Corrosion Control Study for Small and Medium Public Water Systems and Treatment Recommendations

TCEQ Form 20495

# Introduction

The chemistry of drinking water can cause lead and copper to leach from plumbing materials. If water produced by your public water system (PWS) exceeds the action level for lead or copper you must complete a corrosion control study (CCST). A CCST reviews the water chemistry in your system.

To help organize and report your study information TCEQ developed a *Corrosion Control Study Form* (TCEQ-Form 20495).

You have 12 months⎯from the end of the monitoring period with the exceedance⎯to gather data, prepare the CCST, and submit to TCEQ for approval. This study is designed to gather the information needed to develop an action plan to reduce corrosion and leaching. At any time during the study feel free to contact TCEQ’s Plan and Technical Review Section for assistance.

After TCEQ approves your CCST, you have 24 months to submit and obtain approval of plans and specifications/exceptions needed, install the approved treatment, and submit certification to the TCEQ.

The following are specific items that must be covered in the CCST.

* Water quality parameter sample results collected for each calendar quarter must be included in your study. This data will determine the best corrosion control treatment (CCT) option for your PWS.
* Describe your current water treatment plant and list all the chemicals used. If you are treating for iron or manganese or if you have “scaling” water, please include this information as well.
* Evaluation of neighboring water systems with the same treatment plant and water chemistry as you is required. Documenting what they are doing to correct their corrosion problem helps you choose a treatment option.
* The most important part of your study is choosing a treatment. In your study, you must evaluate all potential options. Consider seeking professional advice when reviewing options. Be sure to weigh all options before proposing a treatment. Consider effectiveness, but also cost and ease of operation and maintenance. Make sure to consider other water treatment requirements, such as disinfection capabilities or iron and manganese problems.
* After choosing a CCT option, you must report proposed operational ranges for pH and alkalinity, and orthophosphate, calcium, or silicate if these parameters apply to the treatment option. The ranges should reflect expected distribution system values. When conducting post-installation tap sampling, the PWS, may make necessary adjustments in the ranges.

## Record Keeping

Always keep a copy of every document you send to TCEQ. We require all lead and copper documents be kept on file for twelve years as defined in [Title 30 Administrative Code (TAC) Section 290.46(f)(3)(F)](https://texreg.sos.state.tx.us/public/readtac%24ext.TacPage?sl=T&app=9&p_dir=F&p_rloc=183359&p_tloc=44752&p_ploc=29765&pg=4&p_tac=&ti=30&pt=1&ch=290&rl=46)[[1]](#footnote-2).

## Regulatory Authority

[TAC Section 290.117](https://texreg.sos.state.tx.us/public/readtac%24ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=30&pt=1&ch=290&rl=117) [[2]](#footnote-3) gives the State authority to require a CCST and describes the information needed.

## Submitting a Report

Mail completed report to:

Texas Commission on Environmental Quality
Water Supply Division/Public Drinking Water Section
Lead and Copper Coordinator, MC-155
P O Box 13087
Austin TX 78711-3087

Email submissions to PWSLCR@tceq.texas.gov.

## References

Detailed instructions can be found in

[*Optimal Corrosion Control Treatment Evaluation Technical Recommendations for Primary Agencies and Public Water Systems*](https://www.epa.gov/sites/default/files/2016-03/documents/occtmarch2016.pdf) [[3]](#footnote-4) (March 2016 [Updated 2019], EPA 816-B-16-003). EPA’s current guidance document includes technical recommendations that both systems and primacy agencies can use to comply with Lead and Copper Rule (LCR) CCST requirements and to evaluate and designate optimal corrosion control treatment (OCCT) more effectively.

*[Lead and Copper Rule Guidance Manual Vol. 2: Corrosion Control Treatment](https://www.epa.gov/dwreginfo/lead-and-copper-rule-guidance-manual-volume-ii-corrosion-control-treatment)* [[4]](#footnote-5) published by American Water Works Association (AWWA) for USEPA or by contacting the following agencies.

### Additional References

Helpful References and Phone Numbers

* [EPA National Drinking Water Hotline](https://www.epa.gov/aboutepa/epa-hotlines) [[5]](#footnote-6) 1-800-426-4791
* [Texas Water Utility Association](https://twua.org/) [[6]](#footnote-7) 1-888-367-8982
* [US EPA Region 6 Dallas](https://www.epa.gov/aboutepa/epa-region-6-south-central) [[7]](#footnote-8) 1-800-887-6063
* [Texas Engineering Extension Service (TEEX)](https://teex.org/program/water-and-wastewater/) [[8]](#footnote-9) 1-877-833-9638
* [Texas Rural Water Association (TRWA)](https://www.trwa.org/page/LCR) [[9]](#footnote-10) 512/472-8591
* [AWWA Small Systems Hotline](https://www.awwa.org/Contact-Us) [[10]](#footnote-11) 1-800-366-0107
* [Regional Offices of TCEQ](https://www.tceq.texas.gov/agency/directory/region/reglist.html) [[11]](#footnote-12) Contact the Regional Office nearest you.
* [TCEQ Lead and Copper Compliance](https://www.tceq.texas.gov/drinkingwater/chemicals/lead_copper) [[12]](#footnote-13) 512-239-4691

TCEQ Corrosion Control Study Form

# PWS General Information

## PWS ID Number and Name

*Enter the seven-digit number assigned to your PWS by TCEQ. Please use your PWS ID on all correspondence.*

|  |  |  |
| --- | --- | --- |
| 1 | **PWS ID Number** |  |
| 2 | **PWS Name** |  |

## PWS Contact Information

*Enter contact information for the person directly responsible for the corrosion control program (lead and copper program).*

|  |  |  |
| --- | --- | --- |
| 3 | **Contact Person** (print) |  |
| 4 | **Mailing Address** |  |
| 5 | **Telephone Number** |  |
| 6 | **Email Address** |  |
| 7 | **Fax Number** (if any) |  |

## Population Served

*Enter the actual population served by your system, NOT the number of meters you have in the system. Estimate the population served by multiplying the number of meters (connections) by three. Your population number should be equal or close to the population recorded in your* [*Lead/Copper Sample Site Selection Form*](https://www.tceq.texas.gov/drinkingwater/chemicals/lead_copper/lead-copper.html)*.[[13]](#footnote-14) Schools should give the total of number staff and students. Businesses should report the total number of employees.*

|  |  |  |
| --- | --- | --- |
| 8 | **Population Served** |  |

## Corrosion Control Study Contact

*Enter the name of the person preparing the CCST. This section requires a signature and date.*

|  |  |  |
| --- | --- | --- |
| 9 | **PWS Owner/ Representative Name** |  |
| 10 | **Signature** |  |
| 11 | **Agency/Firm Name** |  |
| 12 | **Date** |  |
| 13 | **Telephone Number** |  |

# PWS Technical Information

## Initial Tap Monitoring Results

*To complete this section, use the lead and copper**result reports sent to you by TCEQ. The report lists all samples you collected and their results. The exceedance notification letter sent to you by certified mail lists the 90th percentile value for lead and copper. If this letter is not available, you can calculate the 90th percentile.* *TCEQ can also calculate the 90th percentile upon request.*

### First Round Tap Monitoring Dates

*List the first and last date samples were collected during the first six-month sampling period.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 14 | **First Round Tap Sampling Dates** | From  |  | To |  |

### First Round Tap Monitoring Results

*Enter the lowest (minimum) and highest (maximum) values for lead and copper in Table 1.*

**Table 1**. First round tap monitoring results

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Parameter** | **Minimum Value**  | **Maximum Value**  | **90th Percentile (mg/L)** |
| 15 | lead (mg/L) |  |  |  |
| 16 | copper (mg/L) |  |  |  |

### Second Round Tap Monitoring Dates

*List the first and last date samples were collected for the second six-month sampling period.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 17 | **Second Round Tap Sampling Dates** | From  |  | To |  |

### Second Round Tap Monitoring Results

*Enter the lowest (minimum) and highest (maximum) values for lead and copper in Table 2.*

**Table 2**. Second round tap monitoring results

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Parameter** | **Minimum Sample**  | **Maximum Sample**  | **90th Percentile (mg/L)** |
| 18 | lead (mg/L) |  |  |  |
| 19 | copper (mg/L) |  |  |  |

# Lead and Copper Entry Point Monitoring

*Identify the entry points (EP) in your distribution system. An EP is a sampling tap after all treatment of the water is complete and before the water goes out to the customers. It could be a tap at the clear well, storage tank, or pressure tank. If you have more than three EPs, attach an extra sheet with results so you include all EPs in the report.* *The facility ID for your EP WQP samples must be noted as PBCU001, PBCU002, PBCU003, etc.*

## Entry Points

*Identify PBCU (EPs) by location or name.*

|  |  |  |
| --- | --- | --- |
| 20 | **PBCU001 (EP 1)** |  |
| 21 | **PBCU002 (EP 2)** |  |
| 22 | **PBCU003 (EP 3)** |  |

### Purchased Water

|  |  |  |  |
| --- | --- | --- | --- |
| 23 | **Do you purchase water from another water system?** *Circle One* | **Yes** | **No** |

***Note****: If you buy water from another system, the provider and receiver are responsible for conducting this study. The provider and receiver must enter into an agreement to complete the study. Failure to submit the study constitutes a violation of state and federal rules.*

## PBCU (EP) Sample Results

*TCEQ requires every water system sample each EP after exceeding lead and/or copper action levels. Report the source water results for each entry point sampled in Table 3.*

Table 3. PBCU (EP) sample results

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Parameter** | **PBCU001 (EP1)** | **PBCU002 (EP2)** | **PBCU003 (EP3)** |
| 24 | lead (mg/L) |  |  |  |
| 25 | copper (mg/L) |  |  |  |

## PBCU Water Quality Parameter (WQP) Results

*Report the quarterly PBCU WQP values for each entry point in Tables 4 to 6. Indicate if the test was run in the field or lab by checking the appropriate box. There are three tables to report quarterly data for up to three years.*

*\*Indicate the year for each table in the space provided in the table header.*

*If preferred, attach an Excel spreadsheet or table with your data using the same format shown below. Make sure to reference the attachment here. For example, see “Attachment 1 for entry point water quality parameter results.”*

***Note****: Only report orthophosphate or silica if used as an inhibitor.*

**Table 4**. PBCU (EP) WQP Results⎯Year 1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\*

|  | **Parameter** | **PBCU001** |  |  |  | **PBCU002** |  |  |  | **PBCU003** |  |  |  | **Field** | **Lab** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Quarter #** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** |  |  |
| 26 | pH |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 27 | temperature (° C) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 | alkalinity as CaCO3 (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 29 | calcium as Ca (mg/L)calcium method:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 | conductivity as µmho/cm @25°C |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 31 | total dissolved solids (TDS) (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 | sulfate (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 33 | chloride (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 | iron (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 35 | manganese (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 | orthophosphate as P (mg/L)  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 37 | silica as SiO2 (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Table 5**. PBCU (EP) WQP Results⎯Year 2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\*

|  | **Parameter** | **PBCU001** |  |  |  | **PBCU002** |  |  |  | **PBCU003** |  |  |  | **Field** | **Lab** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Quarter #** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** |  |  |
| 38 | pH |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 39 | temperature (° C) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 | alkalinity as CaCO3 (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 41 | calcium as Ca (mg/L)calcium method:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 | conductivity as µmho/cm @25°C |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 43 | total dissolved solids (TDS) (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 | sulfate (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 45 | chloride (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 | iron (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 47 | manganese (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 | orthophosphate as P (mg/L)  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 49 | silica as SiO2 (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Table 6**. PBCU (EP) WQP Results⎯Year 3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\*

|  | **Parameter** | **PBCU001** |  |  |  | **PBCU002** |  |  |  | **PBCU003** |  |  |  | **Field** | **Lab** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Quarter #** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** |  |  |
| 50 | pH |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 51 | temperature (° C) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 52 | alkalinity as CaCO3 (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 53 | calcium as Ca (mg/L)calcium method:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 54 | conductivity as µmho/cm @25°C |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 55 | total dissolved solids (TDS) (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 56 | sulfate (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 57 | chloride (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 58 | iron (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 59 | manganese (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 | orthophosphate as P (mg/L)  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 61 | silica as SiO2 (mg/L) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

## Minerals Analysis Report

*Enter the values from your most recent TCEQ minerals analysis report in Table 7. A TCEQ contract sample collector takes a mineral sample from all EPs at least once every three years. The laboratory sends you the sample results.*

**Table 7**. Minerals analysis sample results

|  | **Parameter** | **PBCU001** | **PBCU002** | **PBCU003** |
| --- | --- | --- | --- | --- |
| 62 | TDS (mg/L) |  |  |  |
| 63 | hardness as CaCO3 (mg/L) |  |  |  |
| 64 | chloride (mg/L) |  |  |  |
| 65 | sulfate (mg/L) |  |  |  |

# Distribution System WQP Samples

*This section relates to distribution samples collected for the quarterly WQP reports.*

|  |  |  |
| --- | --- | --- |
| 66 | **How many samples were collected in the distribution system each quarter?** |  |

*List each Quarter WQP samples were collected in the “Q# YYYY” format. Example: “Q4 2021”, “Q1-Q3 2022”*

|  |  |  |
| --- | --- | --- |
| 67 | **What is the time-period of distribution (tap) WQP samples collection?**  |  |

## Distribution System Water Quality Data

*Enter the minimum and maximum values for each parameter listed in Table 8. Since the data represents each season of the year some parameters may have a large range.*

**Table 8**. Distribution system water quality data

|  | **Parameter** | **Minimum** | **Maximum** |
| --- | --- | --- | --- |
| 68 | pH |  |  |
| 69 | alkalinity as CaCO3 (mg/L) |  |  |
| 70 | dissolved inorganic carbon (DIC) as C (mg/L)[[14]](#footnote-15) |  |  |
| 71 | temperature (°C) |  |  |
| 72 | calcium as Ca (mg/L)calcium method:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  |
| 73 | conductivity (µmho/cm @ 25°) |  |  |
| 74 | orthophosphate as P (mg/L), if used |  |  |
| 75 | silica as SiO2 (mg/L), if used |  |  |

|  |  |  |
| --- | --- | --- |
| 76 | What is the average DIC as C (mg/L) |  |

### Water Sources

### Identify all water sources by name (aquifer, wells, lake, river, etc.)

|  |  |  |
| --- | --- | --- |
| 77 | **Source 1** |  |
| 78 | **Source 2** |  |
| 79 | **Source 3** |  |

## Water Quality of Untreated Sources

*Report chemical values, if available, for your raw untreated water from each source in Table 9. If you use surface water include data for each raw water source. If you use groundwater wells, water quality data for each well is acceptable but not necessary if several wells have similar data. For example, you can summarize water quality data for each well field or grouping of wells with similar quality.*

*If preferred, attach an Excel spreadsheet or table with your data using the same format shown below. Make sure to reference the attachment here. For example, see “Attachment 2 for entry point water quality parameter results.”*

*Before a new well is placed into service, the driller should have submitted raw water samples to an accredited laboratory for analysis. Some of this data may be on file at the TCEQ. You can request it through TCEQ Central Records at 512-239-2900. Copies of well drillers’ logs and data are available from the Texas Water Development Board at 512-463-8337.*

**Table 9**. Untreated sources water quality data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Parameter** | **Source 1** | **Source 2** | **Source 3** |
| 80 | pH |  |  |  |
| 81 | alkalinity as CaCO3 (mg/L) |  |  |  |
| 82 | conductivity (µmho/cm @ 25°) |  |  |  |
| 83 | TDS (mg/L) |  |  |  |
| 84 | calcium as Ca (mg/L)calcium method:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  |  |
| 85 | hardness as CaCO3 (mg/L) |  |  |  |
| 86 | temperature (°C) |  |  |  |
| 87 | chloride (mg/L) |  |  |  |
| 88 | sulfate (mg/L) |  |  |  |

# Existing Conditions

## Existing Water Treatment

*In this section, describe your water treatment facilities and chemicals used. List all chemicals you normally feed and occasionally feed into your system. Include disinfection, softening, and sequestering chemicals. Also, include the date of any major changes during the study period. If using a phosphate-based product, include the product name and manufacturer.*

|  |  |
| --- | --- |
| 89 | **Describe all disinfection and filtering methods used.** |
|  |  |
|  |  |

|  |  |
| --- | --- |
| 90 | **List chemicals normally used.** *Include the date of any major change that occurred during the study period.* |
|  |  |
|  |  |
|  |  |

|  |  |
| --- | --- |
| 91 | **List chemicals used occasionally.** *Include when and why the chemicals were used.* |
|  |  |
|  |  |
|  |  |

## Existing Distribution System

*This section deals with distribution. Your distribution system could have lead service lines if installed prior to 1988. Part of good system management involves flushing your dead-end lines. When water stagnates in a dead-end main, water pH will often drop to corrosive levels.*

|  |  |  |  |
| --- | --- | --- | --- |
| 92 | **Does the distribution system contain lead service lines?** *Circle One* | **Yes** | **No** |

If **yes**,

|  |  |  |
| --- | --- | --- |
| 93 | **When were they installed?** |  |
| 94 | **How many can be found from existing records?** *None, Some, Most, All?* |  |
| 95 | **How often is the distribution system flushed?** |  |

## Present Corrosion Control Treatment

|  |  |  |  |
| --- | --- | --- | --- |
| 96 | **Does the system already use corrosion control treatment?** *Circle One* | **Yes** | **No** |

If **no**, skip to the [*Calcium Carbonate, Iron and Manganese Problems*](#_Calcium_Carbonate,_Iron,) section.

If **yes**,

|  |  |  |  |
| --- | --- | --- | --- |
| 97 | **Is an inhibitor used (blended phosphate, orthophosphate, etc.)?** *Circle One* | **Yes** | **No** |

|  |  |  |
| --- | --- | --- |
| 98 | **When was this treatment started?** *Enter Date* |  |

|  |  |  |
| --- | --- | --- |
| 99 | **What is the current inhibitor dose?** |  |

## Inhibitor Residual in Distribution System

|  |  |  |
| --- | --- | --- |
| 100 | Enter the **Maximum Inhibitor Residual** (mg/L) |  |

|  |  |  |
| --- | --- | --- |
| 101 | Enter the **Minimum Inhibitor Residual** (mg/L) |  |

|  |  |  |
| --- | --- | --- |
| 102 | *Enter* **Inhibitor Brand Name and Manufacturer** |  |

|  |  |  |
| --- | --- | --- |
| 103 | *Enter* **Type of Inhibitor Used** (phosphate or silica) |  |

|  |  |
| --- | --- |
| 104 | **Has the inhibitor been effective?** *Comment on your experience.* |
|  |  |

### pH or Alkalinity Adjustment

*Does your system use pH control or alkalinity adjustment for corrosion control with lime, soda ash, or sodium bicarbonate, caustic soda, or carbon dioxide either with or without an inhibitor?*

|  |  |  |  |
| --- | --- | --- | --- |
| 105 | **Does the system use pH or alkalinity adjustment for corrosion control?** *Circle One* | **Yes** | **No** |

If **yes**,

|  |  |  |
| --- | --- | --- |
| 106 | **How is the pH and/or alkalinity adjusted?** |  |

|  |  |  |
| --- | --- | --- |
| 107 | **What is the target pH?** |  |

|  |  |  |
| --- | --- | --- |
| 108 | **What is the target alkalinity (mg/L CaCO3)?** |  |

### Calcium Adjustment

|  |  |  |  |
| --- | --- | --- | --- |
| 109 | **Does the system use calcium adjustment for corrosion control?** *Circle One* | **Yes** | **No** |

If **yes**,

|  |  |  |
| --- | --- | --- |
| 110 | **What is the target calcium (mg/L as Ca)?** |  |

## Previous Corrosion Control Studies

|  |  |  |  |
| --- | --- | --- | --- |
| 111 | **Have there been any previous corrosion control studies?** *Circle One* | **Yes** | **No** |

If **yes**,

|  |  |  |
| --- | --- | --- |
| 112 | **Enter the date(s) of this study** |  |

|  |  |  |
| --- | --- | --- |
| 113 | **Who conducted the corrosion control study?** |  |

|  |  |
| --- | --- |
| 114 | **Briefly describe the results of this study.** *Discuss why treatment changes didn’t work.* |
|  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| 115 | **(Optional) Results of the previous study attached?** *Circle One* | **Yes** | **No** |

|  |  |  |  |
| --- | --- | --- | --- |
| 116 | **Were treatment changes recommended?** *Circle One* | **Yes** | **No** |

|  |  |  |  |
| --- | --- | --- | --- |
| 117 | **Were treatment changes carried out?** *Circle One* | **Yes** | **No** |

### Water Quality Improvement

|  |  |
| --- | --- |
| 118 | **Describe water quality improvements seen since corrosion control treatment was installed.** |
|  |  |

### Measured Improvements

*If you noticed a change in corrosion, how did you know this change happened? How did you measure the change? For example, have you noticed fewer customers calling with “dirty water” complaints or that less corrosion is seen during pipe repairs?*

|  |  |
| --- | --- |
| 119 | **Please list any measured improvements**. |
|  |  |

## Calcium Carbonate, Iron, or Manganese Problems

*If your water system produces scaling water, your customers will report calcium carbonate scale on their faucets, sinks, coffee pots, and inside hot water heaters.*

|  |  |  |  |
| --- | --- | --- | --- |
| 120 | **Does the water system have calcium carbonate scaling problems?** *Circle One* | **Yes** | **No** |

*If you are treating for iron and manganese, enter the product (brand name) being used and include its chemical type. If you are using a phosphate based sequestering chemical, it may be a zinc or sodium compound with a poly, orthophosphate, or blended phosphate or a combination of these chemicals. If unsure of the chemical combinations, ask the vendor who sold it to you.*

|  |  |  |  |
| --- | --- | --- | --- |
| 121 | **Is the water system treating for iron or manganese problems?** *Circle One* | **Yes** | **No** |

If **yes**,

|  |  |  |
| --- | --- | --- |
| 122 | **How do you treat for iron or manganese?** |  |

|  |  |
| --- | --- |
| 123 | **Describe any type of customer complaints received and their severity** (taste, odor, color, sediments, scaling, or staining). |
|  |  |

# Treatment Constraints

***Note****: This section must be completed for your study to be approved.*

|  |
| --- |
| **optimal corrosion control treatment**⎯corrosion control treatment that reduces lead and copper concentrations at users' taps while assuring that treatment does not cause the water system to violate any national primary drinking water regulations*.*  |

*This section helps you choose a method of corrosion control that does not interfere with any other state or federal rule. Part of the lead and copper rule specifically states that corrosion control treatment should not have a detrimental impact on regulatory or functional constraints.*

*In this section discuss your reasons for choosing to use or not use each of the following corrosion control strategies. Be sure to consider the feasibility of each type of treatment. Some treatments may be too expensive or require highly skilled personnel to maintain.*

*If your PWS uses surface water, pH adjustment could exceed the limits of your concentration-time (CT) study. Choose a corrosion control system that is cost effective and easy to operate but does not violate any other state drinking water rules and regulations.*

***Consider the following when choosing a corrosion control treatment.***

* *Increasing the pH before disinfection reduces the inactivation effectiveness of free chlorine. This may cause some positive bacteriological samples. If you have a surface water system, this may affect the ability to meet disinfection requirements of the Surface Water Treatment Rule (SWTR). It may be necessary to conduct daily CT calculations or to submit a revised CT study to ensure compliance with the SWTR if pH adjustment occurs within the disinfection zone.*
* *A raise in pH may cause the precipitation of lime (calcium), aluminum, iron, and manganese. This may generate customer complaints.*
* *Adjusting the pH before disinfection may also increase TTHM concentrations.*
* *In-plant adjustments may affect the removal of radioactive particles when using precipitation techniques for coagulation or softening. Modifying softening practices to achieve corrosion control could interfere with removals.*

***Consider the following functional constraints when choosing a corrosion control treatment.***

* *Installing corrosion control requires the addition of controls and chemical feed equipment. Water operators may need training to maintain the equipment and chemicals which may require increased treatment plant monitoring.*
* *Multiple EPs will require corrosion control treatments at each site. If different EPs have different water characteristics, adjust chemical doses for each water source.*
* *Excessive calcium precipitation can clog distribution lines. Calculate the potential for precipitation with an index called the Calcium Carbonate Precipitation Potential (CCPP). A qualified engineer with water system experience can calculate this value.*
* *Sodium-based chemicals used for alkalinity or pH adjustments, may cause excessively high sodium values in the finished water, if raw water sodium values are already a problem.*
* *Choosing to use a zinc-orthophosphate may exceed allowable zinc or phosphate levels in your community’s treated wastewater effluent. Although rare, check your NPDES wastewater permits for zinc and phosphate limits to see if this may be a problem.*
* *Changes in water chemistry may affect health care facilities. They should be advised of any pending changes.*
* *Some corrosion control treatments may be too costly to install and operate.*
* *Some chemical vendors are more reliable and offer more reasonably priced products than others. Shop around and get references from neighboring water systems.*

## Carbonate Passivation⎯pH/Alkalinity Adjustment

|  |  |
| --- | --- |
| 124 | **Carbonate Passivation using pH or alkalinity adjustment would/would not (circle one) be a good choice of corrosion control because**: |
|  |  |

## Inhibitor Passivation⎯Blended Phosphate, Orthophosphate or Silica-based

|  |  |
| --- | --- |
| 125 | **Inhibitor passivation with either a phosphate or silica-based corrosion control additive would/would not (*circle one*) be a good choice of corrosion control because**:  |
|  |  |

# Evaluation

***Note****: This section must be completed for your study to be approved.*

*List the PWSs you have reviewed as references by name and ID number. In-state or out-of-state water systems may be used if they have similar sized distribution systems and water quality. An ID number is not required for out-of-state systems, but you must provide the name and address.* [*Texas Drinking Water Watch*](https://www.tceq.texas.gov/drinkingwater/instructions-for-texas-drinking-water-watch)*[[15]](#footnote-16) is a good resource for searching and finding operational information for PWSs in Texas.*

## List of Similar PWSs

|  |  |
| --- | --- |
| 126 | **List the PWSs reviewed by name and ID number.** |
|  |  |

## Review of Similar PWSs

*In the space below, briefly summarize the corrosion control review of similar PWSs listed above. Use additional pages if needed. Describe their source water, water treatment, corrosion control, distribution system, and, most important, if their corrosion control reduced the lead and copper levels below the action levels.*

*If preferred, attach the summary or report for each PWS to this form. Make sure to reference the attachment here. For example, see “Attachment 3 for the evaluation of similar water systems summaries.”*

|  |  |
| --- | --- |
| 127 | **Summarize the corrosion control review of similar PWSs listed above**. |
|  |  |

# Recommendations/Proposed Treatment

***Note****: For your study to be approved you must complete this section using one of the four options.*

*At this point you should select a method that best applies to your system using the information summarized in this report. This section establishes guidelines for your PWS to follow. If the state approves your target operational ranges for pH and alkalinity, or for the target dose and residual range for an inhibitor, we expect your PWS to operate within these guidelines. If your follow-up tap sampling does not prove that corrosion control is effective (you exceed the action level for lead or copper at the 90th percentile), you must reevaluate your corrosion control treatment for possible adjustments.*

***SELECT ONE CORROSION CONTROL TREATMENT OPTION.***

## Options 1 and 2

In the OCCT guidance document, the EPA defines two general approaches to corrosion control—**Carbonate Passivation** and **Corrosion Inhibitor Passivation** (using either phosphate-based inhibitors or silicate inhibitors). These approaches are covered in Options 1 and 2. See Table 10.

**Table 10**. Options 1 and 2 corrosion control approaches

|  |  |  |  |
| --- | --- | --- | --- |
| **Control Mechanism** | → | Passivation |  |
| **Treatment Approach** | → | pH/alkalinity | corrosion inhibitor |
| **Key Water Quality Parameters** | → | pH, alkalinity, TDS, and temperature | pH, alkalinity, metals, hardness, and temperature |
| **Appropriate Chemical Feed Systems** | → | lime, aeration, soda ash, potash, sodium bicarbonate, caustic soda, carbon dioxide, limestone/calcite filter | orthophosphate, blended phosphate, or silicate |

|  |  |  |  |
| --- | --- | --- | --- |
| 128 | **OPTION 1**: **CARBONATE PASSIVATION (pH/Alkalinity adjustment)** *Circle One* | **Yes** | **No** |

If **yes**,

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 129 | *Enter* **Target pH Range**  |  | to |  | Target Alkalinity Range (mg/L as CaCO3)  |  | to |  |

|  |  |  |  |
| --- | --- | --- | --- |
| 130 | **OPTION 2**: INHIBITOR PASSIVATION (use of an inhibitor)*Circle One* | **Yes** | **No** |

|  |  |  |
| --- | --- | --- |
| 131 | *Enter* **Inhibitor Used**⎯*phosphate-based (blended phosphate or orthophosphate) OR silica-based.* |  |

|  |  |  |
| --- | --- | --- |
| 132 | *Enter* **Inhibitor Brand Name and Manufacturer** |  |

|  |  |  |
| --- | --- | --- |
| 133 | *Enter* **Target Dose** in mg/L *List one target value* |  |

*Enter* **Target Residual Range.** *For phosphate-based**enter**orthophosphate as P OR for silica-based enter silica as SiO2 (mg/L)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 134 | *Enter* **Target Residual Range** in (mg/L) |  | to |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 135 | *Enter* **pH Operational Range**  |  | to |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 136 | *Enter* **Alkalinity Operational Range** (mg/L as CaCO3)  |  | to |  |

## Option 3

*If already using a CCT when sampling and exceeding the lead or copper action level, you may propose not to change treatment. If you select this option, provide a valid reason treatment did not prevent the leaching of lead and/or copper into your customer's first draw sample. You can probably use the same treatment you were using before with some modifications of the chemical parameters involved. For example, you may need to boost your pH or alkalinity levels or use a different chemical mix for an inhibitor. If you were already using a sequestering agent for iron and manganese, discuss your lead/copper problem with the vendor. They can probably suggest a better product to control both your iron/manganese and lead/copper problems.*

|  |  |  |  |
| --- | --- | --- | --- |
| 137 | **OPTION 3**: CONTINUE USING PRESENT CORROSION CONTROL*Circle One* | **Yes** | **No** |

*Describe the treatment you are currently using. List the ranges of the appropriate parameters.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 138 | *Enter* **pH Operational Range**  |  | to |  |
| 139 | *Enter* **Alkalinity Operational Range** (mg/L as CaCO3) |  | to |  |
| 140 | *Enter* **Calcium Range** mg/L as Ca (if currently using calcium hardness adjustment) |  | to |  |

**Inhibitor Ranges** *Check One, if used*

|  |  |  |
| --- | --- | --- |
| 141 | **phosphate-based (blended phosphate or orthophosphates)** |  |
| 142 | **silica-based** |  |

|  |  |  |
| --- | --- | --- |
| 143 | *Enter* **Inhibitor Brand Name and Manufacturer** |  |

|  |  |  |
| --- | --- | --- |
| 144 | *Enter* **Target Dose** in mg/L  |  |

*Enter the Target Residual Range.**For phosphate-based**enter**orthophosphate as P OR for silica-based enter silica as SiO2 (mg/L)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 145 | *Enter* **Target Residual Range** in (mg/L) |  | to |  |

*If your current CCT was in place at the time of your lead or copper exceedance, why do you think the exceedance happened? For example: equipment failure, improper sampling procedures, etc.*

|  |  |
| --- | --- |
| 146 | **Describe why the lead or copper exceedance happened.** |
|  |  |

## Option 4

*If you propose an alternative treatment that does not follow the current EPA OCCT guidance, it will not be approved unless a demonstration study is conducted. If your PWS wants to conduct a demonstration study, you must submit a demonstration study protocol and a request for up to six months to perform and provide the study results to TCEQ before your corrosion control study due date. A demonstration study can consist of bench scale testing, pipe loop testing, or a limited test of a portion of the distribution system. A summary of demonstration study tools can be found in the* [*EPA OCCT*](https://www.epa.gov/sites/default/files/2019-07/documents/occtmarch2016updated.pdf) *Appendix F Section F.2.[[16]](#footnote-17) Additional demonstration study resources can be found under the “LCR Action Level Exceedance” heading on the* [*Drinking Water Lead and Copper Program*](http://www.tceq.texas.gov/drinkingwater/chemicals/lead_copper/lead-copper.html) *website.[[17]](#footnote-18)*

*For some specific situations, USEPA has authorized the use of daily automated flushing systems to flush the plumbing in very small water systems as an alternative to treatment. For example, they allowed a small elementary school to do this each morning instead of installing chemical corrosion control.*

|  |  |  |  |
| --- | --- | --- | --- |
| 147 | **OPTION 4**: **ALTERNATIVE TREATMENT NOT LISTED** *Circle One* | **Yes** | **No** |

*Please summarize this treatment and your rationale for arriving at this decision. Please be advised that an alternative treatment that does not follow the EPA OCCT guidance will not be approved unless a demonstration study is conducted.*

|  |  |
| --- | --- |
| 148 | **Summarize the alternative treatment and the rationale for arriving at this decision.** |
|  |  |

# Summary

*After we approve this study, you have 24 months to submit plans and specifications/exceptions needed and install the treatment you proposed. We will require two rounds of lead and copper tap sampling to prove that your choice of corrosion control has been effective. If the water system fails to meet the action levels for lead and copper, you are required to reevaluate your corrosion control treatment.* ***Note****: A PWS is not authorized to install treatment until approved by TCEQ*

|  |  |
| --- | --- |
| 149 | **Explain your choice for the proposed corrosion control treatment option (1, 2, 3, or 4). You may attach a full report. Use extra sheets if needed.** |
|  |  |

## Corrosion Control Treatment Installation

|  |  |  |  |
| --- | --- | --- | --- |
| 150 | **If you proposed installation of corrosion control treatment, has it been installed?** *Circle One* | **Yes** | **No** |

If **yes**,

|  |  |  |
| --- | --- | --- |
| 151 | *Enter* **date treatment was placed in service**. |  |

If **no**,

|  |  |  |
| --- | --- | --- |
| 152 | *Enter* **expected date treatment will be placed in service**. |  |

TCEQ will test your option choice with two follow-up rounds of lead and copper tap sampling within 36 months after this study’s approval. Even if you are proposing “no treatment,” you must conduct follow-up rounds. If you fail either of the two rounds, you must reevaluate the study and propose a new corrosion control treatment.

|  |  |  |  |
| --- | --- | --- | --- |
| 153 | **If you installed corrosion control treatment, are you ready to begin follow-up lead and copper tap sampling?** *Circle One* | **Yes** | **No** |

|  |  |  |
| --- | --- | --- |
| 154 | **If you are not ready to sample, when do you expect to be ready?** *Enter a date* |  |

**WARNING: 30 TAC 290.39(h) and (j) requires prior approval by TCEQ before beginning the construction of a PWS or any of its components. The new Lead and Copper Rule Short Term Revision requires all corrosion control treatment be approved before installation. Please contact the TCEQ Plan and Technical Review Team at 512/239-4691 to request approval for the proposed corrosion control system.**

1. https://texreg.sos.state.tx.us/public/readtac$ext.TacPage?sl=T&app=9&p\_dir=F&p\_rloc=183359&p\_tloc=44752&p\_ploc=29765&pg=4&p\_tac=&ti=30&pt=1&ch=290&rl=46 [↑](#footnote-ref-2)
2. https://texreg.sos.state.tx.us/public/readtac$ext.TacPage?sl=R&app=9&p\_dir=&p\_rloc=&p\_tloc=&p\_ploc=&pg=1&p\_tac=&ti=30&pt=1&ch=290&rl=117 [↑](#footnote-ref-3)
3. https://www.epa.gov/sites/default/files/2016-03/documents/occtmarch2016.pdf [↑](#footnote-ref-4)
4. https://www.epa.gov/dwreginfo/lead-and-copper-rule-guidance-manual-volume-ii-corrosion-control-treatment [↑](#footnote-ref-5)
5. https://www.epa.gov/aboutepa/epa-hotlines [↑](#footnote-ref-6)
6. https://twua.org/ [↑](#footnote-ref-7)
7. https://www.epa.gov/aboutepa/epa-region-6-south-central [↑](#footnote-ref-8)
8. https://teex.org/program/water-and-wastewater/ [↑](#footnote-ref-9)
9. https://www.trwa.org/page/LCR [↑](#footnote-ref-10)
10. https://www.awwa.org/Contact-Us [↑](#footnote-ref-11)
11. https://www.tceq.texas.gov/agency/directory/region/reglist.html [↑](#footnote-ref-12)
12. https://www.tceq.texas.gov/drinkingwater/chemicals/lead\_copper [↑](#footnote-ref-13)
13. https://www.tceq.texas.gov/drinkingwater/chemicals/lead\_copper/lead-copper.html [↑](#footnote-ref-14)
14. Dissolved Inorganic Carbon (DIC) can be determined by using the table in Appendix B of EPA’s guidance document, [Optimal Corrosion Control Treatment Evaluation Technical Recommendations for Primary Agencies and Public Water Systems](https://www.epa.gov/sites/default/files/2019-07/documents/occtmarch2016updated.pdf) (EPA816-B-16-003, March 2016 (Updated). [↑](#footnote-ref-15)
15. https://www.tceq.texas.gov/drinkingwater/instructions-for-texas-drinking-water-watch [↑](#footnote-ref-16)
16. https://www.epa.gov/sites/default/files/2019-07/documents/occtmarch2016updated.pdf [↑](#footnote-ref-17)
17. www.tceq.texas.gov/drinkingwater/chemicals/lead\_copper/lead-copper.html [↑](#footnote-ref-18)