Cleaning & Lining Water Mains

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Cleaning and cement mortar lining of a water main can be a cost effective alternative to full pipeline replacement. The process is intended to rehabilitate the pipe from the inside restoring its function and extending its lifespan – in many cases for up to 50 years or more. Some of the advantages include:

- Cost-effective: labor, equipment needs, and less pavement repairs are often less expensive.
- Less Disruptive: less excavation results in minimal disruption to traffic, pedestrians and businesses.
- Faster Completion: complete restoration of a pipeline often takes much less time.

However, there are certain situations where full water main replacement is preferred. These may include:

- The pipe has suffered severe structural damage such as complete collapse, significant breaks or large holes.
- The overall integrity of the pipe wall is questionable, which would result in repeated lining failures.
- The pipe is severely brittle due to age making it too fragile to withstand the cleaning and lining process.
- The pipe has major joint or fitting failure that can not be addressed through a cement mortar lining process.
- An expected increase in the water demand of the service area requires pipe of a larger diameter.

The general steps involved in a traditional cleaning and cement mortar lining project are:

1. Notify the customers in the affected area.
2. Ensure proper Work Zone safety measures are in place throughout the project.
3. Install temporary bypass lines to provide water service to customers while the main is out of service.
4. Dig access pits at strategic points along the water main (typically every 500 feet). The pits are where the equipment will be inserted and removed. .
5. Isolate and dewater the section of pipe to be cleaned.
6. Specialized equipment such as foam pigs, an ice slurry, or mechanical scrapers are pushed/pulled through the pipe to remove biofilm, sediment, tuberculation and other debris. This process is often repeated multiple times and can incorporate a variety of pigging devices to get the pipe wall as clean as possible.
7. The main is flushed to remove all debris and a camera is sent through the pipe to visually inspect the interior surface.
8. A specialized cement mortar lining machine is sent through the pipe. A spinning head on the machine sprays the mortar onto the wall while a cone-shaped trowel smooths out the mortar. A specialized tool is used to clean out each service connection.
9. Cement mortar curing of 24-48 hours is needed to allow for reinspection and, if suitable, return the line to service. Complete curing will take up to 28 days.

You can learn more about the cleaning and lining process by attending the MWWA's remote training on November 5th [insert registration link]

1. When evaluating whether or not to clean and line a pipe, which of the following is the <u>most</u> important thing to consider?
    a. Amount of time customers will be without water.
    b. Cost
    c. The integrity and thickness of the pipe wall.
    d. All of the above.

2. True or False? Cement mortar lining will improve the C-value of the pipe.
    a. True
    b. False

3. An advantage that ice pigging has over traditional foam pigging is .....
    a. Foam pigs can get stuck in valves and fittings
    b. Access pits are not needed.
    c. Pipeline flushing and camera inspection are not needed.
    d. Ice pigging is cheaper

4. Which of the following is <u>not</u> part of the traditional cleaning and lining process?
    a. The section being cleaned and lined is always under full water pressure.
    b. The section being cleaned and lined is flushed and drained.
    c. Temporary customer service lines must be installed.
    d. Access pits are installed approximately 500 feet apart.

5. How many gallons of water are needed to move three volumes of flushing water through a 500 foot section of a newly cleaned 8-inch diameter pipe?
    a. 174
    b. 1,305
    c. 3,915
    d. 187,898

<u>Solution:</u>
Formula to use from ABC/WPI Formula-Conversion Sheet:
Volume of a cylinder = 0.785 X Diameter^2 X Height
Where Diameter = 8in X (1ft/12in) = 0.6667ft
Height = Length of pipe = 500 ft
Volume = 0.785 X 0.6667ft X 0.6667ft X 500 ft = 174.46ft^3
Convert to gallons: 174.46ft^3 X (7.48gal/ft^3) = 1304.9 gal
Problem notes that 3 volumes of water are needed: 3 X 1304.9gal = 3914.92 gal