FACT SHEET 3.2 - Developing and Maintaining an Operations & Maintenance Manual

An **Operations and Maintenance (O&M) Manual** is a written document explaining how a public water system is to be operated on a day-to-day basis to ensure public health, safety and compliance with applicable regulations.

The O&M Manual is one of a water purveyor's most crucial documents. In addition to being an important guide for any new staff, the O&M Manual is a critical tool in assuring the public continues to receive safe, adequate drinking water in cases where existing staff is unavailable to operate the system.

The O&M Manual should be prepared in such a way that it could explain to another operator how to run the water system and keep it in compliance. The manual should be individually tailored to each water system's size, source water, treatment, water quality, distribution system and available resources. The O&M Manual should provide a complete and accurate view of the water system's operation. The system owner and operator should be involved in creating and maintaining the O&M Manual.

Creating an original O&M Manual will require some work. Each suggested step below results in the production of a document. Together these documents comprise the full manual. Also, see sample forms included at the end of this section.

1. Prepare a description of all water system facilities. Use an existing description if available.
2. Provide a list of all operational personnel. Include employee name, job title, certification, operator certification number and grade level.
3. Develop a list of routine (daily, weekly, monthly) operational tasks for all operating personnel. For complex tasks, provide a separate detailed description of the steps involved with each task. Review and document procedures that are adequate to meet regulatory requirements.
4. Develop procedures that address operation and maintenance (routine and preventative) of all system components.

5. Describe procedures to comply with all operational requirements that are specified by the regulatory agency or in a water system survey report.
6. Provide a description of operation, maintenance and record keeping procedures.
7. Prepare a list of past significant operational problems and steps taken to correct them. Establish procedures to respond to these operational problems should they recur.
8. Include a copy of the Coliform Sampling Plan, which is current, accurate and approved by OHA or your county health department.
9. Include a copy of the Emergency Response Plan, which is current, accurate and approved by OHA or your county health department.
10. For any treatment of a surface water source, develop and maintain an accurate and complete Surface Water Treatment Operations Plan.

Information should be categorized in a manner that is practical and easy to find for water system staff. One way to organize the information is shown in the following example

Operations & Maintenance Plan - Example Outline

I. SYSTEM FACILITIES

- Description of water system facilities
- Distribution system map showing location of piping, valves, fire hydrants, blow-off hydrants, system-owned backflow assemblies, etc.

II. SYSTEM OPERATION & MAINTENANCE

- Operational and maintenance procedures including:
  - Maintaining distribution system pressure
  - Responding to loss of pressure
  - Main disinfection program
  - Flushing water lines, hydrant inspection and testing (how often, etc.);
  - Inspection and exercising of water main valves;

    - Master flow meter maintenance;
    - Storage tank inspection and cleaning;
    - Cross connection program (installation, testing, etc.);
    - General maintenance plans.
- Maintenance Schedule
- Record keeping procedures

III. SAMPLING & REPORTING REQUIREMENTS

- Overview of sampling requirements
    - Sample collection procedures
        - Coliform Sampling Plan
        - Lead and copper sampling
        - Disinfectant By-Products sampling
    - Sampling schedule (daily, weekly, monthly, annually, etc.)
    - Lab contact information
- Overview of reporting requirements
    - Public notification and education
    - Consumer Confidence Report (CCR) preparation

IV. EMERGENCY PROCEDURES

- Emergency operational practices (e.g., interruption of water services, contamination events);
- Emergency contact list (e.g., regulatory contacts, lab services, pump repair, leak detection, mutual aid systems)
- AND/OR Emergency Response Plan

V. OWNER / OPERATOR

- List of operational personnel (including employee name, job title, certification, operator certification number and grade level)
- Responsibilities and routine tasks of operational personnel
- Daily operational practices and operational objectives
- Consumer complaint response procedures

Once the O&M Manual is created, it should not be left on a shelf to gather dust. If an O&M Manual is not reviewed regularly, it is not being properly used. The manual should be a regular topic of discussion at staff or board meetings. Once the document is created, it needs to be reviewed and updated at least annually. Remember, there are always changes within a public water system; not only staff changes, but system component and regulation

changes as well. Without updates, such factors could make an O&M Manual obsolete and defeat the purpose of creating it.

Sample forms:

- Sample Form 1: Routine Operations Procedure & Schedule.
- Sample Form 2: Operations Plan for Small Systems with Chlorination.

Sample Form 1:
Routine Operational Procedures & Schedule

System Name: _____

List tasks that are performed and the frequency and who is responsible for performing that task. A separate page should be used to describe the procedure in detail for each task, if needed.

Daily Task	**Performed by**
1. Inspect well	_____
2. Check Storage Tank	_____
3. Maintain gauges & valves	_____
4. Maintain distribution system	_____
5. Respond to consumer complaints	_____

Weekly Task	**Performed by**
1. Inspect valves	_____

Monthly	**Performed by**
1. Take Bacteriological sample	_____

Semi-Annually	**Performed by**
1. Flush dead end lines	_____
2. Flush sediment from storage tank	_____
3. Exercise valves	_____

Sample Form 2:
Operations Plan for Small Systems with Chlorination

For small water systems with a well, storage tank, chlorinator and distribution system, operated by owner or manager.

SYSTEM FACILITIES

- **System Description**: Provide a brief description of source, storage, chlorinator unit (treatment) and number of connections.

  Example: 200 foot well drilled in 1972, 1500-gallon welded steel storage tank, chlorinator with a diaphragm type pump (manufacturer and model) and 25-gallon disinfectant reservoir, serving 15 connections.

- **Map of Distribution System**: List applicable maps, description of information included, and where the maps are kept.

SYSTEM OPERATION & MAINTENANCE

- **Routine Operational Procedures:** Describe operational procedures for each component of the system. Example information to include is shown below.

  A. Visual inspection of **WELL** (daily).
  1. Check for the following: leaks, openings, lubricants, electrical hazards, chemical hazards, etc. (record observations and correct problem).
  2. Check the pump for proper operation.

  B. Visual inspection of the **STORAGE TANKS** (daily).
  1. Inspect for any leaks or damage (record observations and repair as needed).
  2. Record system pressure. Record the pressure when the pump turns on, the pressure when the pump turns off and the duration of the run time.

  C. Visual inspection of **CHLORINATOR PUMP** and disinfection reservoir (daily).
  1. Inspect the pump for proper operation. Inspect the disinfectant in the reservoir for concentration and adequate volume for the operational period (record results).
  2. Determine if there is enough disinfectant on hand for one or more weeks.

D. Measure the **DISINFECTANT RESIDUAL** in the distribution system (free chlorine test kit required).
1. Record the results (at least twice a week, on attached sheet).
2. Determine if an adequate level of disinfectant is maintained.
   a. If disinfectant level is low, determine the reason and correct.
   b. If no measurable disinfectant, notify owner, determine reason, and remedy. If no disinfectant for 24 hours, notify the regulating agency.

E. Maintenance of **GAUGES** and **METERS**.
1. Inspect all gauges and meters for leaks and proper function daily. Repair or replace as needed (keep record of date).

F. Inspection and **EXERCISING** of the **VALVES**.
1. Inspect valves for leaks (record observations, repair or replace if leaking).
2. Exercise valves on a schedule, as needed (e.g., quarterly, semi-annually, annually, record dates on attached sheet).

G. Operation and maintenance of **DISTRIBUTION FACILITIES**.
1. Visually inspect the distribution system for leaks on a regular basis. Record date and observations.
2. Flush dead end mains or lines periodically (quarterly, semi-annually, annually as needed. Record date and observations).
3. Cleaning of storage tank (quarterly, semi-annually or annually). Record date cleaned and observations.

- **Maintenance Schedule**: List tasks that are performed and the frequency and who is responsible for performing that task (See Sample Form 1).

MONITORING & REPORTING

- **Sampling Requirements**:

A. **BACTERIOLOGICAL SAMPLING**: As per approved Coliform Sampling Plan, report coliform results to DWS by the 10th of the month following the sample.
1. If sample is positive, notify DWS immediately and take required repeat and source samples.

2. If your system is currently on monthly coliform monitoring, no need to collect additional coliform samples the month following a positive result (just your routine monthly sample). However, if your system is on a quarterly coliform schedule (which applies to some non-community systems), then a total of three routine coliform samples should be collected the month following a positive result.
3. Keep bacteriological results for five years.

B. **CHEMICAL SAMPLING**: forward required results to DWS.
1. Keep chemical results for ten years.
2. Keep variance and exemptions for five years.

- **Reporting Requirements**.

A. **PUBLIC NOTIFICATION** of violation required.
1. Notification shall be given based on the "tier" of violation, or in a manner directed by the OHA-DWS.
2. State problem and what has been done to correct it.
3. Send a copy of the notification to the OHA-DWS.

B. **CONSUMER CONFIDENCE REPORT** required annually.
1. Develop CCR annually.
2. CCR distributed to customers by July 1st of every year.
3. Complete certificate that specifies when and how the CCR was distributed. Submit the certificate to the OHA-DWS no later than October 1st.

EMERGENCY OPERATIONAL PROCEDURES: May refer to the Emergency Response Plan. Also, include the additional information described below.

A. List of **equipment on hand** for emergency repairs.
1. Miscellaneous wrenches.
2. Leak clamps.

B. List of sources of needed equipment, not on hand. Name and address of supplier and type of equipment.

Name	**Address**	**Phone#**	**Equipment**	**Rental/ Contract**
_____	_____	_____	Steel Tank Welder	_____
_____	_____	_____	Electrical Repair	_____
_____	_____	_____	Digging Equipment	_____
_____	_____	_____	Generator	_____
_____	_____	_____	Chemicals	_____

C. List of distributors or suppliers of replacement parts for the system.
Name and address of supplier and type of equipment.

Name	Address	Phone #	Equipment
_____	_____	_____	PVC pipe, valves, and fittings
_____	_____	_____	Pumps, pressure tank and gauges
_____	_____	_____	Chlorinator

D. List of emergency contact numbers:

Name	Phone #
1. Local County Health Dept or OHA Contact	_____
2. Law Enforcement	_____
3. Electrician	_____
4. Laboratory	_____
5. Pump repair service	_____
6. Chemical disinfectant supplier	_____
7. Equipment supplier	_____
8. Owner	_____

OWNER/OPERATOR

- **Operational Personnel List**: List each person who is involved in the operation of the water system (including treatment and distribution) and their responsibilities:

Name	Title	Phone #	System Responsibilities
1. _____	Board Chair	_____	Pays bills and makes major decisions
2. _____	Manager	_____	Maintains office and performs related duties; keeps Board informed. Makes routine/normal financial decisions.
3. _____	Operator	_____	Operate and maintain the water system. components
4. _____	Laboratory Tech	_____	Take samples as necessary.

- **Consumer complaint response procedures**. Example procedure is described below.

  A. CONSUMER COMPLAINT RESPONSE PROCEDURE

  1. Record in complaint log (name, address and nature of the problem).
  2. Investigate the complaint.
  3. Verify or dismiss the complaint.
  4. Record the steps taken to address or correct the problem.
  5. Notify complainant of action taken.

Keep complaint records with corrective action for five years.