

OPERATION AND MAINTENANCE MANUAL

Name: _____ **Water Works**

Street Address: _____.

City & Zip: _____, **LA**.

PWS# _____.

Phone: (_____) _____.

FAX: (_____) _____.

Note:

This manual is intended to be a “sample” or “go-by” to help Small Water Systems generate their own customized Operations and Maintenance Manual. This manual and all its parts are not to be considered a part of any other manual or to be use to operate or maintain a water system.

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City: _____, Louisiana

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Name: _____.
Title (Alderman, etc.): _____.
Address (Street, P.O. Box): _____.
City/Town: _____, LA _____.
Phone: (____) _____.

Name: _____.
Title (Alderman, etc.): _____.
Address (Street, P.O. Box): _____.
City/Town: _____, LA _____.
Phone: (____) _____.

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Phone: (____) _____.

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Title (Alderman, etc.): _____.
Address (Street, P.O. Box): _____.
City/Town: _____, LA _____.
Phone: (____) _____.

Name: _____.
Title (Alderman, etc.): _____.
Address (Street, P.O. Box): _____.
City/Town: _____, LA _____.
Phone: (____) _____.

Certified Operators:

Name: _____
Title: _____
Certification: Production ___/Certificate # _____/Classification ____
 Treatment ___/Certificate # _____/Classification ____
 Distribution ___/Certificate # _____/Classification ____
Address (Street, P.O. Box): _____
City/Town: _____, LA ____
Phone: (____) _____.

Name: _____
Title: _____
Certification: Production ___/Certificate # _____/Classification ____
 Treatment ___/Certificate # _____/Classification ____
 Distribution ___/Certificate # _____/Classification ____
Address (Street, P.O. Box): _____
City/Town: _____, LA ____
Phone: (____) _____.

Name: _____
Title: _____
Certification: Production ___/Certificate # _____/Classification ____
 Treatment ___/Certificate # _____/Classification ____
 Distribution ___/Certificate # _____/Classification ____
Address (Street, P.O. Box): _____
City/Town: _____, LA ____
Phone: (____) _____.

Name: _____
Title: _____
Certification: Production ___/Certificate # _____/Classification ____
 Treatment ___/Certificate # _____/Classification ____
 Distribution ___/Certificate # _____/Classification ____
Address (Street, P.O. Box): _____
City/Town: _____, LA ____
Phone: (____) _____.

Section 2. Introduction And Overview

This Operations & Maintenance (O&M) Manual is to be used as a reference in the overall operation and maintenance of the _____ Water Works system.

This manual contains the necessary O&M procedures, work sheets 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 this manual be used as a training tool for new employees and as a guide for qualified substitute operators.

(EXAMPLE)

Section 3. Responsibilities of Personnel

Mary White, Mayor

All Managerial and Financial decisions are made by the Mayor.

Sue Black, City Clerk

Responsible for meter reading, billing and collecting, issuing CCR.
Reports to the Mayor.

Ken Brown, Chief Operator

Responsible for operation and maintenance of the system; ordering spare parts, chemicals, and supplies; generating the annual Operating and Maintenance Budgets, and generating the monthly report to OPH. Reports to the Mayor.

Bob Blue, Operator

Responsible for recording all readings and performing all tests.
Reports to the Chief Operator.

Section 3. Responsibilities of Personnel

Name: _____.
Title: _____.
Responsibilities: _____.

_____.

Name: _____.
Title: _____.
Responsibilities: _____.

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Name: _____.
Title: _____.
Responsibilities: _____.

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Name: _____.
Title: _____.
Responsibilities: _____.

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Name: _____.
Title: _____.
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Responsibilities: _____.

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Name: _____.
Title: _____.
Responsibilities: _____.

_____.

Name: _____.
Title: _____.
Responsibilities: _____.

_____.

Section 4. Regulatory Agency and Regulations

- a. The Louisiana State Regulatory Agency for Public Water Supplies is the Office of Public Health which operates 9 regional offices throughout the state. The regional office for this water system is:
Region II
1234 Wood Blvd. Baton Rouge, LA, 70810
Phone (225) 770-8888

- b. The basic regulations which govern the operation of a public water system are contained in LAC 51:XII (formerly Chapter XII, Water Supplies, in the Sanitary Code of the State of Louisiana). LAC 51:XII also incorporates, by reference, all applicable provisions of the National Primary Drinking Water Regulations.

Note: A printed copy of Chapter XII of the Code (now LAC 51:XII) shall be kept permanently posted in the office used by the authority owning or having charge of a public water supply.

(EXAMPLE)

5. General System Description

Raw water is supplied to the system by three (3) 300 GPM @ 65 PSI well pumps pumping from 6 inch casings 600 feet deep with 20 feet long 6 inch screens. The pumps are automatically started and stopped by level control on an elevated 150,000 gallons storage tank. The elevation of the tank maintains 42 to 50 PSI on the distribution system. The raw well water is disinfected with gaseous chlorine prior to leaving each well site.

The distribution system consists of 6, 4, 3, and 2 inch PVC pipe and fittings; sampling, isolation, back flow prevention, and flush valves; and fire hydrants. Provisions for line isolation, flushing, and the five POC sites have been installed. In the event of an electrical power outage, a 50 HP diesel driven generator at each well site will provide the power necessary to keep the total system running.

The town of Anyplace Waterworks can supply water to the Doe Trailer Park via a 6 inch tie-in . The tie-in valve is normally closed and a check valve prevents backflow into the Anyplace Waterworks system.

Fire protection for the city is also provided.

A Site Plan, Water Production System Diagram, and Sampling Tap Locations are provided in the Appendices.

5. General System Description

(EXAMLPE)

Section 6. System Operation and Control

Daily operating data are recorded on the Weekly Operations Log Sheet. In addition, sampling and recording of Chlorine content of the finished treated water and residuals in the distribution system are performed daily. Treated water chlorine content is maintained at 1.3 to 1.5 ppm to ensure a minimum 0.2 ppm throughout the distribution system. The results are recorded on the Monthly Chlorine Residual Report.

Repairs outside of Routine Maintenance are recorded in a separate Maintenance Log Book.

Water Well

Operation of the three (3) water well turbine centrifugal pumps is simple. The pumps are basically maintenance free. They are started by the low level pressure and shut down by the high level pressure switches on the Treated Water Storage Tank. Manual operation of the pumps can be accomplished by turning the control switch mounted on the pump base from "auto" to "manual" and using the start/stop buttons for the pump motor. See Fairbanks Morse Pump operating instructions in the Appendices for detailed Operating and Maintenance Procedures.

The pump 4 inch discharge line is equipped with a pressure gauge and a total flow meter. Pressure and flow are recorded once daily at 10 AM on the Weekly Operations Log Sheet.

Emergency Generator

The emergency generators are operated for one hour each week to ensure good working condition of the generator and electrical systems. See Emergency Generator operating instructions in the Appendices for detailed Operating and Maintenance Procedures.

(EXAMPLE Continued)

Chlorine Disinfection

Each of the well sites has a sheltered Gas Chlorination System and is forced ventilated. Chlorine gas is injected into the raw well water just downstream of the pump discharge block valve to provide 1.3 to 1.5 ppm Chlorine in the treated water to storage in order to maintain minimum 0.2 ml/l in the distribution system. Chlorine is supplied to each of the systems from two Chlorine cylinders via a Regal Gas Chlorination System. Chlorine injection is electrically tied to the well water pump electricals and automatically starts/stops with the well pump motor start and stop.

The electric powered Royal Chlorinator is fully automatic including the switchover from an empty Chlorine to the standby full one. See Chlorinator operating instructions in the Appendices for detailed Operating and Maintenance Procedures.

The treated water is then routed to the Treated Water Storage Tank.

Treatment items checked daily include: Chlorine concentration in the treated water to storage, Chlorine cylinder automatic switchover, and empty Chlorine cylinder. The chlorine residual is recorded on the Monthly Chlorine Residual Report. The other readings are recorded on the Weekly Operations Log Sheet.

Treated Water Storage and Transfer

Treated (or Finished) Water is stored for consumption in the 150,000 gallons Treated Water Storage Tank. The tank is epoxy coated inside and outside for corrosion protection. When the level in the tank falls to 135,000 gallons, a Low Level Pressure Switch will turn the water well pumps on. When the tank level rises to 150,000 gallons, a High Level Pressure Switch will shut the well water pumps down.

Treated Water System items checked daily include: Tank level and Chlorine residual in the storage tank. Tank level is recorded on the Weekly Operations Log Sheet. Chlorine residual is recorded on the Monthly Chlorine Residual Report.

(EXAMPLE Continued)

Distribution System

The distribution system consists of solid PVC 12 inch water mains; 8, 6, 4, and 3 inch branches, and 2 inch service connections complete with isolation valve, backflow check valve, and water meter. Isolation valves are located on the downstream side of all branched tees. 6 inch flush valves are located at appropriate sites in the system. A site plan is provided in the Appendices complete with line and valve sizes, isolation and flush valve locations, and POC monitoring points.

Four sites are tested daily for Chlorine residual. These results are recorded on the Monthly Chlorine Residual Report.

If a supply interruption occurs, the Doe Trailer Park may maintain its treated water supply through a 6 inch tie-in with Anytown Waterworks. A block valve for isolation of the two systems is normally closed. In addition, a check valve was installed to prevent backflow into the Anytown Waterworks system. The 6 inch block valve is located at the northwest corner of the trailer park inside a locked valve box.

Fire Protection

4 inch monitors, 300 hundred feet apart, are located on all 6, and 6 Inch lines.

Safety Considerations

Chlorine gas is hazardous and is lethal at high concentrations. Before opening the door to the Chlorine shelter, the exhaust fan must be activated by the out side switch. Inhalation of Chlorine produces Hydrochloric Acid in the lungs. Exposure to Chlorine gas should be immediately followed by a medical examination.

(EXAMPLE Continued)

All electricity carrying equipment is in excellent condition to prevent electrical shock. Only awareness will prevent electrical shock when working on part of the electrical systems. When performing maintenance on rotating or electrical equipment, the equipment electrical breaker is locked and tagged.

All rotating equipment couplings are guarded and should remain that way.

Common Operating Problems

No power:

- check emergency generators
- check emergency generator switchovers
- check main breakers
- check pump breakers

Low or no water pressure:

- check for power
- check for broken lines
- check water level in the storage tank

Low Water Storage Tank Storage Level:

- check for water well pumps running
- check for a broken line
- check for faulty low pressure switch
- check for faulty electrical starter system on the water well pumps

Water Storage Tank Overflowing:

- check for faulty high level pressure switch
- check for faulty electrical shutdown on the water well pumps

Trouble shooting individual manufacturer's or supplier's equipment or chemical may be found in the Appendices.

(EXAMPLE)

Section 7. Testing

Bacterial samples are collected once a month and testing is performed by the Department of Public Health. Lead & Copper samples are collected every three years by the Owner and tested at a certified lab. All test results are kept in a file in the owner's office.

A standard Chlorine Test Kit is used to determine Chlorine content (maintained at 1.3 to 1.5 ppm) to the Treated Water Storage Tank and free Chlorine residuals (minimum 0.2 ppm at all POC sites) in the distribution system. Samples are caught on the inlet to the Treated Water Storage Tank and at four sample taps on the distribution system. The test is colorimetric. Results are recorded on the Monthly Chlorine Residual Report which is kept in a file in the owner's office.

(EXAMPLE)

Section 8. Maintenance

Well Pump – Little maintenance is required on a turbine centrifugal pump. Replace parts when worn out. See Fair More Pump operating and maintenance instructions in the Appendices.

Gas Chlorinator – A spare Chlorinator is kept in spare parts. Chlorinator repair is performed by the factory. See Royal Chlorinator operating and maintenance manual in the Appendices.

Emergency Generator – Preventative maintenance performed by running unit once per week for one hour. Unit should last 30 to 40 years between overhauls. See Irrigator operating and maintenance instructions in the Appendices.

All equipment is inspected daily. The distribution system is inspected daily when Chlorine residual tests are performed.

(EXAMPLE)

Section 9. Spare Parts, Supplies, and Chemicals

I. Spare Parts

A. Water Well Pump

Impeller

Shaft

Seal

Coupling

B. Distribution Piping

6 – 2” Water Meters

2 – 2” Plug Valves

2 – 2” Check Valves

100’ – 2” PVC Pipe

100’ – 3” PVC Pipe

100’ – 4” PVC Pipe

100’ – 6” PVC Pipe

100’ – 8” PVC Pipe

2 – 4” Fire Hydrants

Various 2, 3 and 4 inch pipe fittings

C. Chlorination System

1 - Chlorinator

Tubing

Tubing Fittings

Tubing Valves

II. Supplies

Chlorine Residual Test Tablets

Log Books

Log Sheets

Lab Sheets

Reporting Forms

(EXAMPLE Continued)

III. Chemicals

Chlorine Gas

List of Manufacturers and Suppliers

Water Well Pump
Bayne Pump, Inc.
1111 Elm Blvd.
Anytown, La 70001
Phone: (225) 987-1111
FAX: (225) 987-1112

Emergency Generator
Adams Electrical
9999 Elm Blvd.
Anytown, La 70001
Phone: (225) 987-2221
FAX: (225) 987-2223

Chlorinator, Chlorine Cylinders, & Chlorine Test Kits
AB Chemicals, Inc.
4444 Elm Blvd.
Anytown, LA
Phone: (225) 987-4444
FAX: (225) 987-4445

All Forms, Reports, Etc.
Acme Printing, Inc.
5555 Elm Blvd.
Anytown, LA 70001
Phone: (225) 987-5555
FAX: (225) 987-5556

(EXAMPLE)

Section 10. Records and Reports

Following is a list of records and reports kept in the owner's office:

1. Weekly Operations Log Sheet*
2. Monthly Chlorine Residual Report*
3. Maintenance and Repair Log Book
4. Lead & Copper Test Results
5. E-coli Test Results including MCL's
6. Sanitary Surveys
7. Consumer Confidence Reports*
8. Operator Certifications and Re-certification Certificates*
9. Monthly Reports sent to OPH Region II
10. La State Sanitary Code, Chapter XII (LAC 51:XII)
11. All correspondence with the Office of Public Health*

* Copies of these are included in the Appendices.

(EXAMPLE)

Section 11. Emergency Preparedness and Response Plan

The Chief Operator is responsible for initiating Emergency Response action. Below are appropriate Emergency Agencies and phone numbers.

LA State Police (225) 321-1234	Anytown Hospital (225) 432-5555
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Parish Sheriff (225) 432-2222	LA Electric (225) 432-6666
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Anytown Police (225) 432-3333	LA Natural Gas (225) 432-7777
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Anytown Fire Department
(225) 432-4444

Section 12. Utilities

La Electric 1234 Park Road Anytown, LA 70001	LA Natural Gas 2345 Park Road Anytown, LA 70001
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Section 13

Appendices

Appendix A

Equipment Technical Data and Drawings

Operations and Maintenance Procedures
Including
Preventive Maintenance and Manufacturer's Instructions

Appendix B

Operation and Maintenance
Forms and Reports

Appendix C

Testing Schedule, Procedures, Forms, and Reports

Appendix D

Spare Parts, Supplies, and Chemicals

(EXAMPLE)

I. Spare Parts

A. Water Well Pump

Impeller

Shaft

Seal

Coupling

B. Distribution Piping

6 – 2” Water Meters

2 – 2” Plug Valves

2 – 2” Check Valves

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100’ – 4” PVC Pipe

100’ – 6” PVC Pipe

100’ – 8” PVC Pipe

2 – 4” Fire Hydrants

Various 2, 3 and 4 inch pipe fittings

C. Chlorination System

1 - Chlorinator

Tubing

Tubing Fittings

Tubing Valves

II. Supplies

Chlorine Residual Test Tablets

Log Books

Log Sheets

Lab Sheets

Reporting Forms

III. Chemicals

Chlorine Gas

Appendix E

Operator Training Certificates

Appendix F

Well Driller's Report

and

DOTD Registration

Appendix G

Water System Maps, Drawings, Etc.

Including

Points of Collection

(EXAMPLE)

TESTING SCHEDULE

Chlorine Residual At POC's – sampled and tested by OPH once per month.

Treated Water Chlorine Content – tested once per day.

Distribution System Chlorine Residuals – four sample taps tested once per day.

Lead & Copper – sampled by Owner and tested at a certified lab once every three years