIAL BALANCE

NA	**Heterotroph (organic carbon bacteria)**
NA	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	NT	NA
ORP (mV)	NT	NA
pH (s.u.)	NT	NA
Specific Conductance (µS)	NT	NA
AOC_S (mg/L)	2.66	10.0
TP EEM (FI)	5,563,507	10.0
MBP EEM (FI)	1,172,000	10.0
DP EEM (FI)	4,391,507	10.0
Est. Dis. Copper (µg/L)	64	0.5
Nitrate-N (mg/L)	0.00	0.0
Protein Assay (mg/L)	NT	NA
BCI (Corrosivity Scale)	14.85	10.0

General BIT Concern(s) Listed by Decreasing Severity

1) AOC is Excessive, which is a food source for certain microbial groups and promotes corrosion.
2) TP EEM is Excessive, which is measure of biofilm stability and starvation.
3) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
4) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
5) BCI is Excessive. BCI is an internally generated corrosion risk estimation.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	NA	NA
Sulfur	NA	NA
Complex Organic Acid	NA	NA
Simple Organic Acid	NA	NA
Protein Degrade	NA	NA
Simple Sugar	NA	NA
Ammonia and/or Protein	NA	NA
Biofilm Degrade	NA	NA
Iron or Metal Deficit	NA	NA

General BAT Concern(s) Listed by Decreasing Severity

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

Project: **Williams Bay, Village of - CCT**
Sample Name: **W3 90 Minutes**
Sample Lab ID: 2022-09-28_A-08
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *WELL*
Sample Disinfection: *NONE*
Corrosion Control: *NONE*

Severity Index Scale

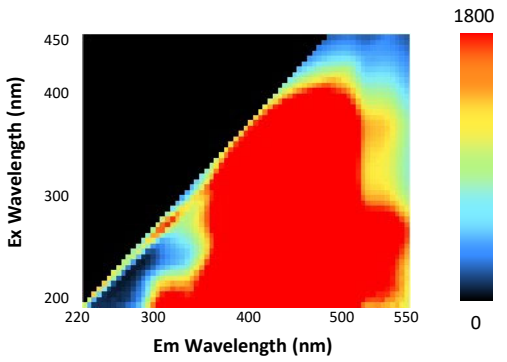
0.0 Low	Moderate	Elevated	10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
10.0	Testing indicates an Excessive magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
10.0	Testing indicates an Excessive potential for reduced biostability in the sample. (water clarity and metals exposure issue)
5.0	Testing indicates an Elevated potential for corrosion of plumbing materials.
#VALUE!	
10	Testing indicates an Excessive amount of organic/protein bound metals present in sample. (corrosion cause indicator)
10.0	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
NA	Not Applicable

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

NT

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Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	NA

MICROBIAL BALANCE

NA	**Heterotroph (organic carbon bacteria)**
NA	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	NT	NA
ORP (mV)	NT	NA
pH (s.u.)	NT	NA
Specific Conductance (µS)	NT	NA
AOC_S (mg/L)	2.65	10.0
TP EEM (FI)	5,508,119	10.0
MBP EEM (FI)	1,143,790	10.0
DP EEM (FI)	4,364,329	10.0
Est. Dis. Copper (µg/L)	42	0.3
Nitrate-N (mg/L)	0.00	0.0
Protein Assay (mg/L)	NT	NA
BCI (Corrosivity Scale)	14.44	10.0

General BIT Concern(s) Listed by Decreasing Severity

1) AOC is Excessive, which is a food source for certain microbial groups and promotes corrosion.
2) TP EEM is Excessive, which is measure of biofilm stability and starvation.
3) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
4) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
5) BCI is Excessive. BCI is an internally generated corrosion risk estimation.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	NA	NA
Sulfur	NA	NA
Complex Organic Acid	NA	NA
Simple Organic Acid	NA	NA
Protein Degrade	NA	NA
Simple Sugar	NA	NA
Ammonia and/or Protein	NA	NA
Biofilm Degrade	NA	NA
Iron or Metal Deficit	NA	NA

General BAT Concern(s) Listed by Decreasing Severity

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

Project: **Williams Bay, Village of - CCT**
Sample Name: **W3 105 Minutes**
Sample Lab ID: 2022-09-28_A-09
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *WELL*
Sample Disinfection: *NONE*
Corrosion Control: *NONE*

Severity Index Scale

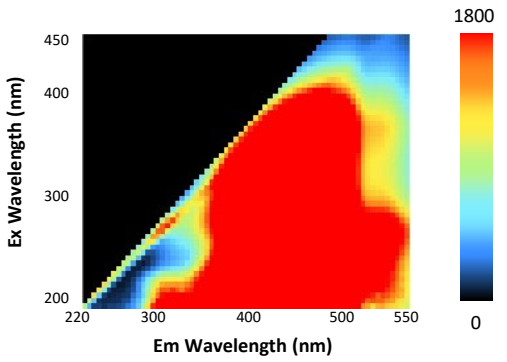
0.0 Low — Moderate — Elevated — 10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
10.0	Testing indicates an Excessive magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
10.0	Testing indicates an Excessive potential for reduced biostability in the sample. (water clarity and metals exposure issue)
5.0	Testing indicates an Elevated potential for corrosion of plumbing materials.
#VALUE!	
10	Testing indicates an Excessive amount of organic/protein bound metals present in sample. (corrosion cause indicator)
10.0	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
NA	Not Applicable

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

NT

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Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	NA

MICROBIAL BALANCE

NA	**Heterotroph (organic carbon bacteria)**
NA	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	NT	NA
ORP (mV)	NT	NA
pH (s.u.)	NT	NA
Specific Conductance (µS)	NT	NA
AOC_S (mg/L)	2.78	10.0
TP EEM (FI)	5,460,457	10.0
MBP EEM (FI)	1,154,382	10.0
DP EEM (FI)	4,306,075	10.0
Est. Dis. Copper (µg/L)	93	0.7
Nitrate-N (mg/L)	0.00	0.0
Protein Assay (mg/L)	NT	NA
BCI (Corrosivity Scale)	14.64	10.0

General BIT Concern(s) Listed by Decreasing Severity

1) AOC is Excessive, which is a food source for certain microbial groups and promotes corrosion.
2) TP EEM is Excessive, which is measure of biofilm stability and starvation.
3) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
4) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
5) BCI is Excessive. BCI is an internally generated corrosion risk estimation.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	NA	NA
Sulfur	NA	NA
Complex Organic Acid	NA	NA
Simple Organic Acid	NA	NA
Protein Degrade	NA	NA
Simple Sugar	NA	NA
Ammonia and/or Protein	NA	NA
Biofilm Degrade	NA	NA
Iron or Metal Deficit	NA	NA

General BAT Concern(s) Listed by Decreasing Severity

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

Project: **Williams Bay, Village of - CCT**
Sample Name: **W3 2 Hours Aquifer**
Sample Lab ID: 2022-09-28_A-10
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *WELL*
Sample Disinfection: *NONE*
Corrosion Control: *NONE*

Severity Index Scale

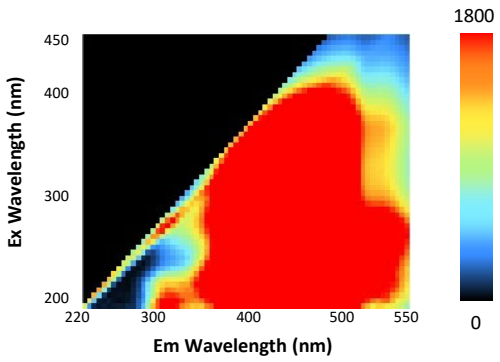
0.0 Low	Moderate	Elevated	10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
7.5	Testing indicates an Excessive magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
5.5	Testing indicates an Elevated potential for reduced biostability in the sample. (water clarity and metals exposure issue)
4.7	Testing indicates a Moderate potential for corrosion of plumbing materials.
10.0	Testing indicates an Excessive potential for DBP formation if chlorinated. (carcinogen potential)
10	Testing indicates an Excessive amount of organic/protein bound metals present in sample. (corrosion cause indicator)
10.0	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
3.3	Not Applicable

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	4

MICROBIAL BALANCE

37%	**Heterotroph (organic carbon bacteria)**
63%	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	1,321	2.6
ORP (mV)	236	3.3
pH (s.u.)	8.01	2.6
Specific Conductance (µS)	698	4.0
AOC_S (mg/L)	2.26	10.0
TP EEM (FI)	5,861,363	10.0
MBP EEM (FI)	1,192,293	10.0
DP EEM (FI)	4,669,070	10.0
Est. Dis. Copper (µg/L)	141	1.1
Nitrate-N (mg/L)	0.00	0.0
Protein Assay (mg/L)	10.47	10.0
BCI (Corrosivity Scale)	14.97	10.0

General BIT Concern(s) Listed by Decreasing Severity

1) AOC is Excessive, which is a food source for certain microbial groups and promotes corrosion.
2) TP EEM is Excessive, which is measure of biofilm stability and starvation.
3) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
4) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
5) Protein is Excessive. Protein is a nutrient source and a cause of corrosion.
6) BCI is Excessive. BCI is an internally generated corrosion risk estimation.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	0.0	0.0
Sulfur	8.6	8.2
Complex Organic Acid	2.3	4.2
Simple Organic Acid	2.8	4.4
Protein Degrade	4.3	4.1
Simple Sugar	6.0	0.0
Ammonia and/or Protein	6.8	0.0
Biofilm Degrade	3.0	0.0
Iron or Metal Deficit	10.0	NA

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

General BAT Concern(s) Listed by Decreasing Severity

1) Patterns show Excessive presence of a biofilm starved of metals needed for metabolism

Water Quality Investigations

2581 State Road 92, Suite 2
Mount Horeb, WI 53572
Phone: (888) 499-2507

Project: Williams Bay, Village of - CCT

OVERALL DATA TREND ASSESSMENT AND RECOMMENDATIONS - TREATMENT PLANT

BIOFILM INDICATION TEST® (BIT) DATA & WATER QUALITY DATA

Ammonia in treated water leaving the plant is 3.2 mg/L as N, which is **excessive** and will select for **excessive** growth of an ammonia oxidizing biofilm in the downstream water system (undesired). This growth will be concentrated in water storage facilities at the air/water interface where oxygen levels will be adequate.
Disinfection is in the form of chloramines. With this type of disinfection, free chlorine will be zero/low and all chlorine present will be measured as total chlorine. Effective chloramine disinfection will have a pH of about 8.2 su and have a small excess of ammonia (about 0.1 mg/L as N). Data suggest that disinfection of the treated water is ineffective and will not control biofilm growth and nitrification in the water distribution system.
The following data patterns are observed when comparing the *Tower Drain* sample to the *Clearwell Stagnation sample:*
Decreased ammonia and protein concentrations, and an **increased** nitrate plus nitrite concentration, which collectively indicate the **excessive** presence of a nitrifying type biofilm in the water tower. Testing did not differentiate nitrate from nitrite.
Excessively increased microbial occurrence, which indicates the presence of a thick biofilm in the water tower and an **ineffective** disinfection residual.
Decreased pH, which correlates with the presence of a **thick** biofilm in the water tower performing nitrification. This process is known to cause a drop in pH.
The **decrease** in ammonia of 3.0 mg/L as N correlates with the **increase** in nitrate of 2.7 mg/L as N and the presence of a nutrifying type of biofilm in the water tower. This conversion would require an oxygen concentration of 8.6 to 11/3 mg/L, depending upon the amount of nitrite and nitrate present. This amount of oxygen would only be available near the air-water interface in the water tower.
The above issues likely exists at all water towers in the water system.

BIOFILM ACTIVITY TEST® (BAT) DATA

Data generally indicate that the treatment system **reduced** biofilm starvation and **reduced** the potential for nitrification to occur in the water.
The following data patterns are observed when comparing the *Tower Drain* sample to the *Clearwell Stagnation* sample:
A shift in biofilm type and activity from primarily heterotrophic to primarily nitrifying (confirms BIT data). This likely correlates with the depletion of the high disinfection residual at the clearwell to no disinfection residual at the water tower.
Increased and excessive Sulfur MSI and **decreased** Ammonia and/or Protein MSI correlate with the **excessive** presence of a nitrifying type biofilm in the water tower that is metabolizing ammonia and proteins (undesired).

Water Quality Investigations

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Project: Williams Bay, Village of - CCT

OVERALL DATA TREND ASSESSMENT AND RECOMMENDATIONS - TREATMENT PLANT

BIOFILM INDICATION TEST® (BIT) DATA & WATER QUALITY DATA

CONCLUSIONS AND RECOMMENDATIONS

Th current practice of lime softening dramatically improves water quality, but does not remove enough ammonia and proteins to prevent biofilm and biofilm related issues in the water distribution system.
Nitrification is occurring in the water distribution system, increasing significantly between clearwell and water tower. Nitrification is likely occurring primarily in the water towers at the air-water interface where required conditions are present.
The following improvements are needed in the water system to control nitrification. These recommendations are inline with recommendations described in AWWA's Manual of Water Supply Practices M68:
Reduce the amount of free ammonia in treated water at the entry point to near zero. This can be accomplished with breakpoint chlorination to achieve a free chlorine residual with no ammonia or partial breakpoint chlorination to achieve an adequate chloramine concentration with low free ammonia. The switch to partial breakpoint chlorination would likely be the least disruptive to biofilm and scales in the water system.
With chloramine disinfection, maintain a pH of 8.2 to 8.5 su at the entry point. This target pH will improve stability of the disinfectant and reduce odor complaints, keeping chloramine present in the form of monochloramine.
Perform unidirectional flushing (UDF) of the water system to reduce the presence of biofilm in the system and maintain control of biofilm. UDF will likely be needed twice per year for the first few years, then once per year or every other year after that.
Perform chemical cleaning of water storage facilities to reduce the presence of biofilm in these facilities and maintain control of biofilm in the system. A combination of chemical cleaning to remove sticky biofilm and mechanical cleaning with pressure washing is the most effective. Chlorination with mechanical cleaning for a nitrifying type biofilm is not effective as these biofilms are incredibly stick and hard to penetrate with this approach.

Water Quality Investigations

BIT DATA SUMMARY - TREATMENT PLANT

Project: Williams Bay, Village of - CCT

Sample	ME/mL	MBP EEM (FI)	DP EEM (FI)	TP EEM (FI)	BCI	ORP (mV)	p.H. (s.u.)	Specific Conductance (uS/cm)	AOC_S (mg/L)	Nitrate + Nitrite (mg/L as N)	WQI Protein Assay (mg/L)	Spike Recovery	Filter Color	Heterotroph (organic carbon bacteria)	Nitrification (ammonia bacteria)
W1 2 Hours Aquifer	2,020	1,483,387	5,927,841	7,411,228	18.5	251	7.90	747	2.98	0.00	13.63	142%	3	63%	37%
W2 2 Hours Aquifer	1,371	1,360,362	5,491,476	6,851,838	17.0	239	8.01	683	2.84	0.00	11.88	167%	3	65%	35%
W3 2 Hours Aquifer	1,321	1,192,293	4,669,070	5,861,363	15.0	236	8.01	698	2.26	0.00	10.47	167%	2	63%	37%
After Sedimentation	37	406,272	1,024,246	1,430,518	5.7	453	8.11	263	1.13	0.00	5.34	148%	0	62%	38%
After Filtration	25	397,966	1,012,174	1,410,140	5.5	451	8.10	266	1.09	0.00	3.81	143%	0	69%	31%
After Clearwell Stagnation	25	389,325	996,238	1,385,563	5.4	477	8.01	327	1.14	0.08	3.06	572%	0	71%	29%
From Tower Drain	62,834	268,518	769,482	1,038,000	3.6	404	7.82	265	0.59	2.33	1.10	222%	0	12%	88%

DATA COMPARISON TABLE

Sample	ME/mL	MBP EEM (FI)	DP EEM (FI)	TP EEM (FI)	BCI	ORP (mV)	p.H. (s.u.)	Specific Conductance (uS/cm)	AOC_S (mg/L)	Nitrate + Nitrite (mg/L as N)	WQI Protein Assay (mg/L)	Spike Recovery	Filter Color	Heterotroph (organic carbon bacteria)	Nitrification (ammonia bacteria)
After Sedimentation	37	406,272	1,024,246	1,430,518	5.7	453	8.11	263	1.13	0.00	5.34	148%	0	62%	38%
After Filtration	25	397,966	1,012,174	1,410,140	5.5	451	8.10	266	1.09	0.00	3.81	143%	0	69%	31%
% Change	*-31%*	*-2%*	*-1%*	*-1%*	*-2%*	*0%*	*2%*	*1%*	*-4%*	*unk*	*-29%*	*-3%*	*unk*	*10%*	*-17%*
After Filtration	25	397,966	1,012,174	1,410,140	5.5	451	8.10	266	1.09	0.00	3.81	143%	0	69%	31%
After Clearwell Stagnation	25	389,325	996,238	1,385,563	5.4	477	8.01	327	1.14	0.08	3.06	572%	0	71%	29%
% Change	*0%*	*-2%*	*-2%*	*-2%*	*-2%*	*6%*	*23%*	*23%*	*5%*	*incr.*	*-20%*	*300%*	*unk*	*3%*	*-6%*
After Clearwell Stagnation	25	389,325	996,238	1,385,563	5.4	477	8.01	327	1.14	0.08	3.06	572%	0	71%	29%
From Tower Drain	62,834	268,518	769,482	1,038,000	3.6	404	7.82	265	0.59	2.33	1.10	222%	0	12%	88%
% Change	*249900%*	*-31%*	*-23%*	*-25%*	*-33%*	*-15%*	*55%*	*-19%*	*-48%*	*2813%*	*-64%*	*-61%*	*unk*	*-83%*	*200%*

Water Quality Investigations

Severity Index Scale

0.0			10.0
Low	Moderate	Elevated	Excessive

BAT DATA SUMMARY - TREATMENT PLANT

Project: Williams Bay, Village of - CCT

	Decay Severity SI									Metabolism Severity SI							
Sample	DSI: PO4	DSI: Sulfur	DSI: Complex OA	DSI: Simple OA	DSI: Protein Degrade	DSI: Simple Sugar	DSI: Ammonia and/or Protein	DSI: Biofilm Degrade	DSI: Iron/Metal Deficit	MSI: PO4	MSI: Sulfur	Complex OA	MSI: Simple OA	MSI: Protein Degrade	MSI: Simple Sugar	MSI: Ammonia and/or Protein	MSI: Biofilm Degrade
W1 2 Hours Aquifer	0.0	7.6	2.7	3.0	4.8	7.3	6.0	2.7	10.0	0.6	7.1	5.1	3.9	3.9	0.0	0.0	0.0
W2 2 Hours Aquifer	0.0	7.3	2.6	2.7	4.8	8.3	6.6	4.6	10.0	0.9	8.8	4.5	5.8	4.7	0.0	0.3	0.0
W3 2 Hours Aquifer	0.0	8.6	2.3	2.8	4.3	6.0	6.8	3.0	10.0	0.0	8.2	4.2	4.4	4.1	0.0	0.0	0.0
After Sedimentation	0.0	4.6	2.2	1.3	2.4	9.8	2.8	4.1	3.4	0.0	4.6	4.7	1.5	1.7	0.0	10.0	0.0
After Filtration	0.0	7.1	1.4	1.7	3.0	7.0	3.9	3.5	3.2	1.8	5.9	2.0	1.5	1.8	0.0	9.1	0.0
After Clearwell Stagnation	0.0	5.7	1.4	1.6	2.8	6.0	3.3	2.9	5.1	1.7	5.4	1.7	1.6	1.8	0.0	10.0	0.0
From Tower Drain	0.8	5.0	1.2	1.1	2.1	7.5	4.3	4.6	2.9	2.0	8.9	1.5	1.3	1.5	0.0	0.0	0.0

DATA COMPARISON TABLE

Sample	DSI: PO4	DSI: Sulfur	DSI: Complex OA	DSI: Simple OA	DSI: Protein Degrade	DSI: Simple Sugar	DSI: Ammonia and/or Protein	DSI: Biofilm Degrade	DSI: Iron/Metal Deficit	MSI: PO4	MSI: Sulfur	Complex OA	MSI: Simple OA	MSI: Protein Degrade	MSI: Simple Sugar	MSI: Ammonia and/or Protein	MSI: Biofilm Degrade
After Sedimentation	0.0	4.6	2.2	1.3	2.4	9.8	2.8	4.1	3.4	0.0	4.6	4.7	1.5	1.7	0.0	10.0	0.0
After Filtration	0.0	7.1	1.4	1.7	3.0	7.0	3.9	3.5	3.2	1.8	5.9	2.0	1.5	1.8	0.0	9.1	0.0
% Change	*61%*	*53%*	*-36%*	*34%*	*21%*	*-29%*	*39%*	*-14%*	*-6%*	*486%*	*27%*	*-57%*	*1%*	*8%*	*-363%*	*-28%*	*-62%*
After Filtration	0.0	7.1	1.4	1.7	3.0	7.0	3.9	3.5	3.2	1.8	5.9	2.0	1.5	1.8	0.0	9.1	0.0
After Clearwell Stagnation	0.0	5.7	1.4	1.6	2.8	6.0	3.3	2.9	5.1	1.7	5.4	1.7	1.6	1.8	0.0	10.0	0.0
% Change	*8%*	*-20%*	*-1%*	*-5%*	*-7%*	*-14%*	*-15%*	*-18%*	*60%*	*-3%*	*-8%*	*-15%*	*6%*	*2%*	*33%*	*9%*	*64%*
After Clearwell Stagnation	0.0	5.7	1.4	1.6	2.8	6.0	3.3	2.9	5.1	1.7	5.4	1.7	1.6	1.8	0.0	10.0	0.0
From Tower Drain	0.8	5.0	1.2	1.1	2.1	7.5	4.3	4.6	2.9	2.0	8.9	1.5	1.3	1.5	0.0	0.0	0.0
% Change	*210%*	*-13%*	*-16%*	*-31%*	*-22%*	*24%*	*30%*	*59%*	*-44%*	*20%*	*66%*	*-12%*	*-18%*	*-16%*	*-39%*	*-103%*	*-115%*

Water Quality Investigations

WATER QUALITY DATA - TREATMENT PLANT

Client/Project:

	Treatment Plant					
Parameter	After Sedimentation	After Filtration	After Clearwell Stagnation	From Tower Drain	**Units**	**LOD**
Aluminum, tot.	0.040	ND	ND	0.015	mg/L	0.0090
Arsenic, tot.	ND	ND	1.5	0.87	ug/L	0.85
Barium, tot.	28	24	26	34	ug/L	0.20
Cadmium, tot.	ND	ND	ND	ND	ug/L	0.12
Calcium, tot.	20	17	18	21	mg/L	0.13
Chromium, tot.	ND	ND	ND	ND	ug/L	2.6
Cobalt, tot.	0.045	0.044	0.050	0.044	ug/L	0.030
Copper, tot.	ND	2.9	2.9	2.1	ug/L	1.7
Iron, tot.	ND	ND	ND	ND	mg/L	0.044
Lead, tot.	ND	0.55	0.33	ND	ug/L	0.25
Magnesium, tot.	5.7	5.8	5.9	5.9	mg/L	0.069
Manganese, tot.	ND	ND	ND	ND	ug/L	1.9
Molybdenum, tot.	0.89	0.80	0.90	0.91	ug/L	0.33
Nickel, tot.	ND	ND	ND	ND	ug/L	1.0
Nitrogen, ammonia as N	3.6	3.9	3.2	0.24	mg/L	0.039
Nitrogen, nitrite as N	NT	NT	NT	NT	mg/L	
Nitrogen, NO2 + NO3 as N	0.14	0.13	0.25	2.9	mg/L	0.052
Phosphorus, tot.	0.010	ND	ND	0.0090	mg/L	0.0090
Potassium, tot.	3.0	2.9	2.9	2.9	mg/L	0.060
Sodium, tot.	21	21	21	21	mg/L	0.14
Strontium, tot.	160	140	150	170	ug/L	0.59
Tin, tot.	ND	ND	ND	ND	ug/L	1.5
Total Organic Carbon (TOC)	1.3	1.4	1.4	1.4	mg/L	0.39
Zinc, tot.	27	ND	ND	11	ug/L	5.4

Project: **Williams Bay, Village of - CCT**
Sample Name: **After Sedimentation**
Sample Lab ID: 2022-09-28_A-11
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *TRT SYS*
Sample Disinfection: *NONE*
Corrosion Control: *NONE*

Severity Index Scale

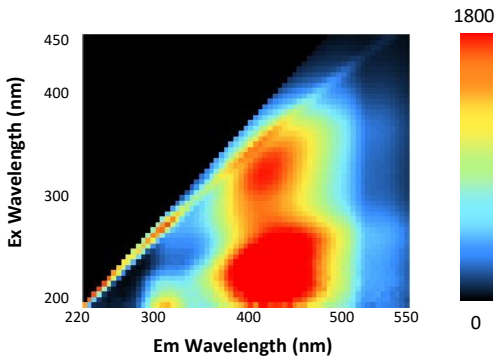
0.0 Low — Moderate — Elevated — 10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
6.7	Testing indicates an Elevated magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
3.2	Testing indicates a Moderate potential for reduced biostability in the sample. (water clarity and metals exposure issue)
4.9	Testing indicates a Moderate potential for corrosion of plumbing materials.
10.0	Testing indicates an Excessive potential for DBP formation if chlorinated. (carcinogen potential)
9.1	Testing indicates an Excessive amount of organic/protein bound metals present in sample. (corrosion cause indicator)
9.8	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
2.9	Not Applicable

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	0

MICROBIAL BALANCE

24%	**Heterotroph (organic carbon bacteria)**
76%	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	37	0.1
ORP (mV)	453	2.9
pH (s.u.)	8.11	3.1
Specific Conductance (µS)	263	4.7
AOC_S (mg/L)	1.13	10.0
TP EEM (FI)	1,430,518	9.5
MBP EEM (FI)	406,272	9.0
DP EEM (FI)	1,024,246	10.0
Est. Dis. Copper (µg/L)	24	0.2
Nitrate-N (mg/L)	0.00	0.0
Protein Assay (mg/L)	5.34	10.0
BCI (Corrosivity Scale)	5.67	6.8

General BIT Concern(s) Listed by Decreasing Severity

1) AOC is Excessive, which is a food source for certain microbial groups and promotes corrosion.
2) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
3) Protein is Excessive. Protein is a nutrient source and a cause of corrosion.
4) TP EEM is Excessive, which is measure of biofilm stability and starvation.
5) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
6) BCI is Elevated. BCI is an internally generated corrosion risk estimation.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	0.0	0.0
Sulfur	4.6	4.6
Complex Organic Acid	2.2	4.7
Simple Organic Acid	1.3	1.5
Protein Degrade	2.4	1.7
Simple Sugar	9.8	0.0
Ammonia and/or Protein	2.8	10.0
Biofilm Degrade	4.1	0.0
Iron or Metal Deficit	3.4	NA

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

General BAT Concern(s) Listed by Decreasing Severity

1) Patterns show Excessive presence of a fermenting type of biofilm

Project: **Williams Bay, Village of - CCT**
Sample Name: **After Filtration**
Sample Lab ID: 2022-09-28_A-12
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *TRT SYS*
Sample Disinfection: *CHLORINE*
Corrosion Control: *NONE*

Severity Index Scale

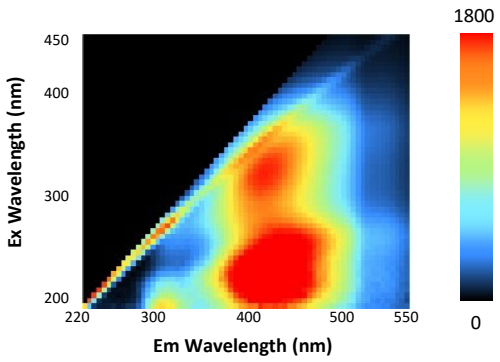
0.0 Low	Moderate	Elevated	10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
6.7	Testing indicates an Elevated magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
3.2	Testing indicates a Moderate potential for reduced biostability in the sample. (water clarity and metals exposure issue)
4.9	Testing indicates a Moderate potential for corrosion of plumbing materials.
10.0	Testing indicates an Excessive potential for DBP formation if chlorinated. (carcinogen potential)
8.9	Testing indicates an Excessive amount of organic/protein bound metals present in sample. (corrosion cause indicator)
9.7	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
9.5	Testing indicates an ineffective disinfection residual is being maintained.

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	0

MICROBIAL BALANCE

19%	**Heterotroph (organic carbon bacteria)**
81%	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	25	0.1
ORP (mV)	451	9.5
pH (s.u.)	8.1	3.0
Specific Conductance (µS)	266	4.7
AOC_S (mg/L)	1.09	10.0
TP EEM (FI)	1,410,140	9.4
MBP EEM (FI)	397,966	8.8
DP EEM (FI)	1,012,174	10.0
Est. Dis. Copper (µg/L)	16	0.1
Nitrate-N (mg/L)	0.00	0.0
Protein Assay (mg/L)	3.81	10.0
BCI (Corrosivity Scale)	5.54	6.7

General BIT Concern(s) Listed by Decreasing Severity

1) AOC is Excessive, which is a food source for certain microbial groups and promotes corrosion.
2) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
3) Protein is Excessive. Protein is a nutrient source and a cause of corrosion.
4) ORP SI is Excessive, which signals inadequate disinfection and/or energy bearing nutrients.
5) TP EEM is Excessive, which is measure of biofilm stability and starvation.
6) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
7) BCI is Elevated. BCI is an internally generated corrosion risk estimation.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	0.0	1.8
Sulfur	7.1	5.9
Complex Organic Acid	1.4	2.0
Simple Organic Acid	1.7	1.5
Protein Degrade	3.0	1.8
Simple Sugar	7.0	0.0
Ammonia and/or Protein	3.9	9.1
Biofilm Degrade	3.5	0.0
Iron or Metal Deficit	3.2	NA

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

General BAT Concern(s) Listed by Decreasing Severity

1) Patterns show Elevated presence of a fermenting type of biofilm

Project: **Williams Bay, Village of - CCT**
Sample Name: **After Clearwell Stagnation**
Sample Lab ID: 2022-09-28_A-13
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *TRT SYS*
Sample Disinfection: *CHLORINE*
Corrosion Control: *NONE*

Severity Index Scale

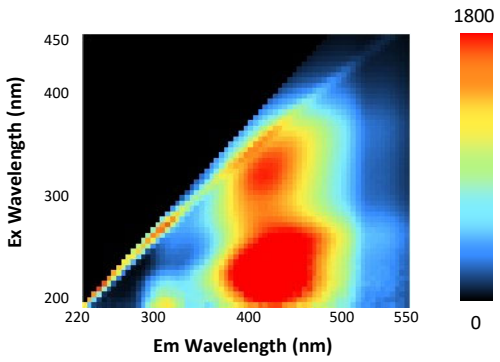
0.0 Low — Moderate — Elevated — 10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
6.7	Testing indicates an Elevated magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
3.1	Testing indicates a Moderate potential for reduced biostability in the sample. (water clarity and metals exposure issue)
4.5	Testing indicates a Moderate potential for corrosion of plumbing materials.
10.0	Testing indicates an Excessive potential for DBP formation if chlorinated. (carcinogen potential)
8.4	Testing indicates an Excessive amount of organic/protein bound metals present in sample. (corrosion cause indicator)
9.6	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
8.5	Testing indicates an ineffective disinfection residual is being maintained.

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	0

MICROBIAL BALANCE

20%	**Heterotroph (organic carbon bacteria)**
80%	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	25	0.1
ORP (mV)	477	8.5
pH (s.u.)	8.01	2.6
Specific Conductance (µS)	327	3.5
AOC_S (mg/L)	1.14	10.0
TP EEM (FI)	1,385,563	9.2
MBP EEM (FI)	389,325	8.7
DP EEM (FI)	996,238	10.0
Est. Dis. Copper (µg/L)	10	0.1
Nitrate-N (mg/L)	0.08	0.1
Protein Assay (mg/L)	3.06	10.0
BCI (Corrosivity Scale)	5.41	6.5

General BIT Concern(s) Listed by Decreasing Severity

1) AOC is Excessive, which is a food source for certain microbial groups and promotes corrosion.
2) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
3) Protein is Excessive. Protein is a nutrient source and a cause of corrosion.
4) TP EEM is Excessive, which is measure of biofilm stability and starvation.
5) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
6) ORP SI is Excessive, which signals inadequate disinfection and/or energy bearing nutrients.
7) BCI is Elevated. BCI is an internally generated corrosion risk estimation.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	0.0	1.7
Sulfur	5.7	5.4
Complex Organic Acid	1.4	1.7
Simple Organic Acid	1.6	1.6
Protein Degrade	2.8	1.8
Simple Sugar	6.0	0.0
Ammonia and/or Protein	3.3	10.0
Biofilm Degrade	2.9	0.0
Iron or Metal Deficit	5.1	NA

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

General BAT Concern(s) Listed by Decreasing Severity

1) Patterns show Elevated presence of a fermenting type of biofilm
2) Patterns show Elevated presence of a biofilm starved of metals needed for metabolism

Project: **Williams Bay, Village of - CCT**
Sample Name: **From Tower Drain**
Sample Lab ID: 2022-09-28_A-14
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *TRT SYS*
Sample Disinfection: *CHLORINE*
Corrosion Control: *NONE*

Severity Index Scale

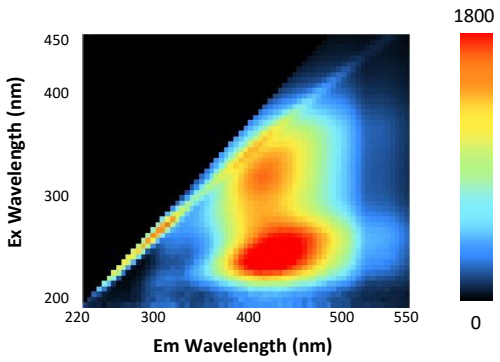
0.0 Low	Moderate	Elevated	10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

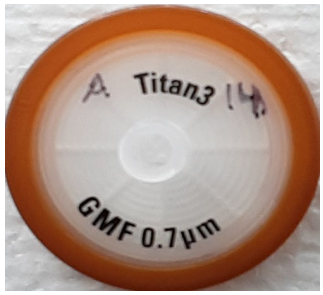
SI	General Sample Assessment and Concerns
8.1	Testing indicates an Excessive magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
5.6	Testing indicates an Elevated potential for reduced biostability in the sample. (water clarity and metals exposure issue)
4.3	Testing indicates a Moderate potential for corrosion of plumbing materials.
10.0	Testing indicates an Excessive potential for DBP formation if chlorinated. (carcinogen potential)
2.1	Testing indicates a Low amount of organic/protein bound metals present in sample. (corrosion cause indicator)
6.7	Testing indicates an Elevated biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
10.0	Testing indicates an ineffective disinfection residual is being maintained.

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE



EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	0

MICROBIAL BALANCE

12%	**Heterotroph (organic carbon bacteria)**
88%	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	62,834	10.0
ORP (mV)	404	10.0
pH (s.u.)	7.82	1.6
Specific Conductance (µS)	265	4.7
AOC_S (mg/L)	0.59	5.9
TP EEM (FI)	1,038,000	6.9
MBP EEM (FI)	268,518	6.0
DP EEM (FI)	769,482	7.9
Est. Dis. Copper (µg/L)	3	0.0
Nitrate-N (mg/L)	2.33	2.3
Protein Assay (mg/L)	1.10	6.4
BCI (Corrosivity Scale)	3.62	4.4

General BIT Concern(s) Listed by Decreasing Severity

1) Microbial Occurrence (ME) is Excessive. ME is a measure of microbial population and biofilm.
2) ORP SI is Excessive, which signals inadequate disinfection and/or energy bearing nutrients.
3) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
4) TP EEM is Elevated, which is measure of biofilm stability and starvation.
5) Protein is Elevated. Protein is a nutrient source and a cause of corrosion.
6) MBP EEM is Elevated, which is a measure of biofilm activity/stress.
7) AOC is Elevated, which is a food source for certain microbial groups and promotes corrosion.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	0.8	2.0
Sulfur	5.0	8.9
Complex Organic Acid	1.2	1.5
Simple Organic Acid	1.1	1.3
Protein Degrade	2.1	1.5
Simple Sugar	7.5	0.0
Ammonia and/or Protein	4.3	0.0
Biofilm Degrade	4.6	0.0
Iron or Metal Deficit	2.9	NA

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

General BAT Concern(s) Listed by Decreasing Severity

1) Patterns show Elevated presence of a nitrifying type of biofilm

Water Quality Investigations

2581 State Road 92, Suite 2
Mount Horeb, WI 53572
Phone: (888) 499-2507

Project: Williams Bay, Village of - CCT

OVERALL DATA TREND ASSESSMENT AND RECOMMENDATIONS - DISTRIBUTION SYSTEM

BIOFILM INDICATION TEST® (BIT) DATA & WATER QUALITY DATA

The following patterns are generally observed when comparing the *System* and *Service Line* samples to the *Clearwell Stagnation* sample:

- Results showing **decreased** protein and ammonia concentrations and **decreased** pH with **increased** nitrite and nitrite concentrations and **increased** microbial occurrence further support the presence of a nitrifying biofilm in the water system.
- Results for Site D28, which saw **little** change, which likely represent young water with a high disinfectant residual from the clearwell that had minimal contact with the water system or the water storage tanks.
- Results for Site D15 and D22, which saw **excessive** changes in water quality, clearly show that nitrification in the water system is causing corrosion of lead and copper plumbing. This follows EPA and Wisconsin DNR guidance for corrosion control.
- Across the three water services profiled in this corrosion study , the **decrease** in ORP correlates with a **decrease** in disinfection residual, which correlate with **increased** microbial occurrence and **increased** nitrite plus nitrate concentrations. These results further show that an ineffective disinfection residual (or inability to maintain a residual) allows nitrification to occur in the system.

Profile samples generally show the following:

- Nitrification is occurring in the water system and in the water service lines.
- **Partial** ammonia oxidation to nitrite in a water service and plumbing is correlated with a **low to moderate** amount of copper corrosion. This is seen at Site D22, which had a **low increase** in copper concentration with **partial/low decrease** in ammonia concentration. **Increased** copper corrosion is also seen at this location with **increased** ammonia oxidation, comparing Sample 1 and Sample 2 to the remainder of the samples at the site.
- **Increased** ammonia oxidation to nitrite in a water service ad plumbing is correlated with an **elevated to excessive** amount of copper corrosion. This is seen at Site D15, which had the **highest** copper concentrations, **lowest** ammonia concentrations and the **highest** nitrite concentrations of the services sampled in this study. **Increased** copper corrosion is also seen at this location with **increased** ammonia oxidation, comparing Sample 1 and Sample 2 to the remainder of the samples at the site.
- The amount of dissolved oxygen present in the water at the entrance to a water service likely inhabits nitrification in the water service and plumbing system, only allowing partial oxidation of ammonia present in the water. The physical location within the water system with the highest oxygen concentration is at the air-water interface in a water storage facility.

Increased and out of compliance nitrite levels were detected at D15 and D22. These results correlate with 1) the presence of an ammonia oxidizing biofilm in the distribution system that is stuck in the nitrite phase, 2) the presence of denitrifying nitrifying type of biofilm in anaerobic parts of the water system that converts nitrate back to nitrite, or 3) an insufficient oxygen concentration and/or amount of time to allow complete oxidation of ammonia to nitrate. Regardless of the situation, nitrite is present in the drinking water at a concentration that is considered to be an acute health risk and above a public health standard, though it does not cause a violation of DNR or EPA regulations. Nitrite in drinking water is regulated by the Wisconsin DNR at the entry point, not the consumer tap.

BIOFILM ACTIVITY TEST® (BAT) DATA

Data patterns generally indicate that a nitrifying type of biofilm is present in the water distribution system at Sites D15 and D22, with nitrification being more pronounced at Site D15.

Water from Site D28 mimics that from the clearwell, which agrees with the above observations.

Water Quality Investigations

BIT DATA SUMMARY - DISTRIBUTION SYSTEM

Project: Williams Bay, Village of - CCT

Sample	ME/mL	MBP EEM (FI)	DP EEM (FI)	TP EEM (FI)	BCI	ORP (mV)	p.H. (s.u.)	Specific Conductance (uS/cm)	AOC_S (mg/L)	Nitrate (mg/L as N)	WQI Protein Assay (mg/L)	Spike Recovery	Dis. Cu Est (µg/L)	Filter Color	Heterotroph (organic carbon bacteria)	Nitrification (ammonia bacteria)
After Clearwell Stagnation	25	389,325	996,238	1,385,563	5.4	477	8.01	327	1.14	0.08	3.06	572%	10	0	71%	29%
From Tower Drain	62,834	268,518	769,482	1,038,000	3.6	404	7.82	265	0.59	2.33	1.10	222%	3	0	12%	88%
D15 Mid Service Line	38,217	338,759	749,818	1,088,577	4.9	378	7.64	271	0.55	2.20	1.61	59%	158	0	14%	86%
D15 System	25,534	327,861	734,478	1,062,339	4.7	429	7.69	275	0.56	2.00	1.77	70%	83	0	16%	84%
D22 Mid Service Line	3,983	258,032	649,032	907,064	3.6	492	8.02	283	0.67	0.93	3.20	124%	103	0	33%	67%
D22 System	11,683	263,569	665,674	929,243	3.7	502	8.01	296	0.58	1.02	2.35	312%	66	0	28%	72%
D28 Mid Service Line	78	398,620	996,853	1,395,473	5.6	492	7.99	283	1.18	0.25	5.80	116%	59	0	54%	46%
D28 System	55	411,432	1,027,420	1,438,852	5.8	480	8.14	291	1.11	0.25	5.81	117%	27	0	53%	47%

DATA COMPARISON TABLE

Sample	ME/mL	MBP EEM (FI)	DP EEM (FI)	TP EEM (FI)	BCI	ORP (mV)	p.H. (s.u.)	Specific Conductance (uS/cm)	AOC_S (mg/L)	Nitrate (mg/L as N)	WQI Protein Assay (mg/L)	Spike Recovery	Dis. Cu Est (µg/L)	Filter Color	Heterotroph (organic carbon bacteria)	Nitrification (ammonia bacteria)
After Clearwell Stagnation	25	389,325	996,238	1,385,563	5.4	477	8.01	327	1.14	0.08	3.06	572%	10	0	71%	29%
From Tower Drain	62,834	268,518	769,482	1,038,000	3.6	404	7.82	265	0.59	2.33	1.10	222%	3	0	12%	88%
% Change	*249900%*	*-31%*	*-23%*	*-25%*	*-33%*	*-15%*	*55%*	*-19%*	*-48%*	*2813%*	*-64%*	*-61%*	*-70%*	*unk*	*-83%*	*200%*
After Clearwell Stagnation	25	389,325	996,238	1,385,563	5.4	477	8.01	327	1.14	0.08	3.06	572%	10	0	71%	29%
D15 Mid Service Line	38,217	338,759	749,818	1,088,577	4.9	378	7.64	271	0.55	2.20	1.61	59%	158	0	14%	86%
% Change	*151955%*	*-13%*	*-25%*	*-21%*	*-9%*	*-21%*	*134%*	*-17%*	*-52%*	*2650%*	*-47%*	*-90%*	*1480%*	*unk*	*-80%*	*193%*
After Clearwell Stagnation	25	389,325	996,238	1,385,563	5.4	477	8.01	327	1.14	0.08	3.06	572%	10	0	71%	29%
D22 Mid Service Line	3,983	258,032	649,032	907,064	3.6	492	8.02	283	0.67	0.93	3.20	124%	103	0	33%	67%
% Change	*15745%*	*-34%*	*-35%*	*-35%*	*-33%*	*3%*	*-2%*	*-13%*	*-41%*	*1063%*	*5%*	*-78%*	*930%*	*unk*	*-54%*	*130%*
After Clearwell Stagnation	25	389,325	996,238	1,385,563	5.4	477	8.01	327	1.14	0.08	3.06	572%	10	0	71%	29%
D28 Mid Service Line	78	398,620	996,853	1,395,473	5.6	492	7.99	283	1.18	0.25	5.80	116%	59	0	54%	46%
% Change	*212%*	*2%*	*0%*	*1%*	*3%*	*3%*	*5%*	*-13%*	*4%*	*213%*	*90%*	*-80%*	*490%*	*unk*	*-23%*	*56%*
D15 System	25,534	327,861	734,478	1,062,339	4.7	429	7.69	275	0.56	2.00	1.77	70%	83	0	16%	84%
D15 Mid Service Line	38,217	338,759	749,818	1,088,577	4.9	378	7.64	271	0.55	2.20	1.61	59%	158	0	14%	86%
% Change	*50%*	*3%*	*2%*	*2%*	*4%*	*-12%*	*12%*	*-1%*	*-2%*	*10%*	*-9%*	*-16%*	*90%*	*unk*	*-11%*	*2%*
D22 System	11,683	263,569	665,674	929,243	3.7	502	8.01	296	0.58	1.02	2.35	312%	66	0	28%	72%
D22 Mid Service Line	3,983	258,032	649,032	907,064	3.6	492	8.02	283	0.67	0.93	3.20	124%	103	0	33%	67%
% Change	*-66%*	*-2%*	*-3%*	*-2%*	*-2%*	*-2%*	*-2%*	*-4%*	*16%*	*-9%*	*36%*	*-60%*	*56%*	*unk*	*17%*	*-7%*
D28 System	55	411,432	1,027,420	1,438,852	5.8	480	8.14	291	1.11	0.25	5.81	117%	27	0	53%	47%
D28 Mid Service Line	78	398,620	996,853	1,395,473	5.6	492	7.99	283	1.18	0.25	5.80	116%	59	0	54%	46%
% Change	*43%*	*-3%*	*-3%*	*-3%*	*-3%*	*3%*	*41%*	*-3%*	*6%*	*0%*	*0%*	*-1%*	*119%*	*unk*	*2%*	*-2%*

Water Quality Investigations

Severity Index Scale

0.0			10.0
Low	Moderate	Elevated	Excessive

BAT DATA SUMMARY - DISTRIBUTION SYSTEM

Project: Williams Bay, Village of - CCT

	Decay Severity SI									Metabolism Severity SI							
Sample	DSI: PO4	DSI: Sulfur	DSI: Complex OA	DSI: Simple OA	DSI: Protein Degrade	DSI: Simple Sugar	DSI: Ammonia and/or Protein	DSI: Biofilm Degrade	DSI: Iron/Metal Deficit	MSI: PO4	MSI: Sulfur	Complex OA	MSI: Simple OA	MSI: Protein Degrade	MSI: Simple Sugar	MSI: Ammonia and/or Protein	MSI: Biofilm Degrade
After Clearwell Stagnation	0.0	5.7	1.4	1.6	2.8	6.0	3.3	2.9	5.1	1.7	5.4	1.7	1.6	1.8	0.0	10.0	0.0
From Tower Drain	0.8	5.0	1.2	1.1	2.1	7.5	4.3	4.6	2.9	2.0	8.9	1.5	1.3	1.5	0.0	0.0	0.0
D15 Mid Service Line	0.0	5.6	1.0	1.3	2.0	6.2	3.0	4.1	2.2	0.0	10.0	1.4	1.4	1.7	0.0	0.2	0.0
D15 System	0.0	3.8	1.3	0.8	5.8	7.7	3.3	6.4	2.3	0.1	8.5	3.0	1.3	1.6	0.0	1.4	0.0
D22 Mid Service Line	0.0	7.1	1.3	1.8	3.1	5.4	3.4	5.7	1.6	0.1	4.9	1.6	1.5	1.8	0.0	0.0	0.0
D22 System	0.0	5.9	1.4	1.7	2.7	9.3	3.4	4.9	3.0	0.8	4.2	1.4	1.5	1.7	0.0	3.9	0.0
D28 Mid Service Line	0.1	6.3	1.6	2.0	3.3	7.5	4.7	4.5	3.2	0.9	4.9	1.7	2.0	2.1	0.0	5.4	0.0
D28 System	0.0	6.7	1.3	1.8	3.0	6.7	3.4	4.0	3.3	1.5	3.6	1.5	1.7	2.0	0.0	8.3	0.0

DATA COMPARISON TABLE

Sample	DSI: PO4	DSI: Sulfur	DSI: Complex OA	DSI: Simple OA	DSI: Protein Degrade	DSI: Simple Sugar	DSI: Ammonia and/or Protein	DSI: Biofilm Degrade	DSI: Iron/Metal Deficit	MSI: PO4	MSI: Sulfur	Complex OA	MSI: Simple OA	MSI: Protein Degrade	MSI: Simple Sugar	MSI: Ammonia and/or Protein	MSI: Biofilm Degrade
After Clearwell Stagnation	0.0	5.7	1.4	1.6	2.8	6.0	3.3	2.9	5.1	1.7	5.4	1.7	1.6	1.8	0.0	10.0	0.0
From Tower Drain	0.8	5.0	1.2	1.1	2.1	7.5	4.3	4.6	2.9	2.0	8.9	1.5	1.3	1.5	0.0	0.0	0.0
% Change	*210%*	*-13%*	*-16%*	*-31%*	*-22%*	*24%*	*30%*	*59%*	*-44%*	*20%*	*66%*	*-12%*	*-18%*	*-16%*	*-39%*	*-103%*	*-115%*
After Clearwell Stagnation	0.0	5.7	1.4	1.6	2.8	6.0	3.3	2.9	5.1	1.7	5.4	1.7	1.6	1.8	0.0	10.0	0.0
D15 System	0.0	3.8	1.3	0.8	5.8	7.7	3.3	6.4	2.3	0.1	8.5	3.0	1.3	1.6	0.0	1.4	0.0
% Change	*-94%*	*-34%*	*-8%*	*-52%*	*110%*	*28%*	*-1%*	*122%*	*-56%*	*-95%*	*58%*	*76%*	*-18%*	*-12%*	*-39%*	*-86%*	*-251%*
After Clearwell Stagnation	0.0	5.7	1.4	1.6	2.8	6.0	3.3	2.9	5.1	1.7	5.4	1.7	1.6	1.8	0.0	10.0	0.0
D22 System	0.0	5.9	1.4	1.7	2.7	9.3	3.4	4.9	3.0	0.8	4.2	1.4	1.5	1.7	0.0	3.9	0.0
% Change	*-14%*	*3%*	*-3%*	*6%*	*-1%*	*54%*	*4%*	*70%*	*-41%*	*-51%*	*-22%*	*-16%*	*-8%*	*-4%*	*27%*	*-61%*	*-41%*
After Clearwell Stagnation	0.0	5.7	1.4	1.6	2.8	6.0	3.3	2.9	5.1	1.7	5.4	1.7	1.6	1.8	0.0	10.0	0.0
D28 System	0.0	6.7	1.3	1.8	3.0	6.7	3.4	4.0	3.3	1.5	3.6	1.5	1.7	2.0	0.0	8.3	0.0
% Change	*-209%*	*17%*	*-8%*	*10%*	*10%*	*12%*	*3%*	*39%*	*-35%*	*-15%*	*-33%*	*-12%*	*2%*	*9%*	*35%*	*-17%*	*-23%*
D15 Mid Service Line	0.0	5.6	1.0	1.3	2.0	6.2	3.0	4.1	2.2	0.0	10.0	1.4	1.4	1.7	0.0	0.2	0.0
D15 System	0.0	3.8	1.3	0.8	5.8	7.7	3.3	6.4	2.3	0.1	8.5	3.0	1.3	1.6	0.0	1.4	0.0
% Change	*-136%*	*-32%*	*29%*	*-41%*	*188%*	*24%*	*10%*	*56%*	*3%*	*109%*	*-36%*	*107%*	*-6%*	*-6%*	*10%*	*687%*	*-63%*
D22 Mid Service Line	0.0	7.1	1.3	1.8	3.1	5.4	3.4	5.7	1.6	0.1	4.9	1.6	1.5	1.8	0.0	0.0	0.0
D22 System	0.0	5.9	1.4	1.7	2.7	9.3	3.4	4.9	3.0	0.8	4.2	1.4	1.5	1.7	0.0	3.9	0.0
% Change	*-136%*	*-17%*	*6%*	*-2%*	*-13%*	*71%*	*1%*	*-13%*	*95%*	*973%*	*-15%*	*-11%*	*-2%*	*-3%*	*57%*	*208%*	*58%*
D28 Mid Service Line	0.1	6.3	1.6	2.0	3.3	7.5	4.7	4.5	3.2	0.9	4.9	1.7	2.0	2.1	0.0	5.4	0.0
D28 System	0.0	6.7	1.3	1.8	3.0	6.7	3.4	4.0	3.3	1.5	3.6	1.5	1.7	2.0	0.0	8.3	0.0
% Change	*-1790%*	*6%*	*-21%*	*-10%*	*-9%*	*-10%*	*-27%*	*-9%*	*4%*	*68%*	*-26%*	*-11%*	*-15%*	*-7%*	*-2%*	*54%*	*37%*

Note: For a set of samples from a given system, water quality would not change by more than 5% unless biofilm were present.

Water Quality Investigations

WATER QUALITY DATA - DISTRIBUTION SYSTEM SERVICE LINE PROFILE SAMPLING

Client/Project: Williams Bay Profile Sampling: D15 (63 Lincoln Parkway)

Parameter	D15 Sample 1	D15 Sample 2	D15 Sample 3	D15 Sample 4	D15 Sample 5	D15 Sample 6	D15 Sample 7	D15 Sample 8	D15 Sample 9	D15 Sample 10	Units	LOD	% Change
Copper, dis.	1100	490	320	330	240	200	190	170	120	75	ug/L	1.7	**-124%**
Copper, tot.	1000	490	320	330	240	200	200	180	130	88	ug/L	1.7	**-104%**
Nitrogen, ammonia as N	0.67	0.60	0.47	0.47	0.34	0.32	0.32	0.39	0.45	0.49	mg/L	0.039	**-12%**
Nitrate as N, corr. for NO2	0.78	0.71	0.59	0.70	1.2	1.3	1.3	1.1	0.94	0.85	mg/L	0.073	**-10%**
Nitrogen, nitrite as N	2.3	2.5	2.7	2.6	2.2	2.2	2.2	2.3	2.4	2.5	mg/L	0.040	**8%**

Note: Sample results shown in RED indicate a violation of a drinking water standard.

Water Quality Investigations

WATER QUALITY DATA - DISTRIBUTION SYSTEM SERVICE LINE PROFILE SAMPLING

Client/Project: Williams Bay Profile Sampling: D22 (524 Wiswell Street)

Parameter	D22 Sample 1	D22 Sample 2	D22 Sample 3	D22 Sample 4	D22 Sample 5	D22 Sample 6	D22 Sample 7	D22 Sample 8	D22 Sample 9	D22 Sample 10	Units	LOD	% Change
Copper, dis.	150	130	110	94	110	53	40	34	27	23	ug/L	1.7	**-15%**
Copper, tot.	150	140	110	97	110	56	44	35	28	27	ug/L	1.7	**-7%**
Nitrogen, ammonia as N	1.5	1.8	2.3	2.3	2.3	2.5	2.5	2.4	2.4	2.3	mg/L	0.039	**17%**
Nitrate as N, corr. for NO2	0.36	0.35	0.34	0.35	0.36	0.34	0.29	0.29	0.31	0.32	mg/L	0.073	**-3%**
Nitrogen, nitrite as N	2.1	1.7	0.87	0.89	1.1	0.83	0.72	0.78	0.91	1.0	mg/L	0.040	**-24%**

Note: Sample results shown in RED indicate a violation of a drinking water standard.

Water Quality Investigations

WATER QUALITY DATA - DISTRIBUTION SYSTEM SERVICE LINE PROFILE SAMPLING

Client/Project: Williams Bay Profile Sampling: D28 (26 Liechty Drive)

Parameter	D28 Sample 1	D28 Sample 2	D28 Sample 3	D28 Sample 4	D28 Sample 5	D28 Sample 6	D28 Sample 7	D28 Sample 8	D28 Sample 9	D28 Sample 10	Units	LOD	% Change
Copper, dis.	58	26	35	27	24	21	22	26	26	21	ug/L	1.7	**-123%**
Copper, tot.	75	30	44	33	29	24	25	31	31	23	ug/L	1.7	**-150%**
Nitrogen, ammonia as N	3.1	3.1	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	mg/L	0.039	**0%**
Nitrate as N, corr. for NO2	0.16	0.22	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	mg/L	0.073	**27%**
Nitrogen, nitrite as N	0.21	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.14	mg/L	0.040	**-40%**

Note: Sample results shown in RED indicate a violation of a drinking water standard.

Project: **Williams Bay, Village of - CCT**
Sample Name: **D15 Mid Service Line**
Sample Lab ID: 2022-09-28_A-15
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *DIS SYS*
Sample Disinfection: *CHLORINE*
Corrosion Control: *NONE*

Severity Index Scale

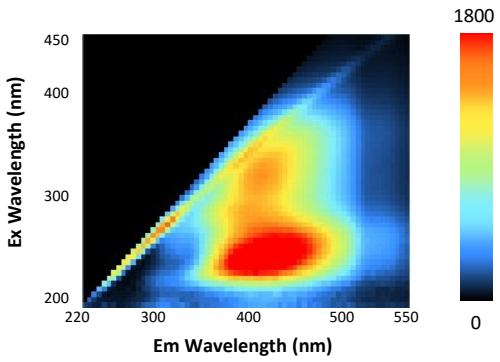
0.0 Low	Moderate	Elevated	10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
9.0	Testing indicates an Excessive magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
5.8	Testing indicates an Elevated potential for reduced biostability in the sample. (water clarity and metals exposure issue)
4.1	Testing indicates a Moderate potential for corrosion of plumbing materials.
10.0	Testing indicates an Excessive potential for DBP formation if chlorinated. (carcinogen potential)
2.4	Testing indicates a Low amount of organic/protein bound metals present in sample. (corrosion cause indicator)
8.3	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
10.0	Testing indicates an ineffective disinfection residual is being maintained.

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	0

MICROBIAL BALANCE

14%	**Heterotroph (organic carbon bacteria)**
86%	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	38,217	10.0
ORP (mV)	378	10.0
pH (s.u.)	7.64	0.7
Specific Conductance (µS)	271	4.6
AOC_S (mg/L)	0.55	5.5
TP EEM (FI)	1,088,577	7.3
MBP EEM (FI)	338,759	7.5
DP EEM (FI)	749,818	7.7
Est. Dis. Copper (µg/L)	158	1.2
Nitrate-N (mg/L)	2.20	2.2
Protein Assay (mg/L)	1.61	9.3
BCI (Corrosivity Scale)	4.92	5.9

General BIT Concern(s) Listed by Decreasing Severity

1) Microbial Occurrence (ME) is Excessive. ME is a measure of microbial population and biofilm.
2) ORP SI is Excessive, which signals inadequate disinfection and/or energy bearing nutrients.
3) Protein is Excessive. Protein is a nutrient source and a cause of corrosion.
4) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
5) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
6) TP EEM is Elevated, which is measure of biofilm stability and starvation.
7) BCI is Elevated. BCI is an internally generated corrosion risk estimation.
8) AOC is Elevated, which is a food source for certain microbial groups and promotes corrosion.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	0.0	0.0
Sulfur	5.6	10.0
Complex Organic Acid	1.0	1.4
Simple Organic Acid	1.3	1.4
Protein Degrade	2.0	1.7
Simple Sugar	6.2	0.0
Ammonia and/or Protein	3.0	0.2
Biofilm Degrade	4.1	0.0
Iron or Metal Deficit	2.2	NA

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

General BAT Concern(s) Listed by Decreasing Severity

1) Patterns show Elevated presence of a nitrifying type of biofilm

Project: **Williams Bay, Village of - CCT**
Sample Name: **D15 System**
Sample Lab ID: 2022-09-28_A-16
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *DIS SYS*
Sample Disinfection: *CHLORINE*
Corrosion Control: *NONE*

Severity Index Scale

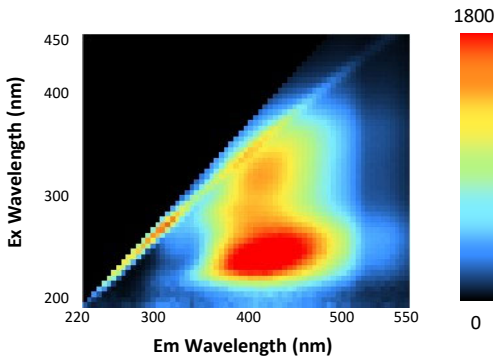
0.0 Low	Moderate	Elevated	10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
9.2	Testing indicates an Excessive magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
5.7	Testing indicates an Elevated potential for reduced biostability in the sample. (water clarity and metals exposure issue)
4.0	Testing indicates a Moderate potential for corrosion of plumbing materials.
10.0	Testing indicates an Excessive potential for DBP formation if chlorinated. (carcinogen potential)
2.6	Testing indicates a Moderate amount of organic/protein bound metals present in sample. (corrosion cause indicator)
8.6	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
10.0	Testing indicates an ineffective disinfection residual is being maintained.

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	0

MICROBIAL BALANCE

16%	**Heterotroph (organic carbon bacteria)**
84%	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	25,534	10.0
ORP (mV)	429	10.0
pH (s.u.)	7.69	1.0
Specific Conductance (µS)	275	4.5
AOC_S (mg/L)	0.56	5.6
TP EEM (FI)	1,062,339	7.1
MBP EEM (FI)	327,861	7.3
DP EEM (FI)	734,478	7.5
Est. Dis. Copper (µg/L)	83	0.6
Nitrate-N (mg/L)	2.00	2.0
Protein Assay (mg/L)	1.77	10.0
BCI (Corrosivity Scale)	4.74	5.7

General BIT Concern(s) Listed by Decreasing Severity

1) Microbial Occurrence (ME) is Excessive. ME is a measure of microbial population and biofilm.
2) ORP SI is Excessive, which signals inadequate disinfection and/or energy bearing nutrients.
3) Protein is Excessive. Protein is a nutrient source and a cause of corrosion.
4) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
5) MBP EEM is Elevated, which is a measure of biofilm activity/stress.
6) TP EEM is Elevated, which is measure of biofilm stability and starvation.
7) BCI is Elevated. BCI is an internally generated corrosion risk estimation.
8) AOC is Elevated, which is a food source for certain microbial groups and promotes corrosion.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	0.0	0.1
Sulfur	3.8	8.5
Complex Organic Acid	1.3	3.0
Simple Organic Acid	0.8	1.3
Protein Degrade	5.8	1.6
Simple Sugar	7.7	0.0
Ammonia and/or Protein	3.3	1.4
Biofilm Degrade	6.4	0.0
Iron or Metal Deficit	2.3	NA

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

General BAT Concern(s) Listed by Decreasing Severity

1) Patterns show Elevated presence of a nitrifying type of biofilm

Project: **Williams Bay, Village of - CCT**
Sample Name: **D22 Mid Service Line**
Sample Lab ID: 2022-09-28_A-17
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *DIS SYS*
Sample Disinfection: *CHLORINE*
Corrosion Control: *NONE*

Severity Index Scale

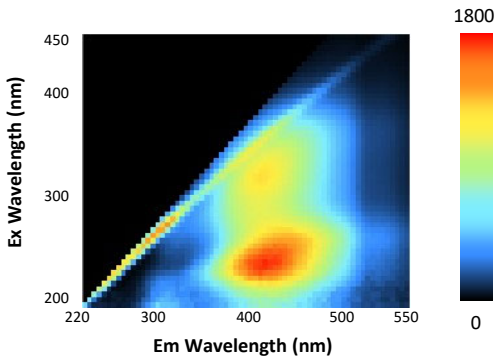
0.0 Low — Moderate — Elevated — 10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
8.2	Testing indicates an Excessive magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
4.7	Testing indicates a Moderate potential for reduced biostability in the sample. (water clarity and metals exposure issue)
4.0	Testing indicates a Moderate potential for corrosion of plumbing materials.
10.0	Testing indicates an Excessive potential for DBP formation if chlorinated. (carcinogen potential)
4	Testing indicates a Moderate amount of organic/protein bound metals present in sample. (corrosion cause indicator)
8.0	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
7.9	Testing indicates an ineffective disinfection residual is being maintained.

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	0

MICROBIAL BALANCE

33%	Heterotroph (organic carbon bacteria)
67%	Nitrification (ammonia bacteria)

Parameter	Result	Severity
ME/mL	3,983	8.0
ORP (mV)	492	7.9
pH (s.u.)	8.02	2.6
Specific Conductance (µS)	283	4.3
AOC_S (mg/L)	0.67	6.7
TP EEM (FI)	907,064	6.0
MBP EEM (FI)	258,032	5.7
DP EEM (FI)	649,032	6.6
Est. Dis. Copper (µg/L)	103	0.8
Nitrate-N (mg/L)	0.93	0.9
Protein Assay (mg/L)	3.20	10.0
BCI (Corrosivity Scale)	3.61	4.3

General BIT Concern(s) Listed by Decreasing Severity

1) Protein is Excessive. Protein is a nutrient source and a cause of corrosion.
2) Microbial Occurrence (ME) is Excessive. ME is a measure of microbial population and biofilm.
3) ORP SI is Excessive, which signals inadequate disinfection and/or energy bearing nutrients.
4) AOC is Elevated, which is a food source for certain microbial groups and promotes corrosion.
5) DP EEM is Elevated. DP EEM is a measure of recalcitrant carbon and starvation.
6) TP EEM is Elevated, which is measure of biofilm stability and starvation.
7) MBP EEM is Elevated, which is a measure of biofilm activity/stress.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	0.0	0.1
Sulfur	7.1	4.9
Complex Organic Acid	1.3	1.6
Simple Organic Acid	1.8	1.5
Protein Degrade	3.1	1.8
Simple Sugar	5.4	0.0
Ammonia and/or Protein	3.4	0.0
Biofilm Degrade	5.7	0.0
Iron or Metal Deficit	1.6	NA

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

General BAT Concern(s) Listed by Decreasing Severity

No major BAT related concerns regarding this sample

Project: **Williams Bay, Village of - CCT**
Sample Name: **D22 System**
Sample Lab ID: 2022-09-28_A-18
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *DIS SYS*
Sample Disinfection: *CHLORINE*
Corrosion Control: *NONE*

Severity Index Scale

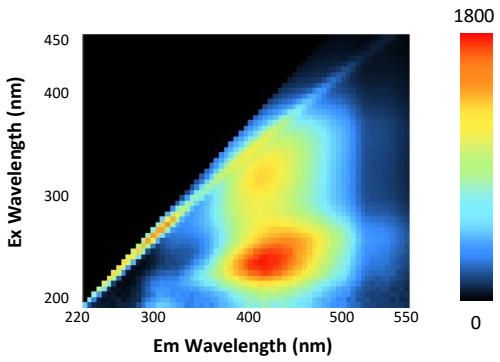
0.0 Low	Moderate	Elevated	10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

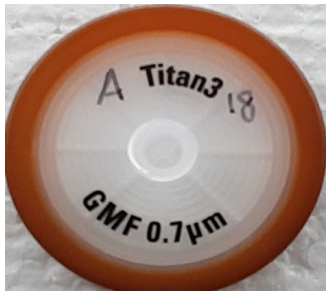
SI	General Sample Assessment and Concerns
8.9	Testing indicates an Excessive magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
5.4	Testing indicates an Elevated potential for reduced biostability in the sample. (water clarity and metals exposure issue)
3.6	Testing indicates a Moderate potential for corrosion of plumbing materials.
10.0	Testing indicates an Excessive potential for DBP formation if chlorinated. (carcinogen potential)
3.9	Testing indicates a Moderate amount of organic/protein bound metals present in sample. (corrosion cause indicator)
8.1	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
7.5	Testing indicates an ineffective disinfection residual is being maintained.

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE



EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	0

MICROBIAL BALANCE

28%	**Heterotroph (organic carbon bacteria)**
72%	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	11,683	10.0
ORP (mV)	502	7.5
pH (s.u.)	8.01	2.6
Specific Conductance (µS)	296	4.1
AOC_S (mg/L)	0.58	5.8
TP EEM (FI)	929,243	6.2
MBP EEM (FI)	263,569	5.9
DP EEM (FI)	665,674	6.8
Est. Dis. Copper (µg/L)	66	0.5
Nitrate-N (mg/L)	1.02	1.0
Protein Assay (mg/L)	2.35	10.0
BCI (Corrosivity Scale)	3.68	4.4

General BIT Concern(s) Listed by Decreasing Severity

1) Microbial Occurrence (ME) is Excessive. ME is a measure of microbial population and biofilm.
2) Protein is Excessive. Protein is a nutrient source and a cause of corrosion.
3) ORP SI is Excessive, which signals inadequate disinfection and/or energy bearing nutrients.
4) DP EEM is Elevated. DP EEM is a measure of recalcitrant carbon and starvation.
5) TP EEM is Elevated, which is measure of biofilm stability and starvation.
6) MBP EEM is Elevated, which is a measure of biofilm activity/stress.
7) AOC is Elevated, which is a food source for certain microbial groups and promotes corrosion.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	0.0	0.8
Sulfur	5.9	4.2
Complex Organic Acid	1.4	1.4
Simple Organic Acid	1.7	1.5
Protein Degrade	2.7	1.7
Simple Sugar	9.3	0.0
Ammonia and/or Protein	3.4	3.9
Biofilm Degrade	4.9	0.0
Iron or Metal Deficit	3.0	NA

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

General BAT Concern(s) Listed by Decreasing Severity

No major BAT related concerns regarding this sample

Project: **Williams Bay, Village of - CCT**
Sample Name: **D28 Mid Service Line**
Sample Lab ID: 2022-09-28_A-19
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *DIS SYS*
Sample Disinfection: *CHLORINE*
Corrosion Control: *NONE*

Severity Index Scale

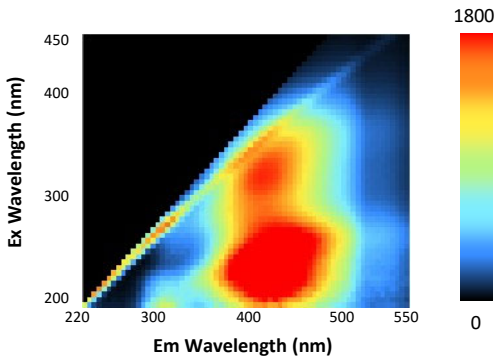
0.0 Low | Moderate | Elevated | 10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
6.7	Testing indicates an Elevated magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
3.2	Testing indicates a Moderate potential for reduced biostability in the sample. (water clarity and metals exposure issue)
4.9	Testing indicates a Moderate potential for corrosion of plumbing materials.
10.0	Testing indicates an Excessive potential for DBP formation if chlorinated. (carcinogen potential)
7.5	Testing indicates an Excessive amount of organic/protein bound metals present in sample. (corrosion cause indicator)
9.7	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
7.9	Testing indicates an ineffective disinfection residual is being maintained.

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	0

MICROBIAL BALANCE

54%	**Heterotroph (organic carbon bacteria)**
46%	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	78	0.2
ORP (mV)	492	7.9
pH (s.u.)	7.99	2.5
Specific Conductance (µS)	283	4.3
AOC_S (mg/L)	1.18	10.0
TP EEM (FI)	1,395,473	9.3
MBP EEM (FI)	398,620	8.9
DP EEM (FI)	996,853	10.0
Est. Dis. Copper (µg/L)	59	0.5
Nitrate-N (mg/L)	0.25	0.3
Protein Assay (mg/L)	5.80	10.0
BCI (Corrosivity Scale)	5.58	6.7

General BIT Concern(s) Listed by Decreasing Severity

1) AOC is Excessive, which is a food source for certain microbial groups and promotes corrosion.
2) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
3) Protein is Excessive. Protein is a nutrient source and a cause of corrosion.
4) TP EEM is Excessive, which is measure of biofilm stability and starvation.
5) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
6) ORP SI is Excessive, which signals inadequate disinfection and/or energy bearing nutrients.
7) BCI is Elevated. BCI is an internally generated corrosion risk estimation.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	0.1	0.9
Sulfur	6.3	4.9
Complex Organic Acid	1.6	1.7
Simple Organic Acid	2.0	2.0
Protein Degrade	3.3	2.1
Simple Sugar	7.5	0.0
Ammonia and/or Protein	4.7	5.4
Biofilm Degrade	4.5	0.0
Iron or Metal Deficit	3.2	NA

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

General BAT Concern(s) Listed by Decreasing Severity

No major BAT related concerns regarding this sample

Project: **Williams Bay, Village of - CCT**
Sample Name: **D28 System**
Sample Lab ID: 2022-09-28_A-20
Analysis Date: 9/28/2022
Collection Date: 9/27/2022

Water System: *DIS SYS*
Sample Disinfection: *CHLORINE*
Corrosion Control: *NONE*

Severity Index Scale

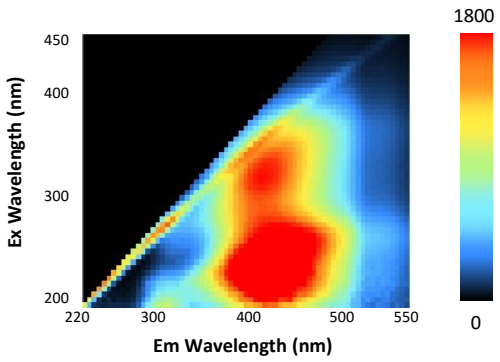
0.0 Low	Moderate	Elevated	10.0 Excessive

SAMPLE SPECIFIC BIOFILM RELATED ISSUES

SI	General Sample Assessment and Concerns
6.7	Testing indicates an Elevated magnitude of starved biofilm signatures present in the sample. (corrosion indicator)
3.2	Testing indicates a Moderate potential for reduced biostability in the sample. (water clarity and metals exposure issue)
4.8	Testing indicates a Moderate potential for corrosion of plumbing materials.
10.0	Testing indicates an Excessive potential for DBP formation if chlorinated. (carcinogen potential)
7.7	Testing indicates an Excessive amount of organic/protein bound metals present in sample. (corrosion cause indicator)
9.8	Testing indicates an Excessive biofilm thickness, which can promote microbially induced corrosion and harbor pathogenic organisms.
8.4	Testing indicates an ineffective disinfection residual is being maintained.

BIOFILM INDICATION TEST® (BIT) DATA AND SEVERITY INDEX SUMMARY

TOTAL PRODUCTS DATA (EEM)



FILTER IMAGE

EEM - A visual representation of microbially secreted compounds present in the bulk water. If biofilm were not present, this image would be blank and would not change between sample and source water.

Filter - A visual representation of material filtered from the water sample. Color on the filter indicates presence of corrosion debris and/or biofilm in the sample.

Filter SI:	0

MICROBIAL BALANCE

53%	**Heterotroph (organic carbon bacteria)**
47%	**Nitrification (ammonia bacteria)**

Parameter	Result	Severity
ME/mL	55	0.1
ORP (mV)	480	8.4
pH (s.u.)	8.14	3.2
Specific Conductance (µS)	291	4.2
AOC_S (mg/L)	1.11	10.0
TP EEM (FI)	1,438,852	9.6
MBP EEM (FI)	411,432	9.1
DP EEM (FI)	1,027,420	10.0
Est. Dis. Copper (µg/L)	27	0.2
Nitrate-N (mg/L)	0.25	0.3
Protein Assay (mg/L)	5.81	10.0
BCI (Corrosivity Scale)	5.76	6.9

General BIT Concern(s) Listed by Decreasing Severity

1) AOC is Excessive, which is a food source for certain microbial groups and promotes corrosion.
2) DP EEM is Excessive. DP EEM is a measure of recalcitrant carbon and starvation.
3) Protein is Excessive. Protein is a nutrient source and a cause of corrosion.
4) TP EEM is Excessive, which is measure of biofilm stability and starvation.
5) MBP EEM is Excessive, which is a measure of biofilm activity/stress.
6) ORP SI is Excessive, which signals inadequate disinfection and/or energy bearing nutrients.
7) BCI is Elevated. BCI is an internally generated corrosion risk estimation.

BIOFILM ACTIVITY TEST® (BAT) DATA AND SEVERITY INDEX SUMMARY

	BAT SI	
Parameter	DSI	MSI
PO4	0.0	1.5
Sulfur	6.7	3.6
Complex Organic Acid	1.3	1.5
Simple Organic Acid	1.8	1.7
Protein Degrade	3.0	2.0
Simple Sugar	6.7	0.0
Ammonia and/or Protein	3.4	8.3
Biofilm Degrade	4.0	0.0
Iron or Metal Deficit	3.3	NA

DSI = Decay Severity Index: A measure of needing a resource but can not find
MSI = Metabolism Severity Index: A measure of active use of a resource

General BAT Concern(s) Listed by Decreasing Severity

1) Patterns show Elevated presence of a fermenting type of biofilm

Water Quality Investigations

2581 State Road 92, Suite 2
Mount Horeb, WI 53572
Phone: (888) 499-2507

Biofilm Indication Test® Report Explanation Page

- BIT = Biofilm Indication Test
- SI = Severity Index on a scale of 0 (good) to 10 (poor)
- Biofilm: A layer of diverse bacteria on a surface that have grown to form a colony. Biofilm attaches to a surface with a slime layer that protects the bacteria/colony from stress. Biofilm naturally grows inside of water distribution system piping, water treatment systems, plumbing, hot water heaters, softeners, process piping, fountains, groundwater wells, and more. Bacteria found in biofilms are typically harmless (but not always). Biofilm in a water system becomes a problem when conditions allow it to grow so thick that the bacteria can change the quality of the water or cause microbial induced corrosion. Thick biofilm can corrode plumbing fixture to increase metals in the water (such as lead and copper), cause an increase in disinfection byproducts, and/or cause taste and odor complaints. Thick biofilms can also harbor pathogens such as Legionella.
- ME = Microbial Equivalents: Estimate of total microbial occurrence in sample volume based on measurement of ATP present. Does not estimate ME in biofilm only ME in bulk water. Samples from a drinking water system with greater than 500 ME/mL have elevated microbial occurrence and are likely to be affected by microbial biofilms. In certain waters, low ME indicate the presence of an excessively thick biofilm because of stressful conditions.
- ORP = Oxidation Reduction Potential: A relative measure of the concentration of dissolved energy-bearing nutrients in the water, and/or is an indicator of an adequate disinfectant residual.
- pH = measure of acidity: pH of sample is highly dependent on geology, aquifer/sediment/mineral chemistry, water source, the type of chemical/disinfectant used, and the type of microbial activity present. Change in pH can be caused by acid producing biofilm and certain bacterial metabolisms.
- Specific conductance: Estimate of the concentration of dissolved ions present in the water.
- AOC_S: A surrogate estimate of dissolved assimilable organic carbon present in the water, which is a subset of total organic carbon. Can be used to assess the presence of biofilm and biofilm-produced organic molecules.
- EEM = Excitation Emission Matrix: Provides information on the type of fluorescing organic carbons present in water (food for microbial growth and/or microbial created products) and/or exposure of water to biofilm. In general, the greater the EEM, the greater the starved biofilm presence was in the system sampled, with the proportion of each type of EEM indicating the underlying cause of biofilm.
- MBP = Microbial By Products EEM: Metabolic by products excreted by actively respiring microorganisms in water and biofilm. High levels create the potential for microbial induced corrosion. Units = FI (fluorescence intensity)
- DP = Decay Products EEM: Products caused by the decay of organic matter and/or biofilm. High levels indicate the presence of decaying organic matter and/or biofilm attempting to cause decay. Units = FI (fluorescence intensity)
- TP = Total Products EEM: Total of microbial produced compounds and fluorescing organic matter in water. Units = FI (fluorescence intensity)
- BCI = Biofilm Corrosivity Index: Assessment of biofilm's ability to cause corrosion of aquifer, equipment and/or plumbing materials. As BCI increases, the potential for microbial induced corrosion increases. A biofilm sloughing event could cause a spike in ME and BCI.
- BDL = Below Detection Limit.
- Filter Color: Color of filters used to process the samples is used to gauge the presence of biofilm and/or sloughed material in the water samples. All filters begin as white.
- Iron/Metal Limitation: Assesses the presence of bacterial molecules searching for needed metals for activation of metabolism related processes.
- Protein Assessment: Biofilms that are stressed often secrete proteins to alleviate stressful conditions. Stressors include a nutrient imbalance, disinfection and/or a change in nutrient conditions. Biofilm with excessive protein production can harbor Legionella.

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393415
NLS Customer: 107964
Phone: 888 499 2507

Project: **Williams Bay, Village of - CCT**

W1 2 Hours Aquifer NLS ID: 1340235
Matrix: DW
Collected: 09/27/22 11:35 Received: 09/29/22

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Aluminum, tot. recoverable as Al by ICP-MS	ND	mg/L	1	0.0090	0.031	10/05/22	EPA 200.8, Rev 5.4	721026460
Arsenic, tot. recoverable as As by ICP-MS	9.9	ug/L	1	0.85	2.8 / 10	10/05/22	EPA 200.8, Rev 5.4	721026460
Barium, tot. recoverable as Ba by ICP-MS	350	ug/L	1	0.20	0.67 / 2000	10/05/22	EPA 200.8, Rev 5.4	721026460
Cadmium, tot. recoverable as Cd by ICP-MS	ND	ug/L	1	0.12	0.40 / 5.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Calcium, tot. recoverable as Ca by ICP-MS	65	mg/L	1	0.13	0.43	10/05/22	EPA 200.8, Rev 5.4	721026460
Chromium, tot. recoverable as Cr by ICP-MS	ND	ug/L	1	2.6	8.7 / 100	10/05/22	EPA 200.8, Rev 5.4	721026460
Cobalt, tot. recoverable as Co by ICP-MS	0.16	ug/L	1	0.030	0.090	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	ND	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Iron, tot. recoverable as Fe by ICP-MS	1.6	mg/L	1	0.044	0.15	10/05/22	EPA 200.8, Rev 5.4	721026460
Lead, tot. recoverable as Pb by ICP-MS	ND	ug/L	1	0.25	0.82 / 15	10/05/22	EPA 200.8, Rev 5.4	721026460
Magnesium, tot. recoverable as Mg by ICP-MS	37	mg/L	1	0.069	0.23	10/05/22	EPA 200.8, Rev 5.4	721026460
Manganese, tot. recoverable as Mn by ICP-MS	16	ug/L	1	1.9	6.3	10/05/22	EPA 200.8, Rev 5.4	721026460
Molybdenum, total recoverable as Mo by ICP-MS	1.1	ug/L	1	0.33	1.1	10/05/22	EPA 200.8, Rev 5.4	721026460
Nickel, tot. recoverable as Ni by ICP-MS	ND	ug/L	1	1.0	3.4 / 100	10/05/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	5.3	mg/L	1	0.039	0.13	10/07/22	4500-NH3 G-1997	721026460
Nitrogen, NO2 + NO3 as N (unfiltered)	ND	mg/L	1	0.052	0.17 / 10	10/06/22	4500-NO3 F-2000	721026460
Phosphorus, tot. as P	0.27	mg/L	1	0.0090	0.030	10/03/22	4500-P F-1999	721026460
Potassium, tot. recoverable as K by ICP-MS	2.4	mg/L	1	0.060	0.20	10/05/22	EPA 200.8, Rev 5.4	721026460
Sodium, tot. recoverable as Na by ICP-MS	23	mg/L	1	0.14	0.47	10/05/22	EPA 200.8, Rev 5.4	721026460
Strontium, tot. recoverable as Sr by ICP-MS	670	ug/L	1	0.59	2.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Tin, tot. recoverable as Sn by ICP-MS	ND	ug/L	1	1.5	5.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Total Organic Carbon (TOC)	3.9	mg/L	1	0.39	1.3	10/04/22	5310 C-2000	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Zinc, tot. recoverable as Zn by ICP-MS	ND	ug/L	1	5.4	18	10/05/22	EPA 200.8, Rev 5.4	721026460

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393415
NLS Customer: 107964
Phone: 888 499 2507

Project: **Williams Bay, Village of - CCT**

W2 2 Hours Aquifer NLS ID: 1340236
Matrix: DW
Collected: 09/27/22 09:35 Received: 09/29/22

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Aluminum, tot. recoverable as Al by ICP-MS	ND	mg/L	1	0.0090	0.031	10/05/22	EPA 200.8, Rev 5.4	721026460
Arsenic, tot. recoverable as As by ICP-MS	**13**	ug/L	1	0.85	2.8 / 10	10/05/22	EPA 200.8, Rev 5.4	721026460
Barium, tot. recoverable as Ba by ICP-MS	280	ug/L	1	0.20	0.67 / 2000	10/05/22	EPA 200.8, Rev 5.4	721026460
Cadmium, tot. recoverable as Cd by ICP-MS	ND	ug/L	1	0.12	0.40 / 5.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Calcium, tot. recoverable as Ca by ICP-MS	66	mg/L	1	0.13	0.43	10/05/22	EPA 200.8, Rev 5.4	721026460
Chromium, tot. recoverable as Cr by ICP-MS	ND	ug/L	1	2.6	8.7 / 100	10/05/22	EPA 200.8, Rev 5.4	721026460
Cobalt, tot. recoverable as Co by ICP-MS	0.13	ug/L	1	0.030	0.090	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	ND	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Iron, tot. recoverable as Fe by ICP-MS	1.6	mg/L	1	0.044	0.15	10/05/22	EPA 200.8, Rev 5.4	721026460
Lead, tot. recoverable as Pb by ICP-MS	ND	ug/L	1	0.25	0.82 / 15	10/05/22	EPA 200.8, Rev 5.4	721026460
Magnesium, tot. recoverable as Mg by ICP-MS	35	mg/L	1	0.069	0.23	10/05/22	EPA 200.8, Rev 5.4	721026460
Manganese, tot. recoverable as Mn by ICP-MS	15	ug/L	1	1.9	6.3	10/05/22	EPA 200.8, Rev 5.4	721026460
Molybdenum, total recoverable as Mo by ICP-MS	[0.92]	ug/L	1	0.33	1.1	10/05/22	EPA 200.8, Rev 5.4	721026460
Nickel, tot. recoverable as Ni by ICP-MS	ND	ug/L	1	1.0	3.4 / 100	10/05/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	5.3	mg/L	1	0.039	0.13	10/07/22	4500-NH3 G-1997	721026460
Nitrogen, NO2 + NO3 as N (unfiltered)	ND	mg/L	1	0.052	0.17 / 10	10/06/22	4500-NO3 F-2000	721026460
Phosphorus, tot. as P	0.33	mg/L	1	0.0090	0.030	10/03/22	4500-P F-1999	721026460
Potassium, tot. recoverable as K by ICP-MS	2.0	mg/L	1	0.060	0.20	10/05/22	EPA 200.8, Rev 5.4	721026460
Sodium, tot. recoverable as Na by ICP-MS	20	mg/L	1	0.14	0.47	10/05/22	EPA 200.8, Rev 5.4	721026460
Strontium, tot. recoverable as Sr by ICP-MS	650	ug/L	1	0.59	2.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Tin, tot. recoverable as Sn by ICP-MS	ND	ug/L	1	1.5	5.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Total Organic Carbon (TOC)	3.4	mg/L	1	0.39	1.3	10/04/22	5310 C-2000	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Zinc, tot. recoverable as Zn by ICP-MS	ND	ug/L	1	5.4	18	10/05/22	EPA 200.8, Rev 5.4	721026460

NORTHERN LAKE SERVICE, INC.
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ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

NLS Project: 393415
NLS Customer: 107964
Phone: 888 499 2507

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

Project: **Williams Bay, Village of - CCT**

W3 2 Hours Aquifer NLS ID: 1340237
Matrix: DW
Collected: 09/27/22 09:35 Received: 09/29/22

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Aluminum, tot. recoverable as Al by ICP-MS	ND	mg/L	1	0.0090	0.031	10/05/22	EPA 200.8, Rev 5.4	721026460
Arsenic, tot. recoverable as As by ICP-MS	7.5	ug/L	1	0.85	2.8 / 10	10/05/22	EPA 200.8, Rev 5.4	721026460
Barium, tot. recoverable as Ba by ICP-MS	350	ug/L	1	0.20	0.67 / 2000	10/05/22	EPA 200.8, Rev 5.4	721026460
Cadmium, tot. recoverable as Cd by ICP-MS	ND	ug/L	1	0.12	0.40 / 5.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Calcium, tot. recoverable as Ca by ICP-MS	66	mg/L	1	0.13	0.43	10/05/22	EPA 200.8, Rev 5.4	721026460
Chromium, tot. recoverable as Cr by ICP-MS	ND	ug/L	1	2.6	8.7 / 100	10/05/22	EPA 200.8, Rev 5.4	721026460
Cobalt, tot. recoverable as Co by ICP-MS	0.28	ug/L	1	0.030	0.090	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	ND	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Iron, tot. recoverable as Fe by ICP-MS	1.0	mg/L	1	0.044	0.15	10/05/22	EPA 200.8, Rev 5.4	721026460
Lead, tot. recoverable as Pb by ICP-MS	ND	ug/L	1	0.25	0.82 / 15	10/05/22	EPA 200.8, Rev 5.4	721026460
Magnesium, tot. recoverable as Mg by ICP-MS	39	mg/L	1	0.069	0.23	10/05/22	EPA 200.8, Rev 5.4	721026460
Manganese, tot. recoverable as Mn by ICP-MS	9.8	ug/L	1	1.9	6.3	10/05/22	EPA 200.8, Rev 5.4	721026460
Molybdenum, total recoverable as Mo by ICP-MS	[1.0]	ug/L	1	0.33	1.1	10/05/22	EPA 200.8, Rev 5.4	721026460
Nickel, tot. recoverable as Ni by ICP-MS	ND	ug/L	1	1.0	3.4 / 100	10/05/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	4.0	mg/L	1	0.039	0.13	10/07/22	4500-NH3 G-1997	721026460
Nitrogen, NO2 + NO3 as N (unfiltered)	ND	mg/L	1	0.052	0.17 / 10	10/06/22	4500-NO3 F-2000	721026460
Phosphorus, tot. as P	0.10	mg/L	1	0.0090	0.030	10/03/22	4500-P F-1999	721026460
Potassium, tot. recoverable as K by ICP-MS	2.6	mg/L	1	0.060	0.20	10/05/22	EPA 200.8, Rev 5.4	721026460
Sodium, tot. recoverable as Na by ICP-MS	20	mg/L	1	0.14	0.47	10/05/22	EPA 200.8, Rev 5.4	721026460
Strontium, tot. recoverable as Sr by ICP-MS	710	ug/L	1	0.59	2.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Tin, tot. recoverable as Sn by ICP-MS	ND	ug/L	1	1.5	5.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Total Organic Carbon (TOC)	3.3	mg/L	1	0.39	1.3	10/04/22	5310 C-2000	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Zinc, tot. recoverable as Zn by ICP-MS	ND	ug/L	1	5.4	18	10/05/22	EPA 200.8, Rev 5.4	721026460

Values in brackets represent results greater than or equal to the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation". Results greater than or equal to the LOQ are considered to be in the region of "Certain Quantitation". LOD and/or LOQ tagged with an asterisk(*) are considered Reporting Limits. All LOD/LOQs adjusted to reflect dilution and/or solids content.

ND = Not Detected (< LOD) LOD = Limit of Detection LOQ = Limit of Quantitation NA = Not Applicable
DWB = Dry Weight Basis %DWB = (mg/kg DWB) / 10000 1000 ug/L = 1 mg/L
MCL = Maximum Contaminant Levels for Drinking Water Samples. Shaded results indicate >MCL.

Reviewed by:

Authorized by:
R. T. Krueger
President

For Terms and Conditions please see www.nlslab.com

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393412
NLS Customer: 107964
Phone: 888 499 2507

Project: **Williams Bay, Village of - CCT**

After Clearwell Stagnation NLS ID: 1340231
Matrix: DW
Collected: 09/27/22 19:03 Received: 09/29/22

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Aluminum, tot. recoverable as Al by ICP-MS	ND	mg/L	1	0.0090	0.031	10/05/22	EPA 200.8, Rev 5.4	721026460
Arsenic, tot. recoverable as As by ICP-MS	[1.5]	ug/L	1	0.85	2.8 / 10	10/05/22	EPA 200.8, Rev 5.4	721026460
Barium, tot. recoverable as Ba by ICP-MS	26	ug/L	1	0.20	0.67 / 2000	10/05/22	EPA 200.8, Rev 5.4	721026460
Cadmium, tot. recoverable as Cd by ICP-MS	ND	ug/L	1	0.12	0.40 / 5.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Calcium, tot. recoverable as Ca by ICP-MS	18	mg/L	1	0.13	0.43	10/05/22	EPA 200.8, Rev 5.4	721026460
Chromium, tot. recoverable as Cr by ICP-MS	ND	ug/L	1	2.6	8.7 / 100	10/05/22	EPA 200.8, Rev 5.4	721026460
Cobalt, tot. recoverable as Co by ICP-MS	[0.050]	ug/L	1	0.030	0.090	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	[2.9]	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Iron, tot. recoverable as Fe by ICP-MS	ND	mg/L	1	0.044	0.15	10/05/22	EPA 200.8, Rev 5.4	721026460
Lead, tot. recoverable as Pb by ICP-MS	[0.33]	ug/L	1	0.25	0.82 / 15	10/05/22	EPA 200.8, Rev 5.4	721026460
Magnesium, tot. recoverable as Mg by ICP-MS	5.9	mg/L	1	0.069	0.23	10/05/22	EPA 200.8, Rev 5.4	721026460
Manganese, tot. recoverable as Mn by ICP-MS	ND	ug/L	1	1.9	6.3	10/05/22	EPA 200.8, Rev 5.4	721026460
Molybdenum, total recoverable as Mo by ICP-MS	[0.90]	ug/L	1	0.33	1.1	10/05/22	EPA 200.8, Rev 5.4	721026460
Nickel, tot. recoverable as Ni by ICP-MS	ND	ug/L	1	1.0	3.4 / 100	10/05/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	3.2	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrogen, NO2 + NO3 as N (unfiltered)	0.25	mg/L	1	0.052	0.17 / 10	10/06/22	4500-NO3 F-2000	721026460
Phosphorus, tot. as P	ND	mg/L	1	0.0090	0.030	10/03/22	4500-P F-1999	721026460
Potassium, tot. recoverable as K by ICP-MS	2.9	mg/L	1	0.060	0.20	10/05/22	EPA 200.8, Rev 5.4	721026460
Sodium, tot. recoverable as Na by ICP-MS	21	mg/L	1	0.14	0.47	10/05/22	EPA 200.8, Rev 5.4	721026460
Strontium, tot. recoverable as Sr by ICP-MS	150	ug/L	1	0.59	2.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Tin, tot. recoverable as Sn by ICP-MS	ND	ug/L	1	1.5	5.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Total Organic Carbon (TOC)	1.4	mg/L	1	0.39	1.3	10/04/22	5310 C-2000	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Zinc, tot. recoverable as Zn by ICP-MS	ND	ug/L	1	5.4	18	10/05/22	EPA 200.8, Rev 5.4	721026460

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393412
NLS Customer: 107964
Phone: 888 499 2507

Project: **Williams Bay, Village of - CCT**

From Tower Drain NLS ID: 1340232
Matrix: DW
Collected: 09/28/22 06:37 Received: 09/29/22

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Aluminum, tot. recoverable as Al by ICP-MS	[0.015]	mg/L	1	0.0090	0.031	10/05/22	EPA 200.8, Rev 5.4	721026460
Arsenic, tot. recoverable as As by ICP-MS	[0.87]	ug/L	1	0.85	2.8 / 10	10/05/22	EPA 200.8, Rev 5.4	721026460
Barium, tot. recoverable as Ba by ICP-MS	34	ug/L	1	0.20	0.67 / 2000	10/05/22	EPA 200.8, Rev 5.4	721026460
Cadmium, tot. recoverable as Cd by ICP-MS	ND	ug/L	1	0.12	0.40 / 5.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Calcium, tot. recoverable as Ca by ICP-MS	21	mg/L	1	0.13	0.43	10/05/22	EPA 200.8, Rev 5.4	721026460
Chromium, tot. recoverable as Cr by ICP-MS	ND	ug/L	1	2.6	8.7 / 100	10/05/22	EPA 200.8, Rev 5.4	721026460
Cobalt, tot. recoverable as Co by ICP-MS	[0.044]	ug/L	1	0.030	0.090	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	[2.1]	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Iron, tot. recoverable as Fe by ICP-MS	ND	mg/L	1	0.044	0.15	10/05/22	EPA 200.8, Rev 5.4	721026460
Lead, tot. recoverable as Pb by ICP-MS	ND	ug/L	1	0.25	0.82 / 15	10/05/22	EPA 200.8, Rev 5.4	721026460
Magnesium, tot. recoverable as Mg by ICP-MS	5.9	mg/L	1	0.069	0.23	10/05/22	EPA 200.8, Rev 5.4	721026460
Manganese, tot. recoverable as Mn by ICP-MS	ND	ug/L	1	1.9	6.3	10/05/22	EPA 200.8, Rev 5.4	721026460
Molybdenum, total recoverable as Mo by ICP-MS	[0.91]	ug/L	1	0.33	1.1	10/05/22	EPA 200.8, Rev 5.4	721026460
Nickel, tot. recoverable as Ni by ICP-MS	ND	ug/L	1	1.0	3.4 / 100	10/05/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	0.24	mg/L	1	0.039	0.13	10/07/22	4500-NH3 G-1997	721026460
Nitrogen, NO2 + NO3 as N (unfiltered)	2.9	mg/L	1	0.052	0.17 / 10	10/06/22	4500-NO3 F-2000	721026460
Phosphorus, tot. as P	[0.0090]	mg/L	1	0.0090	0.030	10/03/22	4500-P F-1999	721026460
Potassium, tot. recoverable as K by ICP-MS	2.9	mg/L	1	0.060	0.20	10/05/22	EPA 200.8, Rev 5.4	721026460
Sodium, tot. recoverable as Na by ICP-MS	21	mg/L	1	0.14	0.47	10/05/22	EPA 200.8, Rev 5.4	721026460
Strontium, tot. recoverable as Sr by ICP-MS	170	ug/L	1	0.59	2.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Tin, tot. recoverable as Sn by ICP-MS	ND	ug/L	1	1.5	5.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Total Organic Carbon (TOC)	1.4	mg/L	1	0.39	1.3	10/04/22	5310 C-2000	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Zinc, tot. recoverable as Zn by ICP-MS	[11]	ug/L	1	5.4	18	10/05/22	EPA 200.8, Rev 5.4	721026460

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393412
NLS Customer: 107964
Phone: 888 499 2507

Project: **Williams Bay, Village of - CCT**

After Sedimentation NLS ID: 1340233
Matrix: DW
Collected: 09/27/22 09:50 Received: 09/29/22

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Aluminum, tot. recoverable as Al by ICP-MS	0.040	mg/L	1	0.0090	0.031	10/05/22	EPA 200.8, Rev 5.4	721026460
Arsenic, tot. recoverable as As by ICP-MS	ND	ug/L	1	0.85	2.8 / 10	10/05/22	EPA 200.8, Rev 5.4	721026460
Barium, tot. recoverable as Ba by ICP-MS	28	ug/L	1	0.20	0.67 / 2000	10/05/22	EPA 200.8, Rev 5.4	721026460
Cadmium, tot. recoverable as Cd by ICP-MS	ND	ug/L	1	0.12	0.40 / 5.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Calcium, tot. recoverable as Ca by ICP-MS	20	mg/L	1	0.13	0.43	10/05/22	EPA 200.8, Rev 5.4	721026460
Chromium, tot. recoverable as Cr by ICP-MS	ND	ug/L	1	2.6	8.7 / 100	10/05/22	EPA 200.8, Rev 5.4	721026460
Cobalt, tot. recoverable as Co by ICP-MS	[0.045]	ug/L	1	0.030	0.090	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	ND	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Iron, tot. recoverable as Fe by ICP-MS	ND	mg/L	1	0.044	0.15	10/05/22	EPA 200.8, Rev 5.4	721026460
Lead, tot. recoverable as Pb by ICP-MS	ND	ug/L	1	0.25	0.82 / 15	10/05/22	EPA 200.8, Rev 5.4	721026460
Magnesium, tot. recoverable as Mg by ICP-MS	5.7	mg/L	1	0.069	0.23	10/05/22	EPA 200.8, Rev 5.4	721026460
Manganese, tot. recoverable as Mn by ICP-MS	ND	ug/L	1	1.9	6.3	10/05/22	EPA 200.8, Rev 5.4	721026460
Molybdenum, total recoverable as Mo by ICP-MS	[0.89]	ug/L	1	0.33	1.1	10/05/22	EPA 200.8, Rev 5.4	721026460
Nickel, tot. recoverable as Ni by ICP-MS	ND	ug/L	1	1.0	3.4 / 100	10/05/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	3.6	mg/L	1	0.039	0.13	10/07/22	4500-NH3 G-1997	721026460
Nitrogen, NO2 + NO3 as N (unfiltered)	[0.14]	mg/L	1	0.052	0.17 / 10	10/06/22	4500-NO3 F-2000	721026460
Phosphorus, tot. as P	[0.010]	mg/L	1	0.0090	0.030	10/03/22	4500-P F-1999	721026460
Potassium, tot. recoverable as K by ICP-MS	3.0	mg/L	1	0.060	0.20	10/05/22	EPA 200.8, Rev 5.4	721026460
Sodium, tot. recoverable as Na by ICP-MS	21	mg/L	1	0.14	0.47	10/05/22	EPA 200.8, Rev 5.4	721026460
Strontium, tot. recoverable as Sr by ICP-MS	160	ug/L	1	0.59	2.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Tin, tot. recoverable as Sn by ICP-MS	ND	ug/L	1	1.5	5.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Total Organic Carbon (TOC)	1.3	mg/L	1	0.39	1.3	10/04/22	5310 C-2000	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Zinc, tot. recoverable as Zn by ICP-MS	27	ug/L	1	5.4	18	10/05/22	EPA 200.8, Rev 5.4	721026460

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Analytical Laboratory and Environmental Services
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ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

NLS Project: 393412
NLS Customer: 107964
Phone: 888 499 2507

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

Project: **Williams Bay, Village of - CCT**

After Filtration NLS ID: 1340234
Matrix: DW
Collected: 09/27/22 09:56 Received: 09/29/22

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Aluminum, tot. recoverable as Al by ICP-MS	ND	mg/L	1	0.0090	0.031	10/05/22	EPA 200.8, Rev 5.4	721026460
Arsenic, tot. recoverable as As by ICP-MS	ND	ug/L	1	0.85	2.8 / 10	10/05/22	EPA 200.8, Rev 5.4	721026460
Barium, tot. recoverable as Ba by ICP-MS	24	ug/L	1	0.20	0.67 / 2000	10/05/22	EPA 200.8, Rev 5.4	721026460
Cadmium, tot. recoverable as Cd by ICP-MS	ND	ug/L	1	0.12	0.40 / 5.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Calcium, tot. recoverable as Ca by ICP-MS	17	mg/L	1	0.13	0.43	10/05/22	EPA 200.8, Rev 5.4	721026460
Chromium, tot. recoverable as Cr by ICP-MS	ND	ug/L	1	2.6	8.7 / 100	10/05/22	EPA 200.8, Rev 5.4	721026460
Cobalt, tot. recoverable as Co by ICP-MS	[0.044]	ug/L	1	0.030	0.090	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	[2.9]	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Iron, tot. recoverable as Fe by ICP-MS	ND	mg/L	1	0.044	0.15	10/05/22	EPA 200.8, Rev 5.4	721026460
Lead, tot. recoverable as Pb by ICP-MS	[0.55]	ug/L	1	0.25	0.82 / 15	10/05/22	EPA 200.8, Rev 5.4	721026460
Magnesium, tot. recoverable as Mg by ICP-MS	5.8	mg/L	1	0.069	0.23	10/05/22	EPA 200.8, Rev 5.4	721026460
Manganese, tot. recoverable as Mn by ICP-MS	ND	ug/L	1	1.9	6.3	10/05/22	EPA 200.8, Rev 5.4	721026460
Molybdenum, total recoverable as Mo by ICP-MS	[0.80]	ug/L	1	0.33	1.1	10/05/22	EPA 200.8, Rev 5.4	721026460
Nickel, tot. recoverable as Ni by ICP-MS	ND	ug/L	1	1.0	3.4 / 100	10/05/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	3.9	mg/L	1	0.039	0.13	10/07/22	4500-NH3 G-1997	721026460
Nitrogen, NO2 + NO3 as N (unfiltered)	[0.13]	mg/L	1	0.052	0.17 / 10	10/06/22	4500-NO3 F-2000	721026460
Phosphorus, tot. as P	ND	mg/L	1	0.0090	0.030	10/03/22	4500-P F-1999	721026460
Potassium, tot. recoverable as K by ICP-MS	2.9	mg/L	1	0.060	0.20	10/05/22	EPA 200.8, Rev 5.4	721026460
Sodium, tot. recoverable as Na by ICP-MS	21	mg/L	1	0.14	0.47	10/05/22	EPA 200.8, Rev 5.4	721026460
Strontium, tot. recoverable as Sr by ICP-MS	140	ug/L	1	0.59	2.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Tin, tot. recoverable as Sn by ICP-MS	ND	ug/L	1	1.5	5.0	10/05/22	EPA 200.8, Rev 5.4	721026460
Total Organic Carbon (TOC)	1.4	mg/L	1	0.39	1.3	10/04/22	5310 C-2000	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Zinc, tot. recoverable as Zn by ICP-MS	ND	ug/L	1	5.4	18	10/05/22	EPA 200.8, Rev 5.4	721026460

Values in brackets represent results greater than or equal to the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation". Results greater than or equal to the LOQ are considered to be in the region of "Certain Quantitation". LOD and/or LOQ tagged with an asterisk(*) are considered Reporting Limits. All LOD/LOQs adjusted to reflect dilution and/or solids content.
ND = Not Detected (< LOD) LOD = Limit of Detection LOQ = Limit of Quantitation NA = Not Applicable
DWB = Dry Weight Basis %DWB = (mg/kg DWB) / 10000 1000 ug/L = 1 mg/L
MCL = Maximum Contaminant Levels for Drinking Water Samples. Shaded results indicate >MCL.

Reviewed by:

Authorized by:
R. T. Krueger
President

For Terms and Conditions please see www.nlslab.com

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
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ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393402
NLS Customer: 107964
Phone: 888 499 2507

Project: Williams Bay, Village of - CCT

D15 Sample 1 NLS ID: 1340188
COC: :1 Matrix: DW
Collected: 09/27/22 07:40 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	1100	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	1000	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	0.67	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.78	mg/L	1	0.073	0.24 / 10	09/29/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	**2.3**	mg/L	1	0.040*	0.13 / 1.0*	09/29/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D15 Sample 2 NLS ID: 1340189
COC: :2 Matrix: DW
Collected: 09/27/22 07:40 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	490	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	490	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	0.60	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.71	mg/L	1	0.073	0.24 / 10	09/29/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	**2.5**	mg/L	1	0.040*	0.13 / 1.0*	09/29/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D15 Sample 3 NLS ID: 1340190
COC: :3 Matrix: DW
Collected: 09/27/22 07:40 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	320	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	320	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	0.47	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.59	mg/L	1	0.073	0.24 / 10	09/29/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	**2.7**	mg/L	1	0.040*	0.13 / 1.0*	09/29/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

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ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393402
NLS Customer: 107964
Phone: 888 499 2507

Project: Williams Bay, Village of - CCT

D15 Sample 4 NLS ID: 1340191
COC: :4 Matrix: DW
Collected: 09/27/22 07:40 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	330	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	330	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	0.47	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.70	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	**2.6**	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D15 Sample 5 NLS ID: 1340192
COC: :5 Matrix: DW
Collected: 09/27/22 07:40 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	240	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	240	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	0.34	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	1.2	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	**2.2**	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D15 Sample 6 NLS ID: 1340193
COC: :6 Matrix: DW
Collected: 09/27/22 07:40 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	200	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	200	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	0.32	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	1.3	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	**2.2**	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

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Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
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ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393402
NLS Customer: 107964
Phone: 888 499 2507

Project: Williams Bay, Village of - CCT

D15 Sample 7 NLS ID: 1340194
COC: :7 Matrix: DW
Collected: 09/27/22 07:40 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	190	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	200	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	0.32	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	1.3	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	**2.2**	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D15 Sample 8 NLS ID: 1340195
COC: :8 Matrix: DW
Collected: 09/27/22 07:40 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	170	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	180	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	0.39	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	1.1	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	**2.3**	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D15 Sample 9 NLS ID: 1340196
COC: :9 Matrix: DW
Collected: 09/27/22 07:40 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	120	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	130	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	0.45	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.94	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	**2.4**	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

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ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

NLS Project: 393402
NLS Customer: 107964
Phone: 888 499 2507

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

Project: **Williams Bay, Village of - CCT**

D15 Sample 10 NLS ID: 1340197
COC: :10 Matrix: DW
Collected: 09/27/22 07:40 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	75	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	88	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	0.49	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.85	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	**2.5**	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

Values in brackets represent results greater than or equal to the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation". Results greater than or equal to the LOQ are considered to be in the region of "Certain Quantitation". LOD and/or LOQ tagged with an asterisk(*) are considered Reporting Limits. All LOD/LOQs adjusted to reflect dilution and/or solids content.
ND = Not Detected (< LOD) LOD = Limit of Detection LOQ = Limit of Quantitation NA = Not Applicable
DWB = Dry Weight Basis %DWB = (mg/kg DWB) / 10000 1000 ug/L = 1 mg/L
MCL = Maximum Contaminant Levels for Drinking Water Samples. Shaded results indicate >MCL.

Reviewed by:

Authorized by:
R. T. Krueger
President

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ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393404
NLS Customer: 107964
Phone: 888 499 2507

Project: William Bay, Villate of - CCT

D22 Sample 1 NLS ID: 1340200
COC: :1 Matrix: DW
Collected: 09/27/22 08:28 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	150	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	150	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	1.5	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.36	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	**2.1**	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D22 Sample 2 NLS ID: 1340201
COC: :2 Matrix: DW
Collected: 09/27/22 08:28 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	130	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	140	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	1.8	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.35	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	**1.7**	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D22 Sample 3 NLS ID: 1340202
COC: :3 Matrix: DW
Collected: 09/27/22 08:28 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	110	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	110	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	2.3	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.34	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.87	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

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ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393404
NLS Customer: 107964
Phone: 888 499 2507

Project: William Bay, Villate of - CCT

D22 Sample 4 NLS ID: 1340203
COC: :4 Matrix: DW
Collected: 09/27/22 08:28 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	94	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	97	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	2.3	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.35	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.89	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D22 Sample 5 NLS ID: 1340204
COC: :5 Matrix: DW
Collected: 09/27/22 08:28 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	110	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	110	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	2.3	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.36	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	**1.1**	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D22 Sample 6 NLS ID: 1340205
COC: :6 Matrix: DW
Collected: 09/27/22 08:28 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	53	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	56	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	2.5	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.34	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.83	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

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ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393404
NLS Customer: 107964
Phone: 888 499 2507

Project: **William Bay, Villate of - CCT**

D22 Sample 7 NLS ID: 1340206
COC: :7 Matrix: DW
Collected: 09/27/22 08:28 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	40	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	44	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	2.5	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.29	mg/L	1	0.073	0.24 / 10	09/29/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.72	mg/L	1	0.040*	0.13 / 1.0*	09/29/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D22 Sample 8 NLS ID: 1340207
COC: :8 Matrix: DW
Collected: 09/27/22 08:28 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	34	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	35	ug/L	1	1.7	5.6 / 1300	10/17/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	2.4	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.29	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.78	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D22 Sample 9 NLS ID: 1340208
COC: :9 Matrix: DW
Collected: 09/27/22 08:28 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	27	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	28	ug/L	1	1.7	5.6 / 1300	10/07/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	2.4	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.31	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.91	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

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ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393404
NLS Customer: 107964
Phone: 888 499 2507

Project: **William Bay, Villate of - CCT**

D22 Sample 10 NLS ID: 1340209
COC: :10 Matrix: DW
Collected: 09/27/22 08:28 Received: 09/29/22
Notes: Per client instruction, samples for Nitrate and Nitrite were analyzed beyond holding time.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	23	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	27	ug/L	1	1.7	5.6 / 1300	10/04/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	2.3	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.32	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	1.0	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

Values in brackets represent results greater than or equal to the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation". Results greater than or equal to the LOQ are considered to be in the region of "Certain Quantitation". LOD and/or LOQ tagged with an asterisk(*) are considered Reporting Limits. All LOD/LOQs adjusted to reflect dilution and/or solids content.
ND = Not Detected (< LOD) LOD = Limit of Detection LOQ = Limit of Quantitation NA = Not Applicable
DWB = Dry Weight Basis %DWB = (mg/kg DWB) / 10000 1000 ug/L = 1 mg/L
MCL = Maximum Contaminant Levels for Drinking Water Samples. Shaded results indicate >MCL.

Reviewed by:

Authorized by:
R. T. Krueger
President

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ANALYTICAL REPORT

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Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393405
NLS Customer: 107964
Phone: 888 499 2507

Project: **Williams Bay, Village of - CCT**

D28 Sample 1 NLS ID: 1340210
COC: :1 Matrix: DW
Collected: 09/27/22 08:03 Received: 09/29/22
Notes: Per client instruction, sample was analyzed past holdtime.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	58	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	75	ug/L	1	1.7	5.6 / 1300	10/04/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	3.1	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	[0.16]	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.21	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D28 Sample 2 NLS ID: 1340211
COC: :2 Matrix: DW
Collected: 09/27/22 08:03 Received: 09/29/22
Notes: Per client instruction, sample was analyzed past holdtime.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	26	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	30	ug/L	1	1.7	5.6 / 1300	10/04/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	3.1	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	[0.22]	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.15	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D28 Sample 3 NLS ID: 1340212
COC: :3 Matrix: DW
Collected: 09/27/22 08:03 Received: 09/29/22
Notes: Per client instruction, sample was analyzed past holdtime.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	35	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	44	ug/L	1	1.7	5.6 / 1300	10/04/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	3.2	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	[0.23]	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.15	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393405
NLS Customer: 107964
Phone: 888 499 2507

Project: Williams Bay, Village of - CCT

D28 Sample 4 NLS ID: 1340213
COC: :4 Matrix: DW
Collected: 09/27/22 08:03 Received: 09/29/22
Notes: Per client instruction, sample was analyzed past holdtime.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	27	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	33	ug/L	1	1.7	5.6 / 1300	10/04/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	3.2	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	[0.23]	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.15	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D28 Sample 5 NLS ID: 1340214
COC: :5 Matrix: DW
Collected: 09/27/22 08:03 Received: 09/29/22
Notes: Per client instruction, sample was analyzed past holdtime.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	24	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	29	ug/L	1	1.7	5.6 / 1300	10/04/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	3.2	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	[0.23]	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.15	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D28 Sample 6 NLS ID: 1340215
COC: :6 Matrix: DW
Collected: 09/27/22 08:03 Received: 09/29/22
Notes: Per client instruction, sample was analyzed past holdtime.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	21	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	24	ug/L	1	1.7	5.6 / 1300	10/04/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	3.2	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	[0.23]	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.14	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

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ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393405
NLS Customer: 107964
Phone: 888 499 2507

Project: **Williams Bay, Village of - CCT**

D28 Sample 7 NLS ID: 1340216
COC: :7 Matrix: DW
Collected: 09/27/22 08:03 Received: 09/29/22
Notes: Per client instruction, sample was analyzed past holdtime.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	22	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	25	ug/L	1	1.7	5.6 / 1300	10/04/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	3.2	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	[0.23]	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.14	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D28 Sample 8 NLS ID: 1340217
COC: :8 Matrix: DW
Collected: 09/27/22 08:03 Received: 09/29/22
Notes: Per client instruction, sample was analyzed past holdtime.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	26	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	31	ug/L	1	1.7	5.6 / 1300	10/04/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	3.2	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	[0.23]	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.14	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

D28 Sample 9 NLS ID: 1340218
COC: :9 Matrix: DW
Collected: 09/27/22 08:03 Received: 09/29/22
Notes: Per client instruction, sample was analyzed past holdtime.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	26	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	31	ug/L	1	1.7	5.6 / 1300	10/04/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	3.2	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	[0.23]	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.14	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

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ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: **Water Quality Investigations, LLC**
Attn: Emily Hefty-Dieckhoff
2581 State Hwy 92, Suite 2
Mount Horeb, WI 53572

NLS Project: 393405
NLS Customer: 107964
Phone: 888 499 2507

Project: **Williams Bay, Village of - CCT**

D28 Sample 10 NLS ID: 1340219
COC: :10 Matrix: DW
Collected: 09/27/22 08:03 Received: 09/29/22
Notes: Per client instruction, sample was analyzed past holdtime.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Copper, dis. as Cu by ICP-MS	21	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	23	ug/L	1	1.7	5.6 / 1300	10/05/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	3.2	mg/L	1	0.039	0.13	10/04/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	[0.23]	mg/L	1	0.073	0.24 / 10	09/30/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	0.14	mg/L	1	0.040*	0.13 / 1.0*	09/30/22	EPA 300.0, Rev 2.1	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	09/30/22	EPA 180.1	721026460
Lab filtration	yes					09/29/22	NA	721026460

Values in brackets represent results greater than or equal to the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation". Results greater than or equal to the LOQ are considered to be in the region of "Certain Quantitation". LOD and/or LOQ tagged with an asterisk(*) are considered Reporting Limits. All LOD/LOQs adjusted to reflect dilution and/or solids content.
ND = Not Detected (< LOD) LOD = Limit of Detection LOQ = Limit of Quantitation NA = Not Applicable
DWB = Dry Weight Basis %DWB = (mg/kg DWB) / 10000 1000 ug/L = 1 mg/L
MCL = Maximum Contaminant Levels for Drinking Water Samples. Shaded results indicate >MCL.

Reviewed by:

Authorized by:
R. T. Krueger
President

For Terms and Conditions please see www.nlslab.com

ANALYTICAL RESULTS: Haloacetic Acids by EPA 552.3, Rev 1
Customer: Water Quality Investigations, LLC NLS Project: 394874
Project Description: Williams Bay, Village of - CCT
Project Title: Template: 552.3DW Printed: 11/07/2022 12:38

Sample: 1345213 After Sedimentation 35 mg/L Collected: 10/20/22 Analyzed: 11/03/22 - Analytes: 6

ANALYTE NAME	RESULT	UNITS	DIL	LOD	LOQ	MCL	Note
Dibromoacetic acid	2.8	ug/L	2	0.19	0.62	60	
Dichloroacetic acid	14	ug/L	2	0.29	0.98	60	
Total Haloacetic Acid (HAA5)	29	ug/L	2			60	
Monobromoacetic acid	ND	ug/L	2	0.26	0.87	60	
Monochloroacetic acid	ND	ug/L	2	1.9	6.2	60	
Trichloroacetic acid	12	ug/L	2	0.43	1.4	60	
2-Bromobutanoic Acid (SURR)	122%		2				S

NOTES APPLICABLE TO THIS ANALYSIS:
S = This compound is a surrogate used to evaluate the quality control of a method.

ANALYTICAL RESULTS: GCMS 524.2, Rev 4.1 Safe Drinking Water Analysis - DNR Form
Customer: Water Quality Investigations, LLC NLS Project: 394874
Project Description: Williams Bay, Village of - CCT
Project Title: Template: 524THM Printed: 11/07/2022 12:39

Sample: 1345213 After Sedimentation 35 mg/L Collected: 10/20/22 Analyzed: 11/01/22 - Analytes: 4

ANALYTE NAME	RESULT	UNITS	DIL	LOD	LOQ	MCL	Note
Bromodichloromethane	10	ug/L	1	0.15	0.48	80	
Bromoform	ND	ug/L	1	0.14	0.45	80	
Chloroform	57	ug/L	5	0.99	3.3	80	
Dibromochloromethane	3.1	ug/L	1	0.18	0.61	80	
TTHM in water, (summation)	70	ug/L	1			80	
4-Bromofluorobenzene (SURR)	62%		1				S
1,2-Dichlorobenzene-d4 (SURR)	67%		1				S

NOTES APPLICABLE TO THIS ANALYSIS:
S = This compound is a surrogate used to evaluate the quality control of a method.

Pay Period Date: 10/22/2022 - 11/4/2022
Pay Date: 11/11/2022

Department	Gross Regular Wages	Gross OT Wages	Payroll Taxes & Deductions	Net Wages
Crossing Guard	$653.76	$0.00	$51.38	$602.38
General Administration	$9,666.16	$0.00	$2,885.98	$6,780.18
KNC	$2,093.00	$0.00	$721.57	$1,371.43
Lakefront/Beach	$4,401.00	$57.75	$1,415.50	$3,043.25
Library	$7,134.41	$0.00	$2,299.78	$4,834.63
Municipal Court	$1,227.11	$0.00	$163.07	$1,064.04
Parks	$1,172.44	$0.00	$139.06	$1,033.38
Police	$23,075.06	$586.88	$7,928.68	$15,733.26
Protective Services (F&R)	$5,379.68	$0.00	$1,146.26	$4,233.42
Public Works/W&S	$12,372.36	$455.49	$4,579.43	$8,248.42
Recreation Department	$2,784.69	$0.00	$706.60	$2,078.09
Village Board	$0.00	$0.00	$0.00	$0.00
Total Net Wages				$49,022.48

Payroll Register - Detail by Department

GL Account and Title	Description	Amount	Date Paid	GL Period
CITY ELECTRIC SUPPLY				
100-51730-150 VH BLDG REPAIRS/MAINT	NEW LIGHTS FOR COUN	2,361.00	11/15/2022	1122
Total CITY ELECTRIC SUPPLY:		2,361.00		
Grand Totals:		2,361.00		

Village Board Approval Date: _____

GL Account and Title		Description	Amount	GL Period
1122				
BAKER & TAYLOR				
400-58200-000	ADULT PRINT	BOOKS	1,754.38	1122
400-58201-000	CHILDREN PRINT	CHILDRENS BOOKS	20.12	1122
410-58200-102	BOOKS, DONOR DESIGNATED	BOOKS DONOR DESIGNATED	40.00	1122
410-58200-101	BOOKS, BOARD COMMITTED	BOOKS BOARD COMMITTED	116.36	1122
Total BAKER & TAYLOR:			1,930.86	
CUSTOM PLASTIC CARD COMPANY				
400-58100-160	LIBRARY SUPPLIES	SUPPLIES	355.00	1122
Total CUSTOM PLASTIC CARD COMPANY:			355.00	
DEMCO				
400-58100-160	LIBRARY SUPPLIES	SUPPLIES	319.97	1122
Total DEMCO:			319.97	
FINDAWAY WORLD LLC				
400-58201-100	CHILDREN DIGITAL	CHILDREN'S DIGITAL	507.90	1122
400-58201-100	CHILDREN DIGITAL	CHILDREN'S DIGITAL	314.95	1122
400-58200-100	ADULT DIGITAL	ADULT DIGITAL	710.49	1122
400-58201-100	CHILDREN DIGITAL	CHILDREN'S DIGITAL	125.98	1122
400-58200-100	ADULT DIGITAL	ADULT DIGITAL	225.22	1122
Total FINDAWAY WORLD LLC:			1,884.54	
HUDSON, DANIELLE				
400-58220-000	LIBRARY MILEAGE EXPENSE	MILEAGE REIMBURSEMENT	11.50	1122
Total HUDSON, DANIELLE:			11.50	
MIDWEST TAPE				
400-58240-000	LIBRARY MEDIA	MEDIA	92.21	1122
400-58240-000	LIBRARY MEDIA	MEDIA	22.49	1122
Total MIDWEST TAPE:			114.70	
MUSKEGO PUBLIC LIBRARY				
400-58310-000	IT/LICENSES/CONTRACTED SERVICE	IT/LICENSES/CONTRACTED SE	6.99	1122
Total MUSKEGO PUBLIC LIBRARY:			6.99	
PETTY CASH				
400-58100-161	LIBRARY POSTAGE	POSTAGE EXPENSE	3.32	1122
400-58230-000	PROGRAMS FOR CHILDREN & ADULTS	PROGRAMS FOR CHILDREN	50.00	1122
Total PETTY CASH:			53.32	
SANDERS, EMILY				
400-58220-000	LIBRARY MILEAGE EXPENSE	MILEAGE REIMBURSEMENT	34.50	1122
Total SANDERS, EMILY:			34.50	
SCHNUPP, JOY				
400-58220-000	LIBRARY MILEAGE EXPENSE	MILEAGE REIMBURSEMENT	11.50	1122
400-58100-160	LIBRARY SUPPLIES	REIMBURSEMENT FOR SUPPLI	32.98	1122

GL Account and Title	Description	Amount	GL Period
Total SCHNUPP, JOY:		44.48	
UNIQUE SERVICES			
400-58310-000 IT/LICENSES/CONTRACTED SERVICE	IT/LICENSES/CONTRACTED SE	50.00	1122
Total UNIQUE SERVICES:		50.00	
WALWORTH COUNTY SECURITY ALARMS			
400-58310-000 IT/LICENSES/CONTRACTED SERVICE	IT/LICENSES/CONTRACTED SE	324.00	1122
Total WALWORTH COUNTY SECURITY ALARMS:		324.00	
Total 1122:		5,129.86	
Grand Totals:		5,129.86	

Village Board Approval Date: _____

GL Account and Title	Description	Amount	GL Period
0			
AIRGAS USA LLC			
200-57631-160 WATER TREATMENT CHEMICALS	CARBON DIOXIDE- BULK	1,830.67	0
Total AIRGAS USA LLC:		1,830.67	
AMAZON CAPITAL SERVICES			
100-55210-278 REC DEPT BOO IN THE BAY	BOO IN THE BAY	169.54	0
100-52120-160 POLICE SUPPLIES	POLICE SUPPLIES	263.75	0
100-52120-190 POLICE TRAINING	TRAINING EXPENSE	91.87	0
100-52120-210 POLICE COMMUNITY PROGRAMS	COMMUNITY PROGRAM	59.96	0
300-58968-150 SEWER COLLECTION SYSTEM MAINT	SUPPLIES	109.36	0
Total AMAZON CAPITAL SERVICES:		694.48	
ARAMARK			
100-54310-125 STREETS UNIFORMS	UNIFORMS-STREETS DEPT	42.89	0
100-55410-125 PARKS UNIFORMS	UNIFORMS-PARKS DEPT	42.89	0
100-54310-125 STREETS UNIFORMS	UNIFORMS-STREETS DEPT	38.68	0
100-55410-125 PARKS UNIFORMS	UNIFORMS-PARKS DEPT	38.68	0
100-54310-125 STREETS UNIFORMS	UNIFORMS-STREETS DEPT	42.89	0
100-55410-125 PARKS UNIFORMS	UNIFORMS-PARKS DEPT	42.89	0
200-57903-125 WATER METER READING - UNIFORMS	UNIFORMS-WATER DEPT	106.50	0
200-57903-125 WATER METER READING - UNIFORMS	UNIFORMS-WATER DEPT	106.50	0
Total ARAMARK:		461.92	
ARNOLD, SUZANNE			
100-51412-110 ELECTION WAGES	ELECTION PAY	55.00	0
Total ARNOLD, SUZANNE:		55.00	
BAUSCH, JUDITH			
100-51412-110 ELECTION WAGES	ELECTION PAY	232.50	0
Total BAUSCH, JUDITH:		232.50	
BIANCHI-KNOD, ELIZABETH			
100-51412-110 ELECTION WAGES	ELECTION PAY	102.50	0
Total BIANCHI-KNOD, ELIZABETH:		102.50	
BLACK, DAVID			
100-51412-110 ELECTION WAGES	ELECTION PAY	62.50	0
Total BLACK, DAVID:		62.50	
BLACK, DEBORAH			
100-51412-110 ELECTION WAGES	ELECTION PAY	62.50	0
Total BLACK, DEBORAH:		62.50	
BURLINGTON WASTEWATER UTILITY			
200-57623-170 WATER TESTING	MONTHLY BILLING	100.00	0
Total BURLINGTON WASTEWATER UTILITY:		100.00	

GL Account and Title	Description	Amount	GL Period
BYRNES, CORA			
100-51412-110 ELECTION WAGES	ELECTION PAY	65.00	0
Total BYRNES, CORA:		65.00	
BYRNES, PATRICK			
100-51412-110 ELECTION WAGES	ELECTIN PAY	65.00	0
Total BYRNES, PATRICK:		65.00	
CASPER'S TRUCK EQUIPMENT			
550-54310-140 STREETS CAPITAL OUTLAY	25% DOWN PAYMENT ON EQUI	33,755.50	0
Total CASPER'S TRUCK EQUIPMENT:		33,755.50	
CINDY ROWE MARKETING			
100-52360-170 RESCUE DEPT INTERGOVT AGMNT	FINAL PAYMENT FOR REFEREN	4,625.00	0
Total CINDY ROWE MARKETING:		4,625.00	
CITY OF LAKE GENEVA			
100-51412-000 ELECTION EXPENSE	PUBLIC TEST NOTICE	5.13	0
Total CITY OF LAKE GENEVA:		5.13	
CORE & MAIN			
200-57610-140 WATER FUND CAPITAL OUTLAY	HWY 67 RECONSTRUCTION CO	250,126.23	0
200-57346-000 NEW WATER METERS	WATER METERS	1,467.57	0
300-58968-150 SEWER COLLECTION SYSTEM MAINT	SUPPLIES	1,772.32	0
200-57641-160 WATER DISTRIBUTION SUPPLIES	WATER DIST SUPPLIES	647.39	0
200-57641-160 WATER DISTRIBUTION SUPPLIES	SUPPLIES	340.16	0
200-57610-140 WATER FUND CAPITAL OUTLAY	HWY 67 RECONSTRUCTION CO	45,304.00	0
200-57610-140 WATER FUND CAPITAL OUTLAY	HWY 67 RECONSTRUCTION CO	177.00	0
200-57610-140 WATER FUND CAPITAL OUTLAY	HWY 67 RECONSTRUCTION CO	3,391.00	0
Total CORE & MAIN:		303,225.67	
COX, KARSEN			
100-55210-275 REC DEPT PROGRAM EXPENSES	FLAG FOOTBALL REF 2022	40.00	0
Total COX, KARSEN:		40.00	
CREED, BRUCE			
100-51412-110 ELECTION WAGES	ELECTION PAY	52.50	0
Total CREED, BRUCE:		52.50	
DAILEY, SONYA			
100-51412-110 ELECTION WAGES	ELECTION PAY	62.50	0
Total DAILEY, SONYA:		62.50	
DISPLAY SALES			
100-56120-000 HOLIDAY DECORATION SUPPLIES	BULBS	195.75	0
Total DISPLAY SALES:		195.75	

GL Account and Title	Description	Amount	GL Period
DJS SCUBA LOCKER INC			
100-52340-145 DIVE TEAM TANK MAINTENANCE	WORK ORDERS	461.46	0
100-52340-150 DIVE TEAM REPAIRS/MAINT	SUPPLIES	1,075.50	0
Total DJS SCUBA LOCKER INC:		1,536.96	
EAGLE EYE TREE SERV			
100-56130-000 TREE ENHANCEMENT	TAKE DOWN TREE AND STUMP	817.63	0
Total EAGLE EYE TREE SERV:		817.63	
EDWARDS, WAYNE			
100-54310-125 STREETS UNIFORMS	REIMBURSEMENT FOR WORK	150.00	0
Total EDWARDS, WAYNE:		150.00	
EMPLOYEE BENEFITS CORP			
100-51510-000 INSURANCE EXPENSE	ANNUAL RENEWAL FEE	275.00	0
Total EMPLOYEE BENEFITS CORP:		275.00	
FREEDOM MAILING			
100-52360-160 RESCUE DEPT SUPPLIES	EMS REFERENDUM NOTICE	1,168.15	0
100-52360-160 RESCUE DEPT SUPPLIES	EMS REFERENDUM NOTICE	1,110.75	0
Total FREEDOM MAILING:		2,278.90	
GORDON FLESCH			
100-51410-162 GEN ADMIN COPIER EXPENSE	VH MONTHLY CHARGES	264.17	0
Total GORDON FLESCH:		264.17	
GRAINGER INC.			
400-58100-155 LIBRARY BLDG SUPPLIES	SUPPLIES	388.02	0
Total GRAINGER INC.:		388.02	
GREAT LAKES TV SEAL INC			
300-58968-150 SEWER COLLECTION SYSTEM MAINT	SANITARY SEWER INSPECTION	639.95	0
Total GREAT LAKES TV SEAL INC:		639.95	
HANDLEY, CRISSY			
100-51412-110 ELECTION WAGES	ELECTION PAY	102.50	0
Total HANDLEY, CRISSY:		102.50	
HEISE, BRIAN			
100-51412-110 ELECTION WAGES	ELECTION PAY	67.50	0
Total HEISE, BRIAN:		67.50	
LAKE GENEVA MARINE CO			
100-55210-280 KAYAK/PADDLEBOARD EXPENSE	KAYAK AND STAND UP PADDLE	58.50	0
Total LAKE GENEVA MARINE CO:		58.50	

GL Account and Title	Description	Amount	GL Period
LAKE GENEVA REGIONAL NEWS			
100-51410-160 GEN ADMIN SUPPLIES	2 YEAR SUBSCRIPTION	109.99	0
Total LAKE GENEVA REGIONAL NEWS:		109.99	
LAUGHLIN, CATHEE			
100-51412-110 ELECTION WAGES	ELECTION PAY	152.50	0
Total LAUGHLIN, CATHEE:		152.50	
LAUGHLIN, JOHN			
100-51412-110 ELECTION WAGES	ELECTION PAY	52.50	0
Total LAUGHLIN, JOHN:		52.50	
LEITNER, LAURIE			
100-51412-110 ELECTION WAGES	ELECTION PAY	52.50	0
Total LEITNER, LAURIE:		52.50	
MARRA, HALINA			
100-55415-000 ENHANCEMENT COMMITTEE	ENHANCEMENT COMMITTEE R	56.40	0
Total MARRA, HALINA:		56.40	
MICHAELSON, SHERYL			
100-51412-110 ELECTION WAGES	ELECTION PAY	62.50	0
Total MICHAELSON, SHERYL:		62.50	
MILPORT ENTERPRISES INC			
200-57631-160 WATER TREATMENT CHEMICALS	ALUMINUM SULFATE	1,155.00	0
Total MILPORT ENTERPRISES INC:		1,155.00	
MONROE, RENA			
100-51412-110 ELECTION WAGES	ELECTION PAY	765.00	0
Total MONROE, RENA:		765.00	
NIEUWENHUIS BROS. INC.			
225-54635-131 RECYCLING FEES	RECYCLING CURBSIDE PICKU	6,677.71	0
100-54710-000 REFUSE COLLECTIONS	REFUSE CURBSIDE PICKUP	13,714.25	0
Total NIEUWENHUIS BROS. INC.:		20,391.96	
ODLING CONSTRUCTION INC.			
200-57651-150 WATER MAINS REPAIRS/MAINT	TORPEDO SAND	56.03	0
Total ODLING CONSTRUCTION INC.:		56.03	
PACKARD, JOHNNY			
100-55210-274 REC DEPT ADULT FITNESS	TAI CHI	136.00	0
Total PACKARD, JOHNNY:		136.00	
PATS SERVICES INC			
200-57631-160 WATER TREATMENT CHEMICALS	LIME SLUDGE	220.00	0

GL Account and Title	Description	Amount	GL Period
200-57631-160 WATER TREATMENT CHEMICALS	PUMPING LIME SLUDGE	240.00	0
200-57631-160 WATER TREATMENT CHEMICALS	LIME SLUDGE	240.00	0
200-57631-160 WATER TREATMENT CHEMICALS	PUMPING LIME SLUDGE	240.00	0
100-55210-143 BASEBALL FIELD UPKEEP	PORTABLE TOILET RENTAL TH	236.12	0
Total PATS SERVICES INC:		1,176.12	
PERKINS, HEATHER			
100-51412-110 ELECTION WAGES	ELECTION PAY	52.50	0
Total PERKINS, HEATHER:		52.50	
PETE'S PRINTING			
230-58100-170 KNC POSTAGE AND PRINTING	MAP BROCHURES	260.00	0
Total PETE'S PRINTING:		260.00	
PETE'S TIRE ELKHORN LLC			
100-54310-150 STREETS EQUIP REPAIRS/MAINT	FLAT REPAIR	310.00	0
Total PETE'S TIRE ELKHORN LLC:		310.00	
PRODUCTIVITY PLUS ACCOUNT			
100-55410-150 PARKS REPAIRS/MAINT	PARKS REPAIR/MAINT	3,461.80	0
Total PRODUCTIVITY PLUS ACCOUNT:		3,461.80	
RHODE, RITA			
100-51412-110 ELECTION WAGES	ELECTION PAY	52.50	0
Total RHODE, RITA:		52.50	
RIEDEL, JAMES			
100-51412-110 ELECTION WAGES	ELECTION PAY	52.50	0
Total RIEDEL, JAMES:		52.50	
SECURIAN FINANCIAL GROUP INC			
100-52120-124 POLICE LIFE INSURANCE	POLICE LIFE INSURANCE	73.11	0
100-54310-124 STREETS LIFE INSURANCE	STREETS - LIFE INSURANCE	24.50	0
100-55410-124 PARKS LIFE INSURANCE	PARKS LIFE INSURANCE	1.82	0
200-57630-124 WATER TREATMENT - LIFE INS	WATER TREATMENT LIFE INSU	10.08	0
200-57640-124 WATER DISTRIBUTION - LIFE INS	WATER DISTRIBUTION LIFE INS	10.08	0
230-58100-124 KNC LIFE INSURANCE	KNC LIFE INSURANCE	3.53	0
100-51410-124 GEN ADMIN LIFE INSURANCE	GEN ADMIN LIFE INSURANCE	42.56	0
100-55210-124 REC DEPT LIFE INSURANCE	REC DEPT. LIFE INSURANCE	4.54	0
400-58100-123 LIBRARY HEALTH INSURANCE	LIBRARY LIFE INSURANCE	32.59	0
100-21257 LIFE INSURANCE PAYABLE	EMPLOYEE CONTRIBUTION	254.87	0
Total SECURIAN FINANCIAL GROUP INC:		457.68	
SHI INTERNATIONAL CORP			
100-51414-000 SOFTWARE LICENSE & IT SUPPORT	POWER ADAPTER	217.53	0
Total SHI INTERNATIONAL CORP:		217.53	
STATE OF WI - COURT FINES			
100-45001 COURT FINE REVENUE	MONTHLY SHARE OF COURT FI	1,190.50	0

GL Account and Title	Description	Amount	GL Period
Total STATE OF WI - COURT FINES:		1,190.50	
STEVENSON, MERCY			
100-51412-110 ELECTION WAGES	ELECTION PAY	152.50	0
Total STEVENSON, MERCY:		152.50	
STROUD, ROXANNE			
100-51412-110 ELECTION WAGES	ELECTION PAY	52.50	0
Total STROUD, ROXANNE:		52.50	
SYMBOL ARTS			
100-52120-125 POLICE UNIFORMS	POLICE UNIFORMS	60.00	0
Total SYMBOL ARTS:		60.00	
TENYER, KATHRYN			
100-51412-110 ELECTION WAGES	ELECTION PAY	62.50	0
Total TENYER, KATHRYN:		62.50	
THE PARTS PLACE			
100-54310-150 STREETS EQUIP REPAIRS/MAINT	STREETS SUPPLIES	54.57	0
Total THE PARTS PLACE:		54.57	
TRANSCENDENT TECHNOLOGIES			
100-51414-000 SOFTWARE LICENSE & IT SUPPORT	TAX LICENSING ANNUAL SUPP	652.00	0
100-51414-000 SOFTWARE LICENSE & IT SUPPORT	PET LICENSING ANNUAL SUPP	186.00	0
100-51414-000 SOFTWARE LICENSE & IT SUPPORT	TAX RECEIPTING CREDIT CAR	450.00	0
Total TRANSCENDENT TECHNOLOGIES:		1,288.00	
TRAVIS, KIMBERLY			
100-51412-110 ELECTION WAGES	ELECTION PAY	10.00	0
Total TRAVIS, KIMBERLY:		10.00	
TRUSH, GREGORY			
100-51412-110 ELECTION WAGES	ELECTION PAY	62.50	0
Total TRUSH, GREGORY:		62.50	
TUMA, RICHARD			
100-51412-110 ELECTION WAGES	ELECTION PAY	52.50	0
Total TUMA, RICHARD:		52.50	
UPPER CASE PRINTING			
100-52360-170 RESCUE DEPT INTERGOVT AGMNT	REFERENDUM INFORMATION	782.80	0
100-52360-170 RESCUE DEPT INTERGOVT AGMNT	REFERENDUM INFORMATION P	515.25	0
Total UPPER CASE PRINTING:		1,298.05	
USA BLUE BOOK			
200-57930-140 WATER DIGGERS HOTLINE EXPENSE	WATER DIST SUPPLIES	73.95	0

GL Account and Title	Description	Amount	GL Period
Total USA BLUE BOOK:		73.95	
VERITIV OPERATING COMPANY			
100-51410-160 GEN ADMIN SUPPLIES	COPY PAPER	375.60	0
Total VERITIV OPERATING COMPANY:		375.60	
VILLAGE OF FONTANA			
100-52360-170 RESCUE DEPT INTERGOVT AGMNT	OCTOBER 2022 EMS SERVICES	36,907.15	0
100-52360-170 RESCUE DEPT INTERGOVT AGMNT	50% OF BUNK ROOM EXPENSE	4,622.34	0
100-52360-170 RESCUE DEPT INTERGOVT AGMNT	SEPTEMBER 2022 EMS SERVIC	36,907.15	0
100-52360-170 RESCUE DEPT INTERGOVT AGMNT	50% OF UNIFORMS & BUNK RO	3,247.37	0
Total VILLAGE OF FONTANA:		81,684.01	
W.S. DARLEY & CO.			
215-52320-165 FIRE DUES 2% EXPENDITURES	SUPPLIES	710.44	0
Total W.S. DARLEY & CO.:		710.44	
WALCOMET			
300-58980-300 WALCOMET SEWERAGE EXPENSES	MONTHLY BILLING	53,577.23	0
Total WALCOMET:		53,577.23	
WALWORTH COUNTY TREASURER-COURT FINES			
100-45001 COURT FINE REVENUE	MONTHLY SHARE OF COURT FI	340.00	0
Total WALWORTH COUNTY TREASURER-COURT FINES:		340.00	
WEHRWEIN, KEEGAN			
100-55210-275 REC DEPT PROGRAM EXPENSES	FLAG FOOTBALL REF 2022	80.00	0
Total WEHRWEIN, KEEGAN:		80.00	
WELDERS SUPPLY CO.			
100-54310-160 STREETS SUPPLIES	ACETYLENE	113.60	0
Total WELDERS SUPPLY CO.:		113.60	
WILLE, SANDRA			
100-55210-275 REC DEPT PROGRAM EXPENSES	ART CLASS TEACHER	160.00	0
Total WILLE, SANDRA:		160.00	
WISCONSIN STATE LABORATORY OF HYGIENE			
200-57623-170 WATER TESTING	FLUORIDE	28.00	0
Total WISCONSIN STATE LABORATORY OF HYGIENE:		28.00	
Total 0:		522,730.71	
Grand Totals:		522,730.71	

GL Account and Title	Description	Amount	GL Period

Village Board Approval Date: _____

ORDINANCE #2022-18
AN ORDINANCE CREATING SECTION 253-5 M. OF THE CODE OF ORDINANCES OF THE VILLAGE OF WILLIAMS BAY CONCERNING PUBLIC NUISANCES AFFECTING PEACE AND SAFETY

WHEREAS, the Village has become aware of public safety issues arising from certain properties upon which uncontrolled animals are harbored which then wander freely throughout the area, thereby threatening or endangering the safety of the residents of neighboring properties and others throughout the village; and

WHEREAS, the Building, Zoning and Ordinance Committee of the Village of Williams Bay having recommended to the Village Board the creation of the below subpart of Section 253-5 to address the harboring of uncontrolled animals by recognizing said behavior as constituting a public nuisance; and

WHEREAS, the Village Board of the Village of Williams Bay having determined that it is appropriate to adopt the recommendation of the Building, Zoning and Ordinance Committee.

NOW, THEREFORE, the Village Board of the Village of Williams Bay do hereby ordain as follows:

Section I. Section 253-5 M. of the Code of Ordinances of the Village of Williams Bay is hereby created to read as follows:

M. Uncontrolled animals. The harboring or otherwise providing of shelter, food or other such comfort to any animal, whether domesticated or undomesticated, which is not kept within the boundaries of a property and is free to wander within the Village.

Section II. This ordinance shall take effect upon passage and publication is provided by law.

Approved by the Village Board of the Village of Williams Bay this _____ day of _____, 2022.

VILLAGE OF WILLIAMS BAY

By: _____
William Duncan, President

Attest: _____
Tina Kolls, Clerk

First Reading: _____
Second Reading: _____
Date Adopted: _____
Date Published: _____

VILLAGE OF WILLIAMS BAY

250 Williams Street | PO Box 580 | Williams Bay | WI | 53191 | williamsbay.org
Phone: 262-245-2700

RESOLUTION R-30-22

A JOINT BARRETT MEMORIAL LIBRARY BOARD AND VILLAGE BOARD OF TRUSTEES RESOLUTION REGARDING LIBRARY RESERVES

WHEREAS, the Village of Williams Bay Village Board, Walworth County, State of Wisconsin provides an annual levy to the Barrett Memorial Library; and

WHEREAS, The Barrett Memorial Library Board shall have exclusive control of the expenditure of all moneys collected, donated or appropriated for the library fund per Wisconsin State Statues 43.58(1); and

WHEREAS, the Barrett Memorial Library submits to the Village Board its budget on an annual basis, as the Village considers its own budget and Library levy allocation; and

WHEREAS, in the course of any budget year, library expenses may or may not exceed budgeted revenues; and

WHEREAS, the Resolution effective date shall commence with the 2023 annual budget; and

NOW, THEREFORE, BE IT RESOLVED that any funds remaining at the end of Library fiscal year shall be placed into the Library reserve account, and any shortfall shall be drawn from the Library reserve account.

Approved by the Village Board of the Village of Williams Bay this _____ day of _____, 2022.

VILLAGE OF WILLIAMS BAY

By:_____
William Duncan, President

Attest:_____
Tina Kolls, Clerk

Approved by the Barrett Memorial Library Board of the Village of Williams Bay this _____ day of _____, 2022.

BARRETT MEMORIAL LIBRARY BOARD

By:_____
Edgar Mosshamer, President

Attest:_____
Gretchen Witowich, Secretary

VILLAGE OF WILLIAMS BAY

250 Williams Street | PO Box 580 | Williams Bay | WI | 53191 | williamsbay.org
Phone: 262-245-2700

RESOLUTION R-31-22

RESOLUTION FOR COMMITMENT OF DECEMBER 31, 2022 FUND BALANCES

WHEREAS, the Government Accounting Standards Board (GASB) has issued Statement No. 54 – Fund Balance Reporting and Governmental Fund Type Definitions, which changes the terminology used for fund balance reporting on balance sheets of Governmental Funds; and

WHEREAS, by the Village of Williams Bay Board of Trustees commits fund balances for the following purposes;

Committed Fund Balance

Fire Department Building	$450,000
Pier Slips	$300,000

THEREFORE, BE IT RESOLVED that the Village of Williams Bay, Walworth County, Wisconsin by this resolution accepts the recommendation, as presented.

Approved by the Village Board of the Village of Williams Bay this _____ day of _____, 2022.

VILLAGE OF WILLIAMS BAY

By:_____

William Duncan, President

Attest:_____

Tina Kolls, Clerk

VILLAGE OF WILLIAMS BAY

250 Williams Street | PO Box 580 | Williams Bay | WI | 53191 | USA | williamsbay.org
Phone: 262-245-2700

RESOLUTION R-32-22
ESTABLISHING SALARIES AND WAGES FOR 2023

Salaried Employees		Hourly Employees	
General Government		**Police Department**	
Kolls, Tina	$49,920.00 (1)	Barber, Lisa	$22.28
Peternell, Lori	$70,000.00 (2)	Borgen, Benjamin (6)	$39.12
Stanek, Cynthia	$47,590.40 (3)	Erickson, Mark (6)	$39.52
Tobin, Becky	$96,390.00 (4)	Nettesheim, Victoria	$20.43
Municipal Court		Raabe, Maddison (6)	$31.03
Robison, Donald	$10,904.92	Rudi, Valentino (6)	$31.03
Vaun, Jennifer	$21,840.00	Scurto, Joseph (6)	$34.79
Police Department		Shiroda, Michaela (6)	$34.79
Kostock, William	$78,832.29	Wright, Thomas	$20.43
Timm, Justin	$90,711.13	**Public Works/W&S**	
Public Works/W&S		Hansen, David	$16.00
Edwards, Wayne	$78,921.39 (5)	Mehring, Richard	$13.28
Recreation Department		Reynolds, James	$25.40
Rowland, David	$60,000.00	Schiller, Josh	$25.52
		Shafer, John	$23.81
Fire Department		Smith, Doug	$30.99
Fire Chief	$8,000.00	**Recreation Department**	
Assistant Fire Chief	$4,300.00	Venteicher, Sheila	$16.64
Fire Captain	$3,200.00	**Beach/Lakefront**	
Fire Inspector	$6,000.00	Returning Beach Manager	$15.60
Fire Lieutenant	$1,200.00	Returning Beach Attendant	$12.48
Fire Treasurer	$800.00	New Hire Beach Attendant	$11.00
Fire Secretary	$650.00	Returning Harbormaster	$22.88
Fire Dept Calls & Drill	$17.00/hr	Returning Assistant Harbormaster	$18.72
Fire Dept Meetings	$9.00/hr	Returning Launch Attendant	$15.60
Fire Dept Training	$12.00/hr	New Hire Launch Attendant	$15.00
Rescue Department		**Dive Team**	
Rescue Captain	$3,200.00/year	Dive Captain	$900.00
Rescue Lieutenant	$1,200.00/year	Dive Team Drills	$15.00
Rescue Secretary	$1,000.00/year	Dive Team Meetings	$9.00
Rescue Dept Calls			
- EMR Personnel	$15.00/hr		
- EMT Personnel	$17.00/hr		
- AMET Personnel	$18.00/hr		
Rescue Dept Drills	$12.00/hr		
Rescue Dept Meetings	$9.00/hr		

(1) Allocated as follows: GG Admin 50%, Water fund 25%, Sewer fund 25%
(2) Allocated as follows: GG Admin 40%, Water fund 25%, Sewer fund 25%, Library fund 10%
(3) Allocated as follows: GG Admin 25%, Water fund 37.50%, Sewer fund 37.50%
(4) Allocated as follows: GG Admin 70%, Water fund 15%, Sewer fund 15%
(5) Allocated as follows: DPW 50%, Water fund 25%, Sewer fund 25%
(6) Per 2023-2025 Police Union Contract.

Passed and adopted this _____ day of _____2022.

VILLAGE OF WILLIAMS BAY:

_____
William Duncan, President

ATTEST:

_____
Tina Kolls, Clerk

VILLAGE OF WILLIAMS BAY

250 Williams Street | PO Box 580 | Williams Bay | WI | 53191 | williamsbay.org
Phone: 262-245-2700

RESOLUTION R-30-22

A JOINT BARRETT MEMORIAL LIBRARY BOARD AND VILLAGE BOARD OF TRUSTEES RESOLUTION REGARDING LIBRARY RESERVES

WHEREAS, the Village of Williams Bay Village Board, Walworth County, State of Wisconsin provides an annual levy to the Barrett Memorial Library; and

WHEREAS, The Barrett Memorial Library Board shall have exclusive control of the expenditure of all moneys collected, donated or appropriated for the library fund per Wisconsin State Statues 43.58(1); and

WHEREAS, the Barrett Memorial Library submits to the Village Board its budget on an annual basis, as the Village considers its own budget and Library levy allocation; and

WHEREAS, in the course of any budget year, library expenses may or may not exceed budgeted revenues; and

WHEREAS, the Resolution effective date shall commence with the 2023 annual budget; and

NOW, THEREFORE, BE IT RESOLVED that any funds remaining at the end of Library fiscal year shall be placed into the Library reserve account, and any shortfall shall be drawn from the Library reserve account.

Approved by the Village Board of the Village of Williams Bay this _____ day of _____, 2022.

VILLAGE OF WILLIAMS BAY

By:_____
William Duncan, President

Attest:_____
Tina Kolls, Clerk

Approved by the Barrett Memorial Library Board of the Village of Williams Bay this _____ day of _____, 2022.

BARRETT MEMORIAL LIBRARY BOARD

By:_____
Edgar Mosshamer, President

Attest:_____
Gretchen Witowich, Secretary

WISCONSIN
ECONOMIC DEVELOPMENT

Wisconsin Economic Development Corporation Program Guidelines for Fiscal Year 2023
Program Name: Community Development Investment (CDI) Grant Program **Program Inception:** WEDC FY13 **Lead Division:** Business and Community Development ☒**New** ☐**Revised** Click here to enter a date. ☒**Aid** ☐**Pass-thru Aid** ☐**Technical Assistance**

Program Goal:

The goal of the Community Development Investment (CDI) Grant Program is to incent commercial corridor community development in the State of Wisconsin.

Program Description:

The program will support urban, small city and rural community redevelopment efforts by providing financial incentives for catalytic, shovel-ready projects with emphasis on, but not limited to, commercial corridor driven efforts. Funded activities should lead to measurable benefits in job opportunities, property values and/or leveraged investment by local and private partners.

Eligibility Requirements:

Definitions:

"Economically Distressed" means a county or municipality so designated by WEDC by considering the most current area and state data available for the following indicators:

- Unemployment rate
- Percentage of families with incomes below the poverty line
- Median family income
- Median per capita income
- Average annual wage
- Manufacturing assessment values by county
- Other significant or irregular indicators of economic distress – such as a natural disaster, or plant closings and layoffs

"Opportunity Zone" means a designated qualified opportunity zone in the State of Wisconsin under Internal Revenue Code § 1400Z-1.

Municipalities (including counties, cities, villages, and towns), tribal entities, and other governmental authorities designated by a municipality to apply on its behalf will be eligible to receive grant assistance under the following conditions:

- Grant recipients must provide a minimum 3:1 matching investment in project costs; projects located in an Economically Distressed community or Opportunity Zone may provide a minimum 1:1 matching funds.
- No more than 50% of eligible project costs may consist of other state and/or federal grant sources, excluding federal ARPA funds; exceptions can be made for projects utilizing federal ARPA funds.
- Applicants must provide a signed resolution by the governing elected body authorizing the submittal of the application(s) to the CDI Grant Program, including the Vibrant Spaces Pilot.
- An applicant that was impacted by an event that has resulted in a State or Federal Disaster Declaration within the 24 months prior to submitting an application may receive funds for mitigation or preparedness planning and will receive additional considerations including the following:
    - WEDC may reduce or waive the match requirements
    - Applicants must demonstrate that other funding mechanisms (CDBG, WI Disaster Fund, FEMA, etc.) have been evaluated and fully utilized before applying for WEDC CDI Grant funding

Eligible activities are:

- Building renovation
- Historic preservation
- Demolition
- New construction
- Infrastructure investment

Eligible projects may qualify under one or more of the following:

- Development of significant destination attractions
- Rehabilitation and reuse of underutilized or landmark buildings
- Infill development
- Historic preservation
- Infrastructure efforts, including disaster prevention measures, providing substantial benefits to downtown residents or property owners
- Mixed-use development (not exclusively residential)

Costs ineligible for grant assistance or match include, but are not limited to:

- Past costs
- In-kind contributions
- Indirect construction costs (a.k.a. "soft" costs)

WEDC may take the following into account when considering a CDI Grant:

- Impact on the community
- Located in an Economically Distressed community
- Financial justification
- Previous planning efforts
- Readiness to proceed demonstrated by financial commitments in place

- Involvement of public-private partnerships and public/community support and collaboration
- Demonstrates involvement of diverse businesses, including women and veteran-owned contractors, in eligible project costs
- Primary building occupant is a diverse-, woman-, or veteran-owned business(es)
- Primary building purpose serves the communities of diverse-, women-, veteran-, or low- and moderate-income individuals
- Clean energy technology investments included in the project (ex. solar panels, electric vehicle charging stations, etc.)
- Quality Urban Design: balancing preservation of existing heritage structures and streetscapes with new development
- Other factors determined by WEDC

Vibrant Spaces Pilot

The Vibrant Spaces Pilot funds are awarded through a competitive application process for communities to invest in public projects that will enhance the community as an attractive place to live. The project must demonstrate a collaborative, community-driven effort, such as identified in a community plan or community document that has identified the project as a positive community investment in order to be considered eligible. A minimum 1:1 match of other funds will be required.

Eligible activities include:

- Public Space Enhancements (including, but not limited to alleys, programmable park spaces)
- Public Signage (limited to: wayfinding, interpretative signage, kiosks)
- Seasonal equipment with the intent to use annually (such as tables, chairs, bike racks, etc.)
- Parklets
- Public infrastructure projects (including public restrooms to serve public spaces)

Ineligible activities include (but are not limited to):

- Events
- Private spaces that are not open to the public
- Activities that are otherwise eligible to be funded through other programs offered by WEDC

Ineligible costs for grant assistance or match include, but are not limited to:

- Past costs
- In-kind contributions
- Indirect expenses (a.k.a. "soft costs")

Incentives and Available Funding (FY23) $8,250,000

CDI Grant - $7,500,000

The maximum award generally does not exceed $250,000 unless the request for funds is for a project that, due to the size and scope of the investment, clearly justifies an award beyond normal parameters.

No more than one grant per fiscal year shall be located within the boundary of a municipality, unless the applicant is located in an economically distressed community; then applicants can apply for two CDI grants per fiscal year.

Vibrant Spaces Pilot - **$750,000**

Awards will generally be between $25,000 and $50,000. Funds will be awarded through a competitive application process. Applicant may receive one Vibrant Spaces Grant in any fiscal year. Receiving a Vibrant Spaces grant does not preclude a community from applying for one (or two, if in an economically distressed community) CDI grant(s).

Activities and Expected Outcomes:

CDI Grant: Assist 30 communities and achieve a 15:1 leverage of other investment.

Vibrant Spaces Pilot: Assist 20 communities and achieve a 1:1 leverage of other investment.

Performance Reporting:

Recipients will be required to annually submit a performance report documenting capital investment, assessed taxable property values, as well as any other contract deliverable. Vibrant Spaces Pilot recipients will submit one performance report at the completion of the project.

WEDC annually selects awards on a sample basis for an audit. All backup documentation to the performance report is required to be maintained for the life of the award.

WEDC may impose additional reporting requirements to evaluate project performance and to ensure compliance with contract deliverables.

Application and Awards Process:

The CDI program has a continuous application process. Applicants for a CDI grant should complete an application through an Account Manager. The completed application will be assigned to an underwriter and will go through the award review process.

Vibrant Spaces Pilot has a competitive application process.

For more information on application review, internal process, and award distribution, please refer to WEDC's award administration policies and procedures.

Good Morning, Becky and Dawn -

My contact at Wisconsin Economic Development Corporation (WEDC), Neil White, thought Clear Waters Salon Spa had a good story. See attached overview that Dawn and I put together. He thinks it would be something the state would consider supporting, which isn't a guarantee but it means that he thinks it has a chance and is willing to champion it for us. This is a matching grant up to $250k. The way it works, though, is that WEDC contracts with the Village, and the Village essentially monitors the project and issues the funds once the requirements have been met. East Troy has done two of these, and I could connect you with Eileen Suhm there, if you want to get more information about it. I don't believe it has been an excessive administrative burden.

Neil said the next step is to complete the attached Budget Worksheet and the Grant Application, which are both attached. I'm thinking it might be good for the three of us to get together to go over these docs to see what questions we have and then find out what it would take for the Village to support this project. Thoughts?

Best,
Derek

Clear Waters Salon Spa and Green Grocer Expansion Overview

Dawn Mancuso and Jennifer Veith started Clear-Water Salon and Spa 18 years ago. Theirs has not been an easy journey, but it's a wonderful American success story. At the time leading up to the formation of their business, Mancuso was a massage therapist, and Veith was a CPA. They noted that no independent companies in the area were offering full-service salon and spa services other than the resorts. After more research and many conversations, they decided to go into business together and fill what they believed to be a gap in the market. During their search for a location, they found a historic building in downtown Williams Bay and rented a small part of it.

With limited resources and a lot of hard work, they gradually built their business. About the five-year mark, the building they were located in had a number of spaces become available. Again, they saw a gap in a different, but compatible, market, a boutique grocery store that could cater to the demand of their clients and a certain segment of seasonal homeowners and visitors. At that point, they leased more space in the building and the Green Grocer was born. They took on a partner to help with this venture, Jane Larsen. About a year into this venture, they realized that they needed to add a deli and start offering lunch and take out options. More recently, the Green Grocer has expanded and opened a coffee and wine bar in the adjoining space called Steamers Coffee.

In an attempt to expand their spa and salon services, they opened a second location in nearby Lake Geneva, hoping to become more visible to a larger group of seasonal residents and visitors. But recently, an opportunity to purchase a commercial lot and an adjacent building across from their Williams Bay location became available, and they purchased them with the intent of expanding their spa, salon, and grocery services and bringing back their salon staff from Lake Geneva. Then Covid-19 came into the picture. As luck would have it, lots of Illinois people moved to their seasonal homes in the area and lots more visited the area. Mancuso, Veith, and Larson experienced a dramatic increase in their businesses that has continued beyond the pandemic.

Currently, they employ 33 at the Clears Water Salon Spa and 20 at the Green Grocer. The average wage for the Clear Water Spa and Salon is $23/hr, and the average wage for the Green Grocer is $11/hr. In addition, they offer the following benefits: 401k, paid vacation, dental/vision, Aflac, employee discounts, and free meal at Green Grocer. The success of their businesses has other compatible businesses to town who want to capitalize on the clientele that they bring to town. Businesses like Dog Harbor Grooming, White Hot Yoga, e-Bike Store, Geneva Lake General Store, and the Cashmere Cape.

Mancuso, Veith, and Larson believe that they could increase business significantly if they were to build a new building on the lots that they purchased in 2020. They would like to build 8,000 square feet of commercial space, which would almost double the space that they currently occupy. This project would feature a roof-top garden area for clientele and customers. To meet the new demand, they estimate that they would need to hire approximately 12 FTEs for the grocery and coffee businesses and 30 FTEs for the salon and spa business, over a 3-year period.

Williams Bay is not likely to have much industrial development, both due to the lack of appropriate space that is available and also the lack of desire from its residents and community leaders. They would prefer to see continued commercial development, and there is zoning in place on its two main arteries to accommodate this type of development. A major expansion from an organization like Clear Waters Salon Spa, Green Grocer, and Green Bean Coffee would be a catalyst for this type of growth because it

has already proven this. The village leaders would also like to see this happen. It would be a major improvement and magnet for the downtown. Unfortunately, seriously elevated construction costs and interest rates have caused the owners to put this project on the back burner. However, WEDC's expansion tax credits or its Community Development Investment (CDI) grant programs might create an incentive for them to move this project forward.

WEDC Program:	Community Development Investment (CDI)
Target Start Date:	
Applicant Entity:	
Community:	

Section A - Redevelopment Narratives

PROJECT DESCRIPTION

1.a. Describe the project, its implementation and its significance to the community.

1.b. Describe any public/private partnerships developed and to what extent the applicant can ensure WEDC that all the activities outlined within application will be undertaken. (highlight capacity of applicant, partners, finality of financing and developments agreements)

1.c. Which eligible activities does the project fit under?

- ☐ Building renovation
- ☐ Historic Preservation
- ☐ Demolition
- ☐ New construction
- ☐ Infrastructure reinvestment

1.d. Describe the potential of the project to enhance the economic viability of the community (e.g. tax base growth, job creation, improved use of site). Response should project anticipated permanent jobs at the site. If possible, include wage rates and health benefits associated with the jobs.

1.e. Describe the potential for this project to act as a catalyst for additional commercial development or investment in the district. Please refer to other opportunities in the area.

1.f. Demonstrate involvement of diverse and minority business interests; which may include planning & development, construction and end user(s).

1.g. Are the any green or renewable energy investments and or grants tied to this project?

FINANCIAL JUSTIFICATION

2.a. Describe the project funding methods; include progress, status and timeline of receiving funds.

2.b. Describe the financial need for WEDC grant funding that cannot be met though private sector, public sector or reduction in scope of project.

2.c. Are American Rescue Plan Act (ARPA) funds targeted for this project, if so please describe.

PREVIOUS PLANNING EFFORTS

3.a. Highlight the extent to which this project is included in previous regional, municipal or downtown planning efforts. Site the section and page numbers of the plan(s).

3.b. Highlight the extent to which the project supports best practices for smart growth and best practices for downtown development, and the extent to which it has community-wide support.

READINESS TO PROCEED

4.a. Please describe past and planned planning activities, with timelines. Include site control status, environmental condition and a project implementation schedule.

4.b. Provide description of property transactions intended to occur in the next 5 years.

4.c. Highlight financing commitments in accordance with Budget Worksheet, note any contingencies.

POMASL FIRE EQUIPMENT INC.

Purchase Agreement

Date: November 9, 2022

DEALER: Pomasl Fire Equipment, Inc.
P.O. Box 267
1918 Neva Road
Antigo, WI 54409

PURCHASER: Williams Bay Rescue Squad
5 East Geneva Street
Williams Bay, WI 53191

MANUFACTURER: Demers Ambulances

This **Purchase Agreement** is entered into by and between the above named **DEALER** and **PURCHASER** for the following:

Including: Chassis: X Body: X Equipment: X

The PURCHASER agrees to pay the DEALER the sum of: per the proposal dated November 7, 2022 for a Demers MX164 ambulance to be built on a 2022 Chevy G4500 chassis.	$ 185,595.00
• Items to match Build-to-order proposal	$ 3,285.00
• UV-C air sterilization unit	$ 1,350.00
• Graphics allowance	$ 8,750.00
• **Balance due upon delivery of the vehicle to the purchaser**	**$ 198,980.00**

Payment Terms:
100% payment due at final delivery at your station.

The PURCHASER agrees that any modifications in the form of additions to and or deletions from the specifications made during the manufacture of the vehicle or prior to delivery, at the

request of the PURCHASER, shall be considered and computed into the final balance; and the final payment adjusted, in accordance with such changes.

Unless otherwise noted herein, the Purchase price agreed to is net F.O.B. Williams Bay, Wisconsin. All customer payments including final payment must be made directly to the DEALER, Pomasl Fire Equipment, Inc.

The title does not pass to the PURCHASER until the purchase price is paid in full. The vehicle will not be turned over to the PURCHASER unless proof of insurance is provided.

All applicable sales and excise taxes now, or hereafter, imposed upon the sale of the items specified herein shall be paid by the PURCHASER.

DEALER:

POMASL FIRE EQUIPMENT, INC.

Authorized Signatures:

Kevin Pomasl

Kevin Pomasl or Dan Pomasl
Vice President or President
Pomasl Fire Equipment, Inc.

Date Signed: 11-9-2022

PURCHASER:

WILLIAMS BAY RESCUE SQUAD

Name # 1 – Sign Above the Line

William B Duncan

Name # 1 – Print Name Above Line

Title: Village President

Date Signed: 11-9-22

Proposal Summary

Reference: QUO0000005319 **Rev:** 0
Purchaser: Pomasl Fire Equipment
Contact: Kevin Pomasl
Address: 1918 Neva Road - PO Box 267

Antigo, WI
USA
Telephone:

Sales Contact: Kevin Pomasl
Mobile: 715-610-4210
Phone: 715-623-7454
Email: kevin@pomasl.com

Opportunity: Pomasl 2022 **Stock: MX164**
Account Pomasl Fire Equipment
Contact: Kevin Pomasl
Shipping Address:

Demers Job: **G22C-3909**
Chevy G4500 cutaway van chassis, 4x2

Name	*Specifications*
Type III - MX164 	Overall Length 271" Overall Width 95" Overall Height 106" **Headroom 72"** Wheelbase 159" Payload Capacity Up to 4500 lbs. **Total height of vehicle may differ according to chassis and suspension

Sales Options by Category

10-Base (BAS)

Item Number	*Name/Description*	*Quantity*
BAS-DRW-11	**Drawing Required** Drawing Required	1.00
BAS-PLA-13	**TYPE III - MX164** TYPE III - MX164	1.00
BAS-TYP-13	**Type III - Cutaway** Type III – Cutaway	1.00

11-Chassis (CH)*

Item Number	*Name/Description*	*Quantity*
BAS-CHA-22	**Chassis Model year 2022** Chassis Model year 2022	1.00

Sewer Utiltiy 2023 Budget							
Account	**Title**	**2021 Acutal**	**2022 Current Actual**	**Estimated 2022 Year End**	**2022 Budget**	**Proposed 2023 Budget**	**Incr/Decr over prior year**
	Revenues						
300-44460	SEWER RESIDENTIAL SALES (R)	$998,236.64	$482,252.09	$997,252.09	$1,030,000.00	$990,000.00	-3.88%
300-44461	SEWER COMMERCIAL SALES (R)	$163,537.32	$78,551.19	$163,021.19	$160,000.00	$160,000.00	0.00%
300-44464	SEWER PUBLIC AUTHORITY SALES (R)	$13,966.24	$6,713.02	$13,932.02	$13,800.00	$13,800.00	0.00%
300-44470	SEWER FORFEITED DISCOUNTS (R)	$5,147.61	$3,192.39	$4,500.00	$4,300.00	$4,000.00	-6.98%
300-44475	SEWER CONNECTION FEE (R)	$121,500.00	$55,500.00	$67,500.00	$67,500.00	$67,500.00	0.00%
300-48004	INTEREST ON INVESTMENTS (R)	$1,090.56	$3,793.99	$40,000.00	$1,000.00	$40,000.00	3900.00%
300-48005	PROPERTY RENTAL INCOME (R)	$9,400.00	$13,395.00	$13,395.00	$9,400.00	$13,395.00	42.50%
	Total Revenues	**$1,312,878.37**	**$643,397.68**	**$1,299,600.30**	**$1,286,000.00**	**$1,288,695.00**	
	Expenditures						
300-58801-000	IT SUPPORT/ANNUAL FEES (E)	$5,048.39	$4,048.42	$6,000.00	$6,000.00	$6,000.00	0.00%
300-58929-000	SEWER MAPPING SYSTEM (E)	$0.00	$0.00	$0.00	$250.00	$250.00	0.00%
300-58960-000	SEWER DEBT SERVICE (E)	$4,613.82	$22,179.60	$22,180.00	$22,180.00	$214,870.00	868.76%
300-58964-110	SEWER ACCOUNTING - WAGES (E)	$43,932.46	$35,251.92	$48,132.00	$47,607.00	$48,077.00	0.99%
300-58964-121	SEWER ACCOUNTING - FICA (E)	$3,390.46	$2,568.83	$3,682.00	$3,642.00	$3,678.00	0.99%
300-58964-122	SEWER ACCOUNTING - RETIREMENT (E)	$3,436.95	$2,606.46	$3,609.00	$3,571.00	$3,750.00	5.01%
300-58964-123	SEWER ACCOUNTING - HEALTH INS (E)	$9,492.04	$13,326.20	$14,000.00	$8,900.00	$12,679.00	42.46%
300-58964-127	SEWER ACCT HSA FUNDING (E)	$2,500.00	$2,656.20	$3,594.00	$2,500.00	$3,750.00	50.00%
300-58965-000	SEWER DEBT SERVICE MISC EXP (E)	$158.33	$158.33	$160.00	$160.00	$160.00	0.00%
300-58965-110	SEWER ADMIN - WAGES (E)	$32,860.72	$22,528.43	$32,360.00	$32,360.00	$34,189.00	5.65%
300-58965-121	SEWER ADMIN - FICA (E)	$2,003.33	$1,681.34	$2,476.00	$2,476.00	$2,616.00	5.65%
300-58965-122	SEWER ADMIN - RETIREMENT (E)	$1,870.13	$1,771.45	$2,427.00	$2,427.00	$2,667.00	9.89%
300-58965-123	SEWER ADMIN - HEALTH INS (E)	$6,180.09	$5,371.65	$7,415.00	$7,415.00	$7,140.00	-3.71%
300-58965-127	SEWER ADMIN HSA FUNDING (E)	$2,000.00	$1,499.99	$2,000.00	$2,000.00	$2,000.00	0.00%
300-58966-160	SEWER OPERATING SUPPLIES (E)	$115.00	$236.99	$500.00	$500.00	$500.00	0.00%
300-58966-170	SEWER UTILITIES - NATURAL GAS (E)	$1,420.96	$2,642.26	$3,000.00	$2,000.00	$3,000.00	50.00%
300-58966-171	SEWER UTILITIES - ELECTRIC (E)	$12,363.14	$9,197.72	$13,000.00	$13,000.00	$13,000.00	0.00%

Sewer Utiltiy 2023 Budget							
Account	**Title**	**2021 Acutal**	**2022 Current Actual**	**Estimated 2022 Year End**	**2022 Budget**	**Proposed 2023 Budget**	**Incr/Decr over prior year**
300-58967-000	SEWER FUEL EXPENSE (E)	$1,274.73	$1,505.05	$1,500.00	$1,000.00	$1,500.00	50.00%
300-58967-150	SEWER VEHICLE REPAIRS & MAINT (E)	$99.53	$821.76	$1,500.00	$1,500.00	$1,500.00	0.00%
300-58968-150	SEWER COLLECTION SYSTEM MAINT (E)	$1,818.07	$1,015.98	$3,000.00	$7,500.00	$7,500.00	0.00%
300-58969-130	SEWER IT EXPENSE (E)	$0.00	$78.19	$300.00	$0.00	$300.00	100.00%
300-58969-160	SEWER OFFICE SUPPLIES (E)	$10,461.48	$7,662.88	$10,000.00	$10,000.00	$10,000.00	0.00%
300-58969-200	SEWER TELEPHONE (E)	$3,196.82	$696.88	$1,100.00	$1,100.00	$1,100.00	0.00%
300-58970-000	SEWER ATTORNEY EXPENSE (E)	$503.00	$0.00	$0.00	$500.00	$500.00	0.00%
300-58972-000	SEWER AUDIT EXPENSE (E)	$15,866.67	$9,175.00	$9,175.00	$8,100.00	$9,000.00	11.11%
300-58973-000	SEWER ENGINEERING EXPENSE (E)	$26,950.50	$900.00	$1,500.00	$30,000.00	$1,500.00	-95.00%
300-58974-000	SEWER INSURANCE EXPENSE (E)	$31,383.00	$26,531.50	$26,531.00	$32,000.00	$30,000.00	-6.25%
300-58975-130	SEWER DRUG TESTING EXPENSE (E)	$37.50	$31.25	$200.00	$200.00	$200.00	0.00%
300-58975-190	SEWER TRAINING EXPENSE (E)	$250.00	$0.00	$250.00	$250.00	$250.00	0.00%
300-58976-000	SEWER REPLACEMENT FUND (E)	$5,373.76	$0.00	$0.00	$10,000.00	$3,500.00	-65.00%
300-58978-000	SLIP LINERS (E)	$0.00	$0.00	$60,000.00	$50,000.00	$50,000.00	0.00%
300-58980-300	WALCOMET SEWERAGE EXPENSES (E)	$714,799.62	$475,081.96	$700,000.00	$800,000.00	$725,000.00	-9.38%
300-58980-310	WALCOMET SEWER CONNECTION FEE (E)	$104,000.00	$54,000.00	$60,000.00	$60,000.00	$60,000.00	0.00%
300-58996-000	I & I REDUCTION (E)	$12,867.45	$14,079.43	$35,000.00	$35,000.00	$20,000.00	-42.86%
	Total Expenditures	**$1,060,267.95**	**$719,305.67**	**$1,074,591.00**	**$1,204,138.00**	**$1,280,176.00**	
	Revenues over/under expenditures	**$252,610.42**	**-$75,907.99**	**$225,009.30**	**$81,862.00**	**$8,519.00**	
	Sewer Replacement						
	SCADA computers	$3,500.00					
	I&I Reduction						
	Televising	$20,000.00					

Water Utility 2023 Budget							
Account	**Title**	**2021 Actual**	**2022 Current Actual**	**2022 Estimated Year End**	**2022 Budget**	**Proposed 2023 Budget**	**Incr/Decr over prior year**
	Revenues						
200-44460	WATER RESIDENTIAL SALES (R)	$474,226.28	$224,429.18	$499,336.18	$568,000.00	$510,600.00	-10.11%
200-44461	WATER COMMERCIAL SALES (R)	$85,508.35	$39,876.18	$92,372.18	$95,000.00	$102,000.00	7.37%
200-44463	WATER PUBLIC FIRE PROTECTION (R)	$183,120.07	$91,655.18	$195,908.18	$219,500.00	$230,000.00	4.78%
200-44464	WATER PUBLIC AUTH SALES (R)	$13,504.78	$5,514.75	$15,284.75	$15,500.00	$15,500.00	0.00%
200-44465	PRIVATE FIRE REVENUE-WTR (R)	$3,616.80	$1,808.40	$3,887.40	$4,000.00	$4,000.00	0.00%
200-44466	MULTIFAMILY RESIDENTIAL (R)	$19,057.28	$9,060.28	$20,050.28	$23,000.00	$20,000.00	-13.04%
200-44470	WATER FORFEITED DISCOUNTS (R)	$3,457.64	$2,083.17	$2,500.00	$2,500.00	$2,500.00	0.00%
200-44474	WATER OTHER REVENUE (R)	$7,684.20	$1,758.00	$2,000.00	$3,052.00	$2,000.00	-34.47%
200-44475	IMPACT FEES (R)	$28,620.00	$13,747.50	$20,041.00	$15,900.00	$62,950.00	295.91%
200-48004	INTEREST ON INVESTMENTS (R)	$2,387.70	$12,673.26	$33,000.00	$2,300.00	$61,560.00	2576.52%
200-48005	PROPERTY RENTAL/TOWER LEASE (R)	$59,215.33	$39,690.67	$57,000.00	$57,000.00	$57,000.00	0.00%
200-48420	IMPACT FEE INTEREST INCOME (R)	$56.65	$520.11	$550.00	$60.00	$500.00	733.33%
	Total Revenues	**$880,455.08**	**$442,816.68**	**$941,929.97**	**$1,005,812.00**	**$1,068,610.00**	
	Expenditurs						
200-57346-000	NEW WATER METERS (E)	$22,087.02	$12,276.75	$20,000.00	$25,000.00	$25,000.00	0.00%
200-57346-100	METER REPLACEMENT PROGRAM (E)	$0.00	$26,131.32	$30,000.00	$30,000.00	$30,000.00	0.00%
200-57408-000	WATER TAX EQUIVALENT (E)	$92,351.56	$100,800.00	$100,800.00	$100,800.00	$100,800.00	0.00%
200-57427-000	INTEREST ON LT DEBT (E)	$11,996.49	$7,113.18	$10,863.00	$10,863.00	$257,588.00	2271.24%
200-57599-000	WATER INSURANCE EXPENSE (E)	$31,383.00	$26,531.50	$26,531.00	$32,000.00	$30,000.00	-6.25%
200-57600-150	WELL #3 - REPAIRS (E)	$192.43	$609.05	$800.00	$0.00	$800.00	100.00%
200-57601-150	WELL #1 - REPAIRS (E)	$0.00	$0.00	$800.00	$800.00	$800.00	0.00%
200-57602-150	WELL #2 - REPAIRS (E)	$0.00	$11,434.13	$12,000.00	$800.00	$800.00	0.00%
200-57610-140	WATER FUND CAPITAL OUTLAY (E)	$27,556.97	$25,333.88	$40,000.00	$40,000.00	$153,500.00	283.75%
200-57622-170	WATER POWER - NATURAL GAS (E)	$901.66	$6,261.04	$7,000.00	$4,000.00	$7,000.00	75.00%
200-57622-171	WATER POWER - ELECTRIC (E)	$73,930.80	$54,041.48	$65,000.00	$65,000.00	$65,000.00	0.00%

Water Utility 2023 Budget							
Account	Title	2021 Actual	2022 Current Actual	2022 Estimated Year End	2022 Budget	Proposed 2023 Budget	Incr/Decr over prior year
200-57623-160	WATER PUMPING SUPPLIES (E)	$0.00	$206.48	$200.00	$200.00	$200.00	0.00%
200-57623-170	WATER TESTING (E)	$2,182.50	$1,296.16	$3,000.00	$3,000.00	$3,000.00	0.00%
200-57630-110	WATER TREATMENT - WAGES (E)	$63,265.00	$34,270.95	$47,711.00	$51,140.00	$51,804.00	1.30%
200-57630-112	WATER TREATMENT - OT WAGES (E)	$227.75	$824.10	$900.00	$0.00	$1,494.00	100.00%
200-57630-113	WATER TREATMENT - DBL OT WAGES (E)	$501.31	$412.07	$500.00	$0.00	$1,494.00	100.00%
200-57630-121	WATER TREATMENT - FICA (E)	$3,844.15	$2,699.51	$3,757.00	$3,840.00	$4,107.00	6.95%
200-57630-122	WATER TREATMENT - RETIREMENT (E)	$3,218.76	$2,825.41	$3,917.00	$2,489.00	$4,187.00	68.22%
200-57630-123	WATER TREATMENT - HEALTH INS (E)	$7,675.59	$7,761.15	$10,830.00	$10,830.00	$10,687.00	-1.32%
200-57630-124	WATER TREATMENT - LIFE INS (E)	$141.88	$90.57	$120.00	$40.00	$120.00	200.00%
200-57630-127	WATER TREATMENT HSA FUNDING (E)	$2,500.00	$2,499.77	$3,333.00	$3,333.00	$3,333.00	0.00%
200-57631-160	WATER TREATMENT CHEMICALS (E)	$115,336.64	$85,327.17	$130,000.00	$140,000.00	$140,000.00	0.00%
200-57632-160	WATER TREATMENT SUPPLIES (E)	$1,999.54	$2,239.33	$2,300.00	$1,300.00	$2,200.00	69.23%
200-57635-150	WATER TREATMENT REPAIRS/ MAINT (E)	$2,688.65	$818.51	$2,000.00	$5,000.00	$5,000.00	0.00%
200-57640-110	WATER DISTRIBUTION - WAGES (E)	$47,051.39	$38,750.98	$52,170.00	$51,140.00	$51,804.00	1.30%
200-57640-112	WATER DISTRIBUTION - OT WAGES (E)	$227.75	$824.26	$900.00	$0.00	$1,494.00	100.00%
200-57640-113	WATER DISTRIBUTION-DBL OT WAGE (E)	$501.46	$412.22	$500.00	$0.00	$1,494.00	100.00%
200-57640-121	WATER DISTRIBUTION - FICA (E)	$3,844.95	$2,699.82	$4,098.00	$3,840.00	$4,107.00	6.95%
200-57640-122	WATER DISTRIBUTION -RETIREMENT (E)	$3,985.31	$2,825.86	$3,917.00	$2,489.00	$4,187.00	68.22%
200-57640-123	WATER DISTRIBUTION - HLTH INS (E)	$7,675.59	$7,761.15	$10,830.00	$10,830.00	$10,687.00	-1.32%
200-57640-124	WATER DISTRIBUTION - LIFE INS (E)	$118.74	$90.57	$120.00	$40.00	$130.00	225.00%
200-57640-127	WATER DISTRIBUTION HSA FUNDING (E)	$2,500.00	$2,500.34	$3,333.00	$3,333.00	$3,333.00	0.00%
200-57641-160	WATER DISTRIBUTION SUPPLIES	$3,755.39	$3,131.75	$6,000.00	$6,000.00	$6,000.00	0.00%
200-57650-150	WATER TOWERS REPAIRS/MAINT (E)	$478,570.09	$0.00	$0.00	$1,000.00	$1,000.00	0.00%
200-57651-150	WATER MAINS REPAIRS/MAINT (E)	$24,789.59	$34,410.52	$35,000.00	$30,000.00	$35,000.00	16.67%
200-57652-150	WATER SERVICES REPAIRS/ MAINT (E)	$5,322.07	$1,470.00	$2,500.00	$5,000.00	$5,000.00	0.00%
200-57653-151	WATER METER TESTING (E)	$3,091.90	$0.00	$0.00	$2,500.00	$3,000.00	20.00%
200-57654-150	HYDRANT REPAIRS/MAINT (E)	$8,093.70	$3,924.48	$8,000.00	$10,000.00	$12,000.00	20.00%
200-57656-150	CROSS CONNECTION INSPECTION (E)	$20,380.00	$12,720.00	$19,080.00	$19,080.00	$19,080.00	0.00%
200-57902-110	WATER ACCOUNTING - WAGES (E)	$46,480.28	$32,997.51	$45,884.00	$47,608.00	$47,393.00	-0.45%

Water Utility 2023 Budget							
Account	**Title**	**2021 Actual**	**2022 Current Actual**	**2022 Estimated Year End**	**2022 Budget**	**Proposed 2023 Budget**	**Incr/Decr over prior year**
200-57902-121	WATER ACCOUNTING - FICA (E)	$3,391.17	$2,569.26	$3,510.00	$3,642.00	$3,626.00	-0.44%
200-57902-122	WATER ACCOUNTING- RETIREMENT (E)	$3,437.05	$2,606.65	$2,982.00	$3,571.00	$3,697.00	3.53%
200-57902-123	WATER ACCOUNTING - HEALTH INS (E)	$9,492.04	$13,326.20	$14,000.00	$8,900.00	$12,679.00	42.46%
200-57902-127	WATER ACCT HSA FUNDING (E)	$2,500.00	$2,656.25	$3,594.00	$2,500.00	$3,750.00	50.00%
200-57903-125	WATER METER READING - UNIFORMS (E)	$4,445.02	$3,274.08	$5,500.00	$5,500.00	$5,500.00	0.00%
200-57920-110	WATER ADMIN - WAGES (E)	$28,810.66	$22,528.43	$32,360.00	$32,360.00	$33,654.00	4.00%
200-57920-121	WATER ADMIN - FICA (E)	$2,003.63	$1,681.57	$2,480.00	$2,480.00	$2,575.00	3.83%
200-57920-122	WATER ADMIN - RETIREMENT (E)	$2,125.17	$1,771.81	$2,430.00	$2,430.00	$2,625.00	8.02%
200-57920-123	WATER ADMIN - HEALTH INS (E)	$6,187.99	$5,371.65	$7,415.00	$7,415.00	$7,140.00	-3.71%
200-57920-127	WATER ADMIN HSA FUNDING (E)	$2,000.00	$1,499.98	$2,000.00	$2,000.00	$2,000.00	0.00%
200-57921-130	WATER IT EXPENSE (E)	$0.00	$78.19	$300.00	$0.00	$300.00	100.00%
200-57921-160	WATER OFFICE SUPPLIES (E)	$12,033.44	$8,419.57	$10,000.00	$10,000.00	$10,000.00	0.00%
200-57921-200	WATER TELEPHONE (E)	$4,784.74	$744.82	$820.00	$2,500.00	$850.00	-66.00%
200-57923-000	WATER ATTORNEY EXPENSE (E)	$0.00	$0.00	$0.00	$2,000.00	$1,000.00	-50.00%
200-57924-000	WATER ENGINEERING EXPENSE (E)	$14,126.00	$3,355.00	$5,000.00	$15,000.00	$15,000.00	0.00%
200-57925-000	WATER AUDIT EXPENSE (E)	$17,366.67	$10,575.00	$10,575.00	$9,900.00	$12,000.00	21.21%
200-57925-100	WATER RATE STUDY EXPENSE (E)	$12,057.17	$5,967.71	$5,968.00	$5,000.00	$0.00	-100.00%
200-57928-000	WATER REGULATORY EXPENSE (E)	$944.36	$0.00	$950.00	$840.00	$950.00	13.10%
200-57930-130	WATER DRUG TESTING EXPENSE (E)	$300.00	$109.75	$500.00	$500.00	$500.00	0.00%
200-57930-140	WATER DIGGERS HOTLINE EXPENSE (E)	$1,974.30	$1,768.20	$2,900.00	$2,900.00	$2,900.00	0.00%
200-57930-190	WATER TRAINING EXPENSE (E)	$1,906.23	$1,896.90	$2,000.00	$3,000.00	$3,000.00	0.00%
200-57933-150	WATER TRANSP REPAIRS/MAINT (E)	$295.54	$1,159.04	$1,500.00	$1,500.00	$1,500.00	0.00%
200-57933-180	WATER FUEL EXPENSE (E)	$710.19	$1,023.02	$1,100.00	$600.00	$900.00	50.00%
200-57934-000	WATER DEBT SERVICE (E)	-$114.87	$18,664.00	$67,821.00	$67,821.00	$211,479.00	211.82%
200-57935-150	WATER PLANT REPAIRS/MAINT (E)	$22,791.17	$13,016.58	$20,000.00	$20,000.00	$20,000.00	0.00%
200-57945-000	WATER DEBT SERVICE MISC EXP (E)	$158.33	$158.33	$160.00	$160.00	$160.00	0.00%
200-57951-000	WATER SHOP TOOLS (E)	$302.11	$85.98	$500.00	$500.00	$500.00	0.00%
200-57952-000	WATER LAB EQUIPMENT (E)	$547.62	$0.00	$1,000.00	$3,000.00	$3,000.00	0.00%
200-58801-000	IT SUPPORT/ANNUAL FEES (E)	$5,048.41	$4,048.43	$7,000.00	$7,000.00	$7,000.00	0.00%

Water Utility 2023 Budget							
Account	**Title**	**2021 Actual**	**2022 Current Actual**	**2022 Estimated Year End**	**2022 Budget**	**Proposed 2023 Budget**	**Incr/Decr over prior year**
	Total Expenditures	**$1,279,994.05**	**$684,679.37**	**$929,059.00**	**$946,314.00**	**$1,472,908.00**	
	Revenues over/under Expenditures	**-$399,538.97**	**-$241,862.69**	**$12,870.97**	**$59,498.00**	**-$404,298.00**	
200-57610-140	Water Fund Capital Outlay	$0.00	$25,333.38	$40,000.00	$40,000.00	$153,500.00	
	2023 Capital Expenses						
	Well #3 Inspection	$150,000.00					
	Computers & SCADA	$3,500.00					
		$153,500.00					

Water Utility 2023 Budget							
Account	**Title**	**2021 Actual**	**2022 Current Actual**	**2022 Estimated Year End**	**2022 Budget**	**Proposed 2023 Budget**	**Incr/Decr over prior year**
	Revenues						
200-44460	WATER RESIDENTIAL SALES (R)	$474,226.28	$224,429.18	$499,336.18	$568,000.00	$510,600.00	-10.11%
200-44461	WATER COMMERCIAL SALES (R)	$85,508.35	$39,876.18	$92,372.18	$95,000.00	$102,000.00	7.37%
200-44463	WATER PUBLIC FIRE PROTECTION (R)	$183,120.07	$91,655.18	$195,908.18	$219,500.00	$230,000.00	4.78%
200-44464	WATER PUBLIC AUTH SALES (R)	$13,504.78	$5,514.75	$15,284.75	$15,500.00	$15,500.00	0.00%
200-44465	PRIVATE FIRE REVENUE-WTR (R)	$3,616.80	$1,808.40	$3,887.40	$4,000.00	$4,000.00	0.00%
200-44466	MULTIFAMILY RESIDENTIAL (R)	$19,057.28	$9,060.28	$20,050.28	$23,000.00	$20,000.00	-13.04%
200-44470	WATER FORFEITED DISCOUNTS (R)	$3,457.64	$2,083.17	$3,100.00	$2,500.00	$2,500.00	0.00%
200-44474	WATER OTHER REVENUE (R)	$7,684.20	$1,758.00	$2,000.00	$3,052.00	$2,000.00	-34.47%
200-44475	IMPACT FEES (R)	$28,620.00	$13,747.50	$20,041.00	$15,900.00	$62,950.00	295.91%
200-48004	INTEREST ON INVESTMENTS (R)	$2,387.70	$12,673.26	$84,000.00	$2,300.00	$70,000.00	2943.48%
200-48005	PROPERTY RENTAL/TOWER LEASE (R)	$59,215.33	$39,690.67	$63,000.00	$57,000.00	$60,000.00	5.26%
200-48420	IMPACT FEE INTEREST INCOME (R)	$56.65	$520.11	$1,100.00	$60.00	$1,000.00	1566.67%
	Total Revenues	**$880,455.08**	**$442,816.68**	**$1,000,079.97**	**$1,005,812.00**	**$1,080,550.00**	
	Expenditurs						
200-57346-000	NEW WATER METERS (E)	$22,087.02	$12,276.75	$20,000.00	$25,000.00	$25,000.00	0.00%
200-57346-100	METER REPLACEMENT PROGRAM (E)	$0.00	$26,131.32	$30,000.00	$30,000.00	$30,000.00	0.00%
200-57408-000	WATER TAX EQUIVALENT (E)	$92,351.56	$100,800.00	$100,800.00	$100,800.00	$100,800.00	0.00%
200-57427-000	INTEREST ON LT DEBT (E)	$11,996.49	$7,113.18	$10,863.00	$10,863.00	$257,588.00	2271.24%
200-57599-000	WATER INSURANCE EXPENSE (E)	$31,383.00	$26,531.50	$26,531.00	$32,000.00	$30,000.00	-6.25%
200-57600-150	WELL #3 - REPAIRS (E)	$192.43	$609.05	$800.00	$0.00	$800.00	100.00%
200-57601-150	WELL #1 - REPAIRS (E)	$0.00	$0.00	$800.00	$800.00	$800.00	0.00%
200-57602-150	WELL #2 - REPAIRS (E)	$0.00	$11,434.13	$12,000.00	$800.00	$800.00	0.00%
200-57610-140	WATER FUND CAPITAL OUTLAY (E)	$27,556.97	$25,333.88	$40,000.00	$40,000.00	$3,500.00	-91.25%
200-57622-170	WATER POWER - NATURAL GAS (E)	$901.66	$6,261.04	$7,000.00	$4,000.00	$7,000.00	75.00%
200-57622-171	WATER POWER - ELECTRIC (E)	$73,930.80	$54,041.48	$65,000.00	$65,000.00	$65,000.00	0.00%

Water Utility 2023 Budget							
Account	Title	2021 Actual	2022 Current Actual	2022 Estimated Year End	2022 Budget	Proposed 2023 Budget	Incr/Decr over prior year
200-57623-160	WATER PUMPING SUPPLIES (E)	$0.00	$206.48	$200.00	$200.00	$200.00	0.00%
200-57623-170	WATER TESTING (E)	$2,182.50	$1,296.16	$3,000.00	$3,000.00	$3,000.00	0.00%
200-57630-110	WATER TREATMENT - WAGES (E)	$63,265.00	$34,270.95	$47,711.00	$51,140.00	$51,804.00	1.30%
200-57630-112	WATER TREATMENT - OT WAGES (E)	$227.75	$824.10	$900.00	$0.00	$1,494.00	100.00%
200-57630-113	WATER TREATMENT - DBL OT WAGES (E)	$501.31	$412.07	$500.00	$0.00	$1,494.00	100.00%
200-57630-121	WATER TREATMENT - FICA (E)	$3,844.15	$2,699.51	$3,757.00	$3,840.00	$4,107.00	6.95%
200-57630-122	WATER TREATMENT - RETIREMENT (E)	$3,218.76	$2,825.41	$3,917.00	$2,489.00	$4,187.00	68.22%
200-57630-123	WATER TREATMENT - HEALTH INS (E)	$7,675.59	$7,761.15	$10,830.00	$10,830.00	$10,687.00	-1.32%
200-57630-124	WATER TREATMENT - LIFE INS (E)	$141.88	$90.57	$120.00	$40.00	$120.00	200.00%
200-57630-127	WATER TREATMENT HSA FUNDING (E)	$2,500.00	$2,499.77	$3,333.00	$3,333.00	$3,333.00	0.00%
200-57631-160	WATER TREATMENT CHEMICALS (E)	$115,336.64	$85,327.17	$130,000.00	$140,000.00	$135,000.00	-3.57%
200-57632-160	WATER TREATMENT SUPPLIES (E)	$1,999.54	$2,239.33	$2,300.00	$1,300.00	$2,200.00	69.23%
200-57635-150	WATER TREATMENT REPAIRS/ MAINT (E)	$2,688.65	$818.51	$2,000.00	$5,000.00	$5,000.00	0.00%
200-57640-110	WATER DISTRIBUTION - WAGES (E)	$47,051.39	$38,750.98	$52,170.00	$51,140.00	$51,804.00	1.30%
200-57640-112	WATER DISTRIBUTION - OT WAGES (E)	$227.75	$824.26	$900.00	$0.00	$1,494.00	100.00%
200-57640-113	WATER DISTRIBUTION-DBL OT WAGE (E)	$501.46	$412.22	$500.00	$0.00	$1,494.00	100.00%
200-57640-121	WATER DISTRIBUTION - FICA (E)	$3,844.95	$2,699.82	$4,098.00	$3,840.00	$4,107.00	6.95%
200-57640-122	WATER DISTRIBUTION -RETIREMENT (E)	$3,985.31	$2,825.86	$3,917.00	$2,489.00	$4,187.00	68.22%
200-57640-123	WATER DISTRIBUTION - HLTH INS (E)	$7,675.59	$7,761.15	$10,830.00	$10,830.00	$10,687.00	-1.32%
200-57640-124	WATER DISTRIBUTION - LIFE INS (E)	$118.74	$90.57	$120.00	$40.00	$130.00	225.00%
200-57640-127	WATER DISTRIBUTION HSA FUNDING (E)	$2,500.00	$2,500.34	$3,333.00	$3,333.00	$3,333.00	0.00%
200-57641-160	WATER DISTRIBUTION SUPPLIES	$3,755.39	$3,131.75	$6,000.00	$6,000.00	$6,000.00	0.00%
200-57650-150	WATER TOWERS REPAIRS/MAINT (E)	$478,570.09	$0.00	$0.00	$1,000.00	$1,000.00	0.00%
200-57651-150	WATER MAINS REPAIRS/MAINT (E)	$24,789.59	$34,410.52	$35,000.00	$30,000.00	$35,000.00	16.67%
200-57652-150	WATER SERVICES REPAIRS/ MAINT (E)	$5,322.07	$1,470.00	$2,500.00	$5,000.00	$5,000.00	0.00%
200-57653-151	WATER METER TESTING (E)	$3,091.90	$0.00	$0.00	$2,500.00	$3,000.00	20.00%
200-57654-150	HYDRANT REPAIRS/MAINT (E)	$8,093.70	$3,924.48	$8,000.00	$10,000.00	$10,000.00	0.00%
200-57656-150	CROSS CONNECTION INSPECTION (E)	$20,380.00	$12,720.00	$19,080.00	$19,080.00	$19,080.00	0.00%
200-57902-110	WATER ACCOUNTING - WAGES (E)	$46,480.28	$32,997.51	$45,884.00	$47,608.00	$48,077.00	0.99%

Water Utility 2023 Budget							
Account	Title	2021 Actual	2022 Current Actual	2022 Estimated Year End	2022 Budget	Proposed 2023 Budget	Incr/Decr over prior year
200-57902-121	WATER ACCOUNTING - FICA (E)	$3,391.17	$2,569.26	$3,510.00	$3,642.00	$3,678.00	0.99%
200-57902-122	WATER ACCOUNTING- RETIREMENT (E)	$3,437.05	$2,606.65	$2,982.00	$3,571.00	$3,750.00	5.01%
200-57902-123	WATER ACCOUNTING - HEALTH INS (E)	$9,492.04	$13,326.20	$14,000.00	$8,900.00	$12,679.00	42.46%
200-57902-127	WATER ACCT HSA FUNDING (E)	$2,500.00	$2,656.25	$3,594.00	$2,500.00	$3,750.00	50.00%
200-57903-125	WATER METER READING - UNIFORMS (E)	$4,445.02	$3,274.08	$5,500.00	$5,500.00	$5,500.00	0.00%
200-57920-110	WATER ADMIN - WAGES (E)	$28,810.66	$22,528.43	$32,360.00	$32,360.00	$34,189.00	5.65%
200-57920-121	WATER ADMIN - FICA (E)	$2,003.63	$1,681.57	$2,480.00	$2,480.00	$2,616.00	5.48%
200-57920-122	WATER ADMIN - RETIREMENT (E)	$2,125.17	$1,771.81	$2,430.00	$2,430.00	$2,667.00	9.75%
200-57920-123	WATER ADMIN - HEALTH INS (E)	$6,187.99	$5,371.65	$7,415.00	$7,415.00	$7,140.00	-3.71%
200-57920-127	WATER ADMIN HSA FUNDING (E)	$2,000.00	$1,499.98	$2,000.00	$2,000.00	$2,000.00	0.00%
200-57921-130	WATER IT EXPENSE (E)	$0.00	$78.19	$300.00	$0.00	$300.00	100.00%
200-57921-160	WATER OFFICE SUPPLIES (E)	$12,033.44	$8,419.57	$10,000.00	$10,000.00	$10,000.00	0.00%
200-57921-200	WATER TELEPHONE (E)	$4,784.74	$744.82	$820.00	$2,500.00	$850.00	-66.00%
200-57923-000	WATER ATTORNEY EXPENSE (E)	$0.00	$0.00	$0.00	$2,000.00	$1,000.00	-50.00%
200-57924-000	WATER ENGINEERING EXPENSE (E)	$14,126.00	$3,355.00	$5,000.00	$15,000.00	$10,220.00	-31.87%
200-57925-000	WATER AUDIT EXPENSE (E)	$17,366.67	$10,575.00	$10,575.00	$9,900.00	$12,000.00	21.21%
200-57925-100	WATER RATE STUDY EXPENSE (E)	$12,057.17	$5,967.71	$5,968.00	$5,000.00	$0.00	-100.00%
200-57928-000	WATER REGULATORY EXPENSE (E)	$944.36	$0.00	$950.00	$840.00	$950.00	13.10%
200-57930-130	WATER DRUG TESTING EXPENSE (E)	$300.00	$109.75	$500.00	$500.00	$500.00	0.00%
200-57930-140	WATER DIGGERS HOTLINE EXPENSE (E)	$1,974.30	$1,768.20	$2,900.00	$2,900.00	$2,900.00	0.00%
200-57930-190	WATER TRAINING EXPENSE (E)	$1,906.23	$1,896.90	$2,000.00	$3,000.00	$3,000.00	0.00%
200-57933-150	WATER TRANSP REPAIRS/MAINT (E)	$295.54	$1,159.04	$1,500.00	$1,500.00	$1,500.00	0.00%
200-57933-180	WATER FUEL EXPENSE (E)	$710.19	$1,023.02	$1,100.00	$600.00	$900.00	50.00%
200-57934-000	WATER DEBT SERVICE (E)	-$114.87	$18,664.00	$67,821.00	$67,821.00	$211,479.00	211.82%
200-57935-150	WATER PLANT REPAIRS/MAINT (E)	$22,791.17	$13,016.58	$20,000.00	$20,000.00	$20,000.00	0.00%
200-57945-000	WATER DEBT SERVICE MISC EXP (E)	$158.33	$158.33	$160.00	$160.00	$160.00	0.00%
200-57951-000	WATER SHOP TOOLS (E)	$302.11	$85.98	$500.00	$500.00	$500.00	0.00%
200-57952-000	WATER LAB EQUIPMENT (E)	$547.62	$0.00	$1,000.00	$3,000.00	$3,000.00	0.00%
200-58801-000	IT SUPPORT/ANNUAL FEES (E)	$5,048.41	$4,048.43	$7,000.00	$7,000.00	$7,000.00	0.00%

Water Utility 2023 Budget							
Account	**Title**	**2021 Actual**	**2022 Current Actual**	**2022 Estimated Year End**	**2022 Budget**	**Proposed 2023 Budget**	**Incr/Decr over prior year**
	Total Expenditures	**$1,279,994.05**	**$684,679.37**	**$929,059.00**	**$946,314.00**	**$1,312,535.00**	
	Revenues over/under Expenditures	**-$399,538.97**	**-$241,862.69**	**$71,020.97**	**$59,498.00**	**-$231,985.00**	
200-57610-140	WATER FUND CAPITAL OUTLAY (E)						
	Computers & SCADA	$3,500.00	**2023**				
	Well #3 Inspection		**2024**	$150,000.00			
200-57924-000	WATER ENGINEERING EXPENSE						
	Water Loss & Infiltration	$7,020.00					
	Water Main Asset Management	$3,200.00					
		$10,220.00					