Texas Commission on Environmental Quality (TCEQ)
Form 20495 Corrosion Control Study for
Small and Medium PWS and Treatment Recommendations

PWS General Information:

1. PWS ID No: _____

2. Contact Person (print):	
3. Name of PWS	
4. Mailing Address	
5. Telephone #	
6. Fax # (if any)	

7. Population Served: _____

8. Person Responsible Name	
9. Signature	
10. Agency/Firm	
11. Date	
12. Telephone #	

PWS Technical Information - Initial Tap Monitoring Results:

13. First Round Tap Sampling Dates: From _____ to _____

Parameter	#	Minimum Sample (mg/l)	#	Maximum Sample (mg/l)	#	90th Percentile (mg/l)
Lead	14.		15.		16.	
Copper	17.		18.		19.	

20. Second Round Tap Sampling Dates: From _____to _____

Parameter	#	Minimum Sample (mg/l)	#	Maximum Sample (mg/l)	#	90th Percentile (mg/l)
Lead	21.		22.		23.	

Copper	24.		25.		26.	

Lead & Copper Entry Point Monitoring

Identify entry points by location or name:
27. 1:
28. 2:

29. Do you purchase water from another water system? (Yes/No) _____

TCEQ required every water system that exceeded the lead or copper action levels to sample each entry point. In the chart below, report the source water results for each entry point.

Parameter	**1**	**2**	**3**
30. Lead (mg/l)			
31. Copper (mg/l)			

Entry Point Water Quality Parameter Results

Report the quarterly values for each entry point. Show if you ran each test in the field or lab by checking the appropriate box.

32. Year 1, _____

Parameter	Entry point 1				Entry point 2				Entry point 3				FIELD	LAB
Quarter #	1	2	3	4	1	2	3	4	1	2	3	4		
33. pH														
34. Temp ^{o}C														
35. Alkalinity (mg/l) as $CaCO_3$														
36. Calcium (mg/l) as Ca														
37. Conductivity as umho/cm @25°C														
38. *orthophosphate, mg/l as P														
39. *silica, mg/l as SiO_2														

* report only if the PWS has used this inhibitor

40. Year 2, _____

Parameter	Entry point 1	Entry Point 2	Entry Point 3	FIELD	LAB

Quarter #	1	2	3	4	1	2	3	4	1	2	3	4		
41. pH														
42. Temp ^{o}C														
43. Alkalinity (mg/l) as $CaCO_3$														
44. Calcium (mg/l) as Ca														
45. Conductivity as umho/cm @25°C														
46. *orthophosphate, mg/l as P														
47. *silica, mg/L as SiO_2														

* report only if the PWS has used this inhibitor

48. Year 3, _____

Parameter	Entry Point1				Entry Point 2				Entry Point 3				FIELD	LAB
Quarter #	1	2	3	4	1	2	3	4	1	2	3	4		
49. pH														
50. Temp ^{o}C														
51. Alkalinity (mg/l) as $CaCO_3$														
52. Calcium (mg/l) as Ca														
53. Conductivity as umho/cm @25°C														
54. *orthophosphate, mg/l as P														
55. *silica, mg/L as SiO_2														

* report only if the PWS has used this inhibitor

The following information is available from your minerals analysis report collected by our field contractor and sent to you by the Texas Commission on Environmental Quality. All chemical reports for your water system must be kept in your files for twelve years.

Parameter	Entry Point 1	Entry Point 2	Entry Point 3
56. Total Dissolved Solids (mg/l)			
57. Hardness (mg/l) as $CaCO_3$			
58. Chloride (mg/l)			

59. Sulfate (mg/l)			

Distribution Water Quality Parameter Samples:

60. How many samples did you take in the distribution system each quarter? Field Lab.

61. pH: minimum = _____maximum = _____ ____ ____

62. Alkalinity: (mg/l as $CaCO_3$)
minimum = _____ maximum = _____

63. Temperature: ^oC
minimum = _____ maximum = _____

64. Calcium: (mg/l as Ca)
minimum = _____ maximum = _____

65. Conductivity: (umho/cm @ 25^oC)
minimum = _____ maximum = _____

66. Orthophosphate: (mg/l as P if used)
minimum = _____ maximum = _____

67. Silica: (mg/l as SiO_2 if used)
minimum = _____ maximum = _____

Raw Water Quality: Results of Untreated Source Water Monitoring

Identify all water sources by name (Aquifer, Wells, Lake, River, etc.)

68. Source No. 1: _____

69. Source No. 2: _____

70. Source No. 3: _____

Complete the following table for typical untreated water quality data if available. If you use surface water include data for each raw water source. If you use wells, water quality information for each well is acceptable but not necessary if several wells have similar data. For example, you can make water quality summaries for each well field or grouping of wells with similar quality.

UNTREATED SOURCE

Parameter	Source No. 1	Source No. 2	Source No. 3
71. pH units			
72. Alkalinity (mg/l) as $CaCO_3$			
73. Conductivity umho/cm @25^oC			

74. Total dissolved solids (mg/l)			
75. Calcium (mg/l) as Ca			
76. Hardness (mg/l) as $CaCO_3$			
77. Temperature, ^oC			
78. Chloride (mg/l)			
79. Sulfate (mg/l)			

Existing Conditions

Existing Water Treatment:

80. Describe the water treatment facility below listing all disinfection and filtering methods used.

81. List chemicals normally fed: _____
82. List chemicals fed occasionally:

Existing Distribution System:

83. Does the distribution system contain lead service lines? (Yes/No) _____

When were they installed? _____

84. If Yes, how many can be found from existing records? (None/Some/Most/All) _____

85. How often is the distribution system flushed? _____

Present Corrosion Control Treatment

86. Does the system already use corrosion control treatment? (Yes/No)_____

87. If "Yes," is an inhibitor (polyphosphate, orthophosphate, etc.) (Yes/No) _____

88. When was this treatment started? (Date) _____

89. Present inhibitor dose: _____

Residual of the inhibitor in distribution system:

90. Minimum (mg/l) _____

91. Maximum (mg/l) _____

92. Brand name: _____

93. Type of inhibitor (phosphate or silica): _____

94. Has the inhibitor been effective? Please comment on your experience. _____

_____
_____

95. Does the system use pH or alkalinity adjustment for corrosion control? (Yes/No)_____

96. If "Yes," what is the pH target? _____

97. What is the alkalinity target (mg/L $CaCO_3$)? _____

98. Does the system use calcium adjustment for corrosion control? (Yes/No)_____

99. If "Yes," what is the calcium target (mg/L Ca)? _____

100. Have there been any previous corrosion control studies (Yes/No)? _____

101. If "Yes," please show the date(s) of this study. _____

102. Who conducted the corrosion control study? _____

103. Briefly describe the results of this study. _____
_____
_____
_____

104. (Optional) Results of previous study attached (Yes/No). _____

105. Were treatment changes recommended (Yes/No)? _____

106. Were treatment changes carried out (Yes/No)? _____

107. What improvements have you seen in your water quality since you installed a corrosion control treatment?
_____
_____
_____

How have you measured this change?

108. Frequency of complaints _____

109. Less corrosion seen during pipe repairs _____

110. Other (describe) _____
_____
_____
_____

111. Does the water system have calcium carbonate scaling problems (Yes/No)? _____

112. Is the water system treating for iron or manganese problems (Yes/No)? _____

113. Describe any type of customer complaints you have received and their severity. (taste and odor, color, sediments, scaling or staining)

_____

_____

_____

*Treatment Constraints: (If you don't complete this section, we cannot approve your study.)

Optimal corrosion control treatment means the corrosion control treatment that reduces the lead and copper concentrations at users' taps while assuring that the treatment does not cause the water system to violate any national primary drinking water regulations. In the lines below discuss your reasons for choosing to use or not to 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 them. If your PWS uses surface water, pH adjustment could exceed the limits of your CT study. You should choose a corrosion control system that is cost effective and easy to operate, but that does not violate any other state drinking water rules and regulations. See the Instructions for other constraints you should consider when choosing a corrosion control treatment.

114. Carbonate Passivation (pH/Alkalinity Adjustment) pH or alkalinity adjustment would/would not (circle one) be a good choice of corrosion control because:

_____

_____

_____

115. Calcium Precipitation (Calcium Adjustment)

_____

_____

_____

Calcium adjustment would/would not (circle one) be a good choice of corrosion control because:

_____

_____

_____

116. Inhibitor Passivation (Phosphate or Silica Based)

_____

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: (If you do not complete this section, we cannot approve your study.)

117. List the PWS's that you have reviewed as references for this study (include name and ID #):

_____

118. In the space below, briefly summarize the reviews of corrosion control for PWS's similar in water chemistry, size, etc. to your PWS. Identify what corrosion control treatment they used (no treatment at all, ph/alkalinity adjustment, calcium adjustment, or a phosphate or silica-based inhibitors) and if the treatment was successful. You may attach the summary or report for each PWS to this form or use more pages if needed.

_____

_____

_____

Recommendations/Proposed Treatment: (If you do not complete this section for one of the five options, we cannot approve your study.)

The corrosion control treatment method being proposed for this public water system is:

*** 119. OPTION 1: CARBONATE PASSIVATION (pH/Alkalinity adjustment) (Yes/No) _____

*** 120. If "yes," target pH range = _____ to _____ and target alkalinity range =_____to _____mg/L as $CaCO_3$.

*** 121. OPTION 2: CALCIUM PRECIPITATION (Calcium adjustment) (Yes/No) _____

152. If "yes," target calcium concentration range = ____ to ____mg/l Ca

122. Target pH = ____ to ____ and target alkalinity = ____ to ____ as $CaCO_3$.

*** 123. OPTION 3: INHIBITOR PASSIVATION (Use of an inhibitor) (Yes/No)_____(check one)

124. ___ Phosphate based

125. ___ Silica based

126. Brand name _____

127. Target dose_____ mg/l

128. Target residual range ___ to ___ mg/l orthophosphate as P or silica as SiO_2

129. pH operational range _____ to _____.

130. Alkalinity operational range _____ to _____ as $CaCO_3$

131. OPTION 4: Continue Using Present Corrosion Control. Describe the treatment you are currently using.

132. List the ranges of the appropriate parameters.

pH operational range _____ to _____.

Alkalinity operational range _____ to _____ as $CaCO_3$

Calcium range = _____ to ____mg/l Ca

Inhibitor ranges:

_____Phosphate based

_____Silica based

Brand name _____

Target dose_____ mg/l

Target residual range _____ to _____ mg/l orthophosphate as P or silica as SiO_2

133. If your current corrosion control treatment was in place at the time of your lead or copper exceedance, why do you believe the exceedance occurred? (For example: equipment failure, improper sampling procedures, etc.)

134. OPTION 5: Alternative treatment not listed above or no treatment at all. Please summarize this treatment and your rationale for arriving at this decision.

_____
_____
_____

Summary

135. In the space below discuss the rationale for the proposed corrosion control treatment. You may attach a full report. Use extra sheets if needed.

_____
_____
_____

After we approve this study, you will have 24 months to install the treatment you proposed. We will require that you conduct two rounds of lead and copper tap sampling to prove that your choice of corrosion control has been effective. If your water system fails to meet the action levels for lead and copper, we will require that you reevaluate your corrosion control treatment.

136. If you have proposed to install corrosion control treatment, is it installed now? ____ Yes/No.

If "yes," when was it installed?_____(date)

If “no,” when do you expect to install it? _____ (date)

137. If you have installed corrosion control treatment, are you ready to begin follow-up lead and copper tap sampling? ____Yes/No.

If you are not ready to sample now, when do you expect to be ready_____ (date)

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

List of Helpful References and Phone Numbers:

EPA National Drinking Water Hotline 1-800-426-4791
Texas Water Utility Association 1-888-367-8982
US EPA Region 6 Dallas1-800-887-6063
Texas Engineering Extension Service TEEX 1-877-833-9638
Texas Rural Water Association TRWA 512/472-8591
AWWA Small Systems Hotline 1-800-366-0107
Regional Offices of TCEQ: Contact the Regional Office nearest you.
TCEQ Lead/Copper Coordinator 512-239-4660
Lower Colorado River Authority Environmental Laboratory Services 1-877-362-5272

Mail Completed Report to:

Texas Commission on Environmental Quality
Water Supply Division/Public Drinking Water Section
Lead/Copper Coordinator, MC-155
P O Box 13087
Austin TX 78711-3087
512/239-4660

*** Always keep a copy of every document you send to TCEQ. We require all Lead/Copper documents be kept on file for twelve years.

Texas Commission on Environmental Quality (TCEQ)
Form 20495 Corrosion Control Study Instructions

s it?

If your water system exceeded the action level for lead or copper, you must submit a corrosion control study to our office. You will have twelve months to gather data and prepare the study. This summary will hopefully answer some of your questions, but feel free to call us for more help. If you buy water from another system, the provider and receiver will be responsible for conducting this study. It is your responsibility to enter into an agreement with the provider to see that the study gets done. Failure to submit the study will constitute a violation of state and federal rules.

The lead or copper in the samples you collected probably came from the first few feet of plumbing behind the tap. Sources for lead are usually lead/tin solder or brass. The source of copper is usually copper pipe. Whatever the source, it was the chemistry of the water you produced that caused the lead or copper to leach into the water. The study you will submit to us will basically examine the water chemistry in your system and outline what you can do to stop the leaching.

The TCEQ refers to this study as a "corrosion control study." Since you are a small water system, they are not requiring you to conduct expensive coupon or pipe loop studies. Instead, you can conduct a "corrosion control study". The TCEQ published a corrosion control study document called a "Form 20495". We can send it to you upon request.

The TCEQ has outlined some specific items that you must cover in the study. We have briefly summarized them for you below.

1. By the time you submit this study to us, you will have been collecting your water quality parameters each calendar quarter for up to two years. This chemical data has to be listed in your study. It will give all of us important clues about how to best fix the corrosion problem caused by your water.

2. You must tell us how you are treating your water now. Describe your water plant and list all the chemicals you use. If you are treating for iron or manganese or if you have "scaling" water, be sure to include this information as well.

3. You must locate neighboring water systems that have water chemistry and a plant like yours and find out what they are doing to correct their corrosion problem. Document what you have found. This will help you make a choice about what treatment you will use on your water.

4. The most important part of your study is choosing a treatment. In your study, you must examine all the options you could use. We urge you to seek professional advice for this. Be sure you weigh all your options before proposing a treatment. You should consider effectiveness, of course, but also cost and ease of operation and maintenance! Make sure you consider other water treatment requirements, such as your disinfection capabilities or iron and manganese problems.

5. When you have chosen a treatment for your water system, you must report proposed operational ranges for pH and alkalinity. You must also report ranges for orthophosphate, calcium, or silicate if these parameters apply to the treatment you have chosen. The ranges should reflect values you expect to see in the distribution system. When you conduct follow-up

tap sampling to see if your treatment is working, you are allowed to make necessary adjustments in the ranges.

What's next?

After you have submitted the study and we have approved it, you are allowed up to two years to install the proposed and approved treatment.

INSTRUCTIONS ON HOW TO FILL OUT YOUR TCEQ FORM 20495 CORROSION CONTROL STUDY FOR SMALL AND MEDIUM PUBLIC WATER SYSTEMS AND TREATMENT RECOMMENDATIONS

We numbered each line to correspond with these instructions. Use them as a reference tool to complete the forms. More detailed instructions can be found in Lead and Copper Rule Guidance Manual Vol. 2: Corrosion Control Treatment published by American Water Works Association for USEPA or by contacting the agencies listed at the end of this document. TAC 290.117 gives the State the authority to require a corrosion control study and describes what you should include in such a study. You have 12 months from the end of the monitoring period of the exceedance in which to complete this form and submit it to TCEQ for approval.

PUBLIC WATER SYSTEM (PWS) GENERAL INFORMATION
(The number in the left margin below matches the line number on Form 20495)

1. PWS Identification no. This number is the seven digit number assigned to your PWS by the TCEQ. You should use it on **all** correspondence.

2 - 6.Contact Person: Give the name of the person directly responsible for the corrosion control program (lead/copper program), mailing address, current phone number and fax number.

7. Population Served: This is the actual population served by your system, NOT the number of meters you have in the system. You may estimate the population served by multiplying the number of meters (connections) by three. Your population number should be equal or close to the population you listed in the "Lead/Copper Sample Site Selection Form." Schools should give the total of number staff and students. Businesses should report the total number of employees.

8 - 12. Person responsible for preparing this form: Give the name of the person preparing this form. If an engineering firm or chemical supply company is preparing this report for you, in person in that company should give us the required information.

PWS TECHNICAL INFORMATION

13. & 20. Initial Tap Monitoring Results: List dates for the first and second six month Sampling periods.

14 - 19 & 21 - 26. Tap Monitoring Results: To complete this section, you will need the lead/copper result reports sent to you by TCEQ which list all the samples you sent in and their results. Write the highest and lowest values you had for lead and copper in the blanks listed. The exceedance notification letter we sent to you by certified mail will list the 90th percentile value for lead and copper. If this letter is not available to you, you may find the 90th percentile yourself.

How to find the 90th percentile: To find the 90th percentile lead value, arrange your samples from the lowest lead level to the highest lead level in a list. Number your samples from

the lowest lead/copper value to the highest lead/copper value. Multiply the number of samples by 0.9. If you have ten samples, then 10 X 0.9 is 9. Find sample number 9. This sample is the 90th percentile. If you only have five samples, the 90th percentile is the average value of the two highest lead samples. (Add your two highest values and divide by 2.) A 90th percentile value higher than 0.015 mg/L for lead and 1.30 mg/L for copper is an exceedance. TCEQ can calculate this value for you upon request.

Lead & Copper Entry Point Monitoring:

27 - 28. Entry Points: Identify the entry points in your distribution system. An entry point 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 two entry points, attach an extra sheet with results so you include all entry points in the report.

29. If you purchase water from another water system, they should help you with completing this form.

30 - 31. In this chart, report the results of your source water analysis for lead and copper conducted when you first exceeded the lead/copper action levels.

Entry Point Water Quality Parameter Results

32 - 55. This chart is for the water quality parameter results you have been sending to TCEQ each quarter. The chart provides spaces for information you gathered each quarter for up to three years. Be sure to show if the test was done in the field or at a lab.

56 - 59. This information is available from your Texas Comission on Environmental Quality (TDH) minerals analysis. A TCEQ contract sample collector has taken a mineral sample from your entry point at least once every three years. The TDH should have sent you the results of this sample. You can get the hardness, total dissolved solids (TDS), chloride, and sulfate values from that report.

Distribution Water Quality Parameter Samples.

This section deals with the distribution samples you took for the quarterly water quality parameter (WQP) reports.

60. Show how many distribution samples for WQP's you took each quarter.

61 - 65. Look over the reports you have and report the minimum and maximum value for each parameter listed in this section. Since you collected data more than four seasons of the year, these values may have a large range for the year. The water chemistry in your distribution system may change during the year. This knowledge will help you plan for corrosion control fluctuations. Dead ends and far reaches of the distribution system may have a large range of values.

66 - 67. Only report values for orthophosphates or silica if you have been using these chemicals for corrosion control. The right column shows if you ran the test in the field or in the lab.

Raw Water Quality: Results of Untreated Source Water Monitoring.

68 - 70. This section is for your raw water source(s). List the aquifers, wells, well fields, lakes, or rivers used as your water source(s) by name.

71 - 79. Report chemical values, if available, for your raw untreated water from each source. Before a new well is placed into service, the driller should have submitted raw water samples to the Texas Department of State Health Services Laboratory or the Lower Colorado River Authority Environmental Laboratory Services for analysis. Some of this data may be on file at the TCEQ, and you may obtain it through our Central Records office 512/239-2900. You may also obtain copies of drillers' logs and well data through the Texas Water Development Board 512/463-8337.

Existing Conditions, **Existing Water Treatment**

80 - 82. In this section, describe your water treatment facilities and the chemicals you use. List all the chemicals you normally feed and occasionally feed into your system. Include disinfection, softening, and sequestering chemicals.

Existing Distribution System

83 - 84. This section deals with your distribution. It is unlikely your distribution system has lead service lines unless it is very old. If it does, do you know where they are?

85. Part of good system management involves flushing your dead end lines, and we would like to know how often your distribution system is flushed. When water stagnates in a dead end main, water pH will often drop to corrosive levels.

Present Corrosion Control Treatment

86. If your system does not presently use corrosion control or treat for iron and manganese, answer "no" to **line 86** and skip down to **line 100**. If you have already been using a form of corrosion control or sequestering agents, answer "yes" to **line 86**, and answer all questions through **line 100.**

87. An inhibitor or sequestering agent is a chemical, usually phosphate or silicate based, used to reduce corrosion or to control iron and manganese.

88. Tell us the date you started any corrosion control or iron and manganese sequestering in your system.

89. Tell us your present inhibitor dose (if used) at the treatment plant.

90 - 91. Tell us the range of inhibitor residual that is in your distribution system now if you are using an inhibitor.

92. Provide the manufacturer's name and their name for the product.

93. Is the inhibitor phosphate based or silica based?

94. Did the inhibitor control corrosion in your system? You may have been using the inhibitor to control "red water" problems or to extend the life of pipe in your distribution system besides lead and copper control. Has the inhibitor accomplished this for you? Discuss your results.

95. If your system uses 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, answer "yes" here.

96. What is your target pH for your finished water?

97. What is your target alkalinity for your finished water?

98. If you add chemicals to change your calcium level for corrosion control such as lime, soda ash, sodium bicarbonate, caustic soda, or carbon dioxide, either with or without an inhibitor, you should answer "yes" here.

99. What is your target calcium level in your finished water?

100. If your water system has ever done any kind of study dealing with corrosion control in the distribution system, answer "yes."

101. Show the date(s) the study was done.

102. Show if an outside firm did this study, such as an engineer or chemical firm, or by the water system itself.

103. What did the study find? Did the study result in a change in the water treatment, and was it successful?

104. Attach your study results if they are available.

105. Referring to the study discussed above, were any changes recommended and were changes put in place within the water system?

106. Was the corrosion treatment installed in your system?

107. Describe the improvements you have seen is water quality.

108 - 110. If you saw a change in the corrosion in your system, how did you know this change had happened and how did you measure this change? Check off the appropriate category. Perhaps you have noticed that fewer customers call you with “dirty water” complaints.

111. 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.

112. If you are treating for iron and manganese, tell us what product (brand name) you are using 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 you are not sure what chemical combinations you have, ask the vendor who sold it to you.

113. Certain types of complaints from your customers provide valuable clues about the water chemistry in your system. Give a short description of the complaints.

Treatment Constraints: If you do not complete this section, we cannot approve your study.

114 - 116. This section will help you choose a method of corrosion control that does not interfere with any other state or federal rule. Part of the lead/copper rule specifically states that your corrosion control should not have a detrimental impact on regulatory or functional constraints. To help you decide if the proposed treatment would meet these

requirements, study the effects your proposed corrosion control would have on the regulatory requirements and the functional requirements.

You should consider some points when choosing a corrosion control treatment.

- If you increase the pH before disinfection, the higher pH will reduce inactivation effectiveness of free chlorine. This may cause you to have some positive bacteriological samples. If you have a surface water system, this may affect your ability to meet disinfection requirements of the Surface Water Treatment Rule. It may be necessary for you 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.

- If you adjust the pH before disinfection, you may also increase THM concentrations.

- In-plant adjustments may affect the removal of radioactive particles if you use precipitation techniques for coagulation or softening. Modifying softening practices to achieve corrosion control could interfere with removals.

You should consider functional constraints when choosing a corrosion control treatment.

- Installing corrosion control will require the addition of controls and chemical feed equipment. You might have to train water operators to maintain the equipment and chemicals, and they may have to monitor the water plant more frequently.

- Multiple entry points will require corrosion control treatments at each site. If different entry points have different water characteristics, you must adjust chemical doses for each water source.

- Excessive calcium precipitation can clog distribution lines. You can 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 for you.

- If you use sodium-based chemicals for alkalinity or pH adjustments, you may have excessively high sodium values in the finished water if your raw water sodium values are already a problem.

- If you choose to use a zinc-orthophosphate, you may exceed allowable zinc or phosphate levels in your community's treated sewage effluent. Check your NPDES sewage permits for zinc and phosphate limits to see if this may be a problem.

- Changes in water chemistry may affect health care facilities, and you should advise them of 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.

Evaluation: If you do not complete this section, we cannot approve your study.

117. List the public water systems you have studied by name and list their ID number. You may use out-of-state water systems provided they have similar water and similar size distribution systems. We require no ID number for out-of-state systems, but you must provide the name and address.

118. In this section, discuss the analogous water systems you have listed at **line 117**. Describe their source water, their water treatment, including their corrosion control, their distribution system, and, most important, if their corrosion control reduced the lead and copper levels below the action levels.

Recommendations/Proposed Treatment: If you do not complete this section for one of the five options, we cannot approve your study.

Options 1, 2, and 3

119 - 130. The USEPA defines three approaches to corrosion control: Carbonate Passivation, Calcium Precipitation, and Corrosion Inhibitor Passivation. (See the table below) At this point you should select a method that best applies to your system using the information you have collected in this report. This section will establish guidelines that your PWS plans to follow. If the state approves your target operational ranges for pH, alkalinity, or calcium, or for the target dose and residual range for an inhibitor, we will expect your PWS to operate within these guidelines. If your follow-up tap sampling does not prove that your corrosion control is effective (you exceed the action level for lead or copper at the percentile), you must reevaluate your corrosion control treatment for possible adjustments. Fill lines 119 to 130 if they apply to your system.

Options 4 and 5

131 & 133. If you were already using a corrosion control treatment when you sampled your system and exceeded lead or copper action level, you may propose not to change your treatment. If you select this option, you must give us a valid reason the 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 for you that will control both your iron/manganese and lead/copper problems. In line 134, you must give us your present operational ranges or your proposed modified operational ranges. If you make no changes in your treatment, you must give us a valid reason why you believe you exceeded the action level for lead and/or coppers (line 135). Perhaps someone was not feeding the sequestering agent into the system at the time of sampling or the samples were collected at invalid sites. We will test your choice of options with two follow up rounds of lead and copper tap sampling within 36 months of study approval.

Option 5

134. OPTION 5 deals with alternative treatments, such as flushing, or using no treatment at all. For example, USEPA has authorized the use of daily automated flushing systems to

flush the plumbing in very small water systems. They allowed a small elementary school to do this each morning instead of installing chemical corrosion control.

You can propose the use of no treatment if the water displays a positive Langelier index or calcium carbonate precipitation potential (CCPP) and/or you can attribute the exceedance to sampling error. The Langelier index and the CCPP are two common ways to calculate the degree of corrositivity water has. We can calculate these values for you upon request.

Summary

135. Explain your choice for this Option (1, 2, 3, 4 or 5) of corrosion control. Use extra sheets if necessary.

136. If you have installed a method of corrosion control (Options 1 through 5), answer the questions in this line.

137. This agency 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. Should you fail either of the two rounds, you must reevaluate your study and propose a new treatment.

SCREENING OF ALTERNATIVES: CONTROL APPROACHES

Control Mechanism	Passivation		Precipitation
Treatment Approach	pH/Alkalinity	Corrosion Inhibitor	Calcium Adjustment
Key Water Quality Parameters	pH, Alkalinity TDS, Temperature	pH, Alkalinity, Metals, Hardness, Temperature	Calcium, pH, Alkalinity, TDS, Temperature
Appropriate Chemical Feed Systems	Lime, Aeration Soda Ash Sodium Bicarbonate Caustic Soda Carbon Dioxide Calcite Filter	Orthophosphate Silicates Polyphosphate Ortho-polyphosphate	Lime Soda Ash Sodium Bicarbonate Caustic Soda Carbon Dioxide

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