

# [YOUR NAME HERE] WATER DEPARTMENT OPERATION AND MAINTENANCE MANUAL

[NAME] Chief Operator

Updated [DATE]

This manual is designed to inform [NAME] Water Department personnel of operation and maintenance requirements for [NAME] Water Supply. Daily, Monthly, Quarterly, yearly and other maintenance requirements are outlined in the following synopsis. All actions are to be recorded in the log book positioned at each [LOCATION] and retained for future use.

Operation and Maintenance Manuals as well as construction drawings for all pieces of equipment are also available at each well location in the event further information is required.

#### Daily:

- Check and record daily system pressure and record in log book;
- Check all chemical supplies and order as necessary;
- Check and listen for any out of ordinary sounds from the well pump or chemical feed pumps;
- Check Zone I and surrounding areas for trash, litter, unauthorized activities report any unauthorized activities as required in the emergency response plan and local police or authorities as necessary;
- Read and record master water meter readings in the log book;
- Check all operations at the pump house such as blowers, ventilation, heat, lights, chemical mixers to assure proper operation;
- Check chemical levels for corrosion control to assure that an adequate amount is stored in the day tank. If necessary mix chemical by adding 1 gallon of caustic potash (KOH) to 3 gallons of water. Allow mixer to operate for 5 to 10 minutes to assure complete mixing.
- Check both the Storage Tank to assure no trespassing or illicit activity. Report all incidents to proper authorities and implement emergency response plan as necessary.

#### Monthly:

- Calibrate chemical feed pump using the following method:
  - Don appropriate personal protective equipment that includes face shield, chemical apron and chemical resistant gloves;
  - Turn valving such that the chemical fills the calibration cylinder. Assure appropriate amount is being dispensed and adjust chemical feed pump as necessary.
  - If chemical pump is not supplying chemical in appropriate amounts, rebuilding of the pump may be necessary. Acquisition of an appropriate rebuild kit from a supply house such as USA Bluebook may be necessary. LMI parts kits include a

new Dayton (diaphragm) and check valves. Foot valves that are equipped with anti-siphon valves must also be checked to assure proper operation.

- Periodic cleaning of the pump and fixtures may be accomplished by cleansing the pump in warm water.
- Mow, brush cut, (or clear snow seasonally) all areas surrounding storage tanks wells and associated infrastructure;
- Assure that the integrity of all fencing is secure;
- Check signals from all telemetry;
- Check all safety equipment such as safety showers, eye washes and personal protective equipment;
- Connect all portable generator systems to both well houses and operate wells on generator power for at least one hour to assure appropriate exercise.
- Test the flow/no flow interlock at both pump houses by the following method:
  - Close the downstream valve exiting the pump house while the well pump is filling the tank this will cause the flow to stop
  - Well pump should de-energize and stop the well pump. If it does not make appropriate repairs or call appropriate personnel in order to make the repair.

#### Quarterly

- Inventory all spare parts for service brass, repair clamps, curb boxes, chemical feed equipment, and hydrant parts. Assure that inventory is retained in the log book. Maintain the minimum number of parts as required. Replace all material shortfalls ASAP.
- Inventory all O&M Manuals to assure that they are updated and the most recent copies are retained at the pump house. Call supply house or search the internet and download copies;
- Assure that all MSDS sheets are updated and retained at the pump houses;
- Inventory all personal protective equipment to assure that it is serviceable (i.e. not cracked or broken);
- Inspect the exterior of all storage tanks to assure that there is minimal concrete spalling around the hatches, screens on overflows are secure, there is no evidence of damage from animals etcetera.

#### Yearly

- Since the master meter is typically pumping against a narrow range of head calibration of the master meter utilizing the following method should be adequate to assure accuracy:
  - Assure that well pump is not pumping and storage tanks are full and not calling for water;
  - Connect a hose to the tap installed after the water meter to a clean 55 gallon drum;

- Start the well pump and fill the barrel with water. Check to see that the meter agrees with the amount dispensed.
- Annual flush all hydrants in [WATER SYSTEM] systems. Flushing is to be accomplished when demands are lowest. Flush water in hydrants until it runs clear and is free of turbidity. Utilize a flashlight and a jar to sample water as it flows from hydrant. Utilize a diffuser or other appropriate device to minimize property damage from washouts. Check the operation of all hydrants during the flushing. Make a note to repair any hydrants that do not operate smoothly.
- Conduct yearly leak locating on system utilizing the Geophones. Leak locating should be accomplished at night when water usage is minimized. Place Geophones on hydrant and listen for noise.
- Inspect and clean all switching gear for the well pumps and telemetry. Contact representatives from Motorola or an electrician as necessary.
- Conduct maintenance on all standby generators. Perform oil, fuel and air filter changes to assure all equipment is ready and operational. Record maintenance in appropriate log books.

Every 5 Years:

- Drain, flush, clean and disinfect the Storage Tank. Make observations when inside the tank for evidence of concrete degradation effluent pipe corrosion or any areas where surface water may enter tank such as around the entrance hatch. Utilize high pressure spray from fire apparatus or portable pump as necessary in order to hose down interior walls and floor for cleaning.
- Upon completion of disinfection of the tank is necessary. Apply a concentration of at least 50 mg/L of chlorine residual to the tanks and allow to sit for 24 hours to assure adequate disinfection. Mixing of the disinfectant within the tank utilizing portable pumps or fire apparatus may be needed to assure that all areas of the tank come into contact with the reagent.
- Disinfect the tanks as follows:

## APPENDIX B

### Chlorine Dosages

*This appendix is for information only and is not a part of AWWA C652.*

**Table B.1** Amounts of chemicals required to give various chlorine concentrations in 100,000 gal (378.5 m<sup>3</sup>) of water\*

Desired Chlorine Concentration in Water <i>mg/L</i>	Chlorine Required <i>lb (kg)</i>		Sodium Hypochlorite Required						Calcium Hydrochlorite Required	
			5 Percent Available Chlorine		10 Percent Available Chlorine		15 Percent Available Chlorine		65 Percent Available Chlorine	
			<i>gal</i>	<i>(L)</i>	<i>gal</i>	<i>(L)</i>	<i>gal</i>	<i>(L)</i>	<i>lb</i>	<i>(kg)</i>
2	1.7	(0.8)	3.9	(14.7)	2.0	(7.6)	1.3	(4.9)	2.6	(1.1)
10	8.3	(3.8)	19.4	(73.4)	9.9	(37.5)	6.7	(25.4)	12.8	(5.8)
50	42.0	(19.1)	97.0	(367.2)	49.6	(187.8)	33.4	(126.4)	64.0	(29.0)

\*Amounts of sodium hypochlorite are based on concentrations of available chlorine by volume. For either sodium hypochlorite or calcium hypochlorite, extended or improper storage of chemicals may cause a loss of available chlorine.

**Table B.2** Amounts of chemicals required to give various chlorine concentrations in 200 mg/L in various volumes of water\*

Volume of Water <i>gal (L)</i>		Chlorine Required <i>lb (kg)</i>		Sodium Hypochlorite Required						Calcium Hydrochlorite Required	
				5 Percent Available Chlorine		10 Percent Available Chlorine		15 Percent Available Chlorine		65 Percent Available Chlorine	
				<i>gal</i>	<i>(L)</i>	<i>gal</i>	<i>(L)</i>	<i>gal</i>	<i>(L)</i>	<i>lb</i>	<i>(kg)</i>
10	(37.9)	0.02	(9.1)	0.04	(0.15)	0.02	(0.08)	0.02	(0.08)	0.03	(13.6)
50	(189.3)	0.1	(45.4)	0.2	(0.76)	0.1	(0.38)	0.07	(0.26)	0.15	(68.0)
100	(378.5)	0.2	(90.7)	0.4	(1.51)	0.2	(0.76)	0.15	(0.57)	0.3	(136.1)
200	(757.1)	0.4	(181.4)	0.8	(3.03)	0.4	(1.51)	0.3	(1.14)	0.6	(272.2)

\*Amounts of sodium hypochlorite are based on concentrations of available chlorine by volume. For either sodium hypochlorite or calcium hypochlorite, extended or improper storage of chemicals may cause a loss of available chlorine.

**WARNING:**

**Water discharged from the tanks after disinfection must be tested for chlorine residual. Excessive chlorine residual (i.e greater than 0.5 mg/L) must be dissipated prior to discharge to the environment. Utilization of a manmade dewatering basin with vegetative swale and hay bales to confine the highly chlorinated water until it can be de-chlorinated is necessary. Utilize an appropriate de-chlorinating agent prior to discharge.**

As Needed:

- The distribution system map was completed in [DATE]. Unless significant changes are made to the system (i.e. installation of another source, extension of a main, addition of more hydrants) the map should be adequate for an extended period of time. If updating of the map is required delivery of the map to an appropriate consultant for digitization and addition of the new infrastructure will be accomplished.