

From: Nick Leonard
Great Lakes Environmental Law Center

To: Aaron Keatley
Michigan Department of Environment, Great Lakes, and Energy

Re: Questions for Discussion – Benton Harbor

Date: April 11, 2022

Benton Harbor Petitioners Request for Discussion with EGLE

The suite of Surface Water Treatment Rules are treatment technique rules designed to limit disease-causing pathogens including legionella, giardia lamblia, and cryptosporidium. While the Safe Drinking Water Act primarily relies upon numeric drinking water quality standards - referred to as Maximum Contaminant Levels - to limit the allowable amount of a given contaminant in a water system, the Act also allows for a treatment technique to be used in lieu of a Maximum Contaminant Level if it is determined that establishing a Maximum Contaminant Level is not economically or technologically feasible.

The treatment technique established by the Surface Water Treatment Rules does not require water systems to directly monitor for any disease-causing pathogens that are the subject of the rule. Instead, the treatment technique consists of a number of layered and interrelated requirements all aimed at ensuring the water treatment plant for the water system is properly treating its water through coagulation, flocculation, filtration, and disinfection.

Ultimately, the water treatment processes required by the Surface Water Treatment Rules, if implemented properly, would reliably achieve the following:

- At least 99.9% (3-log) removal and/or inactivation of Giardia lamblia cysts between a point where the raw water is not subject to recontamination by surface water and a point downstream before or at the first customer;
- At least 99.99% (4-log) removal and/or inactivation of viruses between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer, and;
- At least 99% (2-log) removal of Cryptosporidium between a point where the raw water is not subject to recontamination by surface water runoff and at the first customer.

Both EGLE and EPA have cited a number of violations of the Surface Water Treatment Rules in their respective enforcement orders. Many of these violations were identified in EGLE's 2018 Sanitary Survey of the Benton Harbor water system. Additionally, the 2018 Sanitary Survey also identified a number of other significant deficiencies that relate to the Surface Water Treatment Rules.

The Surface Water Treatment Rules violations cited in the enforcement orders are numerous. They include:

- A failure to maintain a continuous chlorine analyzer at the entry point to the distribution system;
- Failure to properly calibrate the continuous chlorine analyzers;
- Failure to maintain a properly functioning flow meter which is necessary in order to assess compliance with C*T requirements;
- Failure to develop a disinfection profile and benchmark report prior to making a change to chlorine treatment;
- Failure to maintain sufficient system pressure during emergencies.

Many of these issues constitute violations of the treatment technique established by the Surface Water Treatment Rules.

Additionally, a recent inspection report sent by the EPA to the City of Benton Harbor on March 29, 2022 has raised additional concerns. Specifically, page 11 of that report notes that during the inspection the EPA noted that while it believed chlorine was being fed upstream of the reservoirs, it is actually injected into the suction well and not upstream of the filters as previously stated. As such, the EPA stated that the existing chlorine analyzers are not an accurate representation of the residual disinfectant levels throughout the treatment process. Additionally, we are concerned that the mistaken location of the chlorine feed has led to inaccurate C*T calculations, which are required to be performed each day under the Surface Water Treatment Rules to ensure that the system is achieving the specified inactivation rates for *Giardia lamblia* cysts and viruses.

Given that water systems do not directly monitor for the contaminants the Surface Water Treatment Rules seek to limit, given the numerous and long-standing violations of the Surface Water Treatment Rules in Benton Harbor and the confusion regarding the chlorine feed point identified in the EPA's recent inspection report, and given the unique vulnerabilities of the Benton Harbor population, we have repeatedly requested that the EGLE and EPA demonstrate how they have determined that the Benton Harbor water system has been able to adequately treat its water to achieve the treatment requirements provided in the Surface Water Treatment Rules and described above.

EGLE must demonstrate how it has determined that the Benton Harbor water treatment plant has been able to adequately treat its water to minimize public health risks from the disease-causing pathogens that are the subject of the Surface Water Treatment Rule. Specifically, EGLE must demonstrate how it made this determination in light of the fact that many monitoring devices required pursuant to the Surface Water Treatment Rule have either been non-existent, offline, and/or not properly calibrated at some point over the past four years.

A. Petitioners are still waiting for the following records:

1. The following data sets were identified as to be provided in an email from Elizabeth Cisar dated March 15, 2022:
 - a. EGLE summary graphics related to Monthly Operating Reports
 - b. 2018 and 2019 bacteriological test results
 - c. Chemical analysis (IOC/VOC/SOC/Nitrate/Rads)

2. Water Quality Parameter data for 2018-2021. These are needed to be able to observe improvements in the late 2021-early 2022 that are currently available on the website.

For our meeting, petitioners request that EGLE provide written copies, present, and discuss the following:

B. General Questions

1. The list of water quality data and analysis that EGLE determined was necessary to reach the conclusion that there is no cause for concern regarding public health resulting from treatment and monitoring deficiencies at the Benton Harbor water treatment plant. Describe how EGLE determined what needed to be on the list.
2. Each of the deficiencies in the Sanitary Surveys, ACO, and UAO may not individually present a risk to public health, but given the quantity of deficiencies and the duration of many/most, how did EGLE consider the simultaneous risks present from multiple violations of the Surface Water Treatment Rule and their risk to public health?

C. Questions Regarding Compliance with the SWTRs at the Water Treatment Plant

1. Provide a water treatment process diagram that identifies the locations of all treatment processes, chlorine analyzers, flow meters, turbidimeters, and other monitors used to measure and monitor water treatment process control at the Benton Harbor water treatment plant.
2. Identify the monitoring devices in the diagram of C.1 that are used to ensure all SWTR requirements are met.
3. Identify the devices in the diagram of C.1 that have been offline between 2018-present, with dates out of service and/or not calibrated.
4. Demonstrate how EGLE knows that all SWTR treatment requirements have been met during the times that devices were offline and the disinfection and filtration requirements described in the Surface Water Treatment Rules were consistently achieved.
 - a. (e.g., every time device A was out, device B was monitoring so we always had verification that C*T was met)

D. Question Regarding the Compliance Update for the Amended Administrative Consent Order and 2021 Sanitary Survey Significant Deficiencies Sent from EGLE to Benton Harbor Dated March 24, 2022

This memo states, “EGLE was made aware of a discovery regarding the post-chlorination feed point, which was presumed to be fed at the filter influent piping. By following piping from active chlorine feed pumps, water system representatives concluded the location of post-chlorination is in fact into the high service suction well. Since this feed point impacts the chlorine residual on the entry point to distribution, the chlorine analyzer at that location is not representative of water in the finished water reservoirs. In order to accurately study the disinfection segment including the reservoirs, a sample point must be located upstream of the high service suction well feed

point and downstream of the reservoirs. Alternatively, the post-chlorination feed point may be changed to the filter influent piping location.”

The issue is summed up more succinctly in the EPA inspection report: “The chlorine dosing directly into the suction well means that the existing continuous chlorine analyzers *are not an accurate representation of the residual disinfectant levels throughout the treatment process.*” (emphasis added)

1. Identify on the diagram of C.1 where the post-chlorination feed point was originally thought to be located.
2. Identify the actual location of the post-chlorination feed point on diagram C.1 as identified during the February 2022 inspection.
3. How/was the original assumed location of the post-chlorination feed point used in C*T calculations? How do C*T calculations change based on this chlorine feed being located at the entry point to the distribution system?
4. The March 24 memo requires a new chlorine sample point upstream of the high service suction well to accurately measure the disinfection segment that includes the reservoirs.
 - a. Is new data from this new sample point necessary to complete an accurate disinfection profile and benchmarking study? Explain why or why not.
5. If the location of the post-chlorination feed point does not affect C*T calculation, demonstrate, using the diagram of C.1, how other chlorination points and monitors ensure that C*T requirements are met (e.g., redundant monitors or safety factors).
6. Show in the diagram of C.1 where are the new redundant chlorine analyzers per p.3 #6 are located. At what levels are the high and low alarms set?

E. Additional Questions

i. General Questions

1. Please provide EGLE’s summary graphics of Benton Harbor’s Monthly Operating Reports to demonstrate historical water quality data and the improvements over time as the treatment plant comes into compliance. Provide EGLE’s interpretation of these data sets, showing how EGLE has reached the conclusion that the disinfection requirements described in the Surface Water Treatment Rules were consistently achieved.
2. (e.g., chlorine was always greater than X, Filter effluent was always less than Y)
3. Please provide the timeline of major water main breaks in Benton Harbor that could have resulted in inadequate C*T. This list should include the water main break that occurred on 10/21/21 before the EPA UAO was issued.
4. Please provide the data and analysis that EGLE completed to support EGLE's finding that there have been no chlorine incidents, where excessive chlorine doses could have resulted in an exceedance of the MRDL for chlorine as well as significant excursions of the regulated disinfection byproducts Total Trihalomethanes and Haloacetic Acids.
5. (e.g., chlorine was never measured greater than 4 mg/L)
6. To address the filter deficiencies identified in the EPA UAO, please provide a list and schedule of all completed filter repairs, a list and schedule of repairs still in process, and

the analysis completed to reach EGLE's finding that the need for remaining repairs presents no ongoing concern that the filtration requirements described in the Surface Water Treatment Rules will not be consistently achieved.

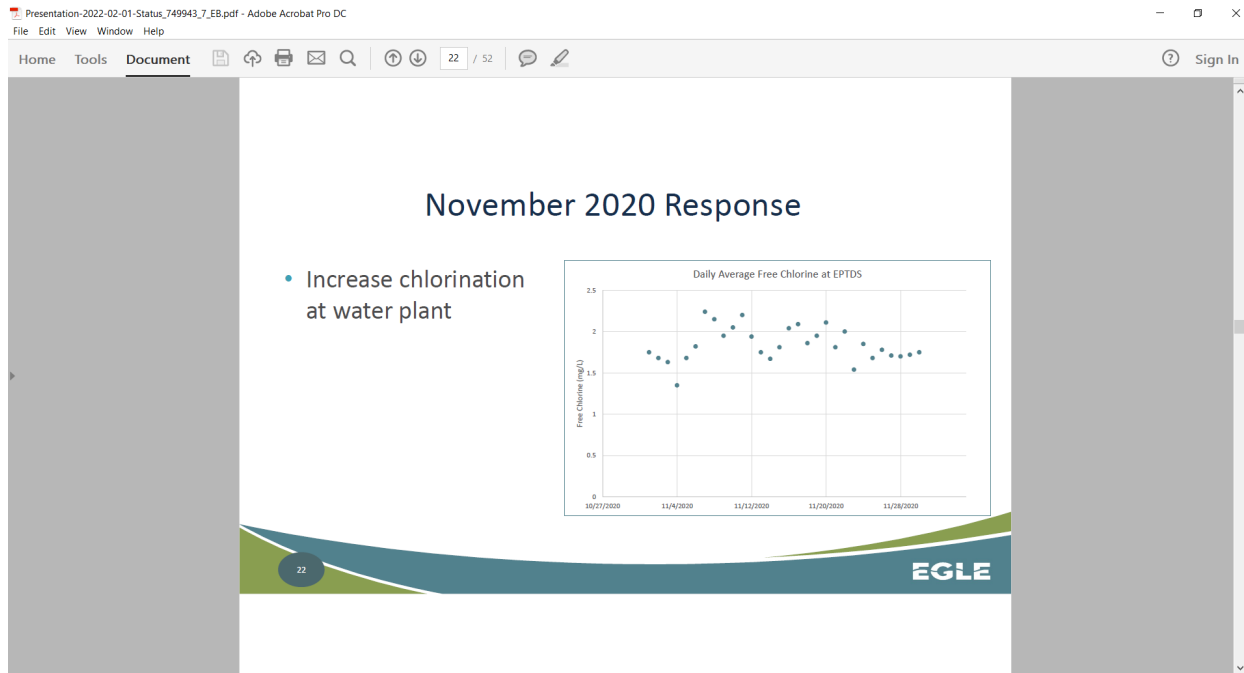
ii. Issues raised in EPA March 29, 2022 Inspection Report

1. EPA observed SCADA alarms disabled when they arrived for the inspection and they were on at the time they left. SCADA alarms have presented recurring problems over multiple inspections. What is being done to ensure the alarms remain on?
2. What is being done to ensure the settled water turbidimeters on the North and South Plate Settlers report to SCADA so alarms can be effective? Who is monitoring these manually to ensure the turbidimeter readings stay within allowable values?

iii. Issues raised in “Presentation 2022-02-01 Status”

1. Which fields were pre-filled on the front pages of MOR reports from 2021 and previous? We need to know this so we know which fields we can rely on when reviewing the public data on the website.
2. What calculations in the MOR reports have been corrected? We need to know this so we know which calculations we can rely on when reviewing the public data on the website.
3. How does the March 24/29 finding about the chlorination point affect the Actual and Minimum C*T reported on the MORs?
4. Please explain the SUVA alternate compliance criteria.
5. Have isolated elevated TOC events coincided with the times process monitoring equipment has not been working?
6. Have alum underfeed incidences coincided with the times process monitoring equipment has not been working?
 - o Was all affected water during the alum underfeed incidences wasted and the BWA issued as a precaution? Or did some of the affected water go to distribution making the BWAs necessary?

- Increased chlorination in the graph at the water plant was the dose at EPTDS per the February 2022 inspection or was the increased dose prior to the finished water reservoirs?



- - Is it correct to assume this increased dose did not contribute to C*T in the finished water reservoirs based on the conclusions of the February 2022 inspection?
7. Please provide dates of elevated TOC, alum underfeed incidences, and dates when process monitoring equipment not available on the same chart.

8. If the correction was made on September 26, 2019 and the incident was recorded 11/6/20, clearly the correction was not sufficient. What is Benton Harbor doing now to prevent this from happening again?

Presentation-2022-02-01-Status_749943_7_EB.pdf - Adobe Acrobat Pro DC
File Edit View Window Help

Home Tools Document 23 / 52

November 2020 Response

- **MDHHS sampling 11/6/20**
- **Correction:** New Alum feed system and rapid mixing were accepted for record on September 26, 2019.

Location	Crypto	Giardia
Raw	ND	ND
Plant tap	ND	ND
B&Z	ND	ND
Blue Water Thermal	ND	ND
Water Tower (LeRoys)	ND	ND

Method 1623, Eurofins, South Bend, IN

23

EGLE

9. What is EGLE doing about the fact you suspect operators are not following the filter backwash SOP? This sounds like a potential for a treatment technique issue in the future.

Presentation-2022-02-01-Status_749943_7_EB.pdf - Adobe Acrobat Pro DC
File Edit View Window Help

Home Tools Document 31 / 52

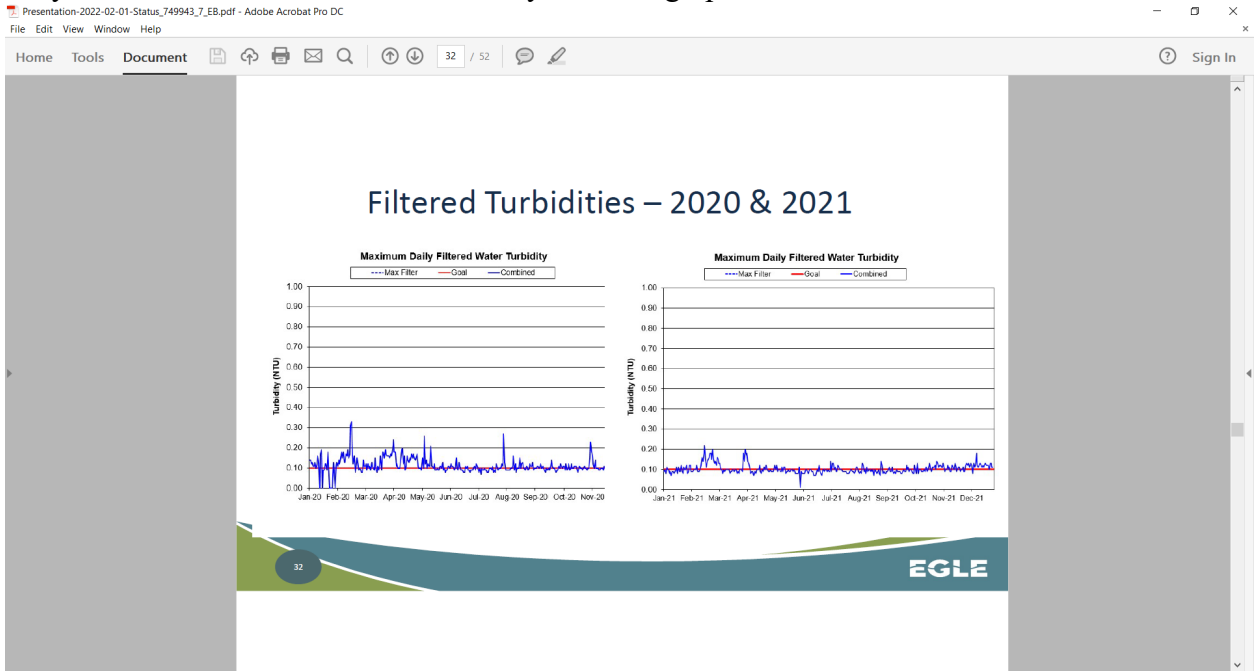
Filter Backwashing, Filter-to-waste

- **2018 Compliance Communication:** Filters with FTW capability (9, 10, 11, 12) weren't being used
- **2019 Survey Finding:** Implement SOP for FTW
 - Could have been utilized during high turbidity event February 2018
 - **Correction:** Developed SOP for operators to backwash, and either use FTW or do an extended/slow wash if no FTW
 - **Update:** suspect operators are not following

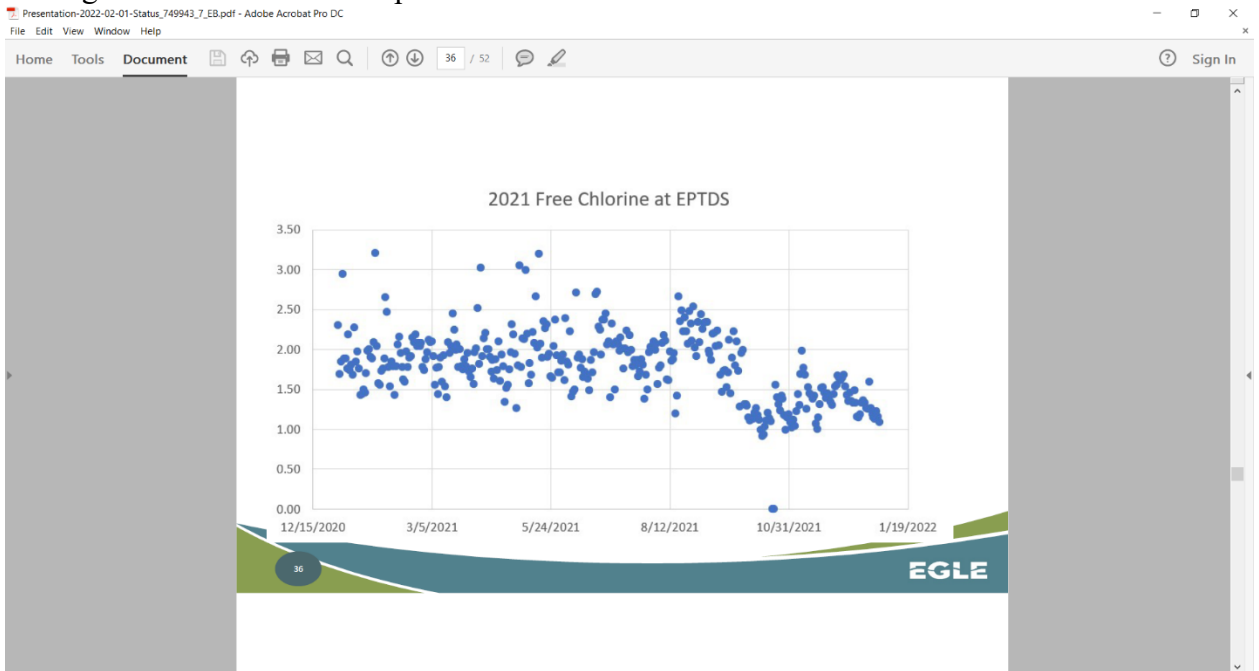
31

EGLE

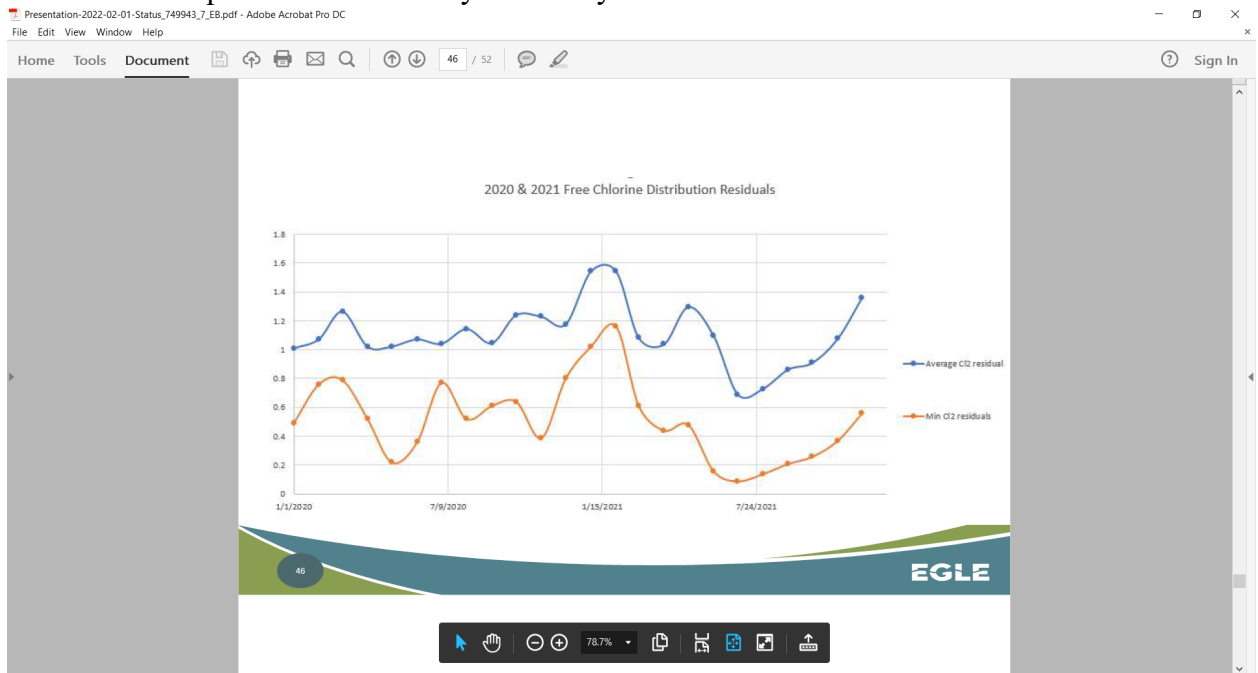
10. Why can't we see the Max Filter turbidity on these graphs?



11. Given this drop in free chlorine at EPTDS how do we know C*T still met given the new finding about the chlorination point?



12. Dates aren't clear on the following graph. Are chlorine residuals increasing in the DS at the same time they are decreasing at EPTDS? These graphs give the appearance that chlorine is 1.4 mg/L in the DS at the same time chlorine dropped to around 1.0 mg/L at EPTD in the previous slide. Can you overlay the raw data to make it make sense?

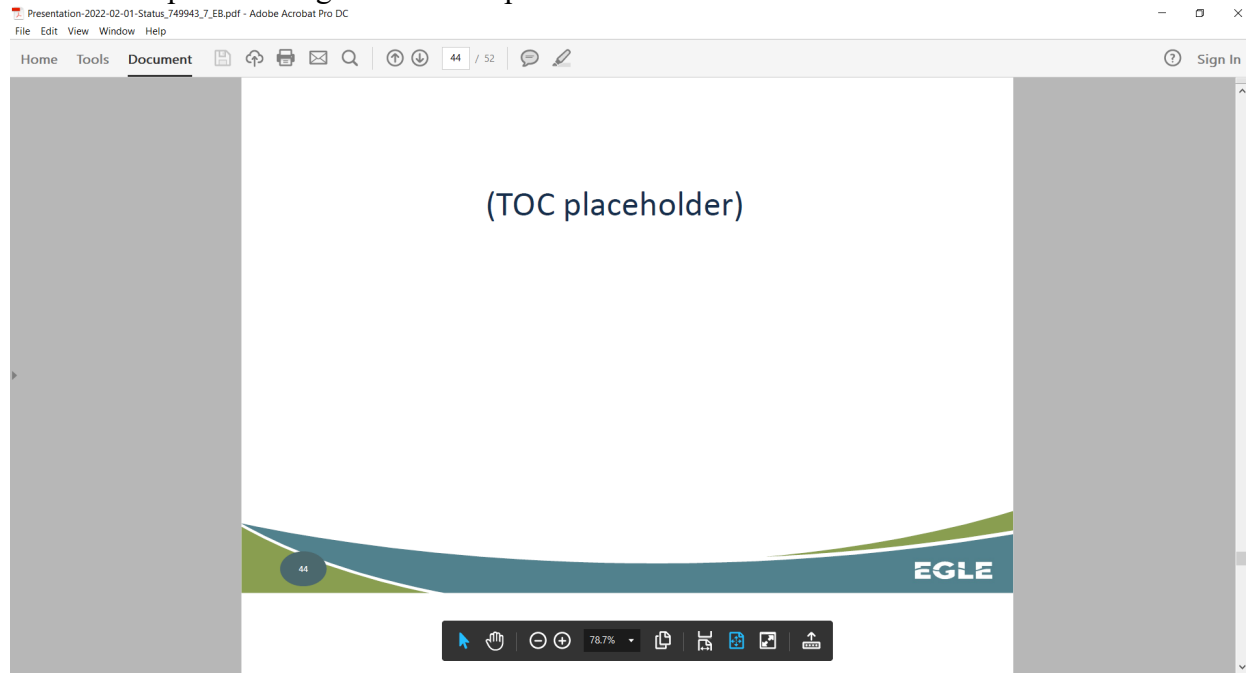


13. If the WTP has not been calculating CT daily, a disinfection profiling and benchmarking study has not been completed, and the point of chlorination is at the EPTDS instead of pre-finished water reservoir, how did EGLE make the determination that CT requirements have been consistently met?

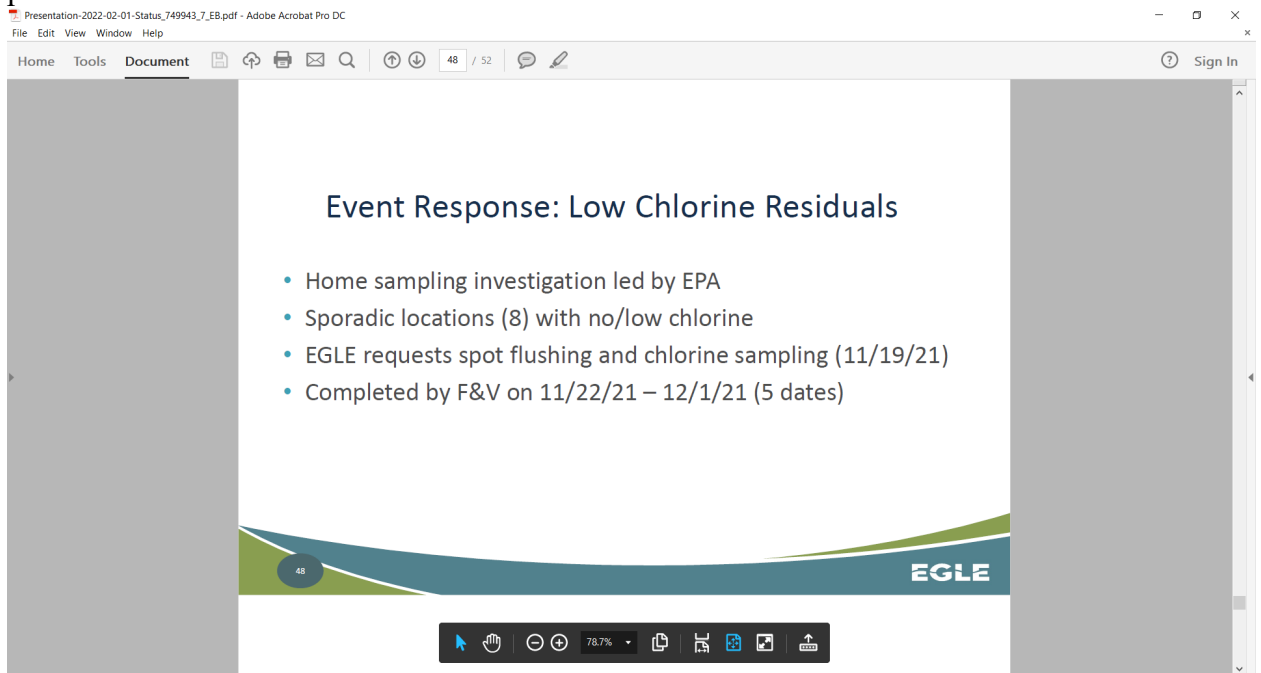
Disinfection

- Required to attain inactivation of 0.5-log (giardia) and 4-log (virus) for conventional treatment
- Due to large volume, estimates of CT ratio vary between 7 – 20
- **2021: EGLE requested** daily CT calculations be added to MOR (*in process*)
- **EPA Order (110 a – e)** requires the City complete a 12-month long Disinfection Profiling and Benchmarking Report (*in process*)

14. What information/update belongs in the TOC placeholder?



15. What was the result of the spot flushing? What chlorine levels were achieved in these homes with previous low/no chlorine? Are these locations able to maintain a chlorine residual on a regular basis or is ongoing flushing required? What are the ongoing flushing plans?



16. Clearly lack of operations oversight continues to be an issue. What is the plan to resolve this?

The image shows a screenshot of a presentation slide displayed in Adobe Acrobat Pro DC. The slide title is "Area of Concern: Staffing and Oversight". The content includes a bulleted list of three items: a 2018 significant deficiency for lack of managerial oversight with a correction of contracted distribution oversight in 2019; a 2020 license revocation of the operator in charge by EGLE with a correction of secured additional contracted operations oversight for WTP and distribution; and a note that the current contract for operations oversight is lacking. The slide features a blue and green footer with the EGLE logo and a page number of 50. The Acrobat interface shows the document is 50 of 52 pages.

Area of Concern: Staffing and Oversight

- **2018 Significant Deficiency** for lack of managerial oversight.
 - **Correction:** contracted distribution oversight (FV Ops) in 2019
- **2020 License Revocation** of Operator in Charge by EGLE
 - **Correction:** secured additional contracted operations oversight for WTP as well as distribution
- Current contract for operations oversight lacking

50 / 52

EGLE