

OPERATION AND MAINTENANCE MANUAL

Water System Name:

Water System Number:

Street Address:

City & Zip:

Phone:

FAX:

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Operations and Maintenance Manual

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Section 1. System Identification And Ownership

System Owned By:

Owner (City, Person, etc.):

Street Address:

City/Town:

Phone:

FAX:

Federal Type: Community
(Circle One) Non-Community
 Transient
 Non- Transient

Federal Source: Groundwater
(Circle One) Groundwater Purchase
 Surface Water
 Surface Water Purchase
 Groundwater GUDI Surface Water
 Groundwater GUDI Surface Water Purchase

Describe

Raw Water Source(s):

(EXAMPLE)

Description, Name, Type

Groundwater

- Subsurface water occupying the zone of saturation, from which springs and wells are fed.
- A ground water source includes all water obtained from drilled wells or springs.
- Groundwater is from an approved sand and gravel aquifer.

Groundwater Under the Direct Influence of Surface Water

- any water beneath the surface of the ground with significant occurrence of insects or other microorganisms, algae, or large-diameter pathogens such as Giardia lamblia or Cryptosporidium, or
- significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions.

Direct influence must be determined for individual sources in accordance with criteria established by the State. The State determination of direct influence may be based on site-specific measurements of water quality and/or documentation of well construction characteristics and geology with field evaluation.

Surface Water

All water which is open to the atmosphere and subject to surface runoff. Characterized by extreme variability in:

- quantity;
- quality;

Persons To Contact:

Name (Mayor, Owner, etc.):
Title (Mayor, Owner, etc.):
Address (Street, P.O. Box):
City/Town:
Phone:

Name:
Title (City Clerk, etc.):
Address (Street, P.O. Box):
City/Town:
Phone:

Name:
Title:
Address (Street, P.O. Box):
City/Town:
Phone:

Name:
Title:
Address (Street, P.O. Box):
City/Town:
Phone:

Name:
Title:
Address (Street, P.O. Box):
City/Town:
Phone:

Name:

Certified Operators:

Name:

Title:

Certification Date, Operator # & Classification:

Address (Street, P.O. Box):

City/Town:

Phone:

Name:

Title:

Certification Date, Operator # & Classification:

Address (Street, P.O. Box):

City/Town:

Phone:

Name:

Title:

Certification Date, Operator # & Classification:

Address (Street, P.O. Box):

City/Town:

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 **Name of Water System** Water 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.

Section 3. Responsibilities of Personnel

(EXAMPLE)

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:

Name:

Title:

Responsibilities:

Name:

Title:

Responsibilities:

Section 4. Regulatory Agency and Regulations

New Mexico Environment Department (NMED) is an executive agency of the State of New Mexico. NMED through its Drinking Water Bureau (DWB) was delegated Safe Drinking Water Act (SDWA) primacy in 1978 from the U.S. Environmental Protection Agency (EPA). This delegation gives the NMED the authority to regulate the state drinking water regulations and National Primary Drinking Water Regulations (NPDWR) at Public Water Systems.

DWB is available to answer your questions. For immediate assistance, call the Drinking Water Bureau during regular business hours (Monday through Friday - 8 a.m. to 5 p.m.) - TOLL FREE at 877-654-8720.

Links

Drinking Water Bureau

<http://www.nmenv.state.nm.us/dwb/Index.htm>

Drinking Water Watch

<https://eidea.nmenv.state.nm.us/DWW/>

General System Description

(EXAMPLE)

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 entry point 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 water system name can supply water to the water system name 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.

System Operation and Control

(EXAMPLE)

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.

Well

Operation of the three (3) water well turbine centrifugal pumps is simple. The pump 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 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.

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 1.5ppm 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 switch over 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.

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 ENTRY POINT 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, water system name may maintain its treated water supply through a 6 inch tie-in with water system name. A block valve for isolation of the two systems is normally closed. In addition, a check valve was installed to prevent backflow into the water system name. 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.

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.

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 ENTRY POINT 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.

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.

Section 9. Spare Parts, Supplies, and Chemicals

(EXAMPLE)

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

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

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.

Section 11. Emergency Preparedness and Response Plan

(EXAMPLE)

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

Include Address

State Police
(225) 321-1234

Town Hospital
(225) 432-5555

Sheriff Office
(225) 432-2222

Electric Company
(225) 432-6666

City Police
(225) 432-3333

Natural Gas
(225) 432-7777

Fire Department
(225) 432-4444

~~Section 12. Utilities~~

Section 13

Appendices
Please Attach

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

I. Spare Parts

(EXAMPLE)

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

III. Chemicals

Chlorine Gas

Appendix E

Certification Date, Operator # & Classification

Appendix F

Well Driller's Report

Appendix G

Water System Maps, Drawings, Etc.

Including
Points of Collection

TESTING SCHEDULE

(*EXAMPLE*)

Chlorine Residual At ENTRY POINT'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

Disinfection by Products TTHM & HAA5

Asbestos