GRETCHEN WHITMER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
LANSING DISTRICT OFFICE

LIESL EICHLER CLARK
DIRECTOR

April 25, 2022

Troy Bell
City of Muskegon Heights
2724 Peck Street
Muskegon Heights, Michigan 49444

WSSN: 04580
County: Muskegon

Dear Troy Bell:

SUBJECT: City of Muskegon Heights (City)
2022 Water System Sanitary Survey (Survey)

This letter confirms the Department of Environment, Great Lakes, and Energy's (EGLE) staff meetings with John Allen on March 14 and 30, 2022, to conduct a Survey of the City's water system, and to present the final findings, discuss areas for improvement, and identify timelines for corrective action where appropriate. The purpose of a Survey is to evaluate the water supply system with respect to the requirements of the Michigan Safe Drinking Water Act, 1976 PA 399, as amended (Act 399). It is also an opportunity to update EGLE's records, provide technical assistance, and identify potential risks that may adversely affect drinking water quality. Enclosed, is a copy of the Sanitary Survey Report for your reference.

Since the last Survey, EGLE acknowledges and appreciates that the City has completed the following water system improvements:

1. Fixed drainage issues near the flocculation and sedimentation basins that were identified in previous Surveys.
2. Completed meter replacement project and verified service material entering all homes.
3. Initiated a lead service line replacement and materials inventory program.
4. Received a drinking water revolving fund (DWRF) loan for lead service line replacement (LSLR), watermain replacement, and transmission main upgrade projects.
5. Completed a rate increase to allow for acceptance of the DWRF loan.

The following table summarizes EGLE's final findings from the Survey of the water system:

Survey Element	Findings
Source	Recommendations Made
Treatment	Recommendations Made
Distribution System	Deficiency Identified
Finished Water Storage	Deficiencies Identified
Pumps	Recommendations Made
Monitoring & Reporting	Deficiencies Identified
Management & Operations	Deficiencies Identified
Operator Compliance	Required Actions Identified
Security	Deficiency Identified
Financial	Deficiency Identified
Other	No deficiencies/recommendations

Deficiencies:

Deficiencies indicate non-compliance with one or more Act 399 requirements, which include defects in a water system's infrastructure, design, operation, maintenance, or management that cause, or may cause, interruptions to the "multiple barrier" protection system and adversely affect the system's ability to produce safe and reliable drinking water in adequate quantities.

During the Survey, eight deficiencies were identified and are listed below:

1. R 325.11905 requires the City to have an operator in charge (OIC) of the distribution system with at least an S-2 license. Per EGLE's operations oversight policy, the OIC must visit staff daily, be on call 24/7, and supervise and direct staff responsible for daily operations. The full-time distribution OIC left City employment last year and the position is currently being filled part time by John Allen, who oversees daily operations at the water treatment plant (WTP) in addition to other duties. Currently, the City is not meeting the distribution system oversight requirements. The City needs to evaluate options for meeting this requirement, such as a full-time distribution OIC, contract operator, etc. Please indicate how the City will satisfy this requirement in the Survey response letter and submit an operator designation form to EGLE for our records.

2. R 325.10720 requires the monitoring of turbidity and the proper calibration of turbidimeters. United States Environmental Protection Agency (U.S. EPA) guidance dictates that turbidimeters must be calibrated (or must have the calibration verified) at least quarterly using an approved procedure. The City's current calibration procedure for online turbidimeters uses a calibration kit with a small glass cuvette inserted. This does not meet EGLE requirements. Quarterly calibrations or verifications must be completed under identical optical conditions as when the instrument is in operation. Additionally, the City could not produce

2022 records of quarterly calibrations for the benchtop or online turbidimeters. The City must begin using an approved procedure for online turbidimeter calibration or verification that involves filling the instrument body with primary standard and start maintaining all calibration records by *May 31, 2022.*

3. R 325.10720(3) requires continuous monitoring for residual disinfectant at an entry point to the distribution system (EPTDS) on a continual basis and requires the daily minimum to be recorded. EGLE was informed during the Survey call on March 14, 2022, that the chlorine analyzer at the City's EPTDS had been offline since January 2022. EGLE staff confirmed the chlorine analyzer was operational during an in-person inspection on March 30, 2022. However, there is still a communication issue between the chlorine analyzer and the SCADA system, resulting in the SCADA system reporting inaccurately scaled values. *The City must ensure the SCADA system is reporting the true measured chlorine residual by May 31, 2022.* In addition, a standard operating procedure (SOP) for maintenance and verification of the instrument must be developed and implemented.

4. R 325.11112(c) states storage tanks shall have no unprotected openings. Per Ten States Standards, 7.0.7, overflows shall be fitted with twenty-four non-corrodible mesh screens, discharge 12 to 24 inches above the ground surface, and not be directly connected to any drain, sanitary sewer, or storm sewer. Overflow pipes are required to terminate above ground to prevent a cross connection, allow for observance of an overflow event, and more easily confirm there is not an obstruction in the overflow piping. Per 7.0.9, tank vents shall be fitted with twenty-four non-corrodible mesh screens and elevated tank vents shall open downward. During the Survey, the following items were observed:

   a. The WTP reservoir overflows consist of a weir that is piped underground to a sewer manhole that then discharges to the on-site lagoon. Size 24 mesh must be installed on the overflow discharge and the pipe between the weir and manhole must be verified to be free flowing on a regular schedule through a method proposed by the City.
   b. The Sherman reservoir had undersized vent screens. The Sherman reservoir overflow consists of a weir that flows to a pipe underground and discharges into a chamber that feeds a sanitary sewer. The overflow pipe had a flapper valve that was observed to be partially open and missing a screen. Size 24 mesh must be installed on the vents and overflow pipe. The flapper valve must be flush with the overflow pipe to prevent animals from entering the reservoir and the condition of the valve position verified periodically. Additionally, please propose a method for the reservoir overflow to conform with section 7.0.7 of Ten States Standards.
   c. The Getty elevated tank rooftop wet interior access hatch is extended with approximately 20 inches of coarse mesh wall, which can allow rain and contaminants to enter the tank. The extended mesh venting on the wet

interior access hatch must be removed and replaced with an overlapping lid and watertight gasket. Additionally, the status of the overflow flapper valve and screen must be confirmed, and any needed correction made.

Please submit a corrective action plan and schedule with the Survey response letter to address these findings.

5. R 325.12303 states that emergency response plans (ERP) at a minimum, shall outline a program for rapid correction or mitigation of emergencies. The current ERP consists of a list of outdated contacts and does not include any SOPs for correction or mitigation of any emergencies, such as watermain breaks or source water contamination. The City must update their ERP to include all elements as outlined in Rule 2303 by *July 31, 2022*. Enclosed is a template for your use.

As a reminder, the U.S. EPA required the City to complete a Risk and Resiliency Assessment (RRA) and an ERP update as part of the 2018 America's Water Infrastructure Act (AWIA) requirements. Certification that both items are complete must be submitted to the U.S. EPA. The RRA certification was due on June 30, 2021, and the ERP certification was due on December 31, 2021. Contact the U.S. EPA at dwresilience@epa.gov for more information on AWIA requirements.

6. R 325.11403 prohibits cross connections for all customer classes, including residential customers. The City has implemented a commercial cross connection control program and performs opportunistic inspections of residential customers when access is granted to the residence. Implementation of this program must be expanded to all residential customers to provide a complete inventory of cross connection devices. The City must submit an implementation plan by *June 30, 2022*, for a fully expanded residential cross connection control and inspection program. The City must submit updates to cross connection program efforts by *March 31, 2023*, and *March 31, 2024*, which may be submitted as part of the cross connection annual report to help evaluate progress toward resolving this deficiency.

7. R 325.11203 states that a water supply shall conduct a reliability study (Study) to determine the quantity of water needed for the waterworks system and shall update the Study every five years unless a waiver is requested and approved by EGLE. The City's last Study was completed in 2015 and is due for an update. Please submit an updated Study by *October 31, 2022*. If the City plans to pursue a waiver, please provide a written request with water demand data to support the request.

8. R 325.11606 outlines the required components of Asset Management Programs (AMP): inventory of assets, methods used to determine the asset criticality and consequence of failure, level of service goals, a capital improvements plan (CIP) that identifies system needs for 5 and 20-year planning periods, and an explanation of the funding structure and rate methodology that provides sufficient

resources to implement the AMP program. EGLE reviewed the City's AMP, received on February 28, 2018, and found the AMP did not meet requirements or provide an explanation of the funding structure. EGLE also reviewed water system budgets and the 7-year CIP to assess the City's financial capacity. EGLE observed that the CIP and budget do not include all water system needs, such as replacement of undersized watermain and lead service lines.

To return to compliance, the City must complete an AMP that is reflective of water system needs and include a comprehensive rate study in the rate methodology section. It is EGLE's understanding that the updated AMP will be completed with grant funds. *Please provide an updated AMP by October 31, 2022.*

Required Actions:

During the Survey, the following required actions were identified:

1. The City has a complex water treatment and distribution system with aging infrastructure requiring qualified oversight. During the Survey, it was discussed that two out of three plant operators are expected to retire on January 1, 2023, and the certified OIC, the utilities director, may retire in the coming years as well. The distribution system has historically been understaffed and the full-time distribution OIC left City employment last year. Due to the loss of experienced water system staff, EGLE is concerned the City may not possess the managerial or technical capacity to oversee water system operations. Therefore, the City must submit a staffing plan that includes an evaluation of staffing needs, organizational chart, and efforts to recruit and retain operators with higher licenses by *August 31, 2022*. In addition to supporting staff training and licensure, written SOPs can ease future transition of leadership. SOPs must be developed for the following areas by *December 31, 2022*:

    a. Pump Maintenance.
    b. Sherman Street pump operation.
    c. Storage management and high service pump station rotation.
    d. Intake maintenance including backwash.
    e. Chemical pump calibration.
    f. Turbidimeter calibration.
    g. Emergency power operation.
    h. Interconnect use.
    i. Chemical delivery procedure.
    j. Bypassing storage tanks.

2. The Concentration of Chlorine x Time of Contact (CT) must be calculated daily and reported on the Monthly Operation Report (MOR), effective *August 10, 2022*. Reporting daily CT on the MOR allows EGLE staff to verify CT requirements are met and is used as a tool to ensure operators are aware of proper disinfection. The City reports the residence time in the flocculation basins, sedimentation

basins, and the WTP reservoirs on the MOR, but does not account for short circuiting or complete a daily CT calculation. A summary of EGLE's CT calculation and example CT calculator will be provided to the City for reference.

3. R 325.10604f(6) requires full replacement of lead service lines (LSLs) and galvanized services if the service line is or was connected to lead piping. Please continue to pursue replacement of all LSLs. Additionally, R 325.11604(c)(vii) requires the City to provide an annual report on LSLR efforts. The report for the 2021 calendar year is due *April 30, 2022*.

4. R 325.11604(c)(ii) requires a complete distribution system materials inventory to be submitted to EGLE by *January 1, 2025*. Please ensure that ongoing verification efforts are sufficient to meet this deadline.

5. Isolation valves in the distribution system are necessary to minimize interruptions in service and sanitary hazards during construction or repairs, per R 325.11108. The City has a valve turning program that should result in the turning of each valve every five years. However, due to staffing limitations, there has been insufficient progress in the valve turning program in recent years, and the program hasn't been updated in several years. The valve turning program must be implemented. Please provide a program implementation plan by *June 30, 2022*, and an update on valve exercising activities by *December 31, 2022*.

Recommendations:

Recommendations are suggestions the public water supply should consider, to enhance its operations and services, and to avoid future deficiencies.

During the Survey, the following recommendations were identified, additional recommendations are included in an enclosure:

1. Per Ten States 5.1.11(c) day tanks should hold no more than a 30-hour supply based on average demand. Based on this, the current day tanks for alum, chlorine, and fluoride are oversized, and should be resized accordingly.

2. Begin routinely using the Area Wide Optimization Program (AWOP) worksheet to evaluate pretreatment and individual filter performance. Daily maximum raw, settled, individual filter effluent, and filter confluence turbidity data is needed for the AWOP worksheet. Consider submitting the AWOP worksheet monthly to EGLE or include the maximum individual filter effluent turbidity on the MOR.

3. Budget for and replace undersized 4-inch and cast iron watermain that is beyond its useful life to increase the reliability and hydraulic capacity of the water system. Additionally, continue to address lost water concerns by replacing service lines with leaks.

4. Encourage all operators to obtain F-1 or S-2 licenses to increase redundancy in licensing and ensure proper succession planning.

5. Remove trees and vegetation from the Sherman reservoir hatches and vents to prevent bugs and other debris from entering the reservoir, as well as to keep tree roots from causing an issue with the tank structure or hatches. The Sherman reservoir is also overdue for a third-party inspection, which should be completed soon considering the age of the reservoir.

6. Develop standard specifications for watermain construction projects and submit them to EGLE for review.

7. EGLE encourages the City to complete annual inspections of the tank rooftop components. Establishment of a third-party maintenance contract could reduce this workload for City staff. Additionally, the City should budget to paint the elevated tank interior and exterior as indicated by third party inspection reports.

Please contact this office within 30 days of the date of this letter to acknowledge its receipt and respond to the recommendations and comments provided.

We anticipate and appreciate your cooperation in addressing these findings. If you have any questions, please feel free to contact me at 517-262-6795, or by e-mail at BatesC7@Michigan.gov.

Sincerely,

Caitlin Bates

Caitlin Bates, P.E.
Surface Water Treatment Specialist
Field Operations Section
Drinking Water and
Environmental Health Division
517-262-6795

Summer Haught

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Enclosures
cc/enc: John Allen, City
cc: Muskegon County Health Department
Michael Bolf, P.E., EGLE
Ernie Sarkipato, P.E., EGLE

Sanitary Survey of Community Water Supply - Review Summary

Water Supply: City of Muskegon Heights
County: Muskegon
Evaluator: Bates/Haught

WSSN: 4580
District: 93
Date: 3/30/2022

Category	Comment	N/A	NotEv	NoD/R	Rec	Def	SigDef
Source					X		
Construction & Maintenance				X			
Standby Power				X			
Isolation				X			
Source Water Protection	*Update SWIPP*				X		
Capacity				X			
Treatment					X		
Disinfection				X			
Fluoride				X			
Phosphate Addition		X					
Softening		X					
Iron/Manganese Removal		X					
Arsenic Removal		X					
Pretreatment				X			
Filtration (gravity or membranes)	*Conduct fitler studies every 5 years*				X		
C*T	*Report daily CT achieved on MOR*			X			
Other	*Evaluate day tank sizing*				X		
Distribution System						X	
Interconnections w/ Other WS	*Develop SOP for use*				X		
Hydrants & Valves	*Exercise all valves on a routine basis*				X		
Service Lines & Metering	*Continue verification efforts, LSL replacements*			X			
General Plan				X			
Cross Connections	*Develop residential program*					X	
Construction & Maintenance	*Develop standard specs*				X		
Capacity	*Replace undersized 4 inch and cast iron watermain*				X		
Finished Water Storage						X	
Construction & Maintenance	*Ensure tanks meet Ten State Standards*					X	
Controls				X			
Capacity				X			
Pumps (All Pumping Facilities)					X		
Construction & Maintenance	*Conduct periodic third party inspection*				X		
Controls				X			
Capacity				X			
Monitoring & Reporting						X	
Bacteriological Monitoring				X			
Chemical Monitoring				X			
MOR or Annual Pumpage Report	*Consider reporting AWOP data on MOR*				X		
Consumer Confidence Report				X			
Analytical Capabilities	*Turbidimeter calibrations/verifications, online Cl analyzer*					X	
System Management & Operations						X	
Owner Responsibility				X			
Capacity Development				X			
Reliability Study	*Update study or request waiver*					X	
Operations Oversight	*Comply with distribution operations oversight requirements*					X	
Permits				X			
Operator Compliance				X			
Operator Certification				X			
Technical Knowledge & Training	*Develop staffing plan & SOPs*			X			
Security						X	
Emergency Response Plan	*Update ERP, conduct RRA*					X	
Site Security (Fences, Alarms...)				X			
Financial						X	
Rates				X			
Budget & Capital Imp. Plan	*Update AMP, conduct rate study*					X	
Other				X			

N/A - Not Applicable
NotEv - Not Evaluated
NoD/R - No Deficiencies/Recommendations Made
Rec - Recommendations Made
Def - Deficiencies Identified
SigDef - Significant Deficiencies Identified

CITY OF MUSKEGON HEIGHTS SANITARY SURVEY FINDINGS cont.

Additional Recommendations:

1	Update and submit the Source Water Intake Protection Plan to EGLE for approval.
2	Conduct comprehensive filter studies every five years. The study should include measuring media depth, core sampling, and sieve analysis, as well as verifying the filter backwash expansion rates.
3	Continue to ensure operators observe all filter backwashes.
4	Routinely calibrate chemical feeders.
5	Ensure turbidimeter controller settings match U.S. EPA recommended settings.
6	Ensure that all WTP valves are exercised on a routine basis.
7	Conduct routine WTP generator load testing quarterly, and increase staff redundancy in knowledge of back up power transfer procedures.
8	Conduct periodic third party inspections of pumps.
9	Continue routine ground storage and elevated tank inspections by a third party.
10	Update the Revised Total Coliform Rule Sample Siting Plan and submit to EGLE for approval.
11	Consider development of an electronic work order system to track maintenance.
12	Develop a formal SOP for use of interconnects with the city of Muskegon and city of Norton Shores.
13	In order to receive CT credit in the filters, conduct a tracer test of the filters in accordance with Appendix C of the U.S. EPA's 1991 Surface Water Treatment Rules guidance manual.
14	Discourage hydrant tampering by enforcing the water use ordinance and consider installing tamper proof locks on vulnerable hydrants.

MI0004580 MUSKEGON HEIGHTS

Alt. State No. (WSSN): 04580
Local Name (District): DISTRICT 93
Principle County: MUSKEGON
Billable Population: 10856
Service Connections: 5124

Activity Status: A
Activity Date: 1/1/1800
Op Category: F1 S2
Owner Type: L
Primary Source: SW

% SW: 100 **% GW:** 0 **% GWUI:** 0
% SWP: 0 **% GWP:** 0 **% GWUIP:** 0

Last Sanitary Survey: 3/30/2022

Population History

Type	Pop Count	Begin Date	End Date
R	10856	5/12/2015	
R	11569	1/7/2011	5/12/2015
R	11741	2/1/2008	1/6/2011
R	12049	10/17/2003	1/31/2008
R	13000	8/12/2002	10/16/2003
R	14611	1/1/1800	8/11/2002

Water System Flow Rates

Flow Rate Type	Quantity / Units	
BSLN Baseline Capacity	33.9	MGD

Regulating Agency

DISTRICT 93
DISTRICT 9
MDEQ

Points of Contact

PL
2724 PECK STREET
MUSKEGON HEIGHTS, MI 49444

DO Mr. JOHN C. ALLEN
CITY OF MUSKEGON HEIGHTS
DIR OF PUBLIC UTIL
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OP Mr. DAVE BONFOY
MUSKEGON HEIGHTS
DISTRIBUTION FOREMAN
MUSKEGON HEIGHTS, MI 49444

AC-Administrative; OW-Owner; DO-Operator in Charge; DS-Distribution Operator; OP-Operator; FC-Financial; PM-Property Manager; EC-Emergency; LE-Lead Engineer; SA-Sampler; LC-Legal; OT-Other; CC-Carbon Copy

Deficiencies Determined in Last 5 Years and/or Unresolved

Deficiency	Severity	Date Determined	Date Resolved	Comments	Description
MRAN Analytical Capabilities	MIN	3/30/2022		DUE: May 31, 2022	POE chlorine analyzer offline, repaired but now SCADA scale is not accurate. Turbidimeter calibration method not approved, no records of 2022 calibrations.

DSXC	Cross Connections	MIN	3/30/2022	DUE: Implementation plan 6/30/22, updates on progress 3/31/23, 3/31/24	Need to implement residential program
FWCM	Construction & Maintenance	MIN	3/30/2022	DUE: (5/25/2022, Corrective action plan in survey response letter)	24 mesh needed on overflow and method to verify free flowing
FWCM	Construction & Maintenance	MIN	3/30/2022	DUE; (5/25/2022, corrective action plan needs to be in survey response letter)	24 mesh on overflow, flapper valve needs to be shut, verify valve position periodically, needs to conform to ten states standards (currently has direct connection to sanitary sewer)
FWCM	Construction & Maintenance	MIN	3/30/2022	DUE: (5/25/2022, need corrective action plan in survey response letter)	Remove extended venting from rooftop wet interior access hatch, verify overflow pipe flapper valve and mesh condition
SMRS	Reliability Study	MIN	3/30/2022	DUE: 10/31/22	Need to update or request waiver
SMOP	Operations Oversight	MIN	3/30/2022	DUE: May 25, 2022 (survey response letter)	Not meeting distribution system oversight requirements (daily site visits, supervise staff directly) by OIC. Need to explain how City will satisfy requirements.
SERP	Emergency Response Plan	MIN	3/30/2022	DUE: 7/31/2022	ERP needs to reflect rule requirements
FIBG	Budget & Capital Improvement Plan	MIN	3/30/2022	DUE: 10/31/22	Need to update AMP to meet requirements, include rate study and CIP.

Violations and Enforcement Actions - Last 10 Years

Type	Violation Name	Code	Analyte Name	Period End	Period Begin	RTC Date
27	MONITORING, ROUTINE (DBP), MAJOR	2920	CARBON, TOTAL	1/1/2021	3/31/2021	2/17/2021
3A	MONITORING, ROUTINE, MINOR (RTCR)	3014	E. COLI	10/1/2021	10/31/2021	11/8/2021
S3	STATE M/R (ENTRY POINT CHEM/RAD)	1040	NITRATE	1/1/2012	9/30/2012	2/6/2013

MI0004580 MUSKEGON HEIGHTS

Storage Facilities

Site Code ST100 **Facility Name:** WTP UNDERGROUND STORAGE **Local Name:** 4.5 MG
Type: UN **Material:** CC **Coating:** **Status:** A **Constructed Date:** 1/1/2000
Comments:

Indicator Type		Value and/or Date		Comments / Corrections / Updates
ALTV	Altitude Valve Indicator	NA		
COVD	Covered Indicator	YES	1/1/1753	
PRES	Pressurized Indicator	NO		
CAPR	Cathodic Protection	NO		
MXSY	Mixing System	NO		
DTIN	Date Last Inspected		5/12/2006	
ISVL	Isolation Valve	YES		
DRAI	Drain Present	YES		
MUDV	Mud Valve	NA		

Measure Type		Quantity / Units	
OFEL	Overflow Elevation	656.5	FT

Flow Rate Type		Quantity / Units	
APCD	Approved Design Capacity	4500000	GAL

Site Code ST200 **Facility Name:** SHERMAN RESERVOIRS **Local Name:** 1.5 MG
Type: RS **Material:** CC **Coating:** **Status:** A **Constructed Date:** 1/1/1940
Comments:

Indicator Type		Value and/or Date		Comments / Corrections / Updates
ALTV	Altitude Valve Indicator	NO		
COVD	Covered Indicator	YES	1/1/1753	
PRES	Pressurized Indicator	YES		
EMER	Emergency Power	NO		
CAPR	Cathodic Protection	NA		
MXSY	Mixing System	NO		
DTIN	Date Last Inspected		11/10/200	
ISVL	Isolation Valve	YES		
DRAI	Drain Present	NO		
MUDV	Mud Valve	NA		

Measure Type		Quantity / Units	
OFEL	Overflow Elevation	12	IN
THED	Total Head Elevation	5	FT
NLWE	Normal Low Water Elevation/Pressure (pump cut-in)	7	FT

Flow Rate Type		Quantity / Units	
APCD	Approved Design Capacity	1500000	GAL

MI0004580 MUSKEGON HEIGHTS

Site Code ST300 **Facility Name:** GETTY STREET ELEVATED TANK **Local Name:** 750,000 GALLONS
Type: EL **Material:** ST **Coating:** ER **Status:** A **Constructed Date:** 1/1/1964
Comments:

Indicator Type		Value and/or Date	
ALTV	Altitude Valve Indicator	YES	1/1/1753
COVD	Covered Indicator	YES	1/1/1753
PRES	Pressurized Indicator	YES	1/1/1753
EMER	Emergency Power	YES	1/1/1753
CAPR	Cathodic Protection	YES	
MXSY	Mixing System	NO	
DTIN	Date Last Inspected		11/12/2018
ISVL	Isolation Valve	YES	
DRAI	Drain Present	YES	
MUDV	Mud Valve	NO	
TABG	Tank Above Grade	YES	

Measure Type		Quantity / Units	
OFEL	Overflow Elevation	767	FT
NLWE	Normal Low Water Elevation/Pressure (pump cut-in)	754	FT
NHWE	Normal High Water Elevation/Pressure (pump cut-out)	766	FT

Flow Rate Type		Quantity / Units	
APCD	Approved Design Capacity	750000	GAL

Comments / Corrections / Updates

Type: EL=elevated GR=ground HD=hydropneumatic BL=bladder ST=standpipe UN=underground
Material: ST=steel CC=concrete AC=asbestos cement AS=asphalt CP=copper ER=earth FG=fiberglass PL=plastic WD=wood
Coating: AP=approved paint ER=epoxy resin FG=fiberglass GR=greased GS=glass-lined steel PL=plastic UN=unlined

MI0004580 MUSKEGON HEIGHTS

Pump Facilities

Site Code PF001 **Facility Name:** LOW SERVICE PUMP STATION **Local Name:**
Pump Type: **Status:** A **Availability** P **Constructed:** **Modified:**
Comments:
Pump Description:

Indicator Type		Value and/or Date	Comments / Corrections / Updates
EMER	Emergency Power	YES	
METR	Metered	YES	

Flow Rate Type		Quantity / Units	
APCD	Approved Design Capacity	33.9	MGD
EMCP	Capacity Under Emergency Power	10	MGD
FIRM	Firm Capacity	25.3	MGD

Site Code PF002 **Facility Name:** HIGH SERVICE PUMP STATION **Local Name:** WTP HIGH SERVICE STATIO
Pump Type: **Status:** A **Availability** P **Constructed:** **Modified:**
Comments:
Pump Description:

Indicator Type		Value and/or Date	Comments / Corrections / Updates
EMER	Emergency Power	YES	
METR	Metered	YES	

Flow Rate Type		Quantity / Units	
APCD	Approved Design Capacity	41.53	MGD
EMCP	Capacity Under Emergency Power	10	MGD
FIRM	Firm Capacity	35.48	MGD

Site Code PF003 **Facility Name:** SHERMAN PUMP STATION **Local Name:**
Pump Type: CF **Status:** A **Availability** P **Constructed:** **Modified:**
Comments:
Pump Description:

Indicator Type		Value and/or Date	Comments / Corrections / Updates
EMER	Emergency Power	NO	

Flow Rate Type		Quantity / Units	
APCD	Approved Design Capacity	15.2	MGD
FIRM	Firm Capacity	9.2	MGD

Type: CF=centrifugal JT=jet PD=positive displacement SC=screw SU=submersible VT=vertical turbine

MI0004580 MUSKEGON HEIGHTS

Distribution System

Site Code DIST **Facility Name: DISTRIBUTION SYSTEM** **Status: A**

Comments:

Comments / Corrections / Updates

MI0004580 MUSKEGON HEIGHTS

Intake Facilities

Site Code IN001 **Facility Name:** DUAL INTAKES 42 INCH
Local Name DIA 42 IN; LGT 4800 FT; SUB 45 FT
Water Body: LAKE MICHIGAN
Comments:

Status: A **Availability** P
Constructed: 1/1/2001 **Modified:**
Latitude: 43.18059 **Longitude:** -86.326

Comments / Corrections / Updates

Flow Rate Type	Quantity	Units
APCD Approved Design Capacity	34	MGD

Site Code IN225 **Facility Name:** LAKE MICHIGAN INTAKE 30 INCH
Local Name DIA 30 IN; LGT 4700 FT; SUB 38 FT
Water Body: LAKE MICHIGAN
Comments:

Status: A **Availability** P
Constructed: 1/1/1940 **Modified:**
Latitude: 43.18189 **Longitude:** -86.3272

Comments / Corrections / Updates

Flow Rate Type	Quantity	Units
APCD Approved Design Capacity	16	MGD

MI0004580 MUSKEGON HEIGHTS

Treatment Facilities

Site Code: TP100 Facility Name: TREATMENT PLANT Status/Date: A 8/17/1941

Availability: P Constructed Date: Lat / Long: 43.18702 -86.30045

Local Name: MUSKEGON HEIGHTS WATER TREATMENT PLANT

Comments / Corrections / Updates

Treatment Process and Objective Pairings	
FLUORIDATION	OTHER
SEDIMENTATION	PARTICULATE REMOVAL
RAPID MIX	PARTICULATE REMOVAL
FLOCCULATION	PARTICULATE REMOVAL
FILTRATION, RAPID SAND	PARTICULATE REMOVAL
COAGULATION	PARTICULATE REMOVAL
HYPOCHLORINATION, PRE	DISINFECTION

Indicator Type		Value and/or Date
EMER	Emergency Power	YES
EMPT	Emergency Power Type	PERM
METR	Metered	YES

Flow Rate Type		Quantity	Units
APCD	Approved Design Capacity	25.2	MGD
EMCP	Capacity Under Emergency Power	10	MGD