O & M Manual

and

Preventive Maintenance Logs

For Drinking Water Systems

Per Chapter 62-555.350 (2); (12) & (13) F.A.C.
O&M Manual and Preventive Maintenance Logs

Water System: _____

Street Address: _____

City, State, Zip: _____

Phone: _____ **Fax:** _____

Contact: _____

E-mail: _____

Number Connections: _____

PWS: _____

County: _____

Classification: Community _____ Non-Community _____ NTNC ____

Source: Ground _____ Surface _____ Purchased _____

Ownership: _____

Date: _____

This template has been developed to help you prepare your own O&M Manual and Preventive Maintenance Log.

For more information or additional copies of this document contact:

FLORIDA RURAL WATER ASSOCIATION
2970 Wellington Circle ~ Tallahassee FL 32309
Telephone: 850-668-2746 ~ e-mail: FRWA@frwa.net

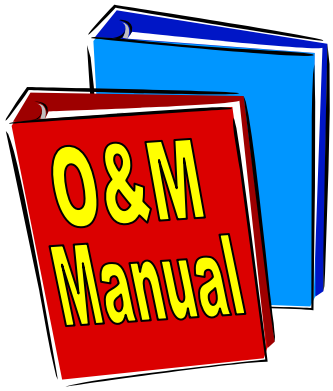
Table of Contents

DEP Requirements
O&M Manual and Preventive Maintenance Logs

This template has been developed to help you prepare your own O&M Manual and Preventive Maintenance Log.

OPERATION & MAINTENANCE MANUALS

Who: ALL water systems regardless of size
What: Up-To-Date Operation & Maintenance Manual of Your System
When: December 31, 2005
Where: Keep a copy in your water plant office
Why: Rule 62-555.350(13), FAC



The O&M Manual should be a quick reference for successful daily operation and include anything from trouble shooting to emergency procedures. The rule requires the O&M Manual to contain:

- ✓ Bound and Indexed Equipment Manufacturer Manuals (you can download most of these manuals off of the web or get them from equipment manufacturers)
- ✓ Operation and Control Procedures
- ✓ Preventive Maintenance and Repair Procedures

We recommend that you make at least **two copies** of the O&M Manual and store one in a safe place in case the plant copy gets lost or damaged by normal use. Your O&M Manual and Preventive Maintenance Logs can be stored in a **3-ring binder**.

PREVENTIVE MAINTENANCE LOGS

Who: ALL water systems regardless of size
What: Up-To-Date Preventive Maintenance Logs of Your System
When: August 28, 2003
Where: Keep a copy in your water plant office
Why: 62-555.350 (2) and 62-555.350 (12), FAC

We recommend that you include the Preventive Maintenance Logs in your O&M Manual Binder. The Preventive Maintenance Logs show the date and type of all maintenance performed, and complies with rule 62-555.350 (2) and 62-555.350 (12), which requires the following:

- ✓ Preventive Maintenance Logs on Electrical and Mechanical Equipment
- ✓ Cleaning and Inspection Logs of Treatment Facilities and Storage Tanks
- ✓ Records of Coatings and Linings Rehabilitation or Repair
- ✓ Licensed Engineer Inspection Report (once every 5-years) for Finished-Drinking-Water Storage Tanks and Hydropneumatic Tanks
- ✓ Written Flushing Program and Logs showing that Dead-End Water Mains are being flushed at least quarterly
- ✓ Isolation Valves Exercise Logs

*However upon completion, **DO NOT** submit your O&M Manual & Preventive Maintenance Logs to the Florida Department of Environmental Protection (FDEP). FDEP will verify that you have these documents during their Sanitary Survey of your system (routine water system inspection). This template is intended for use by small water systems and may be modified to fit the specific needs of each system. This O&M Manual & Preventive Maintenance Logs complies with FDEP minimum requirements and; you may modify it in any way that works for you – add sections, or rearrange them if you wish. Please send a copy of your O&M Manual & Preventive Maintenance Logs to Florida Rural Water Association ~ we would like to see your work!*

Section 1 – Maintenance Contacts List

This Operations & Maintenance (O&M) Manual is to used as a reference in the overall operation and maintenance of this Water System. This manual contains the necessary O&M procedures, worksheets, and record keeping forms, safety and emergency procedures, and testing and monitoring procedures. This manual is to be updated from time to time to reflect physical and procedural changes to the water system. Also it is intended that this manual be used as a training tool for new employees and as a guide for qualified substitute operators.

State Watch Office

Telephone: **800-320-0519**

62-555.350(10)(a) *Suppliers of water shall telephone the SWP immediately (i.e., within two hours) after discovery of any actual or suspected sabotage or security breach, or any suspicious incident, involving a public water system.*

Service / Repair Contacts				
Organization or Company	**Name & Position**	**Telephone**	**Cell Phone**	**e-mail**
Water Testing Lab				
Water Testing Lab				
Pump Supplier				
Equipment Vendor				
Equipment Vendor				
Equipment Vendor				
Rental Equip				
Chemical Supplier				
Chlorine Supplier				
Electrical Contractors				
Safe Dig / One Call				
Excavating Contractors				
Eng. Consultants				

Section 2 - Bound and Indexed Equipment Manufacturer Manuals

Attach ALL Equipment Manufacturer Manuals in this Section.

System Description & Major Equipment *(Attach additional sheets if needed)*

Source or Sources of Water (Wells, FL Unique ID #) _____

_____

Well Pumps (Size, Mfr & Model) _____

Types of Treatment (e.g., Chlorination, Filtration, etc.) _____

_____

_____

Chlorine Feed Equipment (Size, Mfr & Model)_____

Ammonia Feed Equipment (Size, Mfr & Model)_____

Ortho/Polyphosphate Feed Pumps (Size, Mfr & Model)_____

Other Chemical Feed Equipment (Size, Mfr & Model)_____

Treatment Equipment (Size, Mfr & Model)_____

Treatment Equipment (Size, Mfr & Model)_____

Treatment Equipment (Size, Mfr & Model)_____

Standby Power Equipment (Size, Mfr & Model)_____

Major Controls

Control Valves (Size, Mfr & Model)_____

Pump Controls (Type, Mfr & Model)_____

Other Controls (Type, Mfr & Model)_____

Storage & Distribution Features

High Service Pumps (Size, Mfr & Model) _____

High Service Pumps (Size, Mfr & Model) _____

High Service Pumps (Size, Mfr & Model) _____

Storage Tanks (Size, Mfr & Model) _____

Storage Tanks (Size, Mfr & Model) _____

Storage Tanks (Size, Mfr & Model) _____

We suggest attaching a water treatment plant schematic and system map / diagram to show system components, including sampling taps (POC's or points of collection) which are used for bacteriological and chemical sampling, also see recommended Appendices for optional O&M information.

Section 3 - Preventive Maintenance Log

It is essential that water system operators provide Preventive Maintenance for protection of the health and safety of the public; proper equipment operation and preservation; and as required by the Florida Department of Environmental Protection. Your water system may be more complex, if so you will need to add additional Preventive Maintenance categories.

The purpose of any maintenance program is: to ensure that equipment is properly functioning, to maximize system reliability, to ensure that equipment meets or exceeds its expected service life and to ensure that equipment repairs can be performed in a scheduled manner avoiding the extra costs and disruptions caused by unexpected equipment failure.

There are three kinds of maintenance activities that you will perform. These are predictive, Preventive and breakdown maintenance. **Predictive Maintenance** includes such items as oil analysis, to determine optimal oil replacement frequency, infrared analysis, to ensure that electrical connections are sound and that there are no imminent electric failures about to occur and vibration analysis, to ensure that equipment is properly aligned and that bearing wear is identified well before failure occurs.

Preventive Maintenance is a schedule of planned maintenance actions aimed at the prevention of breakdowns and failures in water systems. The primary goal of preventive maintenance is to prevent the failure of pumps and equipment before it actually occurs. It is designed to preserve and enhance equipment reliability by replacing worn components before they actually fail. Preventive maintenance activities include exercising valves and fire hydrants; equipment and tank inspections; partial or complete overhauls at regular specified periods; oil changes; lubrication; and so on. In addition, operators can record equipment deterioration so they know to replace or repair worn parts before they cause system failure.

How often should preventive maintenance for equipment be performed?

A. Once every week
B. After a breakdown
C. According to manufacturer recommendations
D. When time permits
E. According to a well thought out plan

The answer is both C and E. The ideal preventive maintenance program would prevent all water system equipment failure before it occurs. Long-term benefits of preventive maintenance include: improved system reliability, decreased cost of replacement, decreased system downtime, and better spares inventory management.

Breakdown Maintenance is maintenance that must be performed because of unexpected equipment failure. This is the most disruptive and costly type of maintenance and the purpose of a good maintenance program is to minimize these unscheduled events. There are multiple misconceptions about the benefits of preventive maintenance. One such misconception is that preventive maintenance is unduly costly, time consuming, or causes disproportionate work. This logic dictates that it would cost more for regularly scheduled downtime and maintenance than it would normally cost to operate equipment until failure or repair is absolutely necessary. This may be true for some smaller equipment components; however, one should compare not only the costs but also the long-term benefits and savings associated with preventive maintenance. Without a sound preventive maintenance program, labor costs for lost water production time from unscheduled equipment breakdown will be incurred, damages to equipment can be much more severe and potential negative treatment process and/or regulatory ramifications can be unacceptable to the customer and costly to the system.

Even under the best Preventive maintenance program, some breakdown maintenance will occur. Each of these events provides a learning opportunity to improve upon existing Preventive maintenance programs. The operator should evaluate every equipment breakdown situation, to determine the cause, and what measures could have been taken to prevent the occurrence. The lessons learned should then

be added to the Preventive maintenance program. Building these written feedback loops into the Preventive maintenance program will yield significant returns.

Other Maintenance Items ~ FRWA has provided a number of recommended charts that can be very helpful in designing or in improving an existing Preventive maintenance system, Water Systems are advised to use these to develop customized maintenance information documentation for operators and maintenance personnel that are specific to their systems. General maintenance is imperative in keeping a plant in working condition. The following items should be included;

- ✓ Preventive maintenance schedule and instructions for completion;
- ✓ List of Specifications for fuels, lubricants, filters, etc. for equipment;
- ✓ Trouble shooting charts or guides which references pages in O&M manual and manufactures O&M manual;
- ✓ Record system for each type of equipment, this should include; numbering system, catalog, nameplate data cards, maintenance record cards;
- ✓ Manufacturers' maintenance schedule for routine adjustments. A summary with references to page number in manufacturer's O&M manual needs to be provided;
- ✓ A work order system for maintenance of equipment with sample forms.
- ✓ A designated responsible individual to ensure that the program tasks are being met and that timely updates are included in the program as needed
- ✓ Lastly, another benefit of a sound Preventive maintenance program is the ability to identify maintenance trends that consume a great deal of the operator's time. In these cases these trends provide the documentation necessary to management for replacement of equipment that is not performing in an acceptable manner. A Preventive maintenance program that is used in this way can achieve significant cost reductions, improve system reliability, and provide the operator with more time to devote to more critical tasks.

TYPICAL DUTIES OF A WATER PLANT OPERATOR

1. Start up, shut down, and make periodic operating checks of plant equipment, such as pumping systems, chemical feeders, auxiliary equipment (compressors), and measuring and control systems.
2. Perform routine Preventive maintenance, such as lubrication, operating adjustments, cleaning and painting equipment.
3. Load and unload chemicals, such as chlorine cylinders, bulk liquids, powdered chemicals, and bagged chemicals either by hand or using chemical –handling equipment such as forklifts and hoists.
4. Perform minor corrective maintenance on plant mechanical equipment; for example, chemical feed pumps and small units.
5. Maintain plant records, including operating logs, daily diaries, chemical inventories, and data logs.
6. Monitor the status of plant operating guidelines, such as flows, pressures, chemical feeds, levels, and water quality indicators, by reference to measuring systems.
7. Collect representative samples and perform laboratory tests on samples for turbidity, color, odor, coliforms, chlorine residual, and other tests as required.
8. Order chemicals, repair parts and use tools.
9. Estimate and justify budget needs for equipment and supplies.
10. Conduct safety inspections, follow safety rules for plant operations, and also develop and conduct tailgate safety meetings.
11. Discuss water quality with the public, conduct tours of your plant (especially for school children), and participate in your employer's public relations program.
12. Communicate effectively with other operators and supervisors on the technical level expected for your position.
13. Make arithmetic calculations to determine chemical feed rates, flow quantities, detention and contact times, and hydraulic loadings as required for plant operations.

Recommended Daily Operational Duties / Preventive Maintenance

(check or circle items that apply ~ strikethrough items that do NOT apply)

Water Meter Readings	❑ Record Water Plant Meter Readings ❑ Calculate Total Daily Production
Pumps & Tank Levels	❑ Inspect Well Pumps & Controls ❑ Check Chemical Solution Tanks & Record Amount Used ❑ Check & Record Water Levels in Storage Tanks ❑ Inspect Chemical Feed Pumps ❑ Inspect High Service Pumps & Controls ❑ Record Pump Run Times & Start Cycles
Sampling & Readings	❑ Check & Record Chlorine Residual at Point of Application ❑ Check & Record Chlorine Residual at Nearest Customer (Systems Req'd to Provide CT) ❑ Check & Record Chlorine Residual in Distribution System at Remote Points ❑ Check Instrumentation for Proper Input / Output
Security	❑ Investigate Customer Complaints ❑ Complete a Daily Security Check ✓ Windows, Doors, Hatches, Vents, Screens for Evidence of Tampering or Vandalism ✓ Well Caps, Vents & Seals ✓ Security Lighting, Locks & Alarms ✓ Inspect Fences & Gates

Recommended Weekly Operational Duties / Preventive Maintenance

(check / circle items that apply ~ strikethrough items that do NOT apply)

Inspections & Conditions	❑ Inspect Chlorine & Fluoride Testing Equipment (Calibration & Reagents) ❑ Check & Record Well Pumps Pumping Rate ❑ Check Membrane System Pressure Differential
Cleaning	❑ Clean Pump House and/or Plant Operations Office ❑ Clean Water System Grounds
Security	❑ Check ALL Station Alarms for Proper Operation ❑ Check Stand-By Power Source to Ensure Emergency Operation

Recommended Monthly Operational Duties / Preventive Maintenance

(check or circle items that apply ~ strikethrough items that do NOT apply)

Inspections & Conditions	❑ Check & Record Electric Meters ❑ Take Appropriate Monthly Water Quality Samples ❑ Check & Record Static & Draw-Down (Pumping) Levels in Wells ❑ Confirm Submittal of Monthly Operation Reports (MORs) ❑ Lubricate Pumps, Motors, Blowers & ALL Moving/Rotating Equipment ❑ Inspect ALL Pumps House Water Lines, Gaskets & Fittings for Corrosion & Leaks ❑ Inspect Pump, Seals, Water Lines & Fittings for Corrosion & Leaks ❑ Listen to Pump for Unusual Noises (or signs that Bearings are Wearing Out) ❑ Inspect Scales, Analyzer / Alarm, Oxygen Breathing Apparatus, Cross Ventilation ❑ Inspect Filter Head for Leaks ❑ Inspect and Add Salt to Brine Tank (i.e. Ion Exchange Only) ❑ Run Emergency Generator for 30-min UNDER LOAD, Check ALL Fluid and Fuel Levels ❑ Test Eye Wash & Emergency Shower
Cleaning	❑ Clean & Inspect Wellheads ❑ Inspect & Clean Chlorine Injection Points
Security	❑ Inspect Tank Overflow Vent Screens, Ensure Screen Intact, Check Manway Hatch & Ensure it is Secured

Recommended Qtly Operational Duties / Preventive Maintenance

(check or circle items that apply ~ strikethrough items that do NOT apply)

Cleaning	❑ Flush Dead-End Lines (Feb, May, Aug & Nov) Required by FDEP Rule 62-555.350(2) or more often per your written flushing program * ❑ Lubricate Locks ❑ Clean, Inspect & Disinfect Aerator / Degassifier Screens, Sprayheads & Gaskets

** Note: Flushing of dead-end water mains may be limited to just those dead-end mains that are 6 inches or greater in diameter if there is no history of water quality problems at dead-end mains smaller than 6 inches in diameter.*

Preventive Maintenance (PM) Recommendations

January PM Recommendations (Peak Month)

(check or circle items that apply ~ strikethrough items that do NOT apply)

- ❑ Flush Half Distribution System
- ❑ Exercise Half Fire Hydrants

February PM Recommendations (Peak Month)

(check or circle items that apply ~ strikethrough items that do NOT apply)

- ❑ Flush Remaining Distribution System & Exercise Remaining Fire Hydrants (not completed in January)
- ❑ Flush Dead-End Lines (Feb, May, Aug & Nov) Required by FDEP Rule 62-555.350(2) or more often
- ❑ Inspect, Clean & Repair Control Panels in Water Treatment Plant

March PM Recommendations (Peak Month)

(check or circle items that apply ~ strikethrough items that do NOT apply)

- ❑ Inspect Storage Tanks for Defects & Sanitary Deficiencies
- ❑ Clean Storage Tanks as Needed
- ❑ Structural Inspection of Tank & Coatings by Engineer at Least Every 5-yrs and Before Aug 2008 (Clean Tank Prior)
- ❑ Perform Tank Coating Repairs per Mfr Specifications & Recommendations
- ❑ Clean, Inspect & Disinfect Aerator / Degassifier Screens, Sprayheads & Gaskets

April PM Recommendations

(check or circle items that apply ~ strikethrough items that do NOT apply)

- ❑ Clean & Inspect Chemical Feed Lines
- ❑ Clean & Inspect Chemical Solution Tank
- ❑ Calibrate Chemical Feed Pumps

May PM Recommendations (Non-Peak Month)

(check or circle items that apply ~ strikethrough items that do NOT apply)

- ❑ Flush Distribution System
- ❑ Exercise ALL Fire Hydrants & Check FH Valves
- ❑ Water Plant & Pump House Building Preventive Maintenance
- ❑ Flush Dead-End Lines (Feb, May, Aug & Nov) Required by FDEP Rule 62-555.350(2) or more often

June PM Recommendations

(check or circle items that apply ~ strikethrough items that do NOT apply)

- ❑ Contact Electrician to Check Emergency Generator & Run on Load Bank
- ❑ Contact Electrician to Check Running Amps on Pumps
- ❑ Make Sure Unnecessary Equipment is Properly Decommissioned
- ❑ Review Emergency Response Plan – Update as Necessary
- ❑ Clean, Inspect & Disinfect Aerator / Degassifier Screens, Sprayheads & Gaskets

July PM Recommendations (Non-Peak Month)

(check or circle items that apply ~ strikethrough items that do NOT apply)

- ❑ Prepare Water System for Summer Operation / Hurricane Season (Fuel, Generators, Shutters)
- ❑ Building Preventive Maintenance

August PM Recommendations (Non-Peak Month)

(check or circle items that apply ~ strikethrough items that do NOT apply)

- ❑ Operate ALL Valves Inside Treatment Plant & Pump House
- ❑ Clean & Inspect ALL Safety Equipment
- ❑ Flush Dead-End Lines (Feb, May, Aug & Nov) Required by FDEP Rule 62-555.350(2) or more often

September PM Recommendations

(check or circle items that apply ~ strikethrough items that do NOT apply)

- ❑ Clean RO Membranes or per Mfr Recommendations
- ❑ Overhaul or Replace Pressure Relief Valves on Hydropneumatic Tanks – every 5-yrs or per Mfr Recommendations
- ❑ Test Pressure Reducing Valves & RPZs
- ❑ Clean, Inspect & Disinfect Aerator / Degassifier Screens, Sprayheads & Gaskets

October PM Recommendations

(check or circle items that apply ~ strikethrough items that do NOT apply)

- ❑ Overhaul Chemical Feed Pumps (Feeder Head Cleaned, O-Rings, Check Valves & Diaphragms, Worn-Out Parts Replaced)
- ❑ Clean & Inspect Chemical Feed Lines
- ❑ Clean & Inspect Chemical Solution Tanks
- ❑ Calibrate Chemical Feed Pumps after Overhaul
- ❑ Test Eye Wash & Emergency Shower

November PM Recommendations

(check or circle items that apply ~ strikethrough items that do NOT apply)

- ❑ Exercise HALF of ALL Mainline Valves (You may consider combining Valve Exercising with your Flushing & FH Exercising Program if this is appropriate for your system)
- ❑ Check Water Meter For Accuracy (2" or Less Every 3-yrs Recommended) or Annually per Mfr Recommendations
- ❑ Change Media in Filter or per Mfr Recommendations
- ❑ Flush Dead-End Lines (Feb, May, Aug & Nov) Required by FDEP Rule 62-555.350(2) or more often

December PM Recommendations (Peak Month)

(check or circle items that apply ~ strikethrough items that do NOT apply)

- ❑ Exercise Remaining HALF of ALL Mainline Valves (not exercised in November)
- ❑ ALL Safety Equipment - Clean & Inspect
- ❑ Clean, Inspect & Disinfect Aerator / Degassifier Screens, Sprayheads & Gaskets
- ❑ Clean, Inspect & Disinfect Aerator / Degassifier

Suggested Preventive Maintenance Log

Your water system may be more complex, if so you will need to add categories. (Strikethrough items that do NOT apply)

Category	Suggested Frequency	Last Service (Date)	Service (Date)	Service (Date)	Service (Date)
Well / Source Water					
Clean & Inspect Wellheads, Pump, Controls Seals, Vent & Screen	Monthly				
Check & Record Static & Draw-Down (Pumping) Levels in Wells	Monthly				
Water Plant & Pump House					
Inspect Water Lines, Gaskets & Fittings for Corrosion & Leaks	Monthly				
Lubricate Pumps, Motors, Blowers and ALL Moving / Rotating Equipment	Monthly				
Building Preventive Maintenance	Annually - July				
Exercise ALL Valves Inside Treatment Plant & Pump House (AWWA M44 once 2-yrs)	Annually - Aug				
Check Water Meter For Accuracy (2" or Less Every 3-yrs Recommended)	Every 4-yrs - Nov (or per Mfr)				
High Service Pumps					
Inspect Pump, Seals, Water Lines & Fittings for Corrosion & Leaks	Monthly				
Listen to Pump for Unusual Noises (or signs that Bearings are Wearing Out)	Monthly				
Safety & Security					
ALL Safety Equipment - Clean & Inspect (Lock Out Tags)	Annually - Dec				
Emergency Response Plan Review/Update	Annually - June				
Chemical Feed Systems (Liquid)					
Inspect Pump, Seals, Water Lines & Fittings for Corrosion & Leaks	Monthly				
Clean Chlorine Injection Points	Monthly				
Overhaul Chemical Feed Pumps (Feeder Head Cleaned, O-Rings, Check Valves & Diaphragms, Worn-Out Parts Replaced)	Annually - Oct				
Test Eye Wash & Emergency Shower	Bi-annually Apr & Oct				
Chemical Feed Lines - Clean & Inspect	Bi-annually Apr & Oct				
Chemical Solution Tanks - Clean & Inspect	Bi-annually Apr & Oct				
Calibrate Chemical Feed Pumps	Bi-annually Apr & Oct				
Chemical Feed Systems (Gas)					
Inspect Scales, Analyzer / Alarm, Oxygen Breathing Apparatus, Cross Ventilation	Monthly				
Inspect & Clean Chlorine Injection Points	Monthly				

Suggested Preventive Maintenance Log *(continued)*

Your water system may be more complex, if so you will need to add categories. (Strikethrough items that do NOT apply)

Category	Suggested Frequency	Last Service (Date)	Service (Date)	Service (Date)	Service (Date)
Aerator / Degassifer					
Inspect Screens, Sprayheads & Gasket	Annually - Dec				
Clean, Inspect & Disinfect Aerator / Degassifer	Annually - Dec				
Filter / Water Softener					
Inspect Filter Head for Leaks	Monthly				
Inspect and Add Salt to Brine Tank (i.e. Ion Exchange Only)	Monthly				
Change Media in Filter	Per Mfr - Nov				
Reverse Osmosis / Membrane Softening Unit					
Check Pressure Differential	Weekly				
Clean Membranes	Annually – Sep or per Mfr				
Replace Membranes	per Mfr				
Storage Tanks – *attach Inspection Reports with Preventive maintenance plan*					
Inspect Overflow Vent Screens, Ensure Screen Intact, Check Manway Hatch & Ensure it is Secured	Monthly				
Inspect Storage Tanks for Defects, Leaks & Sanitary Deficiencies	Annually - Mar				
Clean Storage Tanks if Needed	Annually – Mar				
Structural Inspection of Tank & Coatings by Engineer (Clean Prior to Inspection)	Every 5-yrs - Mar (Before Aug 2008)				
Perform Coating Repairs per Mfr Specs	Annually - Mar				
Replace Pressure Relief Valves on Hydropneumatic Tanks	Every 5-yrs - Sep (or per Mfr)				
Controls, Electrical & Stand-By Power					
Inspect, Clean & Repair Control Panels in Water Treatment Plant	Annually - Feb				
Prepare Water System for Summer Operation / Hurricane Season	Annually - July				
Run Emerg Generator 30-min under load	Monthly				
Contact Electrician to Check Emergency Generator & Run on Load Bank	Annually - Jun				
Contact Electrician to Check Running Amps on Pumps	Annually - Jun				
Distribution System (You may consider combining Exercising and Flushing Programs if this is appropriate for your system) *					
Exercise ALL Mainline Valves	Annually Jan & Feb	See Chart	on Next	Page	
Flush Distribution System & Exercise ALL Fire Hydrants	Annually Nov & Dec	See Chart	on Next	Page	
Flush Dead-End Lines	Quarterly - Feb, May, Aug & Nov				

Flushing of dead-end water mains may be limited to just those dead-end mains that are 6 inches or greater in diameter if there is no history of water quality problems at dead-end mains smaller than 6 inches in diameter.

Suggested Preventive Maintenance Log *(continued)*

Exercise ALL Mainline Valves - Annually Jan & Feb *(add sheets as needed)*

Valve ID #	Valve Location	Last Service (Date)	Service (Date)	Service (Date)	Service (Date	Service (Date)

Suggested Preventive Maintenance Log *(continued)*

Exercise ALL Fire Hydrants - Annually Nov & Dec *(add sheets as needed)*

FH ID #	Fire Hydrant Location	Last Service (Date)	Service (Date)	Service (Date)	Service (Date	Service (Date)

Suggested Preventive Maintenance Log *(continued)*

Flush Distribution System - Annually Nov & Dec *(add sheets as needed)*

Flush Dead-End Lines (Feb, May, Aug & Nov) Required by FDEP Rule 62-555.350(2) or more often per your written flushing program.

Pipe ID #	Pipe Segment Location	Last Service (Date)	Service (Date)	Service (Date)	Service (Date	Service (Date)

EXAMPLE VALVE RECORD

Location (street / address):		
Type:	**Make:**	**Size:**
Opens: ☐ **Left** ☐ **Right** ☐ **Other:**		**# of Turns:**
Date Installed:		

Date Exercised	Closes/Opens? (Y / N)	# of Turns	Condition of Stem, Packing, Nut, Gearing, Etc.	Valve Status (Open or Closed)

EXAMPLE DEAD-END WATER MAIN FLUSHING RECORD

Location (street):

Flushing Date	Flushing Duration (min.)	Water Characteristics (color, odor, etc.)		Disinfectant Residual, mg/L	
		Before Flushing	After Flushing	Before Flushing	After Flushing

Appendix A – Emergency Response Plan

This information in Appendices A thru G is RECOMMENDED by FRWA for inclusion with your O&M Manual and Preventive Maintenance Logs, but is not specifically required by FDEP in Rule 62-555.350 (2), (12) and (13) FAC.

Insert your ERP here.

How FRWA can help: We encourage you to use the Florida Rural Water Association's Emergency Response Plan (ERP) templates and guides off our website. You can easily download these on-line at www.frwa.net - just click on "security" and download any of the ERP documents. We are ready to help you complete your ERP. Please call your Water Circuit Rider or the FRWA Engineer for assistance.

Appendix B – Permits & Specific Conditions

This information in Appendices A thru G is RECOMMENDED by FRWA for inclusion with your O&M Manual and Preventive Maintenance Logs, but is not specifically required by FDEP in Rule 62-555.350 (2), (12) and (13) FAC.

Insert PERMITS and SPECIFIC CONDITIONS for your Water System here. Include any FDEP or DOH provisions for your water system plus any applicable rules, regulations, latest **Sanitary Survey**, and **Water Management District Consumptive Use Permit**.

Boil Water Notices

Health advisories usually take the form of a drinking water warning or boil water advisory. Communication during these times is critical. DEP / DOH staff are committed to working closely with water systems to determine if an advisory is needed. Health advisories should always be well thought out and provide very clear messages.

Use the assistance of your County Health Department and/or District DEP office, located on DEP's website at: http://www.doh.state.fl.us/environment/water/manual/boil.htm

TYPES OF BOIL WATER NOTICE INCIDENTS

A. Microbiological Contamination
B. Zero or Negative Pressure.
C. Low Water Pressures
D. Water Main Breaks/Interruptions.
E. Flooding of Wells.

ATTACHMENT A

(DATE)

PRECAUTIONARY BOIL WATER NOTICE

TO: RESIDENTS OF (NAME OF CITY, TOWN, TRAILER PARK, SUBDIVISION OR COUNTY) LIVING IN THE AREA BOUNDED BY (STREET, AVENUE, CANAL OR OTHER DESCRIPTIVE BOUNDARY)

(BRIEF DESCRIPTION OF EVENT SUCH AS: BACTERIOLOGICAL ANALYSES OF SAMPLES OBTAINED FROM YOUR WATER DISTRIBUTION SYSTEM HAVE SHOWN POSSIBLE CONTAMINATION OF THE WATER, OR A WATER MAIN BREAK HAS OCCURRED AT _____, OR A LOSS OF WATER PRESSURE HAS BEEN EXPERIENCED DUE TO _____)

THEREFORE, AS A PRECAUTION, WE ADVISE THAT ALL WATER USED FOR DRINKING OR COOKING BE BOILED. A ROLLING BOIL OF ONE MINUTE IS SUFFICIENT. AS AN ALTERNATIVE BOTTLED WATER MAY BE USED.

THIS "PRECAUTIONARY BOIL WATER NOTICE" WILL REMAIN IN EFFECT UNTIL THE PROBLEM HAS BEEN CORRECTED AND A BACTERIOLOGICAL SURVEY SHOWS THAT THE WATER IS SAFE TO DRINK.

IF YOU HAVE ANY QUESTIONS YOU MAY CONTACT (NAME OF PERSON, AGENCY) AT (PHONE NUMBER).

(SIGNATURE)
(NAME, TITLE AND AGENCY OF OFFICIAL ISSUING THE NOTICE)

ATTACHMENT B

(DATE)

RESCISSION OF PRECAUTIONARY BOIL WATER NOTICE

TO: RESIDENTS OF (NAME OF CITY, TOWN, TRAILER PARK, SUBDIVISION OR COUNTY) LIVING IN THE AREA BOUNDED BY (STREET, AVENUE, CANAL OR OTHER DESCRIPTIVE BOUNDARY)

THE (DATE) "PRECAUTIONARY BOIL WATER NOTICE" IS HEREBY RESCINDED FOLLOWING THE (ACTION TAKEN TO CORRECT THE PROBLEM) AND THE SATISFACTORY COMPLETION OF THE BACTERIOLOGICAL SURVEY SHOWING THAT THE WATER IS SAFE TO DRINK.

IF YOU HAVE ANY QUESTIONS, PLEASE CALL (NAME, AGENCY) AT (PHONE NUMBER).

(SIGNATURE)
(NAME, TITLE AND AGENCY OF
OFFICIAL RESCINDING THE NOTICE)

Appendix C – System Description & Reports

This information in Appendices A thru G is RECOMMENDED by FRWA for inclusion with your O&M Manual and Preventive Maintenance Logs, but is not specifically required by FDEP in Rule 62-555.350 (2), (12) and (13) FAC.

A **General System Description** should include:

- ✓ Description of Treatment Processes
- ✓ Principal Design Criteria and Process Equipment Ratings
- ✓ Water System Map indicating Major Valves and Water Storage Tanks
- ✓ Process Flow Schematic Water Treatment System
- ✓ Brief Description of **Interconnections**
- ✓ Mutual Aid Agreements with Adjacent Water Systems / FlaWARN

Records and Reports. Keeping and compiling records is a valuable part of an efficient water system. The following should be included in the manual:

- ✓ A general explanation of the importance of records & reports;
- ✓ The system should maintain a list of complaints and identify responses made;
- ✓ Daily logs, maintenance records, laboratory records, monthly reports, monitoring reports, annual reports, operating cost reports, accident reports, and sanitary surveys. Examples and sample reports of each should be included;
- ✓ A listing of records that are on file (permits and standards, consumption);
- ✓ Location of records on file;
- ✓ Procedures for reporting records to appropriate agencies;
- ✓ Specify how long records should be kept on file;

Water Treatment Plant As-Builts, Equipment Manuals and Vendor Catalogues. Maintaining a current set of plant drawings, equipment manuals and vendor catalogues is critical in promoting timely repairs and reduces the chances for accidental equipment damage. The following should be provided:

- ✓ As-Builts of all Plant piping and valving and a method for updating the information
- ✓ A centralized storage area that is accessible by those needing the information should be made available in the plant.
- ✓ Plant equipment manuals should be maintained in a visible and accessible location
- ✓ Current vendor supply catalogues

How FRWA can help: We are ready to help you complete your O&M Manual, please call your Water Circuit Rider or the FRWA Engineer for assistance.

Appendix D – General System Operation & Control

This information in Appendices A thru G is RECOMMENDED by FRWA for inclusion with your O&M Manual and Preventive Maintenance Logs, but is not specifically required by FDEP in Rule 62-555.350 (2), (12) and (13) FAC.

A general **System Operation and Control.** It is important to fully understand how the water system operates. This section should include;

A. ***Identification of Major System*** *Components* including a description of the normal operation of the component. Show the relationship of each component with other system components, and relate any possible alternative operation modes and circumstances under which they would be used. Include schematic diagrams of each unit and discuss any special features that may be of importance.

B. ***Preventive Maintenance Program***; describe for each major component the Preventive maintenance tasks (if any) that are performed. This should include types of Preventive maintenance or inspection required; frequency of maintenance or inspection; and any extraordinary changes to operations which would occur when a facility is off-line.

C. ***Common Operating Problems*** should be discussed along with methods of bypassing units, and the importance of and how to use laboratory tests for unit control.

D. ***Routine System Operation***; for each major system component describe the routine operational tasks that are performed and controlled. This should include start-up and shut down procedures, safety procedures, meter reading and how system performance is evaluated.

E. **Special Task Lists.** These lists should identify assignments to personnel for notifying regulatory agencies, the media, institutional customers such as hospitals, government buildings or schools and special needs customers who require a continuous supply of water. The list should also include who is authorized as a spokesperson to represent the water system.

F. **Staff Contact and Capability Lists.** This should include a list staff, emergency contact and listing of any training or ability to perform specialized tasks such as electrical work, welding, operation of CDL vehicles or construction equipment, test equipment, or specialized knowledge in maintenance or operational activities through training, licensing or experience.

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Appendix E – Laboratory Testing

This information in Appendices A thru G is RECOMMENDED by FRWA for inclusion with your O&M Manual and Preventive Maintenance Logs, but is not specifically required by FDEP in Rule 62-555.350 (2), (12) and (13) FAC.

A general **Laboratory Testing.** This should include any samples and tests needed for compliance as well as for process control. For samples taken by the State, or taken by the system and analyzed by a State laboratory:

- Type of sample
- Sampling locations;
- Monitoring schedule;

For tests to be performed by outside laboratories:

- Name of the laboratory
- Contact person
- Telephone number
- Type of sample
- Sampling locations;
- Monitoring schedule;

Appendix F – Storeroom & Inventory System

This information in Appendices A thru G is RECOMMENDED by FRWA for inclusion with your O&M Manual and Preventive Maintenance Logs, but is not specifically required by FDEP in Rule 62-555.350 (2), (12) and (13) FAC.

Having the proper equipment, tools, parts and consumable supplies is critical in maintaining the treatment process and plant equipment operation. Equipment owned by the system should be maintained in good working order and should be available to the employees who may need it for use at all times. Similarly, stocks of spare parts, special tools, supplies, chemicals, and other consumable items should be maintained in a secure storage location with controlled access. An inventory tracking and reorder system that identifies who has used the equipment and consumable parts must be maintained so that acceptable levels of inventory are available when needed and restocked to facilitate timely actions. Minimum FRWA recommendations for managing plant inventory are listed below:

- Plant Property, Rolling Stock (vehicles, tractors, construction equipment and trailers), and Assigned Equipment and Furniture
- An inventory of all property and equipment, both moveable and non-moveable, owned by the system;
- A mechanism for assigning specific items of moveable equipment to individual employees (e.g. vehicles, tools, etc.)
- A mechanism for tracking specific items of moveable equipment by location (e.g. furniture, office equipment, etc.)
- A mechanism for storage and checking out of specialized items of equipment needed infrequently.
- Brief operation instructions for each item of equipment with reference to the manufacturers' technical specifications for major system components;
- List of warranted equipment and the warranty provisions;
- List of outside contract maintenance tasks;
- List of equipment manufacturers and local suppliers;
- Spare Parts and Specialized Tools list;
- Special tools list and tools displayed prominently
- Spare Parts Inventory, number available and reorder quantity
- Lists of special test equipment and operating manuals
- List of major suppliers with telephone numbers and contact persons;
- A system of requisitions and/or work orders used to distribute parts, supplies, chemicals, etc. to employees.
- Lists of equipment and spare parts should clearly indicate those items of equipment and parts that are essential to the operation of the system.
- List, number and types of valves, reducers, pipe and repair fittings that are on-hand;
- Hand Tools, raingear, and miscellaneous hardware used in the plant

Chemicals and Other Consumable Items

- Recommended stock levels of supplies and chemicals and method of reordering when stock on hand drops below recommended levels;
- Delivery dates and critical chemicals such as chlorine, lime, polymers, etc
- Laboratory Supplies and reorder quantities (generally maintained by the Lab)
- Identification of responsible party for maintaining of critical inventories
- List of major suppliers with telephone numbers and contact persons

Appendix G – Emergency / Safety Program

This information in Appendices A thru G is RECOMMENDED by FRWA for inclusion with your O&M Manual and Preventive Maintenance Logs, but is not specifically required by FDEP in Rule 62-555.350 (2), (12) and (13) FAC.

Emergency / Safety Program

A. An ***Operating Plan For Emergencies*** and the procedures to be followed until normal operation can be resumed. This plan should include personnel assignments, emergency equipment inventory, and emergency numbers. Phone numbers to keep readily accessible should be police and fire departments, and for chemical spills or exposure CHEMTECH 800 424-9300. The emergency call up list should identify, in ranked order, water system personnel responsible for making decisions in specific situations. This list should include the job title, home and work phone number (beeper/car phone number if available) for all personnel.

B. A ***Contingency Plan*** should also be made to insure proper treatment of water even inadverse conditions. This plan should describe conditions and procedures for putting standby and emergency sources into active service. Procedures for notifying customers, the local health jurisdiction, and DEP of noticeable water quality problems. Sample Public Notices should be prepared for acute Tier I violations and water borne disease outbreaks that must be distributed within 24-hours.

C. ***Safety Procedures*** should identify work space hazards for the waste water system. Potential hazards include asbestos coated pipes, mechanical equipment, electrical, explosion and fire, chlorine, oxygen deficiency, laboratory and any chemicals used by the plant. A potential danger at plants can stem from the chlorination process. The manual should provide information on how to do the following tasks;

1. **Handling of Chlorine Containers**.
    a. Forklift trucks or hoisting equipment with special cradles or carriages designed for chlorine equipment are used for lifting cylinders;
    b. Proper storage of containers;
    c. Tag empty containers, and store separate from full cylinders;
    d. Use cylinders in order that they are received;
    e. Use ONLY approved tools;
    f. Cylinder emergency repair kits should be readily available;
2. **Emergency Procedures and Emergency Equipment**.
    a. Written procedures in event of catastrophic leak or container rupture.
    b. Self-contained pressure helmets; with own compressed air supply and full-face piece; located at readily accessible points, away from area(s) likely to be contaminated with chlorine gas.
    c. Spare cylinders on site for use during prolonged emergencies.
    d. Inspect helmets, emergency kits, and breathing air supply tanks routinely.
    e. Formal training with drills for potential users of helmets and emergency equipment.
3. **Leak Detection**
    a. A strong solution of aqueous ammonia is available for use in locating source of leaks
    b. Repairs of chlorine leaks are to be done by at least two people. Protecting gear should be used, and if below grade, safety harnesses and ropes are worn and emergency rescue operators are present.
    c. Piping and valves in chlorine rooms should be color coded and labeled for rapid identification.
    d. Properly train repair people.

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