UCR Environmental Health & Safety

DISINFECTING WATER LINE GUIDELINES

Contents

A. SCOPE

All new and reintroduced water lines, including domestic hot and cold water systems, fire lines, and any lines connected to them, must be cleaned, disinfected, flushed, and tested for chlorine concentration and coliform absence before being put into use.

B. PRELIMINARY PREPARATION

- During construction, ensure the inside of the pipe remains clean and dry. All pipe openings should be sealed with watertight or rodent-proof plugs when work is halted.
- A suitable service valve or cock, installed within three feet of the supply line, will be used to introduce the disinfectant.
- The line to be disinfected must be isolated from the active distribution system using cross-connection control devices or other appropriate isolation mechanisms.

C. DISINFECTION AGENT

- Acceptable disinfectants include sodium hypochlorite solution or chlorine gas. Tablets or other granular disinfectants are not allowed. Any alternative disinfectants must receive prior approval by EH&S.
- Liquid chlorine (gas) and sodium hypochlorite must conform to ANSI/AWWA standards.

D. DISINFECTION PROCEDURE

A minimum of three (3) business days notice must be given to the Registered Environmental Health Specialist (REHS) prior to the chlorination procedure. Chlorination should be scheduled to end on a Monday through Thursday in order to coordinate with the lab schedule.

Below are methods of disinfection:

- Tablet/Granule Method: Not allowed.
- Continuous-Feed Method:
    - Fill the system with potable water and ensure it is under main pressure.

  - Inject disinfectant through the service cock at a slow, continuous rate until a chlorine residual of at least 50 ppm is detected at the farthest outlet. Test all outlets for compliance with this residual.

  - Retain the chlorinated water in the system by closing all outlets and valves for at least 24 hours. Post warning signs at each outlet.
  - After 24 hours, test to ensure a residual chlorine concentration of 10 ppm or greater. If not, repeat the chlorination process.
  - Following successful chlorination, flush the system until the chlorine residual is reduced to 0.5 ppm or matches the level of the campus water supply.
- Slug Method: Use for large-diameter mains if continuous-feed is impractical. Slowly flow a slug of water containing 100 mg/L chlorine concentration through the main, ensuring exposure for at least 3 hours. Monitor chlorine levels continuously.

Factors to consider when choosing a method should include the length and diameter of the main, type of joints present, availability of materials, equipment required for disinfection, training of the personnel who will perform the disinfection, and safety concerns.

E. FLUSHING AND DECHLORINATION

- Flush the main with potable water to remove particulates and heavily chlorinated water. The flushing velocity should be at least 3.0 ft/sec, ensuring that the water flows clear.
- Thorough consideration should be given to the impact of highly chlorinated water flushed into the environment. Dispose of chlorinated water properly, using dechlorination techniques to neutralize chlorine and avoid environmental damage.
- Dechlorinated flush water must be discharged to the sanitary sewer system or soil. Consult with EH&S and/or Facilities Services to identify nearest sewer access or appropriate soil area for flush water discharge.
- Must meet ANSI/AWWA C655 for the dichlorination of chlorinated or chloraminated water being discharged, including regulatory issues.

F. BACTERIOLOGICAL SAMPLING

- Contact EH&S to conduct bacteriological testing following the completion of disinfection. Water samples will be collected from all segments, including nearest the main line, middle of the line, and at the end of each line and any branches longer than one pipe length.
- Samples should indicate the absence of total coliform bacteria and E. coli in 100 ml of water.
- If coliforms are present, repeat the disinfection procedure until standards are met.

New Main:

  - The installation of new mains requires that two sets of samples for coliform analysis are collected at least 16 hours apart, or two sets collected 15 minutes apart after a 16 hour rest period.

Repaired Mains:

- For repaired mains that are depressurized and/or wholly or partially dewatered, one set of samples are required, and depending on the sanitary conditions, the line may be returned to service before the completion of the bacteriological testing.
- For repaired mains that are kept under positive pressure at all times, bacteriological testing is not required.

G. APPROVAL PROCESS

- The Registered Environmental Health Specialist (REHS) will oversee the disinfection process, verify chlorine residues, and take water samples for bacteriological tests.
- Upon satisfactory test results, the REHS will provide verbal and written approval for the system to be put into use. If results are unsatisfactory, rechlorination and retesting will be required.

H. FINAL CONNECTIONS

- Ensure all newly disinfected water mains pass bacteriological testing before connecting to the active distribution system. Maintain sanitary construction practices to prevent contamination.

I. REFERENCES

- American Water Works Association (AWWA) Standard C651-23 for Disinfecting Water Mains
- Environmental Engineering and Sanitation, 4th ed. (1992), Joseph A. Salvato, Chap. 3 Standard Methods for the Examination of Water and Wastewater, 19th ed., (1995), Chap 4, p 4-36 to 4-47 for Chlorine Residual Tests and Chap. 9, p 9-65 to 9-66 for Coliform test.
- UCSB Environmental Health and Safety Disinfection Procedures