Corrosion Control Requirements

Allison Jackson, Team Leader- Corrosion Control and Disinfection Protocol

1

Presentation Summary

- Lead and Copper thresholds
- 40 CFR §141 rules
- Corrosion Control Requirements
- Corrosion Control Treatment Options
- Treatment Testing
- Optimal Water Quality Parameters

2

Trigger Level and Action Level

	Trigger Level (TL)	Action Level (AL)	Practical Quanitiation Level (PQL)
Lead	0.010 mg/L	0.015 mg/L	0.005 mg/L
Copper	NA	1.3 mg/L	NA

§141.81 Applicability of corrosion control treatment steps to small, medium, and large water systems

Large Systems (serving >50,000)

With CCT & exceed either Lead TL or Copper AL	Without CCT & exceed Lead PQL or Copper AL	With CCT & exceed Lead PQL only
• §141.81(d)	• §141.81(e)	• §141.81(d)

Medium Size Systems (serving >10,000 and <= 50,000)

With CCT & exceed either Lead TL or Copper AL	Without CCT & exceed Lead AL or Copper AL	Without CCT & exceed Lead TL only
• §141.81(d)	• §141.81(c) • §141.81(e)	• §141.81(c) • §141.81(e) Step 1 only

Small Systems (serving <= 10,000)

With CCT & exceed Lead TL or Lead AL but not Copper AL	With CCT & exceed Copper AL	Without CCT & exceed Lead AL	Without CCT & exceed Copper AL
• §141.81(d)	• §141.81(d)	• §141.81(c) §141.81(e)	• §141.81(c) • §141.81(e)

§141.93 Small Water System Compliance Flexibility

The State may require corrosion control study if **Lead Trigger Level**, Lead Action Level or Copper Action Level are exceeded

Tackling Corrosion

- §141.82(c)(1)- PWS performing corrosion control study shall evaluate effectiveness of the following treatments (or combinations of treatments):
  - Alkalinity and pH adjustment;
  - Addition of orthophosphate or silicate-based corrosion inhibitor at concentration sufficient to maintain an effective residual concentration in all test samples.
- NEW • Addition of orthophosphate corrosion inhibitor at concentration sufficient to maintain an ortho residual concentration of 1 mg/L (as PO_4) in all test samples.
- NEW • Addition of orthophosphate corrosion inhibitor at concentration sufficient to maintain an ortho residual concentration of 3 mg/L (as PO_4) in all test samples.

Internal Corrosion Background

- The most significant water quality parameters regarding water corrosivity are:

  pH, alkalinity, and DIC.
- Balancing these enables the formation of carbonate passivating layers.
- pH values less than prescribed corrosion inhibitor ranges can decrease chemical passivation & increase metal solubility.

Ref. AWWA M58, 2nd Ed., p.55

EPA United States Environmental Protection Agency

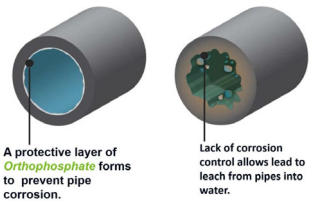
Optimal Corrosion Control Treatment Evaluation Technical Recommendations for Primacy Agencies and Public Water Systems

- Tool contains treatment recommendation flowcharts, dependent on pH and DIC (dissolved inorganic carbon) [Ch. 3]
- Contains Estimated DIC Tables (Total Alkalinity & pH needed) [App. B]

https://www.epa.gov/sites/default/files/2019-07/documents/occtmarch2016updated.pdf

Corrosion Control Treatment Examples

- Carbonate Passivation (pH, alkalinity adjustment)
  - Caustic Soda, Soda Ash, Sodium Bicarbonate, Lime (Hydrated/Quicklime), Limestone Contactors, Aeration, CO2+Caustic
- Inhibitor Passivation
  - Orthophosphate, Zinc Orthophosphate, Blended Phosphate, Silicates
- Alternatives
  - Combination of Treatment Solutions
  - Complete Removal of Lead



Ref. AWWA M58, 2nd Ed., p103

Tests to evaluate corrosion control treatments

- Pipe rig/loop test
  - May be required to be conducted on harvested lead service lines from distribution system
- Metal coupon test
- Partial-system test
- Analyses based on documented analogous treatments

Water quality parameters to measure during tests

Lead	Copper	pH
Alkalinity	Orthophosphate as PO_4 (when ortho-based inhibitor is used)	Silicate (when silicate-based inhibitor is used)

Optimal Water Quality Parameters (OWQP)

- After treatment is installed TCEQ will approve OWQPs as minimum values or a range of values for each entry point and tap samples:
  - pH
  - Alkalinity (if adjusted as CCT)
  - Orthophosphate (as PO_4)(if used as corrosion control treatment)

Reminder!! Corrosion Control Requirements are subject to change with the LCRI

Thank you!

Allison Jackson, Team Leader
Corrosion Control and Disinfection Protocol Team
(CCDPT)

Questions? Contact us at:
PTRS@tceq.texas.gov
512-239-4635