CITY OF WESTMINSTER STANDARD REQUIREMENTS FOR DISINFECTION OF NEWLY INSTALLED WATER MAINS

The Water Quality Supervisor must receive a disinfection plan in writing a minimum of one week before witnessing the disinfecting of the new water main line. The plan must include:

- Demonstrate with the plan how a minimum 50 mg/L *FREE* chlorine residual in the new pipeline (or section) will be achieved.
  - Must see a consistent 50 mg/L residual or more in the new pipeline section's effluent water flush stream.
  - The chlorine dose and residual levels must be witnessed by a Westminster Water Division employee on a digital readout screen such as a Hach "Drop Count Titration" test kit (CN-21P) or similar device which measures 10-200 mg/L. A test kit that matches color to a chart is not acceptable.
- A *drawing* showing:
  - Where the water will be coming from to load the new pipeline section
  - Where the backflow device will be placed
  - Diagram of the piping, and length, to be disinfected
  - How the water will be super-chlorinated
  - How the highly chlorinated water will be isolated from the rest of the water system,
  - How the water will be flushed from the new main section
  - How de-chlorination will be achieved for NPDES requirements
  - Sample points and number of samples to be taken and at what intervals
  - Which state-certified laboratory will be testing the samples

NPDES regulations and standards *must* be observed. No job will start without the prior approval of the written plan from the Water Quality Supervisor.

GENERAL:

The contractor shall supply all material, labor, equipment, and method necessary to conduct tests and provide certification of pipeline disinfection from a state approved laboratory. All tests shall be made in the presence of the City of Westminster's Water Quality Coordinator (or his/her designee) by a state approved lab technician. All portions of the pipeline under construction shall be isolated from the existing public water system while being tested.

NOTE:

All existing city water line valves shall be operated solely by city crews. Contractor must contact city Water Department 48 hours prior to shut down, tie-ins, etc., to schedule operating any city water line valves. Water Department supervisors' phone numbers are (714) 548-3699 or (714) 548-3697.
All new piping must be isolated from the water system and a backflow device must be inserted prior to loading water into the new main.

ABBREVIATED PROCEDURE OF DISINFECTION PROCESS

(See below for more detailed information)

- The Water Quality Supervisor must receive and approve a disinfection plan w/ drawings
- Plan must demonstrate how 50 mg/L *FREE* chlorine residual will be achieved.
- A drawing of the process must be included
- Keep all pipe and appurtenances clean and dry, free of contamination
    - If anything did enter the pipe while in storage, clean and swab pipe with chlorine bleach, let dry
- Introduce enough chlorine to achieve a *FREE* chlorine dose of 50 mg/L to 100 mg/L
- Only Water Division employees will very slowly load the new main with distribution system water
- Operate any valves or other appurtenances in the new section of main several times after pipe is loaded with the highly chlorinated water to expose appurtenances to chlorination
- Let stand for 24 hrs.
- Take free chlorine residual (must be a minimum of 50% of dose, at least 25 mg/L; if not start over)
- Flush the main to achieve a system residual (about 0.6 mg/L *Free* Cl2; 2.0 mg/L *Total* Cl2)
- Let stand for 24 hrs.
- Contractor's lab technician draws a **minimum** of 2 x 100 mL samples (with free and total chlorine residuals) in presence of Water Quality Coordinator (or his/her designee) and takes to state approved lab (extra samples necessary for long runs of pipe)
- Laboratory must use Chromogenic Substrate Coliform Test APHA Standard Methods for the Examination of Water and Wastewater, 21st Ed., 2005 Method 9223 B, Colilert Presence/Absence per 100ml; where "Absence" equals "None Detected" and use SM 9215B to determine the Heterotrophic Plate Counts (HPC).
- Results from lab must be Coliform and E-Coli absent, and the Heterotrophic Plate Count must be less than 200.
- Submit a clear, legible copy of certified lab results to the City of Westminster's Water Quality Coordinator and followed up by a certified (seal of Lab) hard copy to same.
- Have Water Quality Coordinator approve connecting to city's system.
- City crews open valves to connect the new section of pipe to the distribution system.

SCOPE:

All new water mains shall be disinfected before they are placed into service. All water mains taken out of service for any reason shall be flushed and disinfected before they are returned to service.

KEEP PIPES CLEAN AND DRY:

Precautions shall be taken to protect the interiors of pipes, fittings, and valves against contamination. Pipe delivered for installation to the water system shall be delivered so as to minimize the entrance of foreign material. All openings in the pipeline shall be closed with water-tight plugs at the close of the

work day or at any other time when work to that section of pipeline stops, or when it will be left unattended for any length of time.
If water accumulates in the trench, the plugs shall remain in place until the trench is dry. Sections of pipe not being used in a day's work shall have the ends covered to guard against contamination of any kind.

SEALING MATERIALS:

No contaminated material or any material capable of supporting prolific growth of microorganisms shall be used for sealing joints. Sealing material or gaskets shall be handled in a manner that avoids contamination. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water and NSF approved.

CLEANING AND SWABBING:

If dirt or other debris enters the pipe, it shall be removed and the interior pipe surface swabbed clean with a minimum of a six percent Sodium Hypochlorite disinfecting solution.

FLOODING BY STORM OR ACCIDENT DURING CONSTRUCTION:

If the main is flooded during construction, it shall be cleared of the flood-water and flushed with potable water until it is clean. The section exposed to the flood-water shall be filled with potable water which shall be chlorinated sufficiently that, at the end of a 24 hr. holding period, will have a free chlorine residual of not less than 25 mg/L. The chlorinated water may then be drained or flushed from the main. After construction is completed, the main shall be disinfected using the ***continuous-feed method.***

DISINFECTION:

Prior to disinfection the new water main shall be flushed with system water to remove any residual debris and eliminate any air pockets. All water mains, water services, attached appurtenances, and connections shall be disinfected in accordance with AWWA Standard C651-99 for "Disinfecting water mains" as modified herein. In case of any conflict, the requirements of this standard will prevail.

The contractor shall insure that all pipes, fittings, and appurtenances are kept free from dirt, rodents, foreign matter, etc., at all times.

During the disinfection process all valves shall be operated, and the chlorine solution shall be drawn through all laterals and appurtenances using every precaution to not contaminate the public water system with the highly chlorinated water.

Disinfection shall be accomplished by using the "*chlorine gas - continuous feed*" method (unless otherwise approved by the Water Quality Coordinator).

"CHLORINE GAS - CONTINUOUS FEED" METHOD

Using the continuous feed method, gaseous chlorine will be injected into the water mains at a minimum *dose* of 50 mg/L (100 mg/L maximum). A chlorine residual test will be taken at appropriate places (at a minimum of one per every 200 feet, plus one at each end of all pipe) to verify residual levels throughout the new pipeline section.

The chlorinated water shall remain in the new water mains for 24 hours. After 24 hours, chlorine residual levels will again be measured at various places in the newly installed water main. A minimum 50% free chlorine *residual* of 25 mg/L or greater must remain.

FLUSHING AND BACTERIOLOGICAL TESTING:

Following the chlorination period of 24 hours (and minimum 50% of chlorine residual), the water shall be flushed from the main at its extremities and at all outlets until the chlorine residual of the water being flushed equals that of the public water system (which is typically 0.6 mg/L *Free* chlorine or between 0.6 to 2.0 mg/L *"Total"* chlorine). The chlorine must be neutralized.
Fresh water will be loaded into the pipe and shall remain in the new water mains for 24 hours.

The contractor shall have a state certified laboratory technician perform the bacteriological tests and take free and total chlorine residuals of each. Samples shall be taken at the direction of the City of Westminster's Water Quality Coordinator with at least one sample taken from each dead-end main section. **For every 200 foot of pipe length being disinfected, one additional sample and set of chlorine residuals must be taken in addition to each of the ends.** Samples shall be taken 24 or more hours after final flushing. All samples must show absence of coliform and E-Coli organisms, and each Heterotrophic Plate Count (HPC) shall be less than 200.

FINAL APPROVAL AFTER BACTERIOLOGICAL TESTING:

Prior to acceptance of the new water mains, Contractor shall submit state *certified* bacteriological tests from the laboratory to City of Westminster's Water Quality Coordinator at (714) 548-3699, for review and final approval prior to any new water mains being placed into service.

RECORD OF COMPLIANCE:

Bacteriological samples shall be taken after repairs / installations are completed (but prior to connecting to city water system) to provide a record for determining the procedure's effectiveness. The record of compliance shall be the bacteriological test results certifying the water sampled from the water main to be free of Coliform and E-Coli bacteria contamination, and heterotrophic plate count must be less than 200.

DEFINITIONS:

Free Chlorine

Free available residual chlorine is free in the sense that it has not reacted with anything and is available in that it can and will react if need be. It has not yet combined with any other chemicals in drinking water such as ammonia to form ***Total Chlorine.*** ***Free chlorine*** is faster reacting disinfectant than other forms of chlorine.

Total Chlorine

Total or ***Combined chlorine*** is ***Free chlorine*** which has combined with natural or added ammonia or other chemicals in drinking water. It still has disinfecting abilities, however it is slower reacting than ***Free Chlorine.***