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May 31, 2019

PWS ID 63203096
MC La Crosse County

Mr. Bernard Lenz, Utilities Manager
City of La Crosse
400 La Crosse St
La Crosse, WI 54601

SUBJECT: Department Required Optimal Corrosion Control Treatment Modification

Dear Mr. Lenz:

Beginning in 2017, the Wisconsin Department of Natural Resources (department) partnered with the state's twelve large water systems (population served >50,000) to critically evaluate the effectiveness of their existing corrosion control treatment (CCT). The goal of this evaluation initiative was to ensure these systems were optimizing their CCT by minimizing lead and copper concentrations in their drinking water to the greatest extent possible. The outcome of this initiative was discussed with La Crosse Waterworks staff in a meeting on April 23, 2019. At the end of that meeting, La Crosse staff indicated they were going to further discuss the information presented at the meeting internally, and further evaluate sites for compliance monitoring and sequential sampling.

Following the implementation requirements of the Lead and Copper Rule, optimal water quality parameters were previously assigned by the department for your system. However, changes in treatment processes, source water quality, and corrosion control science since that time have prompted the department to take critical look and to reevaluate previous optimization determinations for all the large municipal water systems to better define optimal corrosion control treatment in alignment with the Lead and Copper Rule and EPA guidance. The purpose of this letter is to document that, based on the information provided to date and the department's critical analysis of LaCrosse's CCT and water quality, the department does not currently have sufficient system specific information to make a determination as to whether LaCrosse's existing CCT practices are optimized in a manner that minimizes lead and copper concentrations to the greatest extent possible.

Therefore, in accordance with section NR 809.543(9), Wis. Adm. Code, the department hereby modifies previous determinations that LaCrosse has optimized CCT (OCCT) and requires LaCrosse to conduct a Demonstrative CCT Study by evaluating the drinking water system and develop a report documenting how LaCrosse intends to minimize lead and copper in its drinking water system. This report shall be submitted to the department no later than December 31, 2021.

A Demonstrative CCT Study requires a system to demonstrate through use of pipe-loops or other similar technologies that a given treatment will be effective in their system. The study shall include: an evaluation of the sources of lead in the system, an evaluation of current corrosion treatment for efficacy in minimizing lead concentrations in the drinking water, consideration of other treatment options that may be more effective at reducing lead, and an evaluation of water quality parameters that can impact lead releases and corrosion control treatment efficacy.

Note that an evaluation of the corrosivity of the water alone is not a substantial enough analysis to determine the likelihood of lead release and whether corrosion control is optimized. Additional guidance for what is required in a Demonstrative CCT Study is described in greater detail in EPA's guidance[1].

Given the complexity of a Demonstrative CCT Study, the department has established several interim deadlines to create an opportunity for the department and La Crosse to engage in a dialogue about the CCT study during the duration of time allotted for such a study. The first interim deadline is for La Crosse to submit a proposal to the department outlining the basic steps/components of the CCT study, the anticipated timeline for each step and any additional work completed since meeting with the department on April 23, 2019. This submittal shall be sent to your DNR Representative, Glenn Falkowski, on or before October 31, 2019. Following the submittal of this information, the department would like to discuss the remainder of the interim deadlines and CCT study process with you by Skype. I have tentatively scheduled this meeting for the week of December 2, 2019 and will be following this letter up with a Skype invitation. These deadlines are described further on the enclosed table titled *Corrosion Control Study Timeline*.

The department strongly recommends La Crosse work with a consultant and/or treatment expert to determine the best direction in conducting the CCT Study, using EPA's guidance documents. This document contains several resources that can help to direct CCT Study efforts in a meaningful way. An additional department resource, *Components of a Corrosion Control Study,* has been enclosed for your reference.

Please do not hesitate to contact me or your DNR Representative, Glenn Falkowski at (715) 359-5284, if you have any questions regarding these requirements. Your continued efforts to maintain a safe drinking water system are greatly appreciated.

Sincerely,

Cathrine Wunderlich

Cathrine Wunderlich, P.E.
Public Water Engineering Section Chief
Bureau of Drinking Water and Groundwater
(608) 266-0857

Encl. Corrosion Control Study Timeline
Components of a Corrosion Control Study

ecopy: Leland Anderson; La Crosse Waterworks
Glenn Falkowski; DNR Regional Water Supply Engineer
Troy Stapelmann; DNR Regional DG Supervisor
Adam DeWeese; DNR Public Water Supply Section Chief
Bradley Siefker; DNR Public Water Plan Review Engineering

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[i] *Optimal Corrosion Control Treatment Evaluation Technical Guidance for Primacy Agencies and Public Water Systems, March 2016* https://www.epa.gov/sites/production/files/2016-03/documents/occtmarch2016.pdf

WI Large Public Water System, Corrosion Control Study Timeline

TASK ID	TASK	Action Required	DATE TO BE COMPLETED
1.a.	CCT Study Proposal Due	Water System provides draft submittal to the Dept. describing plans for conducting *Demonstrative CCT Study*	October 31, 2019
1.b	CCT Study Proposal Meeting	Department and System conduct a Skype meeting to discuss Demonstrative CCT Study proposal	Week of December 2, 2019
2.	CCT Study Approval	Water System provides final submittal to the Dept. describing demonstrative CCT study; Department reviews and provides follow up letter within 30 days	December 31, 2019
3.	Corrosion Control Study Progress Meeting	Department and System arrange meeting to discuss interim results of demonstrative CCT study; Department provides recommendations and additional questions or concerns depending on results of study	December 2020
4.	Corrosion Control Study Completed	Water System submits findings of Corrosion Control Study along with *Corrosion Control Treatment Plan* to the Department for review for System Implementation with the intent to achieve Optimized Corrosion Control Treatment	December 31, 2021
5.	Corrosion Control Treatment Plan Modifications Completed	System completes installation of Corrosion Control Treatment Plan modifications with the intent to achieve Optimized Corrosion Control Treatment	December 31, 2023

* Please note these timeframes are the maximum allowable timeframes; systems may complete these an accelerated pace if desired.

CORROSION CONTROL TREATMENT STUDY

Components of a Desktop and Demonstrative Corrosion Control Treatment Study

The purpose of this document is to serve as a reference for systems required to conduct a Corrosion Control Treatment Study and outlines the differences between *Desktop* and *Demonstrative* studies. This may **not** encompass all the content necessary for a Corrosion Control Study but serves to highlight some of the major components and expectations for each study type. Each system's study components will depend on system specifics. Refer to the EPA's *Optimal Corrosion Control Treatment Evaluation Technical Guidance for Primacy Agencies and Public Water Systems* for additional information.

Components of a CCT Study May Include:

1) Evaluation of the efficacy of all treatments described in s. NR 809.543(3), as follows:
    a. Alkalinity and pH adjustment.
    b. Calcium hardness adjustment.
    c. The addition of a phosphate or silicate-based corrosion inhibitor at a concentration sufficient to maintain an effective residual concentration in all test samples.
2) For demonstrative studies systems should:
    a. Evaluate each of the corrosion control treatments listed above using either pipe rig or loop tests, metal coupon tests, partial–system tests (see *Corrosion Control Study – Demonstration Study Types* pg 3).
    b. Collect water quality data before *and* after the evaluation of a given treatment; the list of applicable WQPs will be discussed further in later correspondence.
    c. Recommendation for implementation of CCT that minimizes lead and copper at consumer's taps based a demonstrative study conducted using your system's water.
3) For desktop studies systems should:
    a. Evaluate raw, entry point, and distribution system water quality information for the determination of key water quality parameters and their potential impacts of water quality on lead and copper release and treatability.
    Note: This is not just a determination of the corrosivity of water, but an evaluation that considers all aspects of water quality and other non-corrosion control treatments.
    b. Determine primary causes of elevated lead and/or copper: review materials inventories to determine primary sources of lead and copper in drinking water as well as other materials which may contribute to lead and copper releases (i.e. galvanized services/plumbing, brass fixtures, etc.).
    c. Review customer complaint history to identify potential water quality issues that may be contributing to lead and/or copper releases.
    d. Discuss multiple corrosion control treatment types and how the selected treatment and proposed dosing aligns with EPA guidance. Note that some treatment types may require piloting before the Department can approve treatment implementation.
    e. In cases where blended phosphates are selected, discussion of the blend percentage and justification of polyphosphate in the system should be addressed.
    Note: A survey of analogous treatments at other systems will not be accepted.
4) Data and documentation collected during the study including:
    a. Water Quality Parameters impacted by given treatments.
    b. Identification of all chemical and/or physical constraints of the proposed treatment.
    c. Evaluation of the treatment's effect to other water quality treatment processes.
    d. For a detailed list, see Exhibits 4.3, 4.4, 4.5, 4.6, and 4.8 in the OCCT Guidance.
5) Proposed doses and treatment chemicals that will be used to reduce lead and copper at consumer's taps. Plan Review is required for any treatment changes.
6) A detailed schedule of the System's plan/timeline for treatment start-up.
7) See table *Desktop Study vs. Demonstrative Study Comparisons* (pg 2)

Desktop Study vs. Demonstrative Study Comparison		
Corrosion Control Study Content	Desktop Study	Demonstrative Study
Evaluate Raw, Entry Point, and Distribution system water quality parameters and how the various parameters relate to corrosion control.	✓	✓
Conduct profile sampling to determine efficacy of current Corrosion Control Treatment and generate a baseline for any proposed changes.	✓	✓
Identify causes of elevated lead and copper in the system and include an inventory of plumbing materials in the system	✓	✓
Evaluate Multiple Corrosion Control Treatment types including but not limited to phosphate addition, silicate addition, and pH adjustment.[1]	✓	✓
Identify chemical and physical constraints associated with all examined Corrosion Control Treatment types and substantiate all decisions and constraints with data and documentation.	✓	✓
Evaluate distribution system maintenance and flushing programs; determine how level of distribution system cleanliness may be contributing to lead and copper issues.	✓	✓
Conduct Pilot Scale testing to evaluate and substantiate corrosion control treatment constraints and determine the effect proposed treatments will have on system water quality.	Not Required [2]	✓
Conduct Pipe Scale Analysis to determine effectiveness of existing corrosion control treatment.	Not Required [2]	Not Required [2]
Operate a Pipe Loop to evaluate multiple Corrosion Control Treatments over an extended period of time with harvested distribution system plumbing materials to determine potential impacts a corrosion control treatment change could have on existing plumbing.	Not Required [2]	✓
Suggest corrosion control treatment dose, and timeline for implementation in final Corrosion Control Study submitted to Department for evaluation.[1]	✓	✓

[1] During evaluation and study of any blended phosphate or silicate products, which have the potential to sequester lead and copper, substantiation of the blend percentage and product will be required if proposed for Corrosion Control Treatment.

[2] These items are not required for completion of their respective Corrosion Control Studies; however, they may provide significantly more information during treatment evaluations and allow for increased confidence in Corrosion Control Treatment determinations.

Corrosion Control Study – Demonstrative Study Types

The description below are purely informational. A Corrosion Control Study must be tailored to meet the needs of each specific water system and will depend on a number of different variables including sources of lead and copper, source water, and existing treatment in place.

Water system's that will be conducting a Corrosion Control Study are advised to contact a consultant and/or treatment supplier regarding the proper construction, maintenance, and situational use of the proposed demonstration study types. It is also strongly recommended to schedule a meeting with the Department to discuss the details of a Corrosion Control Study prior to implementation.

1) **Pipe Loop Studies.** A pipe loop study includes development of a system constructed with excavated lead service lines installed in a flow through or recirculating system. Valves located throughout the loop allow for water to be circulated at various flow rates to simulate typical use. Pipe loops may require between 3 and 9 months to develop scales consistent with the water system. Lead and/or copper samples should be taken monthly until lead and/or copper level changes are less than or equal to 5%, to ensure scale stabilization. Small scale treatment modifications can be implemented in pipe loop configurations to determine the impact on the water system.

   OR

2) **Coupon Analyses/Monitoring Stations.** Coupon studies and monitoring stations use samples of lead and/ or copper (usually flat metal pieces) to mimic the exposure of system infrastructure to the system's drinking water. Coupon studies and monitoring stations that are maintained properly can provide information to help determine if treatment modifications installed at the station have the potential to decrease the release of lead and/or copper within the distribution system. Coupon studies and monitoring stations have limited uses in predicting exposure of lead and/or copper at consumer's taps given that "fresh" metal coupons lack the scale and treatment seen in consumer's service lines.

   OR

3) **Scale and Solid Analysis.** Lead services excavated from the water system and opened to examine pipe scales. Scales can be examined visually, via X-ray diffraction (XRD), X-ray fluorescence (XRF), X-ray emission spectroscopy, Raman spectroscopy, inductively coupled plasma mass spectroscopy (ICP-MS) and scanning electron microscope (SEM). Elemental analysis and images of excavated pipes can provide indications about the effectiveness and nature of corrosion control and guide recommendation decisions for corrosion control recommendations.

   OR

4) **Partial System Testing.** In hydraulically isolated areas of the distribution system, Department approved treatment modifications and accompanying monitoring for lead and/or copper and water quality parameters can help to optimize corrosion control treatment for larger systems. This partial system testing can be done in connection with a Pipe Loop Study following conditioning of pipe loops. Partial system testing should only be done in consultation with the Department, as there are substantial risks to consumers associated with modifying treatment which has not been properly tested by use of other demonstrative methods.