

PROCEDURE FOR THE DISINFECTION OF WATER LINES/SYSTEMS

Established by UCM Environmental Health and Safety

I. Scope:

All new and re-introduced potable water lines must be cleaned, disinfected, flushed and must pass testing for chlorine concentration and coliform absence before being put into use.

- A. EH&S will review and if acceptable approve the cleaning and disinfecting procedures; the Facilities Management and Drinking Water Distribution Operator and must be contacted to schedule a meeting prior to the initiation of any work. Coordination can occur once a work order has been submitted.
- B. Upon completion of satisfactory cleaning, chlorination and flushing, the contractor will take the water samples for bacteriological tests. The lab test results must be submitted to EH&S for approval prior to connection with the university water system. If the test results are not approved a rechlorination of the water system must take place and results must be submitted to EH&S (AHJ).

II. Contractor's Responsibility:

- A. The contractor shall furnish properly trained personnel, appropriate equipment and materials, and transportation, for the disinfection of domestic hot and/or cold water systems, fire lines, and any lines connected to them. The personnel shall post warning signs at each outlet. The personnel shall be prepared to dispose of waste water in a way that will cause no harmful effects. The personnel shall be prepared to measure chlorine residuals, at both high and low range, using appropriate techniques. **The Drinking Water Distribution Operator (WDO) will oversee the work and must verify all pertinent chlorine residuals.**
- B. A minimum of three (3) working days notice must be given to the Facilities/WDO prior to the chlorination procedure.

III. Disinfection (Chlorinating) Agent:

- A. Use a sodium hypochlorite solution for disinfection.
- B. **Tablets or granular disinfectants will not be allowed. Pipes with tablets placed inside are not acceptable.**
- C. Any alternative disinfectant must receive prior approval from EH&S AHJ.

IV. Main Campus Hydrants, Backflow and Valves Responsibility:

- A. UCM authorized personnel must be contacted before any hydrant valves are turned on/off. No contractor shall operate the North Campus potable water system connections.
- B. Work Order must be placed with Main Campus Facilities Management at <http://facilities.ucmerced.edu/> before any work is performed.

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V. Procedure:

A. Preliminary Preparation:

1. During the entire construction period, care shall be taken to keep the inside of pipes, etc., as clean as possible.
2. A suitable service cock or valve within three (3) feet of the supply line shall be installed to introduce the disinfecting agent into the lines. The line(s) to be treated shall be isolated from the rest of the distribution system with cross-connection control devices or other appropriate isolation devices.
3. After final pressure tests and before chlorination, each fixture or outlet shall be flushed until the flow shows only clear water.

B. Disinfection:

1. The system must be full of water and under "Main" pressure.
2. Approved injection equipment shall be injected through the service cock for disinfection at a slow, even, continuous rate until a test at the farthest outlet shows chlorine residual concentration of at least 50ppm. All other outlets shall be tested for compliance with the 50ppm residual. The waste chlorinated water must be disposed of properly.
3. All outlets and valves, including service valve at main and injection cock, must then be closed to retain the chlorinated water. Warning signs must be posted at each outlet. This condition must be maintained for at least 24 hours.
4. A test after the 24 hour (or longer) treatment should indicate a chlorine residual of 20ppm or greater. If it does not, steps 2 through 4 must be repeated.
5. After successful completion of the above test, the system should be flushed until the chlorine residual is 0.5 ppm or equivalent to that of the campus water supply.

VI. Bacteriological testing:

- A. Final flushing should be completed during normal business hour in order to expedite laboratory analyses. After final flushing, representative water samples will be taken by the contractor for lab tests of coliform presence or absence. A successful test result will indicate the absence of total E. Coli in 100 ml. The test method is the Chromogenic Substrate Test which **requires 24 hours to complete**. Therefore, occupancy and/or clearance approval will take at least that long. If coliform is found to be present, the disinfection procedure shall be repeated until the standards are met.
- B. Sampling and analyzing for other substances to evaluate potability may be required if considered necessary by the DWO AND EHS.

VII. Approval:

Upon satisfactory results of water tests, EHS will send an email notification of approval to the contractor. Notification of unsatisfactory results will also be made via email with written follow-up as necessary. In that case, the disinfection shall be repeated until the standards are met.

VIII. References:

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.

American Water Works Assc. (AWWA) Standard for Disinfecting Water Mains, AWWA C651-92, p. 7.

American Water Works Assc. (AWWA) Manual M20, Water Chlorination Principles and Practices, pp35-36.