

CHAPTER 6

OPERATIONS AND MAINTENANCE PLAN

The Town of Friday Harbor operates and maintains the water system. The Town council is composed of five elected members. The mayor, also elected, executes policies set forth by the council. The day-to-day management is the responsibility of the Town Administrator, supported by staff members in maintenance, clerical services, and billing.

OPERATOR CERTIFICATION

Waterworks Operator Certification, required under WAC 246-292, mandates that public water systems retain in their employment individuals who are certified by examination as competent in water supply operation and management. The Washington State Department of Health (DOH) determines the required level and number of certified positions based upon the population and complexity of the water system. Since the Town operates a conventional water treatment plant, a certified Water Treatment Plant Operator (WTPO) in addition to a water distribution manager (WDM) is required. The Town more than fulfills the minimum WAC requirements, as indicated in Table 6-1.

Table 6-1. Town of Friday Harbor Certified Operators

| Operator | Certifications | Certification No. |
|--|--|-------------------|
| Frank Byrne, Water Treatment Plant Operator | <ul style="list-style-type: none"> ■ WTPO 2 ■ CCCS ■ BAT | 7551 |
| Michael Deegan, Water Department Supervisor | <ul style="list-style-type: none"> ■ WDS2 ■ WDM2 ■ WTPO 2 ■ CCCS | 6074 |
| Norm Hanson, Water Treatment Plant Operator | <ul style="list-style-type: none"> ■ WTPO 1 | 9696 |
| Andrea Rose, Clerk II | <ul style="list-style-type: none"> ■ WTPO 2 ■ WDM 1 | 7073 |
| Mike Wilks, Utilities Superintendent | <ul style="list-style-type: none"> ■ WTPO 2 ■ WDM 2 ■ WDS 2 ■ CCCS | 4072 |

Note: WTPO = Water Treatment Plant Operator
WDM = Water Distribution Manager
WDS = Water Distribution Specialist
CCCS = Cross Connection Control Specialist
BAT = Backflow Assembly Tester

Training

In order to promote and maintain expertise for the various grades of operator certification, WDOH requires that certified operators complete not less than three (3) Continuing Education Units (CEU) annually. Programs sponsored by the Washington Environmental Training Resources Center (WETRC) and the American Waterworks Association (AWWA) Pacific Northwest Subsection are the most popular sources for CEUs. The Town's 2002 budget included a \$8,450 allowance for operator training.

Besides annual training for the purpose of CEUs, all Town operators are required to complete a course in the following areas:

- Chlorination O&M
- S.C.B.A
- Trench Safety/Cave-in Protection
- Confined Space Entry
- Asbestos Pipe Handling
- Backhoe Safety
- Safety Awareness
- C.P.R./First Aid
- Defensive Driving/Vehicle Inspections
- Flagging/Work Zone Safety

ROUTINE OPERATING PROCEDURES, PREVENTIVE MAINTENANCE, AND RECORD KEEPING

In this section the utility's normal operating procedures are reviewed. Where appropriate, changes to the utility's operating procedures will be recommended.

Water Treatment Plant

The Town operates and maintains the WTP in accordance with the practices documented in the *Water Treatment Plant Operations and Maintenance Manual*, a copy of which is provided in Appendix K. A tracer study was conducted in August 1995 to determine the treatment plant's chlorine contact time. The results of this analysis are included in Appendix I.

Distribution and Storage

Routine maintenance procedures for Friday Harbor are listed in Table 6-2. The Trout Lake reservoir, storage tank facilities, water main valves, fire hydrants, pump stations, and the treatment plant are monitored on an on-going basis. Records of maintenance or equipment generally include only receipts for items purchased to repair equipment because the Town only tracks the cost of

parts, not the labor needed to fix parts. The field crew provides maintenance and emergency response procedures.

Table 6-2. Routine Preventive Maintenance Activities

| Element | Security | Condition | Flush | Lubricate |
|-----------------------|-----------------------|-----------------------|-----------|-----------------------|
| Source | Daily | Daily | N/A | N/A. |
| Reservoirs | Daily | Daily | As needed | N/A |
| Water Treatment Plant | See Operations Manual | See Operations Manual | N/A | See Operations Manual |
| Distribution | Daily | Daily | As needed | N/A |
| Hydrants | On-going | On-going | On-going | On-going |
| Valves | As needed | As needed | As needed | As needed |
| Pump Stations | Daily | Daily | N/A | As needed |

Record Keeping and Reporting

Table 6-3 summarizes the operations and water quality tests of which the purveyor must maintain records, and the time periods for which the records must be kept (WAC 246-290-480).

Table 6-3. Record Keeping Requirements

| Report | Record Keeping |
|---|-----------------------|
| Bacteriological Analysis | 5 years (minimum) |
| Turbidity Analysis | 5 years (minimum) |
| Chemical Analysis | Duration of operation |
| Other Operations and Analyses | 3 years (minimum) |
| Corrective Actions | 3 years |
| Reports, Sanitary Surveys, and Communication with Local, State, and Federal Authorities | 10 years |
| Project Reports, Construction Documents, and Inspections | Duration of operation |
| Chlorine Residuals, Fluoride Levels | 3 years |
| WTP Chemicals Used, Volume of Water Tracked, Turbidity, etc. | 3 years |

Records of the laboratory reports also include the following:

- Date, place, time, and individual sampling
- Identification of sample type
- Date of analysis
- Laboratory and person responsible for analysis
- Result of analysis

Reporting

Reporting requirements and submittal dates to DOH set forth by WAC 246-290-480 include the following:

- All tests, measurements, or analytic reports due before the tenth day of the following month;
- All failures to comply with primary standards or treatment technique requirements, monitoring requirements, or violations of primary MCLs within 48 hours;
- Any change of name or ownership within 60 days;
- Water facilities inventory and report form (WFI) due annually before July 1;
- Coliform sample within ten days of notification by laboratory;
- Fecal coliform or *E. coli* sample by the end of the business day upon notification by the laboratory;
- Acute coliform MCL violations within 24 hours, and non-acute coliform MCL violations by the end of the next business day.

Public Notification

The public notification methods of the Town of Friday Harbor depend on the severity of the problem and the area of impact (WAC 246-290-330). In most cases, the process begins with notifying customers through billing, neighborhood signs, public records, website posting, or local public access television. Additional testing and sampling is then undertaken until the problem is resolved.

WATER QUALITY MONITORING/REPORTING PLAN

Monitoring

The Washington State Department of Health requires the purveyor of the water system to collect, transport, and submit samples for analysis according to department-approved methods (WAC 246-

290-300). Applicable water quality monitoring of the Town of Friday Harbor is summarized in Table 6-4. The water quality parameters and how they relate to Friday Harbor are discussed in the following paragraphs.

Table 6-4. Monitoring Locations

| Type of Sample | Location of Sample |
|--|---|
| Asbestos | Distribution system |
| Bacteriological | Representative points throughout distribution system |
| Complete Inorganic Chemical and Physical | Source, after treatment, and prior to entry into the distribution system |
| Lead/Copper | Targeted sample tap locations |
| Nitrate/Nitrite | Source, after treatment, and prior to entry into the distribution system |
| Turbidity | Before entry point to distribution system. |
| Trihalomethanes and HAAS <ul style="list-style-type: none"> <li data-bbox="381 1035 597 1066">▪ Surface water <li data-bbox="381 1150 605 1182">▪ Ground water | From representative points throughout distribution system and one from farthest point in system. Source before treatment |
| Radionuclides | Source |
| Organic Chemicals (VOCs and SOCs) | Source, after treatment, and prior to entry into the distribution system |
| Other Substances (unregulated chemicals) | Source, after treatment, and prior to entry into the distribution system |

Coliform Monitoring

The Friday Harbor Coliform Monitoring Program is included in Appendix H. Briefly, three samples are collected every month and sent to a DOH-approved laboratory. The laboratory notifies Friday Harbor as soon as possible when follow-up samples are required and relays the results of the analysis in a timely fashion.

Cross Connection Control Program

The Cross Connection Control Program commits the Town of Friday Harbor to preventing possible contamination of the water supply resulting from contaminated backflow. This ordinance was adopted in 1995 and a written program was developed in 1996. Copies of the Town's cross connection program and ordinance are in Appendix L.

The Town of Friday Harbor provides water service primarily to single-family homes in a semi-urban and rural setting. Other consumers include restaurants, business offices, and schools. These types of users pose a minimal potential threat of contamination of the water system. Owners of buildings using sprinkler systems for fire protection are required to install at their own expense the proper backflow device for the system used. The type of device required can be found in the latest edition of the Cross Connection Control Manual, Accepted Procedure and Practice, published by the Cross Connection Control Committee, Pacific Northwest Section, AWWA.

New installations are reviewed for proper compliance and proper functioning of the backflow prevention devices. The priority of inspection of existing backflow prevention devices is determined by an evaluation of potential health risks, with higher inspection priorities for schools, and other sensitive facilities. Periodic surveillance inspections of premises served check for the presence of cross connections. If any are found they are ordered removed and, in the case of immediate hazard, service is discontinued.

Members of the field staff have been trained and certified as cross-connection specialists. The Town dedicates over \$25,000 annually to their cross connection control program, including personnel, supplies and equipment, and training.

Treatment Plant Operation

The treatment plant is staffed daily for routine operations. Total time spent on operation averages about eight hours per day, during which time process control and equipment inspection functions are performed. The following parameters are recorded daily:

- Flow
- Temperature
- Chlorine use
- Chlorine residual
- Raw and filtered water turbidity
- Weather
- pH

In addition, settleable solids and pH of the backwash pond water are measured weekly. Raw water is also sampled quarterly for bacteriological analysis, and annually for inorganic analysis.

Filters are automatically backwashed during a 24 to 36 hour cycle. Each filter is removed from operation for the backwash cycle. Typically, backwashing requires about eight minutes and rinsing about five minutes per filter.

Improvements to chemical feed equipment and laboratory testing have recently been made at the plant. Flow paced chemical feed pumps have been installed and tests to assess the most effective chemical type and dose have been performed. Recently acquired laboratory testing equipment includes a Hach spectrophotometer, an alkalinity test kit, and jar test apparatus.

EMERGENCY PLAN

Emergency planning provides an opportunity for the utility to identify and prioritize procedures in the event of unforeseen circumstances. These may include major transmission breaks, earthquakes, or an unanticipated loss of a key facility. The level of detail required for emergency plans depends upon the utility's size and complexity.

Vulnerability Analysis

Vulnerability analysis consists of four components that are described in the following pages of this chapter.

Water System Components

- Source
Water is obtained from the Trout Lake basin and reservoir, overflow from Lake 310, and AUG 2. The sources are located about 5.3 miles west of the Town limits.
- Collection
Trout Lake raw water passes through the treatment plant, and is then pumped to Town through 10- and 12-inch-diameter pipes to the 500,000-gallon storage tank. The capacity of the treatment plant is 700 gpm.
- Distribution System
Normal pressure in the distribution network averages about 55 psi in the 232-, 327-, 207- and 460-foot pressure zones. The distribution system is made up of asbestos cement, cast iron, and PVC pipelines.
Pipe sizes range from 2 to 12 inches in diameter. Hydrants are spaced approximately 400 feet apart in the Town business areas and average about 600 feet apart in residential areas.
- Transmission
Gravity flow from the 1 MG reservoir and flow from the 10-inch source pipeline feed the 232 and 207 pressure zones distribution network through 2-to 10- and 12-inch diameter mains, augmented by additional pumping from sources on an as-needed basis. The 327-foot pressure zone is fed from the pump station located at the 500,000-gallon storage tank.

- Treatment Facilities
 Trout Lake raw water is filtered and chlorinated in a 700-gpm treatment facility located about 1.2 miles downstream of the Trout Lake Dam.
- Pump Stations
 Emergency power is available for the WTP finished water pumps, the 232 and 357 zone pump stations. The 460-zone pump station does not have emergency power.
- Valving
 Isolation valves are located at key intersections and in areas of specific need. Valves are also located at the treatment plant, the storage tanks, and between the pressure zones.
- Personnel
 The field crew normally performs routine maintenance and service including emergency operations such as isolating main breaks. Major system improvements or extensions are designed by consultants and constructed under contract.
- Power
 Power is provided and distributed by the regional power grid. No power is produced locally.
- Materials and supplies
 Modest amounts of pipes and fittings are kept in inventory for routine maintenance and emergency repair. A substantial reserve of chemicals and chlorine is on hand.
- Communications
 Communications and notices about the water system are made public by telephone, town website, local cable TV (Channel 19), or in person by the Town crew.

 Telephones are located in all key locations and connected through the regular public system.

Hand-held radios enable personnel to communicate when in the field. The base stations are in the administration building and the public works shop building; mobile units are in the repair trucks and with key personnel.

Disaster Characterization

A general review of the local and regional situation suggests the following types of disasters should be considered:

- Earthquake

The Puget Sound Region is considered “~Zone 3 - Major Damage” in the U.S. Seismic Risk Zones. This is characterized by potential intensity of 8 and higher on the Modified Mercalli Scale. Intensity 8 on the Modified Mercalli Scale is approximately equal to intensity 6 on the Richter Scale. The effects of an earthquake of this intensity would be considerable damage and partial collapse of some buildings, displacement from foundations, ground cracks, and underground pipe damage.
- Major Water Main Break Within the System

A large break in a main supply line would cause water shutoff in the affected area and would likely cause water shortages in other areas on the system.
- Damage to Storage Reservoirs

Damage to reservoirs would require that the system function as it did prior to construction of the reservoirs. If reservoir damage occurred during the peak usage times (June through August), peak demand charges would be imposed upon the users of the water system to try and control demand by forcing people to conserve.

Water Requirements and System Capacity

Demand on the water treatment plant during a disaster would be high until broken mains could be valved off. Firefighting demands would also be very high. Customer demands will be limited. System capacity would return slowly because of the potential loss of lines and storage. Isolating reservoirs is an important consideration so as not to deplete the remaining stored volumes.

Critical Components

The critical components are the Trout Lake Dam, the treatment plant, and the 5.3 miles of 10-inch diameter transmission pipeline to Town.

Emergency Telephone Numbers

| | |
|-----------------------|----------------|
| Town Water Department | (360) 378-8353 |
| Town Maintenance Shop | (360) 378-2154 |
| Sheriff Department | 911 |
| Fire Department | 911 |

Friday Harbor has an answering service when the office is closed. At least one employee is in pager contact during that period.

The Town Administrator will immediately notify DOH at (253) 395-6750 in the event that water shutdown is threatened or required for more than 24 hours, water quality is determined to be unacceptable, or the public health is threatened.

Contingency Plan

An important aspect of emergency planning is establishing mitigating actions, or contingency plans, in advance of any emergency. The required details for a contingency typically vary with the utility's site. The following plan provides a level of detail appropriate for a community the size of Friday Harbor.

Priorities

- Potable Water
When used for drinking, the water quality should meet minimum state standards.
- Usage Rating (in order of priority):
Firefighting (life-threatening)
Drinking
Firefighting (property threatening)
Sanitary
Industrial
Commercial

Table 6-5. Staff Responsibilities During an Emergency

| Staff | Responsibilities |
|------------------------|--|
| Mayor | Keep public informed |
| Town Administrator | Public information Oversee operations |
| Utility Superintendent | Assess disaster Direct warning to users Assess remaining elements Contact crew Establish control actions Prioritize emergency operations Direct documentation operations Maintain contact with Town Administrator |
| Field Superintendent | Assemble crew Assess remaining equipment and supplies Assess system damage Establish repair procedures Execute repairs Maintain contact with Utility Superintendent |
| Office Staff | Contact County and other agencies Answer calls Maintain radio contact with crew |
| Sheriff | Traffic control |
| Fire Chief | Fire control |

Table 6-6. Summary of Impacts Related to Water Main Break

| Components | Effects of Disaster | | | Type | Corrective Measure |
|-----------------------|---------------------|---------|-------|--|--|
| | None | Partial | Total | | |
| Source | X | | | | 1. Isolate, repair break. 2. Asses flooding. damage, if required. 3. Disinfect repaired section of pipe. 4. Document cause of break (e.g. corrosion, poor bedding materials, etc.). |
| Transmission | | X | | Damage to line | |
| Treatment | X | | | | |
| Distribution | | X | | Low pressure, flooding | |
| Personnel | | X | | Personnel call-out | |
| Power | X | | | | |
| Material and Supplies | | X | | Use of material inventory | |
| Communications | | X | | Coordination with city staff and possibly police and fire departments. | |
| Emergency Plans | X | | | | |

Table 6-7. Summary of Impacts Related to Reservoir Failure

| Components | Effects of Disaster | | | Type | Corrective Measure |
|-----------------------|---------------------|---------|-------|--|--|
| | None | Partial | Total | | |
| Source | X | | | | 1. Isolate and repair reservoir, utilize remaining storage facilities. |
| Transmission | | X | | Damage storage | |
| Treatment | X | | | | |
| Distribution | | X | | Supplied by other reservoir | |
| Personnel | | X | | May require additional personnel and time to manually operate remaining reservoirs | |
| Power | X | | | | |
| Material and Supplies | X | | | | |
| Communications | | X | | | |
| Emergency Plans | X | | | | |

Table 6-8. Summary of Impacts Related to Earthquake

| Components | Effects of Disaster | | | Type | Corrective Measure |
|-----------------------|---------------------|---------|-------|--------------------------------------|--|
| | None | Partial | Total | | |
| Source | X | | | | |
| Collection | | X | | | 1. Use stored water. |
| Transmission | | | X | Pipe breaks, storage loss, pump loss | 2. Isolate breaks. |
| Treatment | | X | | Plant damage | 3. Disinfect stored water as needed. |
| Distribution | | | X | Pipe breaks | 4. Isolate breaks. |
| Personnel | | X | | Injury | 5. Call on other Districts for assistance. |
| Power | | X | | Loss of power | 6. Distribute stored water as needed. |
| Material and Supplies | X | | | | |
| Communications | X | | | | |
| Emergency Plans | X | | | | |