

ORANGE WATER AND SEWER AUTHORITY

GUIDANCE DOCUMENT

IMPROVING PURITY SAMPLING RESULTS FOR WATER LINES

The types of bacteria that can lead to positive total coliform results during purity sampling are common in the environment. Dirt and debris at the construction site, staging areas, or warehouses/storage yards, contain bacteria that once inside the pipes can lead to positive bacterial samples. Such material can provide places for bacteria to hide, protected from the chlorine disinfection. OWASA is providing this Guidance Document to help educate engineers, developers, and contractors about some of the most common practices that lead to the failure of new pipes to pass purity testing, along with some best practices and related OWASA Specifications.

Theme 1: Contamination of pipes and/or fittings during installation.

Problem Practice: Placing pipes or fittings in direct contact with the ground, including stringing pipe along the path for ease of installation

Best Practice: Where possible, leave pipes on the racks until installation or use another material or method to prevent direct contact between the pipes and the soil. Do not put out more pipe than you can lay in one day, and cap the ends of whatever pipes stays out overnight. This recommendation applies equally to pipe in storage and pipes at the construction site.

Related Specification: "The Contractor shall open only as much ditch as he can completely install pipe, backfill, compact, and cleanup within the working day. The Contractor shall string out the pipe that can be installed in one day, and no more than 300 feet of trench shall be open in advance of the completed work in any section." [02275-3.2(C)(1)(c)] "Protect stored pipe from entry of water or dirt into pipe. Store pipe on shoulders and not in ditch lines. String out no more pipe than can be installed in a day. Also, protect bells and flanges of special fittings from entry of moisture and dirt. If pipe is provided with end protectors, do not remove protectors until ready for installation or for inspection. Once inspected, replace protectors. [02510-1.7(E)]

Problem Practice: Leaving open ends of pipes exposed instead of capping, plugging, or wrapping and taping overnight

Best Practice: Either wrap and tape or install plugs or caps on the exposed ends of pipes overnight. Trenches can flood and wash dirt and debris into pipes. This recommendation applies equally to pipe in storage and pipes at the construction site. The last installed pipe segment of the day shall be tightly plugged or capped.

Related Specifications: "No pipe shall be constructed in water and water shall not be allowed to drain through the pipe. The open end of the pipe shall be kept closed with a tight fitting plug to prevent washing of any foreign matter into the line." [02275-3.1(G)(2)] "At the conclusion of

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the workday, or any other time when pipe laying is not in progress, a watertight plug shall be placed in the bell of the last joint of pipe laid.” [02275-3.2(G)(3)] Pipe shall be kept clean at all times, and no pipe shall be used in the work that does not conform to the appropriate ASTM specifications.” [02510-1.7(A)(1)]

Problem Practice: Failing to inspect each segment of pipe before the next segment is added

Best Practice: Shine a bright light and visually inspect the interior and exterior of each pipe segment before adding the next segment, looking for signs of dirt, debris, or damage. This is particularly true for segments already installed, which are especially susceptible to dirt and debris washing or flooding into the pipe from the trench. Remove any pipe that is dirty or damaged, as it is extremely difficult to clean very dirty pipe adequately.

Problem Practice: Storing pipes with elbows and appurtenances able to catch water

Best Practice: The openings of all pipes and fittings should be downward to keep from capturing water, as well as airborne dust and debris. This recommendation applies equally to pipe in storage and pipes at the construction site.

Related Specification: “Store fire hydrants and valves in such a way as to prevent entry of water and dirt into openings. Support on skids or pallets off the ground or pavement. If fire hydrants or valves are provided with end protectors, do not remove protectors until ready for installation or for inspection. Once inspected, replace protectors. Protect valves against damage to threaded ends or flanges.” [02510-1.7(H)]

Problem Practice: Failing to pig the lines before filling for service

Best Practice: Construction and pipe laying is dirty work that makes it difficult to ensure the clean interior of the pipe even when good precautions are exercised. Pipes are significantly easier to pig during construction. The pig can be installed at the first junction and flushed through before the next valve is installed. OWASA has seen better testing results when pigging is conducted prior to disinfection. This is particularly true if there has been any sign of dirt in the pipes. If OWASA inspectors observe dirt in the pipes, the absence of recommended practices being observed, or violations of OWASA Specifications, pigging may be mandated before acceptance testing begins.

Problem Practice: Use of non-food grade grease to ease pipe couplings

Best Practice: Petroleum products can cause contamination of the pipes and the grease is a strong attractant for dirt and bacteria. If used where the grease may contact drinking water, only products approved for use in drinking water may be used. State regulations require any products that may come into contact with the water to be ANSI/NSF certified.

Related Requirements: “Hydrants, upon installation and prior to acceptance of the project, shall be painted and greased, the caps are to be greased with a food grade anti-seize lubricant after

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installation, and individually operated in front of an OWASA representative to verify the hydrant is greased and in working condition.” [Page 02510-3.2(F)(2)]

15A NCAC 18C .1537 DRINKING WATER ADDITIVES (a) The standards set forth in American National Standards Institute/NSF International, codified at ANSI/NSF Standard 60 and ANSI/NSF Standard 61, are hereby incorporated by reference including any subsequent amendments and editions. (b) A water supply product used in a public water system shall meet the standards incorporated by reference in Paragraph (a) of this Rule. A product certified by an organization having a third-party certification program accredited by the American National Standards Institute to test and certify such products is acceptable for use in a public water system.

Problem Practice: Using a cap on a blow off where the pipe size is reduced, which can catch dirt in the corners, leading to positive samples

Best Practice: Install a graduated reducer to minimize the ability of dirt to settle and bacteria to grow.

Problem Practice: Failing to adequately disinfect pipe ends and fittings

Best Practice: Spray or swab all pipes and fittings with a minimum 1% hypochlorite solution before installation or just prior to making connections.

Related specifications: “The Contractor shall clean the valves before installation and check for satisfactory operation.” [Page 02510-3.2(B)(1)]

Theme 2: Problems with testing and sampling

Problem Practice: Using a used or dirty pipe for the sample tap

Best Practice: Always use new, clean pipe for the sample tap and install into the new section of pipe.

Problem Practice: Providing inadequate chlorine contact time for the situation

Best Practice: OWASA Standard Specifications require 48 hours of hold time with super-chlorinated water. At times, additional hold time may help reduce the number of positive coliform samples. For example, there are greater numbers of positive bacteria test results in warmer weather when bacterial growth is more prolific. The benefits of longer chlorine hold times must be weighed against the possibility of losing too much chlorine residual in the lines before final measurement.

Problem Practice: Failing to use non-threaded bibs

Best Practice: As the threads at the end of a bib are known to hold dirt and debris which can harbor bacteria, ensure that sampling bibs used are non-threaded.

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Problem Practice: Removing and reassembling sample points

Best Practice: Each instance of moving a sample point is an opportunity to contaminate the water line. Select locations carefully, and if a location needs to be moved, use clean pipe following proper disinfection procedures.

Note: “Related Specifications” citations refer to OWASA’s Standard Specifications for Water Distribution and Wastewater Collection Systems, April 2015, as amended.