

STANDARD OPERATING PROCEDURE – DOMESTIC WATER TANK CLEANING AND DISINFECTION

This domestic tank cleaning procedure is applicable to all domestic water tanks that provide access for power washing the interior.

1 PURPOSE

The purpose of this program is to present the steps necessary to clean and disinfect a domestic water tank using liquid sodium hypochlorite solution (chlorine) in a safe and sound manner.

The tank will be disinfected in accordance with the applicable provisions of the Administrative Code of the City of New York, the State Sanitary Code Part 5-1, and industry standards and recommendations including AWWA, NSF/ANSI, and any other applicable national standards developed by ANSI-accredited organizations.

The procedure adheres to:

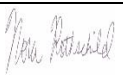

- American Water Works Association (AWWA) Standard C652-11 Disinfection of Water-Storage Facilities
- New York City Department of Health and Mental Hygiene (NYCDOHMH) Article 141.09 Building Water Tank Cleaning, Painting, and Coating
- NYC Plumbing Code 606.5.4.5 Cleaning or Painting of Water Tanks

AWWA Standard C652-11 and Technical SDS will be available for reference along with the following procedure, as needed. Article 141.09 and Plumbing Code 606.5.4.5 are Appendix A and B.

2 SCOPE

The program applies to all personnel employed at Barclay Water Management, Inc.

This standard describes materials, facility preparation, application of disinfectant to interior surfaces, and sampling of the tank water after disinfection. All new storage facilities shall be disinfected before they are placed in service. All storage facilities taken out of service for inspection, repair, painting, cleaning, or other activity that might lead to water contamination shall be disinfected before they are returned to service.

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<i>Approved by:</i> 		
<i>Name:</i> Kyle Koller	<i>Date:</i> 06/19/23	

3 RESPONSIBILITY

- 3.1 It is the responsibility of the individual employee to ensure that this procedure is followed.
- 3.2 It is the responsibility of the supervisors and managers to ensure that these procedures are followed by all personnel.

4 PREREQUISITES

- 4.1 Before proceeding with domestic water tank cleaning, all Barclay employees who are directly involved with domestic water tank cleanings must be trained in Hazard Communication/Right to Know Program, Personal Protection Equipment, Lockout/Tag Out Procedure, Field Personnel Chemical Handling Procedure, Chemical Spill Response Procedure, Respiratory Protection, Fall Protection, Incident Investigation and Pressure Washer Safety.
- 4.2 Barclay Water Management, Inc.'s Customer Representative will work with the building management team: to coordinate scheduling of the tank disinfection and any pre-disinfection preparations needed (for examples, notifying staff or cleaning of the area housing the domestic tank); to communicate the method of disinfection; and to discuss specific building requirements or precautions.

5 PROCEDURE

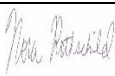

5.1 MATERIALS

All of the materials used for this procedure will comply with the requirements of the Safe Drinking Water Act. All products used during the cleaning and disinfection will be certified by ANSI-accredited organizations. No toxic or lead based materials will be used during this procedure.

5.2 CLEANING AND DISINFECTION

The customer will be responsible for isolating, opening, and draining the domestic water tank before Barclay's Environmental Group employees begin the cleaning and sanitization process.

Any material not part of the structure or operation of the tank will be removed prior to cleaning. Barclay will ensure all internal surfaces of the storage tank will be cleaned using a high-pressure water jet. All water, dirt, and foreign material accumulated during the cleaning process will be discharged from the tank. All water used during the entire process shall be potable water.

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After the tank has been cleaned, all screened openings will be checked and secured to prevent contaminants or organisms from entering the tank. Any materials placed back in the tank after cleaning will be made clean and sanitary. Care will be taken to minimize the introduction of dirt or other material when items are being moved in and out of the storage tank.

Once the tank is completely sanitized and is inspected by the customer, the customer will be responsible for closing and refilling the domestic water tank. Any replacement gaskets will be provided by the customer.

5.2.1. Preparatory to Cleaning and Chemical Disinfection

Provide protective equipment to workers who would perform the disinfection.

A. Protective equipment includes:

- a. Full-Length Protective Clothing
- b. Closed Toe Shoes
- c. Protective Gloves
- d. Goggles and Face Shields
- e. Half-face mask that combines high efficiency particulate air filter and chemical cartridges to protect against airborne chlorine levels of up to 10 mg/L.

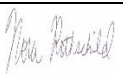

B. Provide workers with appropriate equipment so they can access the domestic water tank safely and work safely. Hygiene Service Director will ensure proper safety equipment is provided for the specific domestic water tank.

C. Hygiene Service Director will be responsible for ensuring that all workers are trained in the task.

5.2.2 Chemical Disinfection

Sodium hypochlorite solution conforming to ANSI/AWWA B300 will be used for the multiple chemical options for disinfection. The chemical solution will be mixed at the time of use. Care is taken to control storage conditions and length of storage time to minimize deterioration.

After a tank has been cleaned or painted, the tank shall be disinfected. The underside of the top, the bottom, and the walls shall be washed with a 200ppm sodium hypochlorite solution. The following method as identified in AWWA C652-11 and NYC Plumbing Code 606.5.4.5 will be utilized for storage tank disinfection:

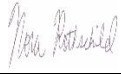

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5.2.2.1. Spraying Storage Tank Water-Contact Surfaces with free chlorine

- A solution of 200ppm sodium hypochlorite will be applied directly to the water-contact surfaces of the storage tank.
- Chlorine shall be applied to any separate drain piping such that it will have available chlorine of 10 mg/L when filled with water.
- The chlorine solution will be sprayed on, thoroughly coating the surfaces including the inlet and outlet piping and will remain in contact with the surfaces for at least 30 minutes.
- The tank shall be filled with potable water and sodium hypochlorite solution, if needed, to achieve at least 10 ppm free chlorine. The chlorinated water shall remain in the tank for two hours at this strength.
- The drinking water supply tank shall be completely drained and flushed with potable water before refilling for use, per NYC Article 141.09.
- The area where chlorinated water will be discharged will be examined. If the chlorinated water is determined to cause damage to sensitive surroundings, the chlorinated water will be neutralized with a reducing agent (Method Appendix C).
- Total coliform and chlorine samples will be taken of the potable water in the storage tank and the tank will be placed back on line for water distribution.

Barclay has a number of options for both liquid and solid chemicals that are designated for use in drinking water systems. This chart below for AL-15 is shown as an example of the information that the Environmental Group Hygiene Service Director uses to create the proper sodium hypochlorite solutions needed.

Volume of Water Gallons	10% Free Chlorine (Sodium Hypochlorite) Gallons	10% Free Chlorine (Sodium Hypochlorite) Cups
2	0.004	0.064 (0.51 Ounces)
10	0.02	0.3 (2.7 Ounces)
50	0.10	1.6 (13.5 Ounces)

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**Amounts of
15 sodium
hypochlorite chemical required to give a free chlorine
concentration of 200 mg/L.**

100	0.20	3.2 (26.9 Ounces)
200	0.40	6.4 (53.8 Ounces)

AL-

NOTE 1: After creating the solution, double check the free chlorine strength with the high range test strips to ensure that the solution is ≥ 200 mg/L. Add more AL-15 if the strength is < 200 mg/L.

NOTE 2: Sodium Hypochlorite degrades over time. Use of proper storage will minimize this degradation. These amounts do not take into account chlorine demand of the water.

5.3 WATER QUALITY SAMPLING AND TESTING

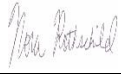

After the chlorination procedure is completed and before the storage tank is placed back on line, a sample of water from the full tank which is representative of the tank water quality will be tested for the following parameters, in accordance with the latest edition of *Standard Methods for the Examination of Water and Wastewater*:

- Coliform bacteria (to include Total Coliform and E. Coli by EPA approved method, SM 9223 B, by plate count), tested by a state certified lab
- Chlorine residual
- Odor, Turbidity, pH and Temperature, if necessary

Barclay employees will monitor the water in the storage tank to ensure that no offensive odor or turbidity exists and that pH and temperature of the tank are equivalent to the city water values.

These results will be compared to the known water supply parameters to be sure that these results are typical of the water system. The chlorine residuals will be within EPA drinking water limits and match the known chlorine residual of the potable water supply.

While bacteriological testing is used to verify that the disinfection is accomplished, following sanitary procedures during the course of all work is necessary to ensure that the disinfected tank is ready for activation.

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5.3.1 SAMPLING

The samples will be taken from a sample tap on the outlet piping from the storage tank or from a sample tap connected directly to the storage tank. If it is necessary, technicians will sample from the top of the tank or hatch. The samples will be taken from a clean and sanitary sample tap. The samples will be placed into appropriate sample bottles according to the *Standard Methods*. Total coliform samples will be sent to a state certified lab using their provided sample bottles for 24 hour turnaround.

The operation will ensure that the sample is collected from water that has been in the storage tank. Sample equipment and methods will follow aseptic techniques for bacteria sampling. If the water in the storage tank tests positive for coliform, additional coliform tests will be performed from samples of water flowing into the tank to determine if coliforms are present in the potable water source.

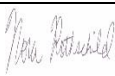

The specific number of samples taken will be determined beforehand and will be based on tank volume and sample tap or hatch availability. **One sample for tanks of 10 MG or less will be taken, and an additional sample for each 10 MG volume, using another tap or hatch if available.**

Barclay Water Management's scope of work does not include painting or epoxy coating the tank; it only covers its cleaning and disinfection. If the tank was painted or epoxy was applied, the facility will also be tested for volatile organic compounds (VOC). No paint including lead in any form shall be used inside a water tank. All products which come in contact with water are NSF/ANSI approved for this application and comply with the requirements of the Safe Drinking Water Act and other federal regulations for potable water.

Barclay Water Management does not conduct underwater inspections or perform underwater cleaning of potable water storage facilities.

5.3.2 SAMPLING RESULTS

If the test is positive for coliform bacteria the situation will be evaluated by qualified personnel. Samples will be re-taken until two consecutive samples are negative, or the disinfection process will be repeated. In this case, samples will also be taken of water flowing into the storage facility

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to determine if coliforms are present in the potable water source. If coliform bacteria are found to be coming from the incoming water supply to the facility, the local health department will be notified

5.4 DOCUMENTATION

Barclay Water Management will provide the customer with a detailed documentation of the domestic water tank cleaning and disinfection. This documentation will include:

- 5.4.1 Written report, detailing all comments and recommendations gathered from the task of cleaning the domestic water tank.
- 5.4.2 A certificate that attests that the domestic water tank has been professionally cleaned and disinfected.

6.0 DEFINITIONS

Aerosol - A system consisting of particles, solid, or liquid, suspended in air.

Approved - Tested and listed as satisfactory jointly by the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH).

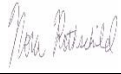

Canister (Air-Purifying) - A container filled with sorbents and catalysts that remove gases and vapors from air drawn through the unit. The canister may also contain an aerosol (particulate) filter to remove solid and liquid particles.

Cartridge - A small container filled with air-purifying media.

Confined Space - An enclosure such as a storage tank, process vessel, boiler, silo, tank car, pipeline, tube, duct, sewer, underground utility vault, tunnel, or pit that has limited means of egress and poor natural ventilation and that may contain hazardous contaminants or be oxygen deficient.

Contaminant - A harmful irritating, or nuisance material that is foreign to the normal atmosphere.

Face piece - That portion of a respirator that covers the wearer's nose, mouth and eyes in a full face piece. It is designed to make a gas-tight fit with the face and includes the headbands, exhalation valve(s), and connections for an air purifying device.

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Face Shield - a device worn in front of the eyes and a portion of, or all of, the face. Its main function is to protect the eyes and face.

Filter - A fibrous medium used in respirators to remove solid or liquid particles from the airstream entering the respiratory enclosure.

Goggle - a device, with contour-shaped eyecups or facial contact with glass or plastic lenses, worn over the eyes for the protection of the eyes and eye sockets

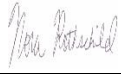

High-Efficiency Particulate Aerosol (HEPA) Filter - A filter designed to remove 99.97% of specific type particle material from air.

Particulate Matter - A suspension of fine solid or liquid particles in air, such as dust, fog, fume, mist, smoke, or sprays. Particulate matter suspended in air is commonly known as an aerosol.

Pesticide - For the purpose of this manual, the terms pesticide and pesticide chemical are synonymous with economic poison, as defined under the United States Department of Agriculture's Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

Safety Glasses - a protective lens whose physical properties are designed to protect the eye from impact.

Vapor - The gaseous state of a substance that is solid or liquid at ordinary temperature and pressure.

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The following Appendices are for information only and are not part of the SOP

APPENDIX A. New York City Article 141.09 Building Water Tank Cleaning, Painting and Coating

§141.09 Building Water Tank Cleaning, Painting and Coating

(a) Applicability. The owner, agent, or other person in control of a building which has one or more water tanks as part of its drinking water supply system shall comply with the provisions of this section.

(b) Qualification. No person or entity shall engage or hold themselves out as engaging in the business of cleaning, painting or coating of a water tank of any kind that is part of a building's drinking water supply system without holding a valid permit issued by the Commissioner, unless:

(1) that person is a licensed master plumber, as defined in section 141.01, or

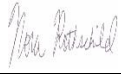

(2) that entity is a corporation or partnership in which one of the officers or partners has the qualifications required by subdivision (b)(1) above.

(c) Cleaning, Painting or Coating Requirements. Water tanks that are a part of a building's drinking water supply system shall be cleaned, painted and coated in accordance with the applicable provisions of the Administrative Code of the City of New York, the State Sanitary Code Part 5-1 and applicable industry standards and recommendations including, but not limited to, AWWA, NSF/ANSI, or other national standards developed by ANSI-accredited organizations. All products related to work performed shall be certified by ANSI-accredited organizations. No paint containing lead in any form or in any amount shall be used on the inside of a water tank. When a tank is cleaned, painted or coated, the water supply connections to and from the tank shall be disconnected or effectively plugged to prevent foreign matter from entering the distribution piping.

(d) Disinfection. All water, dirt, and foreign material accumulated during the cleaning and/or painting process shall be discharged from the tank. The tank shall then be disinfected in accordance with the applicable provisions of the Administrative Code of the City of New York and industry standards and recommendations including, but not limited to, AWWA, NSF/ANSI, or other national standards developed by ANSI-accredited organizations. All products related to work performed shall be certified by ANSI-accredited organizations. The drinking water supply tank shall be completely drained and flushed with potable water before refilling for use.

(e) Sampling. After painting or treating the interior of the tank, a water sample will be taken to ensure volatile organic compounds are not found at levels greater than that allowed by Subpart 5-1 of the State Sanitary Code. Sample results shall be reported by a State certified laboratory equipped to analyze drinking water, in accordance with the latest edition of the Standard Methods for the Examination of Water and Wastewater, published jointly by the APHA, the AWWA and the WEF.

(f) Record Keeping. A record of the date, address and work performed including a list of the cleaning, paints, coating and disinfection products used shall be maintained by the owner, agent or other person in control of a building for at least 5 (five) years from the date of the completed work and such records shall be made available to the Department upon request within 5 (five) business days.

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APPENDIX B. New York City Plumbing Code 606.5.4.5 Cleaning or Painting

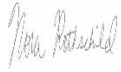

606.5.4.5 Cleaning or painting. Water tanks shall be cleaned and painted in accordance with the following:

1. No water tank of any kind that is part of a building water supply system used for potable purposes shall be cleaned with any material or painted on the inside with any material that will have a toxic or otherwise objectionable effect on the potability of the water supply when the tank is put into service. No lead paint shall be used. The water supply connections to and from a tank shall be disconnected or plugged while the tank is being cleaned or painted to prevent any foreign fluid or substance from entering the distribution piping. Where the air in a tank may be insufficient to sustain human life, or may contain an injurious gas, adequate measures shall be taken for the protection of the workers.
2. After the tank has been cleaned or painted, it shall be disinfected according to the following procedure before it is put back in service:
 - 2.1. The underside of the top, the bottom, and the walls shall be washed with a hypochlorite solution containing 100 or more ppm available chlorine.
 - 2.2. The tank shall be filled with water to which hypochlorite solution is added during the filling in sufficient quantity so that the treated water in the tank will contain at least 10 ppm available chlorine.
 - 2.3. The chlorinated water shall be allowed to remain in the tank for two hours.
 - 2.4. Finally, the tank shall be drained completely before refilling.
3. House and suction tanks shall be drained and cleaned at least once a year.

APPENDIX C. Disposal of Highly Chlorinated Water from AWWA

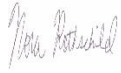

1. Check with the local sewer department for the conditions of disposal to sanitary sewer.
2. Chlorine residual of water disposed of will be neutralized by treatment with: sodium bisulfite, sodium sulfite, or sodium thiosulfate.

Residual Chlorine, mg/L	Sodium Bisulfite, lb	Sodium Sulfite, lb	Sodium Thiosulfate, lb
1	1.2	1.4	1.2
2	2.5	2.9	2.4
10	12.5	14.6	12.0
50	62.6	73.0	60.0

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REVISION HISTORY

Date	Type of Change (Process/Administrative)	Training Required? (Yes / No)	Description of Change
08/29/17			Original issue
02/02/18	Administrative	Y	Director Microbiology reviewed the procedure and no changes are necessary at this time.
03/15/18	Administrative	Y	Several changes made within the procedure; including the table revised in section 5.2.2.1
08/02/19	Administrative	Y	Changed MR name/signature
09/29/20	Administrative	Y	Procedure was audited and several changes were made and added within the document. Primarily in section 5. Title was changed
06/16/23	Administrative	Y	Updated ISO MR

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