

#### STATE OF MICHIGAN

#### DEPARTMENT OF ENVIRONMENTAL QUALITY





C. HEIDI GRETHER DIRECTOR

March 21, 2018

The Honorable Karen W. Weaver, Mayor City of Flint 1101 South Saginaw Street Flint, Michigan 48502

Dear Mayor Weaver:

SUBJECT: Water System Sanitary Survey, WSSN: 2310

The Department of Environmental Quality (DEQ) has reviewed the city of Flint's (City) efforts to resolve the Significant Deficiencies and Deficiencies identified in our 2017 sanitary survey of the City water system. The City, the DEQ, and the U.S. Environmental Protection Agency (EPA) have been working closely to address these issues.

The Significant Deficiencies, Deficiencies, and Recommendations listed below were identified in our sanitary survey, and the City provided a response in your September 8, 2017 letter. Based on your response, and several discussions with City staff and contractors, we have the following comments.

### Significant Deficiencies

1. Source – The City has failed to select a long-term water supply source.

This issue is resolved. The City executed a 30-year water supply agreement with the Great Lakes Water Authority (GLWA), with an effective date of December 1, 2017. Selection of a long-term water source allows the City to move forward with addressing other water system issues.

2. Distribution System – The City's cross connection control program is not being implemented in a satisfactory manner.

This issue is unresolved. The City has stated its intent to fill the vacant cross connection manager position and resume cross connection control activities but has been unable to hire a permanent employee for the manager position. It is our understanding that the City is negotiating for temporary, contractual assistance to oversee its cross connection control program. The use of contractual services to implement the program is acceptable to DEQ. A permanent or contractual cross connection manager must be in place, and routine cross connection control program activities must resume, by June 20, 2018. Implementation of the cross connection program will be evaluated under item 4 (System Management and Operation) below.

3. Distribution System – the City has not provided details about maintenance and replacement programs and/or Standard Operating Procedures (SOPs) for hydrants, valves, meters, and galvanized service lines.

This issue is unresolved. Several SOPs were prepared for the City by the Arcadis Group as part of the City's Distribution System Optimization Plan, but the City has not indicated its formal approval of the SOPs. For each Distribution System SOP, the City must provide the following to the DEQ by April 20, 2018: a signed, dated copy of the SOP (if the City intends to implement the SOP as written), or a statement indicating that a revised SOP is necessary. If revised SOPs are necessary, signed, dated copies of the revised SOPs must be submitted to us by May 21, 2018. Also, an SOP for galvanized service lines was not submitted and a signed, dated copy must be provided by May 21, 2018. The City's implementation of the approved SOPs will be evaluated under item 4 (System Management and Operation) below.

4. System Management and Operation – The DEQ does not have confidence that the City can continue to demonstrate the Technical, Managerial, and Financial (TMF) capacity necessary to consistently operate the water system in accordance with Act 399 after the current technical and training assistance contracts expire.

The overall issue of demonstrating adequate TMF capacity remains unresolved until the other Significant Deficiencies and Deficiencies identified in this letter are appropriately addressed. The DEQ will continue to work with the City and with EPA to ensure TMF capacity is maintained.

5. Financial – The City should adopt an appropriate rate structure and administrative policies for the water system.

This issue is unresolved. Selection of a long-term water source has allowed the City to begin financial planning; however, a water rate structure must be implemented that allows the City to properly operate and maintain the water system. The City must notify us by May 21, 2018, of your plan to implement a sufficient rate structure, including an effective date for any new rates.

### **Deficiencies**

6. Storage – The Cedar Street Reservoir requires an inspection.

This issue is unresolved; however, the DEQ agrees the distribution system storage analysis should be completed before an inspection plan and schedule are developed for the Cedar Street Reservoir. The City projects the analysis will be completed and the reservoir inspection will take place in 2018. The inspection must be completed, and an inspection report and plan for completing any necessary improvements must be submitted to us, by September 28, 2018.

7. Operator Compliance – The City has been unable to recruit and retain a properly-certified operator-in-charge, and is also having difficulty reaching desired staffing levels.

This issue is unresolved. The City has been unsuccessful in its attempts to recruit and hire critical water system staff. The City must supply a full-time operator-in-charge on a permanent or contractual basis and sufficient staffing on a permanent or contractual basis to conduct continuous treatment system operations by June 30, 2018.

8. Security – The City has not provided an updated Emergency Response Plan for DEQ review.

This issue is unresolved; however, the City has committed to competing the Emergency Response Plan by June 2018. We interpret this to mean an updated plan will be submitted to DEQ by June 30, 2018. This schedule is acceptable to the DEQ.

### Recommendations

9. Source – An evaluation of the reliability of utility power and the need for an on-site emergency generator should be completed.

This issue is resolved. The selection of a long-term water source has made an evaluation of the power supply to the water treatment plant unnecessary. Power needs may be considered during the design of permanent chemical feed facilities (item 10 below).

10. Treatment – Additional features should be added to the treatment system currently in operation at CS-II to enhance treatment reliability and consistency, as well as operator safety.

Design of chemical feed system improvements must be completed by December 31, 2018, and construction must be completed by December 31, 2019.

11. Distribution System – The City should plan financially for periodic updates of the General Plan, Asset Management Plan and Capital Improvement Plan.

The City indicated its intent to budget for periodic updates or develop in-house capability to complete these tasks. The cost of completing this task must be reflected in your water rates/budget.

12. Distribution System – The design of future water main replacement projects should strongly consider water age/water main sizing.

The City indicated its intent to use the recently-developed hydraulic model of the distribution system during the design of water system improvements. This is acceptable to the DEQ.

## 13. Storage – A back-up power supply should be provided for the Cedar Street Reservoir booster station.

The City indicated its intent to either purchase or arrange for the use of a properly-sized portable generator at the Cedar Street Reservoir. The generator should be purchased, or the emergency services contract should be executed, by <u>December 31, 2018</u>.

## 14. Pumps – Upgrades to the Torrey Road and Cedar Street booster pumps should be completed.

The City indicated the Torrey Road pumps will be installed in 2018, and upgrades to the Cedar Street pumps will be designed in 2018 and completed in 2019. This schedule for completing the work is acceptable to the DEQ.

## 15. Monitoring and Reporting – The City should begin planning financially for staff to complete all monitoring and reporting requirements.

The City indicated its intent to have adequate staffing and laboratory facilities to complete these tasks. The cost of completing this task must be reflected in your water rates/budget.

If you have any questions, please contact me at the phone number listed below or by email to londonr@michigan.gov.

Sincerely,

Robert A. London, P.E.

Surface Water Treatment Engineer

**Engineering Unit** 

Drinking Water and Municipal Assistance Division 989-450-7834

bl/ail

cc: Mr. Mark Adas, City of Flint

Mr. Rob Bincsik, City of Flint

Mr. Robert Jones, F&V Operations

Mr. Eric Oswald, DEQ

Ms. Sue Maul, DEQ



# STATE OF MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY SAGINAW BAY DISTRICT OFFICE



August 11, 2017

## SIGNIFICANT DEFICIENCY VIOLATION NOTICE

Mr. Sylvester Jones, Administrator City of Flint 1101 South Saginaw Street Flint, Michigan 48502

Dear Mr. Jones:

SUBJECT: Water System Sanitary Survey, WSSN: 2310

Significant Deficiency Violation Notice

The Department of Environmental Quality (DEQ) has completed a sanitary survey of the city of Flint (City) drinking water system. The purpose of the survey is to evaluate the water system with respect to the requirements of the Michigan Safe Drinking Water Act, 1976 PA 399, as amended (Act 399). In addition, the enclosed sanitary survey form was updated to gather information on the City water distribution, storage, pumping, and limited treatment systems. The sanitary survey does not include an evaluation of the water filtration plant. A complete engineering evaluation of the water filtration plant was recently completed by CDM Smith and others, and would form the basis of any future recommendations if the City elects to operate the water filtration plant.

The following table summarizes our findings from our survey of the water system:

Survey Element	Findings
Source	Significant Deficiencies noted
Treatment	Recommendations made
Distribution System	Significant Deficiencies noted
Finished Water Storage	Deficiencies noted
Pumps	Recommendations made
Monitoring & Reporting	Recommendations made
Management & Operations	Significant Deficiencies noted
Operator Compliance	Deficiencies noted
Security	Deficiencies noted
Financial	Significant Deficiencies noted
Other	

A summary of the significant deficiencies, minor deficiencies, and recommendations applicable to your water system is enclosed for your information.

Our investigation is considered complete. This significant deficiency begins as of the date of receipt of this letter and will continue until you complete corrective action. You must complete corrective action within 120 days of receipt of this letter or be in compliance with a corrective action plan and schedule approved by this office. You are directed to contact us within 30 days of receipt of this letter to discuss appropriate corrective action. You must also notify us in writing within 30 days of correcting the significant deficiency.

If you have any factual information you would like us to consider regarding the significant deficiencies identified in this Significant Deficiency Violation Notice please provide it in a written response by September 8, 2017.

If you have any questions or wish to discuss the sanitary survey or Significant Deficiency Violation Notice, please contact me at the phone number listed below or by email to londonr@michigan.gov.

Sincerely,

Robert A. London, P.E.

Robert a Sondon

Surface Water Treatment Engineer

**Engineering Unit** 

Drinking Water and Municipal Assistance Division

989-450-7834

bl/snh

**Enclosures** 

cc/enc: Mr. Robert Jones, F&V Operations

Mr. Mark Adas, City of Flint

Mr. Rob Bincsik, City of Flint

CC:

Mr. Eric Oswald, DEQ Ms. Sue Maul, DEQ

- 1. Source The city has failed to select a long-term water supply source (significant deficiency). In a June 15, 2017 letter from Director C. Heidi Grether, the city was directed by the DEQ to either enter into the long-term water service agreement negotiated by Mayor Karen W. Weaver with the Great Lakes Water Authority (GLWA), or offer a reasonable alternative proposal by June 26, 2017 that was protective of public health. The city's failure to do so resulted in legal action by the DEQ. The lack of a long-term source agreement has prevented the city from moving forward with several important initiatives, including infrastructure improvements, establishing water rates, securing outside funding for critical projects, ensuring reliable delivery of drinking water, and recruiting/hiring water department staff.
- 2. **Source** An evaluation of the reliability of utility power and the need for an onsite emergency generator should be completed (*recommendation*). It is noted that, although the city currently purchases treated water from the GLWA, additional treatment is required at the city's Control Station II (CS-II).
- 3. Treatment Additional features should be added to the treatment system currently in operation at CS-II to enhance treatment reliability and consistency, as well as operator safety (recommendation). The current treatment system was designed to be temporary in nature until a final water source decision was made, and therefore does not have standard features such as scales (for determining the weight of chemical fed). It is recommended that, if the city selects the GLWA as its long-term, primary water source, an upgraded chemical feed and storage facility should be constructed. The facility should include adequate safety features and a SCADA control system that is capable of monitoring incoming water quality from the GLWA, water quality after the city's supplemental chemical feed, flow rates, and chemical feed rates.
- 4. Distribution System The city's cross connection control program is not being implemented in a satisfactory manner (significant deficiency). A cross connection is a piping arrangement where contaminated water may enter the potable water supply. A water utility is required to implement a program, including inspections and testing of backflow prevention devices, to protect the public water supply. The person responsible for implementing the program has reportedly been assigned other duties and has not conducted the required inspections for at least the last three years. Adequate staff time and resources must be allocated to this essential program.
- 5. **Distribution System** The city has not provided details about maintenance and replacement programs and/or Standard Operating Procedures for hydrants, valves, meters, and galvanized service lines (*significant deficiency*). The Distribution System Optimization Study being completed by Arcadis Group should address some or all of these concerns. Under normal circumstances, a community water system should consider replacing 1.5 to 2 percent of its fire hydrants and valves, and 1 to 1.5 percent of its water mains each year. Unfortunately, in the past, the city has fallen far short of these recommended replacement rates. During the past few years, the city has implemented an aggressive hydrant and valve program, which has significantly improved distribution system reliability. Also, the city has applied for funding assistance for a major water main replacement program. Despite the city's recent increase in hydrant and valve maintenance and replacement activities, a significant amount

- of infrastructure replacement/upgrade will be necessary for the city to be completely aligned with industry best practices.
- 6. **Distribution System** The city should plan financially for periodic updates of the General Plan, Asset Management Plan, and Capital Improvement Plan (*recommendation*). These documents assist the city with planning and prioritizing infrastructure improvements. The current version of these documents is being completed with the assistance of the DEQ and/or State contractors. Future updates will be the responsibility of the city.
- 7. **Distribution System** The city's Drinking Water Revolving Fund (DWRF) Project Plan cites water age and the presence of oversized water mains as contributors to water quality concerns in the distribution system. The city's water system was designed for much higher population and demands than exist currently. The design of future water main replacement projects should strongly consider water age/water main sizing (*recommendation*).
- 8. **Storage** The Cedar Street Reservoir requires an inspection; however, it cannot reasonably be inspected until the West Side Reservoir is returned to service (*minor deficiency*). Because there is uncertainty about the long-term need for the West Side Reservoir (due to water age concerns), the city has removed it from service indefinitely. Unfortunately, this prevents the city from conducting a thorough inspection of the Cedar Street Reservoir.
- 9. Storage A backup power supply should be provided for the Cedar Street Reservoir booster pumps (*recommendation*). Routine use of the Cedar Street Reservoir is necessary to manage water quality throughout the distribution system, and the reservoir also serves as an emergency supply of treated water in the event the supply from the GLWA is interrupted. To improve system reliability, backup power should be provided.
- 10. Pumps Upgrades to the Torrey Road and Cedar Street booster pumps should be completed (*recommendation*). Replacement pumps have been purchased for Torrey Road but not installed. Variable Frequency Drive (VFD) controls have been recommended for the Cedar Street pumps to reduce pressure fluctuations and water main breaks in the distribution system.
- 11. **Monitoring and Reporting** The city should begin planning financially for staff to complete all monitoring and reporting requirements (**recommendation**). Lead and copper monitoring, and preparation of the Consumer Confidence Report, have been completed with assistance from DEQ staff. The city will be fully responsible for these tasks in the future.
- 12. **System Management and Operations** The city has failed to select a long-term water source (*significant deficiency*), which has prevented several important water system initiatives from occurring. The DEQ does not have confidence that the city can continue to demonstrate the Technical, Managerial, and Financial (TMF) capacity necessary to consistently operate the water system in accordance with Act 399 after the current technical and training assistance contracts expire.
- 13. **Operator Compliance** The treatment system is currently under the supervision of a contract operations firm. The city has been unable to recruit and retain a properly-certified operator-in-charge, and is also having difficulty reaching desired staffing levels. Staffing problems (*minor deficiency*) are due, in part, to uncertainty about the city's long-term source and treatment requirements.

### City of Flint, Sanitary Survey Summary of Deficiencies and Recommendations

- 14. **Security** The city has not provided an updated Emergency Response Plan (*minor deficiency*) for DEQ review. Significant changes have occurred since the plan was last reviewed.
- 15. **Financial** The DEQ previously notified the city that continued failure to enter into a long-term water service agreement with GLWA or offer a reasonable alternative proposal would place the city in further financial stress. The city's failure to do so has affected the budgeting process, planning, and development of appropriate water rates (**significant deficiency**). The city should adopt an appropriate rate structure and administrative policies for the water system. The recommendations of the Flint Water Interagency Coordinating Committee (FWICC) should be used as a guideline.

Community Water Supply Section

Engineering Unit Phone: 989-450-7834 Fax: 989-891-9213

WSSN:

02310

## Drinking Water and Municipal Assistance Division

## Water System Sanitary Survey

City of Flint Water System
(Distribution System, Limited Treatment, Storage, and Pumping)
August 7, 2017



#### Sanitary Survey of Community Water Supply - Review Summary

Water Supply: City of Flint
County: Genesee
Evaluator: Bob London

WSSN: District:

Date: 8/7/2017

02310

92

Category	Comment	N/A	Not⊵v	NoD/R	Rec	Det	SigDef
Source		2100000		8/51/65 X			X
	No long-term decision on primary/backup sources	3577555755					Χ
The second secon	Appropriate level of standby power is dependent on source selection	75.45	6,00 930	PRATER NO	Χ		an Assa
The state of the s		149		Χ		[]	1. Harris de la de
Isolation	No concerns with current GLWA or potential KWA/GCDC sources	174			n saaa	A. Sayes sa	
Source Water Protection	No formal source water protection program, but no concerns	Pag	erich veleri	Х	TERROR	200 TO 100	J Margaret
Capacity	Lack of decision on source affects planning, finances, staffing, etc.				Alberto Arabitation	CONTRACTOR AND A PROPERTY.	Х
Treatment	Survey does not include filtration facilities (use is to be determined)				X		
Disinfection	Permanent facilities and improved SCADA if GLWA water used				Х		1
Fluoride		Х					
Phosphate Addition	Permanent facilities and improved SCADA if GLWA water used				Х		
Softening		Χ	34,000		描绘花	RYMAR	复选 医环
Iron/Manganese Removal	lang managgapang at malaman langgap paggapan beti beberah langgap bendalan salah salah salah salah salah salah I	Х	1	2,000			
Arsenic Removal		Х	1, 1,150		SERVE	3.44.4A,	
Pretreatment	en ektoriotische Miller (1884) der Meiller der det totalette der eine Aufliche der ein der Geleiche der Aufliche	X	400 - 10,00	1 15 150	49.1	all visits	
•	makiya u 1944 a Gardaya Mada Waraya Intondu da manyi bunda 1920 di Dulu Di Garda 1948 da bunda	x	. + 15.412.1 1 40.621	e bachi		la seces	- Calling
Filtration (gravity or membranes)	。 《····································	x	1, 30, 50,	1.8.3556	- EUVEE	17, 1 11, 1 11	100
C*T	i Baran an an ang kalayang mga salayan ng mga mga mga mga mga kalayan na mga kalayan na mga salayan na mga kababa	1.0	k. 1843	100000000000000000000000000000000000000	0.00	escere como	350,000 000
Other	Permanent facilities and improved SCADA if GLWA water used				X		5.50 CECCO - 10 A A A A A A A A A A A A A A A A A A
Distribution System							X
Interconnections w/ Other WS	A mutual aid agreement is recommended with nearby utilities				Х	n server etc. so	
Hydrants & Valves	Recent efforts very good, but formal long-term program needed					February Constitution	X
Service Lines & Metering	Programs for meter and galvanized service replacement are needed	l			'		X
General Plan	Prepared through State contract - City needs to assume responsibility				Х	Ego Enside	
Cross Connections	No inspections conducted, inadequate administration	1,111		2000000000	l		X
Construction & Maintenance	Age of system, water accountability, number of breaks	100	15.535.50			144773	X
The contract of the Artifact of the contract o	Water age is a concern due to oversized mains/reduced demands		15,172,6	171.101.001	Х		Think Takes
Capacity						X	
Finished Water Storage	Does not include Dort Reservoir and CW#4 (use is to be determined)					X	
Construction & Maintenance	Cedar St. needs inspection, West Side off line due to condition	100.00	nana arayan		بندر دنو	<u>^</u>	e nerrens, galak
Controls		. I dib	anika kit	X			
Capacity	Backup Power rec. at Cedar Street; Arcadis evaluating volumes	<u> </u>			Х		- Maryantania organia organia
Pumps (All Pumping Facilities)	Does not include pumps at water plant site (use is to be determined)				- X		
Construction & Maintenance	Torrey Road pump upgrade has been delayed				X		
Controls	Electrical gear/control upgrades recommended/VFDs recommended				Х		
Capacity				X			
Monitoring & Reporting					Х		200000000000000000000000000000000000000
Bacteriological Monitoring		S HOLDESPASSES.	-11-11-10-11-11-11-11-11-11-11-11-11-11-	X		- Committee of Marie	Marie Company of the
Chemical Monitoring	Completed with State assistance - City needs to assume responibility		James 4	19939.303	Х		
MOR or Annual Pumpage Report			1 1777.795.4.1.	×	:	1 0 0 0 00	1.10.1.300
		, again	YAKE ARA		Х		
Consumer Confidence Report	Prepared with State assistance - City needs to assume responibility	1 111	Para dani		1		A Citalia Col
Analytical Capabilities		655550000000	SSASSAS MINISTER	<u> X</u>	2 (52/22/28/8		
System Management & Operation						-3.485.65	X
Owner Responsibility	Lack of decision on source affects planning, finances, staffing, etc.			.]			Х
Capacity Development	Concerns with long-term source, budget, staffing/cert., plans/studies					X	
Reliability Study	Prepared with State assistance - City needs to assume responibility	1		I	Х	1	
Operations Oversight	Treatment - contract w/F&V Operation; Distribution - in-house staff				Х		
Permits				X		1	1
Operator Compliance		Control Control				X	
Operator Certification	Difficulty hiring/retaining certified operators					X	te a recommendation of the second
Technical Knowledge & Training		1979	la se se se		Х		dan sest
	ranny	5 (#2584888)			S \$50,000,000	Х	0.0000000000000000000000000000000000000
Security	(500)			1	- Combined		
Emergency Response Plan	Status of ERP is unknown		. La reason e		er i i i i i i i i i i i i i i i i i i i	X	4
Site Security (Fences, Alarms)			2	X			
Financial							X
Rates	Raftelis Study predicts a revenue vs. expenses gap			.1	Х		1
Budget & Capital Imp. Plan	Lack of decsion on source affects budget, planning, financing						X
Other			binds of	5 50 55 55			
N/A - Not Applicable	NotEv - Not Evaluated	NoD/I	R - No Def	iciencies/F	Recomm	endations	Made
Por - Pocommondations Made	Def - Deficiencies Identified	SinDe	ef - Signific	ant Deficie	encies Id	entified	

N/A - Not Applicable Rec - Recommendations Made

Def - Deficiencies Identified

SigDef - Significant Deficiencies Identified

### WATER SYSTEM SANITARY SURVEY

### **GENERAL**

WSSN:	02310	Supply:	City of Flint	County:	Genesee
Date:	8/7/2017	Reviewed by:	Bob London	District	RAL/North
Primary Contact:	Sylveste	r Jones	Copy To:	Mark Adas	
SDWIS Role:	AC, FC		SDWIS Role:		
Title:	City Adm	ninistrator	Title:	City Engineer	
Telephone:	810-766-	7346 x 2025	Telephone		
Cell Phone:			Cell Phone:	810-610-7771	
ax;			Fax:	Sign 9	
e-mail:	sjones@	cityofflint.com	e-mail:	madas@cityc	offlint.com
Address:		Saginaw Street	Address:	1101 S. Sagir	naw Street
mand (Call a Street Call Containing Call Call Call Call Call Call Call Cal	Flint, MI	48502		Flint, MI 4850	)2
Population: 98	,310	<b>/ear</b> : 2015	Basis: Census update		

	Operator Training and	Certification - Treatme	nt	
Treatment Capacity:	18 MGD			
Treatment Classification	: D-1	Certification	Op. #	Exp. Date
Operator in Charge:	Robert Jones (F&V Operations)	D-1, F-2, S-1	5026	7/15/2018
Backup Operators:	Catherine Garnham (F&V)	F-1, S-1	5194	7/15/2019
	Stewart Beach (F&V)	F-1, S-1	2273	1/15/2019
Operations Supervisor:	Vacant			
Operations Foreman (4):	Scott Dungee	F-3, S-4	5550	7/15/2019
,	Chris Wilcox	F-4	18586	1/15/2018
	Dominic Smoot	D-3	20034	1/15/2020
	Vacant			
Operator/Maintainer (4):		F-4	18394	1/15/2018
- F - 1 - 2 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	Jeff Maksymowski	None	20033	
	Josh Pickett	None		
	Robert Stinson	None		
Maintenance Supv. (2):	Mike Beckley	F-4, S-4	13782	7/15/2018
	Chris Koryciak	F-4, S-4	4653	1/15/2020
Maintainer/Operator (2):				
, , , , , , , , , , , , , , , , , , ,	Vacant	-		
Instrument Technician:	Vacant			
Lab Supervisor:	Will Bradley	F-3	11941	7/15/2017
Lab Technicians:	Heather Kot	D-4	20031	1/15/2020
	Vacant			
Do the operators receive	e adequate technical training?	Yes		
If not, explain:	,			

Comments on Training and Certification:

The City entered into a contractual agreement with Fleis and Vandenbrink Operations (F&V) for Operator-In-Charge and Certified Backup Operator services for the treatment system on June 22, 2017. F&V is responsible for providing training and certification of contract operations staff.

The City is investigating a contract service agreeement with Hach for analytical equipment maintenance due to the vacant Instrument Technician position. The instrument technician at the wastewater plant may also be available to provide limited assistance.

The State of Michigan has entered into several agreements for training and technical assistance for City of Flint personnel, and has provided training on several occasions at the water treatment plant for City personnel. A comprehensive list of training is contained in Appendix A. The City is responsible for providing adequate training in the future to maintain a competent and properly-certified staff.

## WATER SYSTEM SANITARY SURVEY

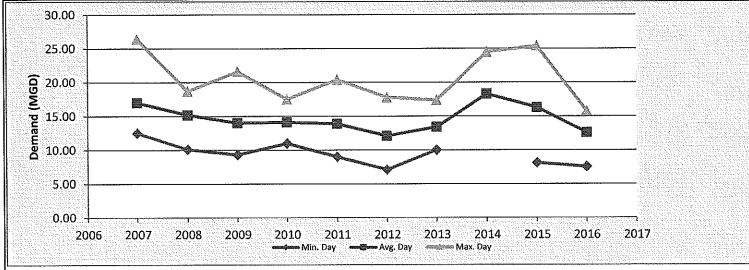
### **GENERAL**

Distribution Classification	: S-1	Certification	Op. #	Exp. Date
	Robert Bincsik	F-4, S-1	13784	1/15/2020
Backup Operator:				
	Howard Swickard	S-2	5091	1/15/2019
•	Paul Simpson	S-2	4849	1/15/2018
•	Jeff Church	S-3	12559	4/15/2020
•	Curtis Brooks	None		
Senior Water Dist.				
Operators:	Jason Bradley	None		
	Dave Hurt	None	17277	
	Rich Johnson	None		
	Jeremy Keefer	None	16060	
	Chris Kennedy	None		
	Phil Kuczera	None		
	Brandon McNiel	None		
	Jon Mochty	None		
	Mark Pavwoski	None	13288	
	Keith Ross	None		
	Juan Sattiewhite	None		
	Don Thompson	None		
	Dan Wells	None None	18922	
Water Dist. Operators:	Clarence Scott	None		
	Greg Sumner	None		
	Fabian Villareal	None None		
	Nancy Prieur	None	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
	Lester Muma	None	14567	
Water Dist. Op. Trainee:	Marc Arter	None		
	Jason Gutierrez	None		
	Ben Gutierrez	None	4366	
	Mark May	None		
	Vacant (8 positions)			
Do the operators receive If not, explain:	adequate technical training?	Yes		
Comments on Training		or training and technical assis	tance for City of Flir	of nersonnel and
has provided training or	nas entered into several agreements for several occasions at the water treatr A. The City is responsible for providin	nent plant for City personnel.	A comprehensive I	ist of training is

Ownership:	City	
Consent Agreement:	NA	
Escrow Account:	NA	
Annual Fee:	Active	
Comments:		

### SOURCE

				Capac	city				
Year			emand (MGD			Max/Avg	Population	G/C/D	%
rear	Max. Day	Date	Avg. Day	Min. Day	Date	IVIAA/AVY	History	GIOID	unacct.H₂O
2007	26.4		17.0	12.50		1.55			
2008	18.7		15.2	10.10		1.23			
2009	21.6		14.0	9.30		1.54			
2010	17.5		14.1	11.00		1.24			43%
2011	20.4		13.9	9.00		1.47			39%
2012	17.8		12.1	7.10		1.47			40%
2013	17.4		13.4	10.00		1.30			50%
2014	24.5		18.3			Data from	2014/2015 i	ncludes W	TP operation.
2015	25.4		16.3	8.10		Do no	t use for cap	acity deter	mination.
2016	15.8		12.6	7.54		1.25			



  Five Year Max. Day	17.8	(Excludes 2014 and 2015, which reflects WTP operation)
Ten year Max. Day	26.4	
Five Year Avg. Day	12.7	(Excludes 2014 and 2015, which reflects WTP operation)
Max Day for capacity requirements:	18.0	(Based on original raw water contract with KWA and
The state of the s		anticipated reduction in lost water from DWRF project)

Purchase Contract
A, City of Flint
10/16/2015  9 months from execution, but extendable based on circumstances
The contract was officially extended July 11, 2016
593,000 Mcf ( = 4.436 Bgal)
21.4 MGD
22.4 MGD measured over one hour
: 60 PSI
40 PSI

#### Comments on the Purchase Contract:

A short-term agreement was reached with the Great Lakes Water Authority (GLWA) in 2015 to allow the City of Flint to discontinue routine use of its water treatment plant. The agreement with GLWA was based on the previous agreement with the Detroit Water and Sewerage Department (DWSD). The agreement was set to expire within 9 months of execution, but included provisions to extend it as necessary based on local circumstances. A 30-year purchase agreement was proposed by GLWA, but Flint City Council has not approved it as of the date of this survey. The City was required to approve the proposed agreement or propose a reasonable alternative that was protective of public health by June 26, 2017, and failed to do so. The DEQ has determined that the City's failure to act presents an immediate threat to public health. The City does not have a secure, long-term source agreement at this time.

### **STORAGE**

Ground Level Storage -	Construction, Controls &	Maintenance
Identification	Dort Reservoir	Clearwell No. 4
Location	Water Treatment Plant	Water Treatment Plant
Function	Finished Water Storage	High Service Pump
	(currently off line but is	Suction
	intended for routine use)	
	·	
Туре	Concrete, 2-cell	Concrete
Nominal Volume (Gallons)	20,000,000	3,000,000
Calculated Usable Volume (Gallons)		
Date Constructed	1952	1954
Date Inspected		*
Buried/At Grade	At grade	Buried
Floor Slab, Elevation		
Floor Relief Valves-Float Prevention (Y/N)		
Sump Area (Y/N)		
Floor Slopes to Sump (Y/N)		
Sump Floor Elevation		
Sump Dimensions		
Date Painted/Coated Inside		
Paint/Coating System		
NSF Std 61 Compliant (Y/N)		
Cathodic Protection		
Leaks (Y/N)		· · · · · · · · · · · · · · · · · · ·
Reservoir Isolation Valve		
Basin Drain (Hydrant/Pumps)		
High Alarm		
Low Alarm		
Alarm Type		
Normal High Water Level		
Normal Low Water level		
Range of Operation		
Chart recorder		
Telemetering System	Wireless/SCADA	Wireless/SCADA
Vents Screened		
Overflow Screened		
Access Hatches Locked		
Hatches Watertight and Overlap		
Overflow Splash Pad		
Site Fenced/Locked	Locked - at WTP	Locked - at WTP
Licobio Storago	0	0
Usable Storage		
Comments on Ground Level Storage: At pres capable of using the Dort Reservoir or Clearw maintenance/repairs, would be necessary before	ell No. 4. A thorough inspection,	and completion of any necessary

#### **STORAGE**

Ground Level Storage -	Construction, Controls &	Maintenance
Identification	Cedar Street Reservoir	West Side Reservoir
Location	Cedar St./Fenton Rd.	Dupont St./Jean Ave.
Function	Distribution Storage	Distribution Storage
Туре	Concrete, 2-cell	Concrete, 2-cell
туре Nominal Volume (Gallons)	20,000,000	12,000,000
Calculated Usable Volume (Gallons)	14,000,000	0 (off line at this time)
Date Constructed	1948	1970
	~2000	2017
Date Inspected		
Buried/At Grade	At grade	At grade
Floor Slab, Elevation	-	
Floor Relief Valves-Float Prevention (Y/N)		
Sump Area (Y/N)		
Floor Slopes to Sump (Y/N)		
Sump Floor Elevation		particular transfer of the second sec
Sump Dimensions	N/A (ato)	NI/A (concrete)
Date Painted/Coated Inside	N/A (concrete)	N/A (concrete)
Paint/Coating System		the sale in
NSF Std 61 Compliant (Y/N)		
Cathodic Protection	No No	No
Leaks (Y/N)	No	Yes
Reservoir Isolation Valve	Yes	Yes
Basin Drain (Hydrant/Pumps)		
High Alarm	Yes	Yes
Low Alarm	Yes	Yes
Alarm Type	Noted on SCADA	Noted on SCADA
Normal High Water Level	20'	
Normal Low Water level	6'/16' (summer/winter)	
Range of Operation	Depends on season	Depends on season
Chart recorder	SCADA at WTP	SCADA at WTP
Telemetering System	Wireless/SCADA	Wireless/SCADA
Vents Screened	Yes	Yes
Overflow Screened		Yes
Access Hatches Locked		Yes
Hatches Watertight and Overlap	Yes	
Overflow Splash Pad	Storm drain w/air gap	Storm drain w/air gap
Site Fenced/Locked	Yes	Yes
Usable Storage	14,000,000	0

Comments on Ground Level Storage:

The West Side Reservoir (WSR) was inspected in 2017. The reservoir was shut down several months ago due to a leaking link seal/coupling through the wall on the influent line. The inspection report recommends approximately \$90,000 of miscellaneous repairs such as brick work and tuck pointing, repainting of pipes and metal surfaces, replacement of downspouts, replacement of the influent line link seal, etc., to prevent the reservoir from deteriorating. There were no other major structural or sanitary concerns. The Arcadis Group will be providing a recommendation on the long-term need for the WSR. Until that recommendation is received, the City will not make a decision on whether to proceed with the repairs. The City has experienced a significant drop in the number of water main breaks since the West Side Reservoir was removed from service. Several sources have recommended that Soft Starts or VFDs be installed on the West Side booster pumps to reduce or eliminate pressure spikes within the distribution system, which may be related to main breaks.

### **STORAGE**

	1175
Location	WTP (elevated)
SDWIS Facility ID (Site Code)	0.000.000
Volume	2,000,000
Type	Elevated, multi-leg
Material	Steel
O.F. Elevation	
Date Constructed	1952
Date Inspected	2009
Date Painted Inside	2009
Paint System	
NSF Std 61 Compliant (Y/N)	Yes
Date Painted Outside	
Cathodic Protection	Yes
Tank Isolation Valve	Yes
Tank Drain (Hydrant)	Yes
Altitude Valve	Yes
Mud Valve	Yes
High Alarm	Yes
Low Alarm	Yes
Alarms Received By	Operations center
Total Head Range (Feet)	
Normal High Water Level	
Normal Low Water level	1.11212-11
Normal/Average Pressure	74
Data Recording System	SCADA
Control Signal Type	Wireless/SCADA
	VVIICICSS/SUADA
Auxiliary Power for Controls?	Yes
Control System Adequate?	res
Vents Screened	
Overflow Screened	
Access Hatches Locked	
Expansion Collar Lubricated	
Mixing System	None
Overflow Splash Pad	<u> </u>
Adequate Security?	Yes - at WTP
Operator Visit Frequency	Daily - at WTP
Comments:	

otal Usable Storage (gal)	16,000,000	16.0	Magi	
	1 1	10.0	Mgal	
otal Usable Storage/Max Day	61%			
otal Usable Storage/Avg. Day	126%			
Comments:				

### <u>Pumping</u>

Pumping S	tations - C						
Location:	Pump Station 4 (Water Treatment Plant)						
Function:	Pum	ping water fro			the 3 MG reserv	oir	
		to the Distribution System					
	-						
Pump Number	1	2	7	8	99		
Year Installed							
Туре	Horiz. Cent.	Horiz. Cent.	Horiz. Cent.	Horiz. Cent.	Horiz. Cent.		
Current Capacity (MGD)	0	0	20	20	6		
Current Capacity (GPM)	0	0		,	-	"	
Basis	Inoperable	Inoperable					
Current TDH (FT)							
HP	800	1000	800	800		"	
Original Name Plate GPM							
Corresponding MGD							
Original Name Plate TDH (FT)							
Pump NPSH (FT)				<del></del>			
Centerline of Pump Intake Elev							
Floor Elevation		· · · · · · · · · · · · · · · · · · ·					
Electrical Controls Elevation							
Pumps/Motors Subject to Flood	?						
Pump Efficiency	·						
Motor Efficiency		<del></del>					
Min. Reservoir WL					-		
Cavitation Problems (Y/N)	•						
VFDs (Y/N)							
Maintenance History	Refe	r to next page	for maintena	nce history of	f pumps and mo	tors	
Comments on Booster Pumpir A number of improvements wo to routinely use the Dort Reser on the Water Treatment Plant.	uld be require	ed if the wate provements a	r plant is retur re included in	rned to opera the CDM Sm	tion or if the City nith Engineering	elects Report	
AUXILIARY POWER	<u> </u>						
Power Type	Dua	l primary feed	s with auto-fra	ansfer	to the transfer of the transfe		
Fuel Type		Starting Fre			•		
Capacity (gpm)		SECURE IN CONTRACT AND CONTRACTOR AN	ng Frequency				
Supusity (gpin)		20.020.000.000.000					
Total Pump Capacity (gpm)			mgd				
Firm Pump Capacity (gpm)			mgd				
Auxiliary Power Capacity (gpm			mgd				
Max Day Demand @ this locati	on		maa				
Max Day Demand @ this location	on		mgd apm (Hvdr	opneumatic S	Stations)		
Peak Hour @ this location			gpm (Hydr	opneumatic s	Stations)		
				opneumatic s	Stations)		
Peak Hour @ this location Avg Day Demand @ this location			gpm (Hydr mgd	opneumatic s	Stations)		
Peak Hour @ this location Avg Day Demand @ this location Firm Pump Capacity/Max Day	on		gpm (Hydr mgd %				
Peak Hour @ this location Avg Day Demand @ this location Firm Pump Capacity/Max Day Peak Hour/Firm Pumping Capa	on		gpm (Hydr mgd % % (Hydr	ropneumatic s			
Peak Hour @ this location Avg Day Demand @ this location Firm Pump Capacity/Max Day Peak Hour/Firm Pumping Capa Aux. Power Capacity/Avg Day	on		gpm (Hydr mgd %				
Peak Hour @ this location Avg Day Demand @ this location Firm Pump Capacity/Max Day Peak Hour/Firm Pumping Capa	on acity	dependent. If	gpm (Hydr mgd % % (Hydr %	ropneumatic (	Stations)	on-site	

### **Pumping**

Pu	mping Stations - C			Ce
Location:		Pump Station 4 (Wa	ter Treatment Plant)	
Function:	Pumping	water from the Dort Re	eservoir and the 3 MG	reservoir
		to the Distrib	ution System	
Pump Station 4	Pump Station 4	Pump Station 4	Pump Station 4	Pump Station 4
Pump 1	Pump 2	Pump 7	Pump 8	Pump 9
				•
			,	

### <u>Pumping</u>

Pumping Sta	tions - C	onstructio	n, Controls	& Maintenance
Location:			Cedar Stree	t Reservoir
Function:	Pump f	rom the Ceda	r Street Rese	rvoir to supply the south and west
- -			areas of	the City
Pump Number	1	2	3	
Year Installed	1948	1948	1948	
-			Horiz, Cent.	
` > 1 ` `	Horiz. Cent.	Horiz. Cent.	Honz. Cent.	
Current Capacity (MGD)			9	
Current Capacity (GPM)	12	9	<del> </del>	
Basis	400	400	460	
Current TDH (FT)	160'	<u>160'</u> 350	<u>160'</u> 350	
HP	500	350	350	
Original Name Plate GPM Corresponding MGD				
Original Name Plate TDH (FT)				
Pump NPSH (FT)				
Centerline of Pump Intake Elev.				
Floor Elevation				
Electrical Controls Elevation				
Pumps/Motors Subject to Flood?	No	No	No	
Pump Efficiency	.,,,			
Motor Efficiency				
Min. Reservoir WL				
Cavitation Problems (Y/N)				
VFDs (Y/N)	No	No	No	
Maintenance History		to next page		nce history of pumps and motors
replacement were recently complete	m the 1940's ed. A permit k was not co d emptving tl	was issued in 2 mpleted. The p ne Cedar Stree	2012 to upgrade oumps are cont t and West Side	CADA improvements and switchgear e the pumping station to accept a trolled remotely from the Operations e Reservoirs is controlled by Operations
AUXILIARY POWER	1. 1			
Power Type	None			
Fuel Type		Starting Fre	auencv	
Capacity (gpm)		***CONTRACTOR CONTRACTOR AND	g Frequency	
Total Pump Capacity (gpm)			mgd	
Firm Pump Capacity (gpm)			mgd	
Auxiliary Power Capacity (gpm)			mgd	
Max Day Demand @ this location	1		mgd	" " "
Peak Hour @ this location				opneumatic Stations)
Avg Day Demand @ this location			mgd	
Firm Pump Capacity/Max Day Peak Hour/Firm Pumping Capac Aux. Power Capacity/Avg Day Comments: In case of interruption of the GLV	VA supply, t		% eet Reservoir	
currently the primary source of w strongly recommended.	ater. Auxilia	ary power or, a	as a minimum	n, portable generator compatibility is

### **Pumping**

### Pumping Stations - Construction, Controls & Maintenance Cedar Street Reservoir Location: Pump from the Cedar Street Reservoir to supply the south and west Function: areas of the City Pumps and motors are on a routine Preventive Maintenance (PM) schedule consisting of visual inspection, checking oil levels, and greasing bearings and fittings. On an as-needed basis, oil is changed, packing is adjusted, bearings are replaced, etc. Recent, non-routine work is shown below: Cedar Street Station Cedar Street Station Cedar Street Station Pump 2 Pump 3 Pump 1 10/30/13 - installed 2/1/10 - rebuilt motor new pump bearings and packing, 1/26/16 - uncoupled rebalanced impeller pump and motor for motor testing 12/5/16 - serviced discharge valve 11/16/16 - tested control cylinder switchgear and recoupled pump and motor 12/5/16 - serviced discharge valve control cylinder, placed pump back in service

	Disinfectio	n (sodium hypochl	orite addition)		
Point of Treatment	***	Cedar St. Booster Sta.			
Injection Point:	_	Reservoir inlet line	_		
SDWIS Facility ID (Site Code)			_		
Purpose:		See comments			
Year Initiated		2016	_		
Product:		Havasan LB-12			
Manufacturer:		Haviland			
Chemical Strength:		14-15% (12.5% nomina	<u>l)</u>		
Dilution:		N/A		0.4	
ANSI/NSF Standard 60 Approval? (Y	/N)	Yes	_NSF max dose: _	84	mg/L
Normal Feed Rate/Dosage		See comments	_mg/L		
Avg Residual (Plant Tap) (mg/L)	free:	1.5	(goal)		
Avg Distribution Residual (mg/L)	free:	0	Distalle di en e	Modele	
Frequency of Residual testing	Plant Tap:	Continuous	Distribution: _	Weekly	_
Analytical Method Used		Hach CL-17 (DPD)	<u> </u>		
Any Overfeed Instances? (Y/N)		No	Date(s):		
Any Low Feed Instances? (Y/N)		No	Date(s):		<b></b>
			· · ·		<del></del>
Pump Type:		Diaphragm	Model:	LMI C721-71FS	
Number of Pumps:		1		LIVII O7Z1711 O	
Pump Capacity		4 gph	gpd min:		
Fullip Capacity	psi:	100			<del></del>
Chemical Storage Tank Type	poi.	55 gallon drums	– Volume:		
Weight/Level Reading Method		None (relies on expecte		spection)	
-					<del> </del>
SAFETY			Culindar Danair Kit	N/A	
Separate Room_	Yes	- Evtra Chl	Cylinder Repair Kit _ orinator or repair kit	N/A N/A	
Exhaust fan _		- Extra Crii	Ammonia Bottle	N/A	<del></del>
Fresh Air Vent		. Colf	Contained Air Packs	N/A	
Door Opens Out With Panic Bar_	λ1/Λ	- Jen (	_Training Programs	19/73	<del>_</del>
More than 1500 # Cl <sub>2</sub> onsite	N/A	-			_
Electrical Protected from Gas?_	N/A	-	Snower/Eye wasn_		
Comments:					
The free chlorine residual of water e	ntering and le ions Center.(	aving the Cedar Street F Chlorine is added to the I goals. As of July 11, 20	water when filling the	CSR as appropriate	to help mee
Electrical Protected from Gas?  Comments: The free chlorine residual of water e	N/A ntering and le	Chlorine is added to the	Shower/Eye Wash Reservoir (CSR) is mowater when filling the	CSR as approp	riate

### <u>Pumping</u>

Pumping Sta	ations - C	onstructio	n, Control	s & Mainten	ance
Location:				e Reservoir	
Function:	Pump f				as on the west side
		of the	City during po	eak demand pe	riods
Pump Number	1	2	3	4	
Year Installed	1970	1970	1970	1970	
Type	VT	VT	VT		
Current Capacity (MGD)	4	4	8	8 -	
Current Capacity (MGD)  Current Capacity (GPM)	<del></del>	<del></del>			
Basis					
Current TDH (FT)					
HP	100	100	200	200	
Original Name Plate GPM	100		200		
Corresponding MGD					
Original Name Plate TDH (FT) Pump NPSH (FT)	142'	142'	142'	142'	
Centerline of Pump Intake Elev.					
Floor Elevation					
Electrical Controls Elevation					
Pumps/Motors Subject to Flood?					
Pump Efficiency					
Motor Efficiency					
Min. Reservoir WL					
Cavitation Problems (Y/N)					
VFDs (Y/N)					
Maintenance History	Refe	r to next page	for maintena	ance history of p	umps and motors
water main breaks since the We suggested that Soft Starts or VF pressure spikes within the distrib	Ds be insta	led on the We	est Side boos	ter pumps to re	
AUXILIARY POWER	<u> </u>				
Power Type	None			· · · · · · · · · · · · · · · · · · ·	
Fuel Type		Starting Fre	equency		
Capacity (gpm)			ng Frequency		
Total Pump Capacity (gpm)			mgd		
Firm Pump Capacity (gpm)			mgd	•	
Auxiliary Power Capacity (gpm)			mgd		
Max Day Demand @ this location	า		mgd		
Peak Hour @ this location				ropneumatic Sta	itions)
Avg Day Demand @ this location	1		mgd		
Firm Pump Capacity/Max Day			%		
Peak Hour/Firm Pumping Capac	ity			ropneumatic Sta	ations)
Aux. Power Capacity/Avg Day	•		%	,	,
Comments:			-		

### **Pumping**

	s - Construction, Co						
ocation:			Reservoir				
unction:	Pump from the West Side reservoir to supply area of the west side						
	of the City during peak demand periods						
	visual inspection, check basis, oil is changed, pa work is shown below:	king oil levels, and grea acking is adjusted, bea	re Maintenance (PM) sched asing bearings and fittings. arings are replaced, etc. Re	On an as-neede			
West Side Station	West Side Station	West Side Station	West Side Station				
Pump 1	Pump 2	Pump 3	Pump 4				
6/7/05 - replaced	9/1/11 - replaced	4/28/15 - rebuilt	5/26/16 - replaced 4-				
motor bearings	upper and lower	discharge valve	way valve				
	motor bearings	control cylinder	1				
	4/9/12 - rebuilt motor,						
	installed new upper						
	shaft and coupling						
			•				

Disin	fection (sodium hypochl			
Point of Treatment	West Side Booster Sta.	_		
Injection Point:		_		
SDWIS Facility ID (Site Code)		_		
Purpose:	See comments	<b>-</b> -		
Year Initiated	2016	_		
Product:	NaOCI	_		
Manufacturer:	~14-15%	<del></del>		
Chemical Strength:		_		
Dilution:	NA Von	- NOT many diago.	0.4	na a II
ANSI/NSF Standard 60 Approval? (Y/N)	Yes	NSF max dose:	84	mg/L
Normal Feed Rate/Dosage	total:	_mg/L free:		
Avg Plant Tap Residual (mg/L) Avg Distribution Residual (mg/L)	total:	_ free:		
, -	nt Tap:	 Distribution:		
Analytical Method Used	пстар			
Analytica: Method Osed		_		
Instrument:				
Any Overfeed Instances? (Y/N)	No	– Date(s):		
Any Low Feed Instances? (Y/N)	No			
This countries is a second of the second of				<del></del>
Pump Type:		Model:		
Number of Pumps:				
Pump Capacity gp	d max:	gpd min:		
Obassical Otassas Tault Toma	psi:		000	
Chemical Storage Tank Type		Volume:	220 gallons	<del></del>
Weight/Level Reading Method		_		
SAFETY				**
Separate Room N		Cylinder Repair Kit	NA	
Exhaust fan N		orinator or repair kit	NA	<del></del>
Fresh Air Vent N		Ammonia Bottle	NA NA	
Door Opens Out With Panic Bar Roll-u		Contained Air Packs	NA	
More than 1500 # Cl <sub>2</sub> onsite N		Training Programs	NA NA	
Electrical Protected from Gas? N	<u>A</u>	Shower/Eye Wash	Eye wash	
Comments:			4	
I .				

### <u>Pumping</u>

Booster Pumping	y Stations	s - Construction, Controls & Maintenance			
Location:		Torrey Road Booster Station			
Function:	Boo	ost pressure to the southwest portion of the City, including			
]	the Hospital area				
Pump Number	1				
Year Installed	1954	1954			
Туре					
Current Capacity (MGD)					
Current Capacity (GPM)					
Basis					
Current TDH (FT)					
HP	40	125			
Original Name Plate GPM					
Corresponding MGD	2.8	4			
Original Name Plate TDH (FT)	65'	100'			
Pump NPSH (FT)					
Centerline of Pump Intake Elev.					
Floor Elevation					
Electrical Controls Elevation					
Pumps/Motors Subject to Flood?					
Pump Efficiency					
Motor Efficiency					
Min. Reservoir WL					
Cavitation Problems (Y/N)					
VFDs (Y/N)	No	No			
Maintenance History	Refer	er to next page for maintenance history of pumps and motors			
	12 for signfi New pum	ficant upgrades to the Torrey Road Booster Station. Electrical ups were purchased but were not installed as planned. The City tallation in the near future.			
AUXILIARY POWER	111				
Power Type	None	Power Rating (kWh)			
Fuel Type		Starting Frequency			
Capacity (gpm)		Load Testing Frequency			
Total Pump Capacity (gpm)		mgd			
Firm Pump Capacity (gpm)		mgd			
Auxiliary Power Capacity (gpm)		mgd			
Max Day Demand @ this location	1	mgd			
Peak Hour @ this location		gpm (Hydropneumatic Stations)			
Avg Day Demand @ this location		mgd			
Firm Pump Capacity/Max Day		%			
Peak Hour/Firm Pumping Capaci	ty	% (Hydropneumatic Stations)			
Aux. Power Capacity/Avg Day		<del></del> %			
Comments:					

### <u>Pumping</u>

	Booster Pumping Stations - Construction, Controls & Maintenance
Location:	Torrey Road Booster Pumping Station
Function:	Boost pressure to the southwest portion of the City, including
	the Hospital area
	D
	Pumps and motors are on a routine Preventive Maintenance (PM) schedule consisting of
	visual inspection, checking oil levels, and greasing bearings and fittings. On an as-needed
	basis, oil is changed, packing is adjusted, bearings are replaced, etc. Recent, non-routine work is shown below:
	WORK IS SHOWN DEIOW.
	Torrey Road Station   Torrey Road Station
	2000 gpm pump
	2000 gpm pamp
	·

		Intoroonnootic	ana with Othe	v Cunnlina		
water purchased	from other su	Interconnectio	ons with Othe	er Supplies		
yes, list WSSN n						
o, of Emergency	Connections:					
	Location	Main Siz	Zo Congoity	Motorod2	Status	WSSN of
	Location	IVIAII 1 312	ze Capacity	Metered?	(Regular/Emergency)	Connection
	, ,,					
re vaives at the in re the interconned		exercised annually?		***		•
	Aca mamo rot	icly hadrica:		-		
Comments: Wate	r is sold to the	ity of Flint by the Great	t Lakes Water Au	uthority (GLW	A). Flint is making a deci	sion whether
o continue purcha Kareanondi Water	asing water fro	GLWA or to upgrade to Currently, water is to	he water treatme	ent plant and t	réat raw water purchased ater plant site, and is ma	I from the
hrough Control S	tation 2 (CS-2	At CS-2, the City adds	NaOH. orthopho	osphate, and s	ater plant site, and is ma- sodium hypochlorite.	ster-metered
		, n , and - m, and -				
	annua anni anni anni anni anni anni anni	ann a a An Anna ann ann an daoire a ceann 2000 a Sciantain a cean	arrando (1885) de Santo de Selekarrando aktilonomico	. An	are morning to the control of the co	
		Distr	ribution Pipir	ıg		
Mains by M	aterial	Ma	ins by Size		Mains by Date of I	nstallation
Cast Iron	96.64%	2"	0.11%	]	1900 to 1910	3.50%
Ductile Iron	2.64%	3"	0.26%		1911 to 1920	25.90%
Steel	0.46%	4"	4.47%		1921 to 1930	34.00%
Concrete	0.22%	6"	51.59%	1	1931 to 1940	6.30%
Other	0.03%	8"	23.74%		1941 to 1950	1.20%
Galvanized	0.01%	10"	0.59%	1	1951 to 1960	25.00%
		12"	8.11%	7	1961 to 1970	2.10%
		14"	0.81%		1971 to 1980	0.30%
		16"	3.52%	1	1981 to 1990	1.70%
		18"	1.90%		1991 to 2000	0.20%
		20"	0.00%	1	2001 to Present	10.80%
		24"	3.88%	-		10.0070
		30"	0.58%	-		
		36"	0.35%	4		
		42"	0.06%			
		48"	0.00%	┨		
		72"	0.01%	-		
	<u> </u>	12		_		1.
stimated percent	of piping with	al tar lining	<u></u> %			
comments:						

Operational Concerns & M	aintenance
Are there areas where water main breaks are frequent?  If yes, identify locations:  See comments	Yes
Comments	
Comments: From 2010 - 2013, the City averaged about 155 breaks per year. In 2014 - 2015, which includes the period when the water plant was in full-time operation, the City averaged about 300 breaks per year. There has been a significant reduction in the number of breaks in 2017, which may be related to taking the West Side Reservoir and pumping station off line for inspection (it is believed that surges associated with operation of pumps and valves at West Side are a significant factor in water main breaks).	Year Number of Breaks 2012 159 2013 153 2014 316 2015 277 2016 138  The City is working toward the Partnership for Safe Water goal of not more than 15 breaks per year per 100 miles of main, which equates to 85-90 breaks per year.
Leak Detection and Condition Assessment:	
The City contracted with Echologics LLC in 2015 and 2016 to conduct a the distribution system and a condition assessment on 24 miles of critical A water audit was also completed, GIS data points were collected, and The leak assessment work was divided into standard "listening" at most mains. The "listening" portion of the leak assessment identified 82 lead "corrleation" portion of the assessment found no confirmed leaks, but sites)" that require further investigation.  The condition assessment found that, of the critical pipes tested, 31% moderate condition, 8% were in poor condition, and 46% did not return	GIS training was provided.  St locations and "correlation" on 15 miles of critical lks with an estimated total loss of 327 gpm. The identified four "Points of Interest (potential leak appeared to be in good condition, 15% were in
Are there areas where aesthetic water quality complaints are frequent?  If yes, identify locations:	
Comments:  Operators are currently doing a good job of meeting treatment goals, and distribution maintenance practices taking place in an attempt to meet distribution system water quality is improving. Many members of the pub however.	ribution system water quality goals; therefore,
Do you receive complaints alleging illness due to the water?  If yes, identify locations:  Comments:	Yes
There have been complaints of lead-related and Legionella-related illness	ses during and since the water crisis began.

Operational Concerr	ıs & Maintenance
Are there areas where customers complain of low pressure?	No
If yes, identify locations:	
Comments:	
What is the procedure to respond to and track these complaints? Comments: There are a number of personal and online resources available to	track and address complaints.
Distribution Sys	tem Capacity
Are there areas where peak flows (including fire flow) cannot be n If yes, identify locations:	naintained? No
Comments:	
Last ISO report date?	Rating
Proposed distribution system improvements (Location and Estima Several neighborhoods were identified for water main replacment prioritized based on several factors including occupancy, service Fundable Range, but the City must demonstrate a long-term, section begin in 2017 or 2018.	in a 2016 DWRF Project Plan. Proposed work areas were line material, and break history. The project is in the DWRF
Distribution Syste	m Optimization
An Assessment of Current Practices and Gap Analysis Technic	cal Memorandum is being completed by Arcadis Group.

An Assessment of Current Practices and Gap Analysis Technical Memorandum is being completed by Arcadis Group. The document compares existing conditions and practices to industry best practices, identifies "gaps" where best practices are not being achieved, and recommends improvements. The evaluation includes water quality integrity, physical integrity, and hydraulic integrity. The completed analysis is expected to provide valuable operational advice.

DISTRIBUTION		
Hydi	rants	
Number of Hydrants	3605	(from 2013 Rowe Reliability Study)
Number Without Auxiliary Shut-Off Valves		
Number that are Self-Draining		_
	See comment	<u>ts</u>
Frequency of Hydrant inspection:		_
Inspection Staff:		<u> </u>
Are there areas where additional hydrants are needed?		_
If yes, list locations:		
<u>-</u>		
Hydrant location system		Accurate?
Are hydrants color coded for capacity?	No	
Has this information been provided to the fire department?	110	<b>—</b>
Frequency and seasons of hydrant flushing	Annual (fall)	<del>_</del>
	Maintain wate	
	No No	quality
Is the public notified prior to flushing?		program is being developed
,	No, but a obi	program is being developed
Is the volume of water used during flushing estimated?	No	<del>_</del>
Do hydrants receive maintenance painting?	No	<del>_</del>
Is a record maintained of hydrant activities?		tune of hydrant size of harral size of hottom
Hydrant records should include: Hydrant number, location of		
valve, size of lead, direction of turn, operable or inoperable, a	uxillary valve	type and size, weep noies plugged of
unplugged, condition of hydrant (caps, chains, valve operation	n, operating n	iut, leakage & etc.), color coded capacity, llow
data (gpm & psi) flushing dates, inspection dates.		
Comments:		line associa. December desemble supercodos pro po
The City reported approximately 35% of hydrants being inope	erable of need	ning repair. Recent hydrant upgrades are as
follows: 2013 - 30 replaced, 11 repaired; 2014 - 12 replaced		10 15 - 55 replaced, 19 repaired. Recent endits
are very good, but a high percentage still require repair or re	Jiacement.	
Va	lves	
Number of Valves	8228	(From 2016 Rowe Reliability Study)
Number of inoperable valves	100	(See comments)
Are there areas where additional valves are needed?		· · · · · · · · · · · · · · · · · · ·
If yes, list locations:		
VIII I V	Map	Accurate?
Valve location system		Accurate:
Valve Turning Frequencies	Primary:	
	Others:	
Records Maintained?		
Valve records should include: valve number, location of valve	e(with witness	s points), type of valve, size of valve, normal
operating status (open or closed), condition of valve (operab	le or inoperab	le), direction of turn, number of turns, and dates
of operation.		
Comments:		
The City has been aggressively identifying and repairing or re		
reported that 57 valves were replaced in 2015, 85 were replaced		
Valve boxes have been located and cleaned out. According	to the Distribu	ution System manager, a 2015 valve study
identified 900 inaccessible/inoperable/problem valves, and the	ne City is repo	orting that it has addressed 800 of those, leaving
about 100 in need of maintenance/repair/replacement. The	City has appli	ed for DWRF funding to replace a significant
amount of water main, which would result in additional valve	replacement.	Recent efforts are very good; however,
continued progress and a long-term plan are still needed.		

	Cus	tomer Service in	rormation			
Number of service connect	ions	56,038	(number of parcels in City)			
Occupied parcels		43,406	(estimated number curren	tly occupied)		
Number of metered service	connections					
Percentage of service line materials (all parcels):		Ownership of Service (CWS/Customer)				
Copper	48.0%	From Corp Stop to	Curb Stop	City		
Galvanized or lead 52.0%		From Curb Stop to	City			
Unknown		From Property Line to Meter		Customer		
Other —		Meter		City		
		L				

Comments: The City's FAST Start Program conservatively estimates there are 29,100 lead/galvanized service lines needing replacement. Sites with suspected lead/galvanized lines are investigated, and non-copper portions of the lines are replaced. From July 1, 2016 to June 30, 2017, the City replaced 2150 service lines. This represents slightly over 7 percent of all targeted service lines, which meets the EPA's requirement of at least 7 percent replacement each year after a lead action level exceedance.

#### CUSTOMER METERS

Meter Reading Staff/Contract:

Types of meters Used Number of Meters with Remote Reading Devices Residential Meter Sizes Industrial/Commercial Meter Sizes Meter Testing/Maintenance Program Average Age of Meter in System Criteria for Changeout Number or Percent Changeout per Year Master Meter Locations Calibration of Master Meters

Detailed information regarding the city's water meters and replacment program was not available at the time of the survey, and therefore the meter program could not be evaluated.

Percent of Usage by Customer Type				
% Residential	80%			
% Other	20%			

Large Users - % of Use					
McLaren Regional Medical Center	1%				
Genesee County Jail	<1%				
Hurley Medical Center (6th and Begole)	<1%				
Hurley Medical Center (One Hurley Place)	<1%				

#### Comments:

General Motors was a former customer that is now purchasing water from Genesee County, but may reconnect to the City's water system. The City is concentrating on the replacement of lead service lines. Approximately 1200 lead lines have been replaced in the last few years.

	Water System Activi
# of Construction Permits Issued	Permitted Amount of WM Feet
6	16,556
4	2698
4	35,273
3	10,355
1	13,854
2	0
1	31,418
2	0
4	18,100
3	10,300
	Permits Issued  6  4  3  1  2  1  2  4

A detailed breakdown of water main permits by purpose (new vs. replacement) was not available at the time of the survey. A review of records indicates that the majority of these permitted mains are for the replacement of existing mains. Most new main is associated with transmission of raw water. Some permits included here are for pumps, controls, storage, and other improvements.

Some of the above-permitted main was not constructed.

DISTRIBUTION		
Water Ra	ates	
What is your current rate schedule?	See comments	
Are current rates adequate to support O&M and CIPS?	See comments	
When was last time rates were adjusted?	2015	_
Has a water rate study been performed? When?		
Is there a meter charge or ready to serve charge?	Yes	
is a copy of the water rate schedule and ordinance available?  Comments:		-
A rate analysis was completed in 2016 by Raftelis Financial Co	nsultants, which indic	cated a "typical" monthly water bill of
\$53.84 for 5 ccf of water consumption. The bill includes commodsts, etc. The Raftelis survey indentifies the commodity charg (\$4.25/1000 gallons). The Raftelis survey further indicates that expenses due to a number of factors. The actual future gap be final Source Selection and associated costs. The current rate of the contract of the current rate of the current r	ge portion of a typical t the current rate stru etween revenue and e	bill as \$15.89/month, or \$3.18/ccf cture is not sufficient to meet future expenses is dependent on the City's
Repair Parts	Inventory	
Extra Mains (Sections for Each Size in Service)		
Repair Clamps (2 or more for each size)		_
Tees, Crosses & Elbows		_
Hydrants	- Lander Committee Committ	
Valves		
Services (Corp & Curb Stops, Clamps and Lines)		_
Other		<del>_</del>
Comments:	4 41 41# 41	
Information about repair parts and equipment was not available	e at the time of the st	irvey.
Safety Pro	grams	
Confined Space Entry Program		_
Trench Safety Program		<del></del>
Comments:		

Information about the city's safety program was not available at the time of the survey.

### **PROGRAM COMPLIANCE**

Ordinance No. Ch. 46, Art. II, Div. 4	nnection Prog	laili sig ggggggggg		effection and an information of the engineering
	Date:	Various		
Approved Program (Y/N)?	Date:			
Staff Assigned to Program, (No., Dept and/or who)				
Is Annual Cross Connection report required (Y/N)?	ica pa de la compansión por la compansión de la compansió	Yes	Data.	
Was previous year's annual report received (Y/N)?		No	Date:	
Was previous year's annual report acceptable (Y/N)?		No	•	
Inspection Status: Inactive	High Hazard		Low Hazard:	
Assembly Testing Performance	High Hazard:		LOW HAZAIU.	
Assembly Testing Performance  Recordkeeping:				
Private Well Isolation/Abandonment Procedure:				
Comments:				
Annual Cross Connection Report forms have not been rece	eived for 2015 or 2	016. The Cross	Connection Inspec	ctor has been
working primarily on plumbing permits, and inspections are			1.2	
Δnnual	Pumpage Rep			
Is Annual Pumpage Report required (Y/N)?	- ampago ixop	No		A CONTRACTOR OF THE CONTRACTOR
Was previous year's annual report received (Y/N)?			Date:	
Comments:	Administrações (Parista Companyos activo Macello de La Companyo			
Monthly (	Operation Rep	orts		
Are Monthly Operation Reports required (Y/N)?		Yes		
Were all previous year's reports received (Y/N)?		Yes	_ Timely?	Yes
Are previous year's reports acceptable (Y/N)?		Yes	<del>-</del>	
If no, describe problems:			and the second s	
Comments:				
The monthly operation report includes water purchased fro	om GLWA chemic	als added at CS-	II. water qualilty da	ita at the water
The monthly operation report melades water paronaced no	THE CLASS OF CHORIES	aio aaaoa ai oo	or Ctroot and Maa	
Inlant tan, and water quality data from the distribution syste	m. Chemical treat	ment at the Ced	ai Sileet and wes	Side Reservoirs
plant tap, and water quality data from the distribution syste is reported on daily summary reports. Chemical feed data	m. Chemical treat from the reservoirs	ment at the Ced s should be inclu	ded on the month	t Side Reservoirs
plant tap, and water quality data from the distribution syste is reported on daily summary reports. Chemical feed data reports once it is determined that daily summary reports ar	from the reservoir	s should be inclu	ded on the month	t Side Reservoirs
is reported on daily summary reports. Chemical feed data reports once it is determined that daily summary reports ar	from the reservoir	s should be inclued.	ded on the month	t Side Reservoirs
is reported on daily summary reports. Chemical feed data reports once it is determined that daily summary reports ar	from the reservoir re no longer require	s should be inclued.  Seport  Yes	ded on the monthl	t Side Reservoirs y operation
is reported on daily summary reports. Chemical feed data reports once it is determined that daily summary reports ar	from the reservoir re no longer require	s should be inclued. ed. <b>eport</b>	ded on the monthl	t Side Reservoirs
is reported on daily summary reports. Chemical feed data reports once it is determined that daily summary reports ar  Consumer  Is the annual CCR required? (Y/N)  Was the previous year's report received? (Y/N)  Was the previous year's acceptable? (Y/N)	from the reservoir re no longer require r Confidence R	s should be inclued.  Report  Yes  Yes  Yes  Yes	ded on the monthl	t Side Reservoirs y operation
is reported on daily summary reports. Chemical feed data reports once it is determined that daily summary reports are consumer is the annual CCR required? (Y/N)  Was the previous year's report received? (Y/N)  Was the previous year's acceptable? (Y/N)  Was the previous year's certification form received? (Y/N)	from the reservoir re no longer require r Confidence R	s should be inclued.  Report  Yes  Yes	ded on the monthl	t Side Reservoirs y operation
is reported on daily summary reports. Chemical feed data reports once it is determined that daily summary reports ar  Consumer  Is the annual CCR required? (Y/N)  Was the previous year's report received? (Y/N)  Was the previous year's acceptable? (Y/N)	from the reservoir re no longer require r Confidence R	s should be inclued.  Report  Yes  Yes  Yes  Yes	ded on the monthl	t Side Reservoirs y operation
is reported on daily summary reports. Chemical feed data reports once it is determined that daily summary reports are Consumer Is the annual CCR required? (Y/N) Was the previous year's report received? (Y/N) Was the previous year's acceptable? (Y/N) Was the previous year's certification form received? (Y/N)	from the reservoir re no longer require r Confidence R	s should be inclued.  Report  Yes  Yes  Yes  Yes	ded on the monthl	t Side Reservoirs y operation
is reported on daily summary reports. Chemical feed data reports once it is determined that daily summary reports are consumer.  Consumer is the annual CCR required? (Y/N) Was the previous year's report received? (Y/N) Was the previous year's acceptable? (Y/N) Was the previous year's certification form received? (Y/N) Comments:	from the reservoir re no longer require r Confidence R	s should be inclued.  Report  Yes  Yes  Yes  Yes  Due 10/1/17	ded on the monthl	t Side Reservoirs y operation
is reported on daily summary reports. Chemical feed data reports once it is determined that daily summary reports are Consumer is the annual CCR required? (Y/N) Was the previous year's report received? (Y/N) Was the previous year's acceptable? (Y/N) Was the previous year's certification form received? (Y/N) Comments:  Emergen	from the reservoir re no longer require r Confidence R	s should be inclued.  Report  Yes  Yes  Yes  Yes  Due 10/1/17	ded on the monthl	t Side Reservoirs y operation
is reported on daily summary reports. Chemical feed data reports once it is determined that daily summary reports are consumer.  Consumer Is the annual CCR required? (Y/N) Was the previous year's report received? (Y/N) Was the previous year's acceptable? (Y/N) Was the previous year's certification form received? (Y/N) Comments:  Emergen  Date of ERP  2013	from the reservoir re no longer require r Confidence R	s should be inclued.  Report  Yes  Yes  Yes  Yes  Due 10/1/17	ded on the monthl	t Side Reservoirs y operation
is reported on daily summary reports. Chemical feed data reports once it is determined that daily summary reports are consumer is the annual CCR required? (Y/N)  Was the previous year's report received? (Y/N)  Was the previous year's acceptable? (Y/N)  Was the previous year's certification form received? (Y/N)  Comments:  Emerger  Date of ERP  Filed where?	from the reservoir re no longer require r Confidence R	s should be inclued.  Report  Yes  Yes  Yes  Yes  Due 10/1/17	ded on the monthl	t Side Reservoirs y operation
is reported on daily summary reports. Chemical feed data reports once it is determined that daily summary reports are consumer is the annual CCR required? (Y/N)  Was the previous year's report received? (Y/N)  Was the previous year's acceptable? (Y/N)  Was the previous year's certification form received? (Y/N)  Comments:  Emerger  Date of ERP Filed where?  Comments:	re no longer require r Confidence R  Confidence R  Acceptable?	s should be included.  Report Yes Yes Yes Due 10/1/17	Date:	t Side Reservoirs y operation  6/13/2017
is reported on daily summary reports. Chemical feed data reports once it is determined that daily summary reports are consumer is the annual CCR required? (Y/N)  Was the previous year's report received? (Y/N)  Was the previous year's acceptable? (Y/N)  Was the previous year's certification form received? (Y/N)  Comments:  Emergen  Date of ERP  Date of ERP  2013  Filed where?  Comments:  The most recent Emergency Response Plan on record with update Emergency Response Plan due to changes in open	re no longer require re no longer require r Confidence R  Acceptable?  Acceptable?  th the DEQ is from rations. Since there	s should be included.  Report Yes Yes Yes Due 10/1/17  Plan  2013. The 2013	Date: Date: Sanitary Survey rages to city and DE	t Side Reservoirs y operation  6/13/2017  ecommended ar EQ staffing and
is reported on daily summary reports. Chemical feed data reports once it is determined that daily summary reports are consumer is the annual CCR required? (Y/N)  Was the previous year's report received? (Y/N)  Was the previous year's acceptable? (Y/N)  Was the previous year's certification form received? (Y/N)  Comments:  Emerger  Date of ERP Filed where?  Comments:	re no longer require re no longer require r Confidence R  Acceptable?  Acceptable?  th the DEQ is from rations. Since there	s should be included.  Report Yes Yes Yes Due 10/1/17  Plan  2013. The 2013	Date: Date: Sanitary Survey rages to city and DE	t Side Reservoirs y operation  6/13/2017  ecommended ar EQ staffing and

PROGRAM COMPLIAN	<u>ICE</u>		
	General Plan		
Date of Most Recent Plan:	Various, up to 2016		
Filed Where?	Part of Rel. Study/Asset Mgt.	Acceptable?	
	General Layout	Yes	
	Facility locations & capacities	See comments	
	Water Main Inventory	Yes	
	Identification of Service Areas	In Contract w/GLWA	
	Hydraulic Analysis	See comments	
	Capital Improvement Plan	In DWRF Project Plan	
Comments:			
	c model of the distribution system, but fire flow c		
EPA is in the process of dev	eloping and calibrating a new model. A draft As	set Management report was	s completed in 2016,
	ution system only, pending a selection of water s		
I -	Reliability Study. Treatment capacities are avai	lable in this Sanitary Survey	A limited Capital
Improvement Plan was also	completed by Imagine Flint in 2105.		
	Reliability Study		
Date of Most Recent Study:	2016	I COMPANIA	
Filed Where?	City, MDEQ	Acceptable?	
Contents:	5 & 20 Year Demand Projections	Yes	
	Source Production Totals (Monthly)		•
	Customer Supply Usage (Annual)		
	Res/Comm/Ind Usage (Annual)	Residential vs.other	
·	Water Shortage Response Plan	See comments	•
	Recommended Improvements		•
Comments:			•
The Reliability Study project	s a 20 percent population loss between 2015 an	d 2040, which would further	affect the City's ability to
	ough water rates. The study includes a detailed v		
	6, Article 1 of the City Ordinances. The water s		
the long-term and backup su			
	Permits		
1	nits prior to construction (Y/N):	Yes	-
Reviews plans prior to subm	· · · · · · · · · · · · · · · · · · ·	Yes	-
Standard specifications on f			,
1 11 1	ntract with supplier regarding plan submittal (Y/N	): See comments	Date:
Follows master plan for any			<del>-</del>
Develops as-built plans (Y/N	•		_
Updates general plans (Y/N	):		_
Comments:			
	NA allows for review and approval of projects re		
24 inches or larger, pump st	tations, reservoirs, water towers, and projects in	proximity to GLWA facilities	s. It is not known
whether GLWA routinely ex-	cercises its right to do so.		

### **Capacity Development**

Comments on Capacity Development: The EPA has required (in its Administrative Order) that the City must demonstrate adequate Technical, Financial, and Managerial capacity (TMF) prior to switching to another water source (i.e., other than treated water purchased from the Great Lakes Water Authority (GLWA)). The decision whether to continue to purchase water from GLWA, begin treating raw water from the KWA, or select another source has not been finalized. Because the City's source water selection decision is not finalized, it is not known whether a formal TMF demonstration will be required. However, certain aspects of a TMF demonstration are necessary regardless of source selection.

The following components of a TMF capacity assessment warrant further discussion:

#### Technical Capacity:

1. Source - a water system must have an adequate quantity of water available to meet demands, either through its own production facilities or secured through contract and capable of delivery from another water system. At this time, the City only has a short-term agreement with GLWA for the purchase of treated water. The DEQ had instructed the City to either approve the long-term agreement with GLWA that was negotiated by Mayor Karen Weaver, or offer a reasonable alternaivte proposal to provide drinking water from another source, by June 26, 2017. The City has not done so, and therefore does not have satifactory Technical Capacity with regard to its source.

#### **Financial Capacity:**

1. Budget - a water system must have adequate revenue to operate its water system, including operational costs, personnel costs, capital improvements, and debt retirement. As stated in the Flint Water Rate Analysis by Raftelis, operational costs and staffling levels are highly dependent on the City's final selection of a water source. Raftelis projects a future gap between revenue and expenses, although the analysis was based on routine operation of the City's water plant and other conservative assumptions. The actual future gap, if any, is dependent on source selection, the terms of any water service agreements, efforts to improve water accountability (currently around 50 percent unaccounted), availability of grants and alternative funding sources, relative levels of automation and staffing, water rates, etc. Once the source determination is made, water rates should be reviewed and, if necessary, adjusted to ensure adequate financial capcity with regard to budget. It should be noted that, in addition to other duties, water treatment/operations staff are responsible for operation of five dams on the Flint River. The time and resources needed to manage the dams must be accounted for when developing staffing and budget plans for water treatment/pumping.

Also, it has been mentioned that a low pay scale is reportedly contributing to the City's difficulty in recruting, hiring, and retaining staff.

#### Managerial Capacity:

- 1. Maintaining Certified Operators a water system must place its treatment and distribution systems under the supervision of properly-certified operators. Operations staff may either be City employees or contractors. The operator currently supervising the distribution system is a City of Flint permanent employee. The operator in charge of the treatment system is a contractor with Fleis & Vandenbrink Operations. The City may attempt to recruit an internal or external candidate to supervise the treatment system.
- 2. Sampling Plans a water system must prepare sampling plans, and follow the plans when conducting compliance monitoring under the Safe Drinking Water Act. The City's Total Coliform Rule sampling plan must be revised to include an additional five (5) routine sites, with associated repeat sites. The Disinfection Byproducts sampling plan is satisfactory, but may need future revisions based on the Arcadis Group distribution system optimization study. The lead and copper sampling plan is revised as necessary as additional information is obtained regarding service line materials.
- 3. Cross Connection Control a water system must implement a program for the elimination of cross connections within its distribution system. It appears that due to personnel shortages, adequate time is not being devoted to cross connection control, and inspections and program administration are lacking.
- 4. Other Plans and Studies a water system must complete other plans and studies as required by the Safe Drinking Water Act. The City completed a draft Reliablity Study and a draft Asset Management Plan in 2016. These studies should be finalized. Their contents are used to justify the City's Drinking Water Revolving Fund (DWRF) Project Plan and funding application. Also, an Asset Management Plan, and a 5-year and 20-year Capital Improvement Plan are required components of a Water System General Plan.

### **MONITORING**

Bacteriological			
Date of Approved Site Sampling Plan :	2/21/2017		
Number of samples required each month:	100	Basis:	Population
Certified Lab Used:	City of Flint water p	lant	
MCL, Monitoring or Reporting Violation(s) in past 3 years? (Y/N)	Yes	Date:	2014
Number & Type of Violations	3 MCL violations in	2014	
Public Notice Issued according to regulations? (Y/N)	Yes	_ Date: _	Various
Comments:			
The RTCR sampling plan was approved on 3/2/17 based on 20 routine sampling sassoicated repeat sites, have been identified. The suitability of the sites will be coexpanded to 25 routine sites in the near future.	sites. Five more pointing and the sa	etential rou ampling pla	tine sites, with an will be
Chemical			
Date of Monitoring Schedule:	5/12/2017		
MCL, Monitoring or Reporting Violations(s)? (Y/N)	No	_	
Public Notice Issued according to regulations? (Y/N)	NA	- -	
	NI.	_	
Detects for inorganics > 50% of MCL? (Y/N)	No No	-	
Detects for VOCs (Y/N)	No No	_	
Detects for SOCs (Y/N)	No	_	
DBP Sampling Done According to Approved Plan? (Y/N/Waived)	Yes	-	
Date of Approved Disinfection Byproduct Monitoring Plan:	7/12/2016	-	
Comments: The DBP Monitoring Plan may need to be updated based on the distribution syste  Lead and Copper Monitorin		dy (in prog	ress).
No. of Samples Required:	60		
Frequency (Semi Annual/Annual/Triennial)	See comments	-	
Exceedance of lead or copper action level (Y/N)	See comments	_	
If yes, was public education issued? (Y/N)	See comments	Date:	
Next Monitoring Period:	1/1/17 - 6/30/17	(final repo	rting in progress)
Corrosion Control Program Status, if applicable	See comments	_	
Lead service line replacement status, if applicable	Active - see Custo	mer Sevic	e Information
,	page of this sani	tary surve	y for details
Comments: The city has collected two consecutive, 6-month rounds of samples (in 2016 and levels. The last monitoring period that exceeded the lead action level was Janua completed in response to exceeding the action level. Samples are collected by the valid tier 1 site results are used to calculate the 90th percentile lead and copper city is practicing corrosion control treatment for the incoming water from the GLW conducted by Cornwell Engineering Group to evaluate current conditions and evaluates of finished water from GLWA, purchase of water from Genesee County Water Plant, and combinations/mixing of those sources).	ry-June 2016. All rene City, sentinel teat concentrations and I/A. A corrosion con luate future possib	equired resums, and the determine ntrol study le situatior	sponses were ne public, and all compliance. The is currently being s (continued
Radiological Monitoring			
Date of Monitoring Schedule	Not Required		
Alpha, beta, radium, uranium		_ Date:_	
Radon		_ Date: _	
Tritium		_ Date: _	
Detects for Rads > 50% of MCL? (Y/N)		_ Date:	
If yes, list		_ Date. ⊢	
Comments: Radiological monitoring is the responsibility of the wholesale supplier (Great Lake	es (Mater Authority)		

#### Analytical Capabilities

Parameter	Analytical	Calibration	Instruments	Method of Data	Frequency of	Sampling Location		Analysis Run by
	Method(s)	Frequency	Used	Recording	Measurements		Source	
Alkalinity	SM 2320B	Per batch of	Standard burettes	Manual	Weekly	CS-II	GLWA Supply Main	Lab staff
,,	Titration	titrant			Daily	Lab Tap	In-Plant Piping	
	1				Weekly	Distribution	Per RTCR Sampling Plan	
Total	SM 2340C	Per batch of	Standard burettes	Manual	Weekly	CS-II	GLWA Supply Main	Lab staff
Hardness	OM ZOTOG	titrant			Daily	Lab Tap	In-Plant Piping	
i iai ai iooo	1	Tar on re			Weekly	Distribution	Per RTCR Sampling Plan	
Calcium	SM 3500 Ca D	Per batch of	Standard burettes	Manual	Weekly	CS-II	GLWA Supply Main	Lab staff
Hardness	0.0000 000	titrant	C.G.,GGIG DGIGIGG		Daily	Lab Tap	In-Plant Piping	
i lai di icos		The date			Weekly	Distribution	Per RTCR Sampling Plan	
рH	SM 4500 H+B	Daily	Hach HQ440d	Manual	Daily	CS-II	GLWA Supply Main	Lab staff
pri	Electrometric	Dairy	1100111104-100	, mariadi	Daily	Lab Tap	In-Plant Piping	
	Liecatinettic		Hach SL1000		Weekly	Distribution	Per RTCR Sampling Plan	
			Hach HQ440d		Every 2 Hours	CS-II	GLWA Supply Main	Operations staff
1			Iacii i iQ~~od		Every 2 Hours	Mini Lab Tap	In-Plant Piping	
O = = d = = di = ide =	CM 0540D	Monthly	Mottler	Manual	Daily	CS-II	GLWA Supply Main	Lab staff
Conductivity	SM 2510B	ivionaniy	Mettler Toledo	ivialiuai	Daily	Lab Tap	In-Plant Piping	Laco Civili
					Weekly	Distribution	Per RTCR Sampling Plan	
	014.05500		Hach SL1000	N		CS-II	GLWA Supply Main	Lab staff
Temperature	SM 2550B	Annually	Grade 1	Manual	Daily	Lab Tap	In-Plant Piping	Lab stail
			Thermometer		Daily Weekly	Distribution	Per RTCR Sampling Plan	
			1	h		CS-II		Lab staff
Fluoride	SM 4500 F-C	Daily	Hach HQ440d	Manual	Daily		GLWA Supply Main	Lab stan
	ISE				Daily	Lab Tap	In-Plant Piping	1 -11-55
Chlorine Residual		Daily	Hach SL1000	Manual	Twice per day	CS-II	GLWA Supply Main	Lab staff
			1		Twice per day	Lab Tap	In-Plant Piping	
					Weekly	Distribution	Per RTCR Sampling Plan	
		Periodic Checks	Hach Pocket	Manual	Every 4 Hours	CS-II	GLWA Supply Main	Operations staff
		by Lab Manager	Colorimeter II		Every 2 Hours	Mini Lab Tap	In-Plant Piping	
			Hach CL-17	Manual	Continuous	CS-II	GLWA Supply Main	Operations staff
				Manual	Continuous	WTP Basement	In-Plant Piping	
Chloride	SM 4500 CI-B	Per batch of	Standard burettes	Manual	Weekly	CS-II	GLWA Supply Main	Lab staff
	Argentometric	titrant			Daily	Lab Tap	In-Plant Piping	
					Weekly	Distribution	Per RTCR Sampling Plan	
Turbidity	SM 2130B	Monthly - primary	Hach 2100 N	Manual	Twice per day	CS-II	GLWA Supply Main	Lab staff
	Nephelometric	Daily - secondary			Twice per day	Lab Tap	In-Plant Piping	
	•				Weekly	Distribution	Per RTCR Sampling Plan	
Total Colform	SM 9223 B-04	Biannual PE		Manual	Twice per day	CS-II	GLWA Supply Main	Lab staff
	Colilert				Twice per day	Lab Tap	In-Plant Piping	
					Weekly	Distribution	Per RTCR Sampling Plan	
HPC	SM 9215 B	Annual PE		Manual	Weekly	CS-II	GLWA Supply Main	Lab staff
<del>-</del>	IDEXX Simplate				Weekly	Lab Tap	In-Plant Piping	
					Weekly	Distribution	Per RTCR Sampling Plan	
Iron			Hach DR 3900	M	Daily	CS-II	GLWA Supply Main	Lab staff
				-	Daily	Lab Tap	In-Plant Piping	
					Weekly	Distribution	Per RTCR Sampling Plan	
1				7	U U C C KIY	Distribution	. S. ICTOIC Campung Flan	
	<u> </u>			ļ		1		

#### Analytical Capabilities

Parameter	Analytical Method(s)	Calibration Frequency	Instruments Used	Method of Dat Recording	Frequency of Measurements	Sampling Location	Location for Water Source	Analysis Run by
Suifate Phosphate			Hach DR 3900 Hach DR 3900	Manual Manual	Daily Daily Daily Weekly	Lab Tap CS-II Lab Tap Distribution	In-Plant Piping GLWA Supply Main In-Plant Piping Per RTCR Sampling Plan	Lab Staff Lab Staff

### Other Notes/Observations on Laboratory Practices/Capabilities

- 1. The lab is certified for Total Coliform, E. Coli, HPC, and fluoride.
- 2. Based on inspections and conversations between lab staff and DEQ field personnel, lab practices are generally satisfactory. Minor issues brought to the attention of the Lab Manager are addressed promptly.
- 3. Lab QA/QC appears to be greatly improved under the current Lab Manager, who is working on plans for further imprrovement.
- 4. The laboratory balance was last calibrated in December 2016. Scale accuracy is checked monthly using certified weights...
- 5. The laboratory is successfully running extra performance evaluation/proficiency testing samples each quarter for all parameters being reported to the DEQ/EPA.

Disinfectio	n (sodium hypochlo	orite addition)		
Point of Treatment	Control Station 2	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
Injection Point:	42-inch supply main	<del></del>		
SDWIS Facility ID (Site Code)	· · · · · · · · · · · · · · · · · · ·	-		
Purpose:	See comments	<u></u>		
Year Initiated	2016	<del>-</del>		
Product:	Havasan LB-12	-		
Manufacturer:	Haviland	-		
Chemical Strength:	12%	<del>-</del>		
Dilution:	NA	-		
ANSI/NSF Standard 60 Approval? (Y/N)	Yes	NSF max dose:	84	mg/L
Target Feed Rate/Dosage	1.0 - 1.3	_ mg/L		
Basis for Target Feed Rate	See comments	-		
Range of Incoming (GLWA) Residual	0.6 - 1.4	mg/L		
Range of Plant Tap Free Residual	0.8 - 2.0	mg/L		
Range of Distribution System Free Residual	0.2 - 2.0	_mg/L		
Frequency of residual testing Incoming:	Continuous plus 2 confir	mation grabs/day		
Plant Tap:	Continuous plus 2 confir	mation grabs/day		
Distribution:	Several per week			
Analytical Method Used:	DPD			
Instrument:	Hach CL-17, Hach SL10	00, Hach Pocket Co	lorimeter	
Any Overfeed Instances? (Y/N)	No	Date(s):		
Any Low Feed Instances? (Y/N)	No No	_ Date(s): Date(s):		i
Any Low recomistances r (1714)	140	_ Date(8).		•
Feed Pumps:				
Type:	Diaphragm	_ Model:	Milton Roy SD46-88P	
Number of Pumps:	2	_		
Capacity:	10 gph each	_ Discharge Head:	150 psi	
_	Po. 1	n# 1 :	1111 0704 7450	
Type:		_ Model:	LMI C721-71FS	•
Number of Pumps:		- Bississassas (1)	400!	
Capacity:	4 gph	_ Discharge Head:		
	(Note: this model is no lo	onger manutactured,	, but repair parts are be	llevea
	to be readily available)			
Chaminal Storage Tank Type	Totes (from supplier)	_ Volume:	220 gallons	
Chemical Storage Tank Type Weight/Level Reading Method	Staff gage on tank wall	volume.	ZZU gallons	-
veight/Level Reading Method	Stan gage on tank wan	<del>-</del>		
Comments on Sodium Hypochlorite Feed: The C phosphoric acid, and sodium hydroxide to meet the mg/l), and pH (7.5 units) goals established by the ranges shown above are for the period of time who controls to help maintain consistent feed rates.	he plant tap free chlorine U.S. EPA's technical tea	residual (1.7 mg/l), am. The incoming,	orthophosphate residua Plant Tap, and Distribu	al (3.6 tion pH

The existing treatment system was designed and installed as a temporary measure while long-term treatment decisions are being made. Chemical scales may be installed at a later date. An SOP for chemical feed has been developed for both existing (temporary) and future (permanent) treatment at CS-II. Because the City has not selected a long-term water source, final decisions have not been made regarding the future treatment layout at CS-II.

Safety: The sodium hydroxide tote and sodium hypochlorite tote are stored together in a garage structure with air conditioning, a portable eye wash station, and face shield/gloves/PPE.

Corrosion In	hibitor (phosphoric	acid addition)		
Point of Treatment	Control Station 2			
Injection Point:	42-inch supply main			
SDWIS Facility ID (Site Code)		<b></b>		
Purpose:	See comments	-		
Year Initiated	2015 (December)	-		
Product	Phosphoric Acid	-		
Manufacturer:	Brenntag	-		
Chemical Strength	75%	-		
Dilution:	None	-		
ANSI/NSF Standard 60 Approval? (Y/N)	Yes (NSF)	NSF max dose:	13	mg/L
Target Feed Rate/Dosage	2.4 - 2.7	mg/L		-
Basis for Target Feed Rate	See comments	-		
Range of Incoming (GLWA) PO4	1.0 -2.2	mg/L		
Range of Plant Tap PO4	3.5 - 3.9	mg/L		
Range of Distribution System PO4	2.9 - 3.9	-		
Frequency of residual testing Incoming:	Daily	_		
Plant Tap:	Daily	=		
Distribution: <sup>-</sup>	Several per week	_		
Analytical Method Used:	Spectrophotometry	_		
Instrument: <sup>*</sup>	Hach DR3900	_		
Λ Ο f - ad location 2 (V/A)	No	- Data(a):		
Any Overfeed Instances? (Y/N)	No No	_ Date(s): _		-
Any Low Feed Instances? (Y/N)	No	Date(s): _		-
Feed Pumps:				
Type: _	Diaphragm	_ Model: _	LMI C921-362SI	
Number of Pumps:	2	<u>.</u>		
Capacity: _	4 gph each	_ Discharge Head: _	100	-
Oh and other and Taula Tau	DE Objection Table		000 !!	
Chemical Storage Tank Type	PE Shipping Totes	Volume: _	220 gallons	•
Weight/Level Reading Method	Scale markings on tote	_		
Comments on Phosphoric Acid Feed: The City be control by re-establishing an orthophosphate scale. The EPA has established a distribution system ort goal more consistently since May 2017. The incorthe 12-month period covering June 1, 2016 to May The existing treatment system was designed and being made. Chemical scales may be installed at (temporary) and future (permanent) treatment at C decisions have not been made regarding the futur Safety: The phosphoric acid tote is stored in a different in a garage structure with a portable eye was	e on lead surfaces within thophosphate residual goming, Plant Tap, and Disy 31, 2017.  Installed as a temporary a later date. An SOP for CS-II. Because the City has treatment layout at CS-ferent bay from the sodius	the distribution system of 3.5 mg/l, and the tribution PO4 residures measure while longer chemical feed has not selected a lo-II.	em/individual plumbing ne City appears to be i al ranges shown above term treatment decision been developed for bo ng-term water source,	g systems. meeting the e are for ons are oth existing final

pH Adjustn	nent (sodium hydro	xide addition)		
Point of Treatment	Control Station 2			<u></u>
Injection Point:	42-inch supply main	_		
SDWIS Facility ID (Site Code)				
Purpose:	pH adjustment			
Year Initiated	2017 (February)	· •		
Product	Sodium hydroxide	_		
Manufacturer:	Brenntag	- -		
Chemical Strength	25%	· -		
Dilution:	None	_		
ANSI/NSF Standard 60 Approval? (Y/N)	Yes (NSF)	NSF max dose:	200	mg/L
Target Feed Rate/Dosage	2.6	mg/L		
Basis for Target Feed Rate	To meet the point-of-entr	y pH minimum goal	of 7.5 units, and the	_
	distribution system goal of	of 7.5 +/- 0.3 units		
Range of Incoming (GLWA) pH	7.18 - 7.47	_	•	
Range of Plant Tap pH	7.17 <i>-</i> 7 <i>.</i> 50	-		
Range of Distribution System pH	7.14 - 7.59	_		
Frequency of pH testing Incoming:	Every 2 hours plus daily	confirmation grab by	y lab staff	
Plant Tap:	Every 2 hours plus daily	confirmation grab by	y lab staff	•
Distribution:	Several per week			-
Analytical Method Used:	Electrode	_		
Instrument:	Hach HQ440d, Hach SL1	Ī000		
		D ( ( )		
Any Overfeed Instances? (Y/N)	No No	_ Date(s):		-
Any Low Feed Instances? (Y/N)	No	_ Date(s):		-
Feed Pumps:				
Type:	Diaphragm	Model:	Milton Roy SD46-88P	
Number of Pumps:	2	_		-
Capacity:	10 gph each	Discharge Head:	150 psi	
, · ·		<b>-</b>		•
Туре:	Diaphragm	_ Model:	LMI C721-71FS	_
Number of Pumps:	1	-		
Capacity:	4 gph	Discharge Head:	100 psi	_
	(Note: this model is no lo	nger manufactured	, but repair parts are be	elieved
	to be readily available)			
Chemical Storage Tank Type	PE Shipping Totes		220 gallons	_
Weight/Level Reading Method	Scale markings on tote	_		
Comments on Sodium Hydroxide Feed: The City				
the distribution system. Beginning in June 2017,				
recommended distribution system pH goal of app				
shown above are for the period of time when sod	ium nyaroxiae nas been r	ea. The teea pump	is now nave flow-paced	controls
to help maintain consistent feed rates.				
The existing treatment system was designed and	installed as a temporary	measure while long	-term treatment decisio	ns are
being made. Chemical scales may be installed a				
(temporary) and future (permanent) treatment at				
decisions have not been made regarding the futu				
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		•		
Safety: The sodium hydroxide tote and sodium h	ypochlorite tote are store	d together in a gara	ge structure with air co	nditioning
a portable eye wash station, and face shield/glove		0 0	-	
· · · · · · · · · · · · · · · · · · ·				

# **TREATMENT Corrosion Control Treatment - General Comments** As part of the U.S. EPA's Emergency Administrative Order, the City's Optimal Corrosion Control plan must be reviewed and, if necessary, revised. To accomplish this, a contract was awarded to Arcadis Group to complete a Water Distribution System Optimization study, including a Corrosion Control Plan (CCP). The CCP is being completed by Cornwell Engineering Group as a subcontractor to Arcadis Group. The proposed scope of the CCP (dated 12/19/16) included: -An evaluation of the existing Flint system (purchase of treated water from Great Lakes Water Authority) -The potential conversion to Genesee County as water supplier -A plan for treating KWA raw water at the Flint Water Treatment Plant -An evaluation of the interface (blending) between two sources of treated water The DEQ recommended that the scope be flexible enough to consider other scenarios The final CCP has not been finalized, in part due to delays caused by the City failing to select a permanent water source.

### Appendix A

### Classes offered at the Flint Water Treatment Plant, 2016-2017:

Safe Drinking Water Act Overview: September 27, 28, and 29, 2016 (2 hours each day) - Bryce Feighner (DEQ)

Basic Math and Hydraulics (condensed course): October 18, 19, and 20 (2 hours each day)

- Bob London and Jon Bloemker (DEQ)

Filtration: November 29, 30, and December 1, 2016 (2 hours each day) - Nick Pizzi

Rapid Mix, Flocculation, and Sedimentation: January 10 and 11, 2017 (2 hours each day) - Nick Pizzi

<u>Jar Test Calculations</u>: March 14, 2017 (2 Hours) – Nick Pizzi <u>Hands-on Jar Testing</u>: March 15, 2017 (2 Hours) – Nick Pizzi

<u>Chemical Feed</u>: April 18, 2017 (2 Hours) – Nick Pizzi <u>Distribution Math</u>: April 19, 2017 (2 Hours) – Nick Pizzi

<u>Lime Softening Practice Math</u>: April 19, 2017 (2 Hours) – Nick Pizzi <u>Ion Exchange Practice Math</u>: April 20, 2017 (2 Hours) – Nick Pizzi

<u>Basic Math</u>: July 17, 2017 (2 Hours) – Nick Pizzi <u>Chemical Feed</u>: July 18, 2017 (2 Hours) – Nick Pizzi