

## **Corrosion Control Study Requirements**

Public water systems may be required to conduct a corrosion control study (CCS) as required by the Lead and Copper Rule. The Lead and Copper Rule, as well as the Lead and Copper Rule Revisions, have a variety of reasons a public water system is or may be required to implement a corrosion control study. For example: an action level is triggered or exceeded, becoming a large public water system (i.e., population growth over 50,000 people), or if the Arizona Department of Environmental Quality determines that corrosion control is not optimal. If a corrosion control study is required, by ADEQ, the public water system must meet all requirements in R-18-111 (CFR 141, Subpart I by reference).

A corrosion control study should be developed as per EPA's Guidance Manual (1992 and 2016). The study design or plan must be submitted to ADEQ or your delegated county for review and approval.

ADEQ requires that the corrosion control study include:

The Department requires that the CCS include:

- Methodology:
  - Immersion coupons
  - Pipe loops
  - Static Testing
- Source water:
  - If the supplier has multiple sources (e.g., groundwater, surface water) then the CCS must include multiple scenarios that reflect each source water. Each individual source water does not necessarily need to be tested but the CCS must address all sources (e.g., the CCS may test a single GW source which is representative of a well field).
- Blending:
  - If the supplier has multiple treatment plants and/or purchases potable water from other suppliers then the CCS must include scenarios that model blending of these waters in the distribution system. If the multiple treatment plants have similar potable water quality entering the distribution system then the CCS may use a representative water plant (e.g., if two treatment plants are located on the same surface water source but at different intake locations the study may include a water quality comparison/discussion rather than testing water from both plants).
- Treatment scenarios:
  - Control - baseline conditions
  - All treatment technologies (e.g., pH/alkalinity adjustment, inhibitor addition) required under R-18-4-111 must be tested.
    - For inhibitor addition, the CCS must evaluate an effective corrosion inhibitor residual dose. An effective corrosion inhibitor residual dose is generally considered, per EPA guidance document, an orthophosphate residual 1.0 mg/L as P, 3.0 mg/L as PO<sub>4</sub>, or an equivalent dose.
    - Treatment technologies that result in metal dissolution (e.g., high polyphosphate blends) will not be considered corrosion inhibitors and the Department may require additional treatment scenarios.
    - pH must be controlled over the test period.

- Duration:
  - Tests must be of sufficient duration for coupons or pipes to stabilize. The test duration must be a minimum of 6 weeks of testing conditions however longer may be necessary if results have not stabilized.
  - The Department recommends a pre-soak of at least 6-weeks with control condition water prior to test conditions.
- Materials:
  - Materials tested must reflect primary lead and copper-containing sources present in the service lines and premise plumbing within the supplier's distribution system. At a minimum, copper with lead solder must be tested. If lead service lines are present, then lead coupons must be included.
  - For immersion coupons, new materials are acceptable. For lead pipe loop studies, harvested materials are required.
- Replicates:
  - A sufficient number of replicates must be tested to provide reproducible results analysis with accounts for potential outliers. At least 3 coupons must be tested for each scenario.
- Water change outs / soak period:
  - Water must be changed out to model customer usage (i.e., a 12-week soak period is not acceptable). At a minimum, water must be changed out two times per week.
- Water quality testing frequency:
  - Water quality samples must be taken at least once every week during test conditions. Composite samples over the week period are acceptable within the same test scenario (e.g., samples collected Monday, Wednesday and Friday). Composite samples between scenarios (e.g., samples from lead solder jar 1, jar 2, jar 3) are not acceptable.
- Water quality testing:
  - Lead results must be sent to an Arizona certified laboratory.
  - Copper results may be sent to a laboratory or tested onsite (e.g., portable testing devices) are acceptable.
  - pH results must be tested onsite with calibrated equipment.
  - Alkalinity may be tested onsite or sent to a laboratory. If tested on-site then testing should be performed by a 40 CFR 136 approved method.
  - Inhibitor residual may be tested onsite or sent to a laboratory. If tested on-site then testing should be performed by a 40 CFR 136 approved method.

The CCS report must recommend an optimal corrosion control treatment, provide a testing protocol summary, summary of all water quality parameter monitoring results, and all testing data. The report should identify any potential impact to primary drinking water standards (i.e. impacts to disinfection, disinfection by-product formation, and impacts to current treatment) or secondary treatment (e.g., scaling) water quality impacts.