

# The Commonwealth of Massachusetts

Department of Public Health  
250 Washington Street  
Boston, MA 02108

Department of Environmental Protection  
1 Winter Street  
Boston, MA 02108

**POST THIS NOTICE NEAR EACH  
HYDROFLUOSILICIC ACID METERING  
SYSTEM. DO NOT REMOVE OR COVER  
THIS NOTICE IN ANY WAY.**

## Standard Operating Procedure (SOP) Hydrofluosilicic Acid (H<sub>2</sub>SiF<sub>6</sub>) Metering System

### Personal Protective Equipment

- When handling hydrofluosilicic acid also called fluorosilicic acid, the operator should ALWAYS wear the following personal protective equipment (PPE):
  - Gauntlet neoprene gloves with cuffs, which should be a minimum length of 12 inches;
  - Full face shield worn over splash-proof safety goggles; and
  - Heavy-duty, acid proof neoprene apron, rubber boots or acid proof clothing. Avoid skin, nose and eye contact.

### Operations

- Refer to the material safety data sheet (MSDS) and CDC's *Engineering and Administrative Recommendations for Water Fluoridation* publication for more detailed information on how to properly handle the fluoride compound.
- Keep 50# of hydrated lime on hand in a covered container and store near the fluoride room door.
- Inspect the fluoride metering pump daily for proper operation and air binding. **ALWAYS bleed or depressurize all pump(s) and piping system(s)** to help avoid operator exposures. Always wear personal protective equipment as described including
  - Gauntlet neoprene gloves with cuffs, which should be a minimum length of 12 inches;
  - Full face shield worn over splash-proof safety goggles; and
  - Heavy-duty, acid proof neoprene apron, rubber boots or acid proof clothing.
- Inspect suction and discharge piping or tubing for leaks especially at fittings and connections. Tighten or replace as necessary after cleaning up spillage.
- Record on the official monthly form the gallons of water produced and net pounds of sodium silicofluoride used in last 24 hour period. If the pounds of fluorosilicic acid are high or low, investigate as necessary. For example, if low, was the metering pump air bound; or if high, did the percent of fluorosilicic acid strength increase from using a different shipment or barrel? A rule of thumb is to expect 31 to 43 pounds or 3 to 4 gallons of fluorosilicic acid consumed per million gallons of water optimally fluoridated.
- If a pump station has been in operation pumping water for at least 5 to 10 minutes, collect a water sample from the state-approved representative sample tap. It is usually tapped 100 feet outside the building wall. Test sample on your fluoride laboratory tester according to the recommended instructions. Record concentration in parts per million (ppm) fluoride on the official monthly form, rounded off to nearest tenth of a ppm. For example, round off 0.85 ppm as 0.9 ppm. It is encouraged that more than one sample reading be taken daily.
- Visually or using the scale reading, check the level or depth of fluorosilicic acid in the day tank or barrel which is located on the scale. A droplight suspended behind the translucent plastic day tank will help to see the level. Add or transfer AWWA and NSF approved fluorosilicic acid when low or less than 24 hours worth of fluorosilicic acid remains. **DO NOT** overfill the tank. If your day tank has been identified as too large, do not overfill past the "Full Mark".
- ALWAYS** wear 1. Gauntlet neoprene gloves with cuffs, which should be a minimum length of 12 inches; 2. Full face shield worn over splash-proof safety goggles; and 3. Heavy-duty, acid proof neoprene apron, rubber boots or acid proof clothing when handling or adding fluorosilicic acid to the day tank.
- Add the pale or yellow colored liquid fluoride compound slowly without spilling. Be sure to turn the metering pump temporarily off for 5 minutes to help avoid air binding. **Do not leave the fill process unattended.**
- Do not dilute the fluorosilicic acid with water in the day tank prior to pumping.
- Keep scale in proper working order and test accuracy semi-annually by adding known weights. Maintain flexible horizontal connectors for outside vent, suction line, and fill line if so equipped.
- Verify the day tank cover is securely fastened to the day tank ensuring there are no leaks using gaskets and bolts if necessary. Fill plug, if so equipped, must be inserted.
- Verify the day tank is continuously vented to the outside to exhaust fumes and is not blocked by snow, wildlife, or water traps.
- Adjust the metering pump stroke length or strokes per minute adjustment upward or downward to maintain a 1.0 ppm fluoride (average) in the finished water. Normally this adjustment is not made often.
- Check to make sure the metering pumps and ring loaded diaphragm type anti-siphon valves or back-pressure valves on the discharge line are present. Disassemble and inspect each anti-siphon valve at least every 12 months and sooner if past inspections have found severe deterioration of parts. **ALWAYS bleed or depressurize all pump(s) and piping system(s)** to help avoid operator exposures. They must never be removed, to avoid possible siphoning or an overdose of fluoride. If removal is necessary, install a spare immediately!
- Check monthly the metering pump electric interlock or pacing system to insure the fluoride metering pump shuts down completely when the well or pump station is off line. If not practical, do not perform, and seek DPH assistance.
- Store unopened barrels of fluorosilicic acid upright, out of direct sunlight, and separate from other waterworks chemicals. Do not drop or roll barrels. Instead, use hand trucks and automatic lift gates. Do not leave barrels open when not in use. Use proper tool to removed barrel plug. (Your supplier may sell proper tool.)
- If you store fluorosilicic acid in large storage tank(s) greater than 1,000 gallons: A) Verify the correct chemical is being added during delivery by using labeled fill pipe; B) Do not allow overfilling of bulk tank(s) especially through outside vent; C) Inspect for leaks; D) Check level remaining to avoid running out; E) Do not add water to fluorosilicic acid or allow rainwater, snowmelt, or groundwater to enter tanks or piping.
- Check strength in percent of fluorosilicic acid monthly using hydrometer while wearing 1. Gauntlet neoprene gloves with cuffs, which should be minimum length of 12 inches; 2. Full face shield worn over splash-proof safety goggles; and 3. Heavy-duty, acid proof neoprene apron, rubber boots or acid proof clothing. Strength varies between 22 to 30 percent depending upon vendor.

### First Aid and Spills

- If the acid comes in contact with the skin, the affected parts should be **immediately rinsed thoroughly for at least 15 minutes** with water. Then apply 2.5% calcium gluconate gel liberally to area(s) suspected of fluorosilicic acid contact paying particular attention to the area under fingernails. It is recommended that a supply be kept on site wherever fluorosilicic acid is handled or stored. **Prompt medical attention should follow.**
- Any fluorosilicic acid operator accident requiring overnight hospitalization must be reported by the next business day to MDPH and MassDEP.**
- Small spills** should be cleaned up using hydrated lime wearing
  - Gauntlet neoprene gloves with cuffs, which should be a minimum length of 12 inches;
  - Full face shield worn over splash-proof safety goggles; and
  - Heavy-duty, acid proof neoprene apron, rubber boots or acid proof clothing.

### Questions?

Who to Contact	During Work Hours	Outside Normal Working Hours
Department of Public Health	Department of Public Health Office of Oral Health 617-624-6074	617-983-6800 (Via the Mass Division of Epidemiology and Immunization Emergency Call Center)
Department of Environmental Protection	Regional Office OR 617-292-5770	1-888-304-1133 (via Massachusetts Emergency Management Agency (MEMA))

### Optimal Levels

- The recommended optimal fluoride concentration is 1.0ppm with a permissible increase of 0.2 ppm above, or 0.1 ppm below that amount.
- Any fluoride concentration greater than 2.0 ppm must be reported immediately to MDPH and MassDEP.
- In the event of a fluoride concentration above 4.0ppm, immediately determine and repair the problem. If the problem cannot be immediately determined shut off the fluoride metering pump until the system is repaired.
- For concentrations of fluoride over 10.0ppm immediately shut off the fluoride metering pump until state assistance is available.**
- If the concentration of fluoride reaches 30mg/l (30.0 ppm) the water main should be flushed until the concentration is less than 30mg/l.