



GRETCHEN WHITMER
GOVERNOR

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



LIESL EICHLER CLARK
DIRECTOR

February 13, 2020

VIA EMAIL AND U.S. MAIL

Mr. Ellis Mitchell
City of Benton Harbor
200 Wall Street
Benton Harbor, Michigan 49022

WSSN: 00600
County: Berrien
Supply: Benton Harbor

Dear Mr. Mitchell:

SUBJECT: Water System Corrosion Treatment

On October 22, 2018, the Department of Environment, Great Lakes, and Energy (EGLE), Drinking Water and Environmental Health Division (DWEHD), issued a letter to the City of Benton Harbor (the City) for a lead action level exceedance (ALE). In response, the City applied for a construction permit for installation of corrosion control treatment, under the Michigan Safe Drinking Water Act, 1976 PA 399, as amended (Act 399). On February 25, 2019, EGLE issued the Act 399 construction permit to the City to address the ALE by means of installing a corrosion control treatment system. The treatment chemical permitted, based on a recommendation by Elhorn Engineering, was Carus 8600 which is comprised of 70% orthophosphate and 30% polyphosphate. The target dose was 1.5 milligrams per liter (mg/L) as orthophosphate, and the City's water operators have consistently reached that treatment goal. This has resulted in a residual of approximately 1.5 mg/L orthophosphate in the distribution system.

A review of the last three lead and copper sampling rounds collected by the City concludes the treatment is not achieving desired results quickly enough. The most recent round of samples was collected approximately eight months after the beginning of corrosion control treatment.

The City met with representatives from EGLE on January 15, 2020, to discuss results from the City's lead and copper sampling as it relates to the City's corrosion control treatment. The purpose of this letter is to provide a summary of that meeting and outline next steps for the City to pursue designation of optimized corrosion control treatment as required by Rule 604f of the administrative rules promulgated under Act 399.

Based on a review of the corrosion control treatment and the last three rounds of tap samples for lead and copper, **the City is hereby directed to change its current blended phosphate chemical from the 70%/30% ortho/poly-phosphate to a product with a minimum of 90% orthophosphate.** The chemical selected must be ANSI/NSF 60 certified for use in drinking water systems. **The City is also hereby directed to adopt a new treatment rate, such that a minimum of 3.0 mg/L orthophosphate (as phosphate) residual is maintained throughout the distribution system.** This

designation is being made under R325.10604f(3)(d). The reason for this change is to speed up treatment effectiveness. EGLE's intent is to quickly put into place treatment that will more efficiently lower corrosion rates in the distribution system for greater protection of public health. This decision is based on corrosion control treatment studies and analyses of documented analogous treatment systems with other water supplies of similar source water chemistry.

The above phosphate treatment strategy is intended to provide immediate improvement of corrosion protection in the distribution system but, without further study, it is not certain to be the optimum treatment strategy. Therefore, the City is directed to have a third-party consultant submit to the department a corrosion control study proposal following the requirements of Rule 325.10604f(3)(c) of the administrative rules promulgated under Act 399. This study proposal must be submitted to the department within six months following the date that the directed treatment change is completed. The study plan must focus on identifying optimum corrosion control treatment for the City's water system. Reference to analogous water systems alone will not suffice to meet this requirement.

In addition, the permitted corrosion control treatment scheme requires the high service pump suction header valve that is next to High Service Pump 3 be closed. This is to force the flow of all water from the suction well through the meter and corrosion control treatment. At the onsite meeting referenced above, it was indicated that the valve state is unknown. Please immediately verify in writing to the department the valve has been closed according to the permit.

TRANSITION AND TIMELINE

Prior to changing chemicals, the City must obtain approval of the specific chemical selected by requesting revision of the construction permit under Act 399.

Following approval, the transition to a minimum 90% orthophosphate product must occur as soon as possible, but not later than February 28, 2020.

The City must follow these guidelines during transition to the new chemical:

1. Blending of the two phosphate products must not occur. The transition should be abrupt.
2. Immediately following the transition to the new treatment, gentle flushing of the distribution system will help provide a thorough transition.
3. Increased monitoring of the plant tap and distribution sites will verify when the transition has concluded and the directed residual of a minimum 3.0 mg/L orthophosphate as phosphate is achieved.

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We anticipate and appreciate your cooperation in resolving this matter. If you have any questions regarding this letter, please contact me at 616-307-6736 or OnanB@Michigan.gov; or you can contact Mr. Ernie Sarkipato, Surface Water Treatment Specialist, Engineering Unit, Field Operations Section, DWEHD, at 616-307-0261; SarkipatoE@Michigan.gov; or EGLE-DWEHD, 350 Ottawa Avenue NW, Unit 10, Grand Rapids, Michigan 49506.

Sincerely,

A handwritten signature in black ink, appearing to be 'Brandon Onan', with a long horizontal line extending to the right.

Brandon Onan, Supervisor
Lead & Copper Unit
Community Water Supply Section
Drinking Water and Environmental Health Division

cc: Mr. Mike O'Malley, City of Benton Harbor
Mr. Darold Harlan, Fleis & Vandenbrink
Mr. Todd Luks, Elhorn Engineering
Ms. Nicki Britten, Berrien County Health Department
Mr. Eric Oswald, EGLE
Mr. Mike Bolf, EGLE
Mr. Ernie Sarkipato, EGLE

based on lessons learned in Flint, even with correctly harvested LSLs there will be a period of stabilization that delays the results of the study.

MT 8600 Benton Harbor ACO Reply Corrosion Study ①
7/28/20

CITY OF BENTON HARBOR-CORROSION STUDY PLAN

Purpose:

The purpose of this study is to determine optimum corrosion control treatment for the City of Benton Harbor water treatment plant. This study will utilize harvested Lead & Galvanized service line material from the cities distribution system and new copper in order to replicate lead service line replacement activities. The study will focus on "not only Lead" but all aspects of optimum corrosion control treatment. The study will be ran for a minimum of 6 months for initial result data to be compiled and a treatment technic plan be developed. A additional 6 month period will follow.

Pipe Loops:

Example of pipe loops attached. Five Test Loops will utilized. Each pipe loop will consist of 36" sections of Lead, Galvanized & Copper pipe. A 3/4" flow meter, 24 hour timer, solenoid switch, phosphate feed pump w/injection, tubing, valves and sample taps.

Pipe Loop Operation:

Each pipe loop will be run from a 24 hour timer to be used for 6 hour on/ 6 hours off operation. Flow will be maintained using valving set to less than 0.5 gpm when solenoid valve is opened.

Source Water Feed:

The water used will be from the finished water clear well prior to any phosphate feed on (4)four of the test loops. The fifth test loop will test finished water with current phosphate feed.

Products to be Tested:

The products to be tested and there particular blends are as follows:

- | | |
|--|--------------------|
| 1-TEST LOOP-SK-7661 Blended 10% Polyphosphate/ 90% Orthophosphate | Current feed rate. |
| 1-TEST LOOP-SK-7661 " " " | @1.0-1.5ppm PO4 |
| 1-TEST LOOP-Carus 8600 Blend 30% Polyphosphate/ 70% Orthophosphate | @1.0-1.5ppm PO4 |
| 1-TEST LOOP-Carus 8600 " " " | @2.5-3.0ppm PO4 |
| 1-TEST LOOP-Carus 4105 36% Phosphoric Acid | @2.5-3.0ppm PO4 |

Operation:

Daily oversight will be provided by the City of Benton Harbor staff. Oversight should consist of checking test loops daily for proper operating conditions; leaks, pipe failure, pump failure, electrical problems etc. Any failures of operation should be reported directly to Elhorn Company @517-676-3786. Minor issue's can be discussed for correct repair instructions.

Weekly visits from Elhorn Staff will commence upon study system startup.

Sample/Testing Schedule:

Benton Harbor staff to provide daily PO4 residual testing on all test loops! Reagents will be provided by Elhorn Company for additional testing. Elhorn Company will collect weekly WQP samples & First Draw L/ C samples from each test loop. Samples will be delivered to Carus Corporation for analysis. Each sample will be tested for: Hardness, Orhtophosphate, Iron, Manganese, pH, Langelier, Temperature, Alkalinity, Calcium, Chloride, Conductivity, TDS, Sulfate, Polyphosphate & Total phosphates, Lead, Copper.

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Section Pieces:

The section pieces will be individually weighed prior to installation on the pipe loop. The pieces will consist of 2 sections each of lead, galvanized & copper pipe. Rubber fernco style fittings will hold pieces in place during operation. After a minimum of 90 days 1 section of each type of material will be carefully removed from the loop system. A unknown drying time will be determined for each piece and then re-weighed upon dried weight. Section pieces will then be sent to Carus Lab for analysis of film development.

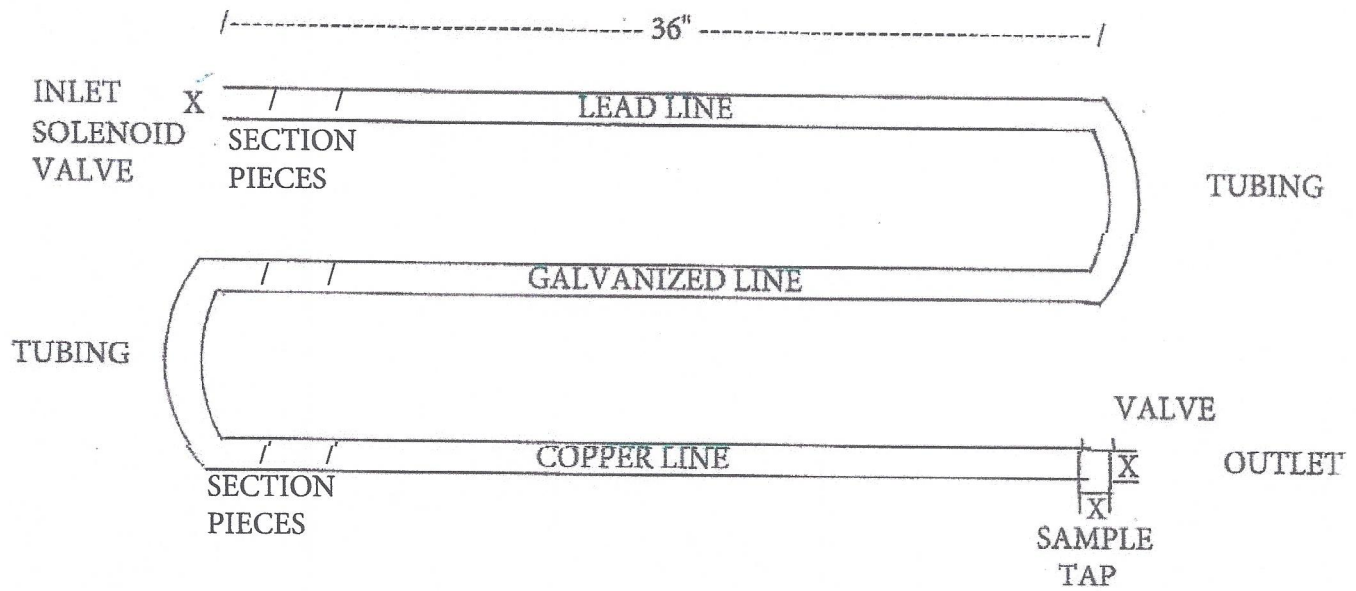
This same procedure will take place with the 2nd section piece of each material after a minimum of 180 days.

Completion of Results:

All results will be compiled into several spread sheets and graphs to determine a optimal corrosion treatment plan. The plan will depict the best overall treatment product and dosage rates concerning the City of Benton Harbor Water Treatment Plant.

PIPE LOOP LAYOUT

As Reply Corrosion study (5)



Inlet will consist of 3/4" water meter and solenoid valve for on & off operation. Flow will be 0.5 gpm for 6 hours on / 6 hours off. 24 hour timers will be used for on/off operation. Timers will be setup based on operator scheduling for weekly sampling requirements.