

CHAPTER 8

OPERATIONS AND MAINTENANCE



Panorama Booster Pump Station

INTRODUCTION

The City of Bonney Lake's (City) water operations and maintenance (O&M) program consists of the following four elements.

1. Normal Operations
2. Emergency Operations
3. Preventive Maintenance
4. Cross-Connection Control

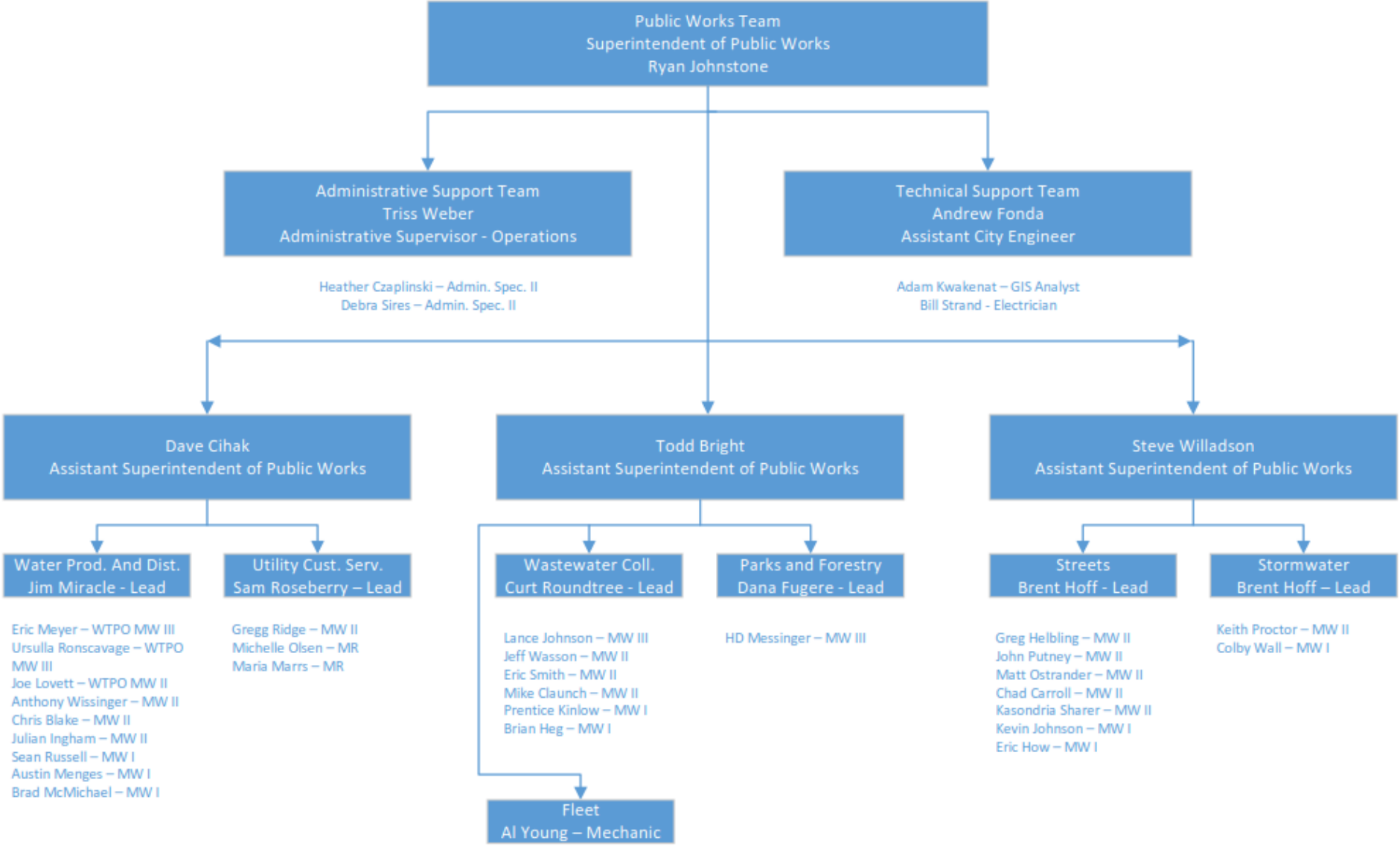
NORMAL OPERATIONS

City Personnel

The City’s Water Division is a one of several divisions under the operations section of the City’s Public Works Department. The 2019 public works organization chart is shown in **Chart 8-1 – Public Works Department Organization Chart**.

The current Water Division O&M staff consist of several maintenance personnel that function under the Water Utility’s lead worker, as shown in **Chart 8-1 – Public Works Department Organization Chart**. The water system O&M staff perform numerous tasks, including inspection, testing, installation and repair of system facilities, routine operation and preventive maintenance, water quality sampling, regulatory compliance monitoring, recordkeeping, administrative tasks, general clerical work, and corrective or breakdown maintenance required in response to emergencies.

**Chart 8-1
Public Works Department Organization Chart**



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Chapter 246-292 Washington Administration Code (WAC) requires that the City’s water system is operated by one or more certified operators. In addition, special certification is required for backflow device testing and cross-connection control program activities and management. **Table 8-1 – Personnel Certification** shows the current certifications of the City’s water O&M staff. It is City policy to maintain a well-qualified, technically trained staff. The City annually allocates funds for personnel training, certification, and membership in professional organizations, such as the American Water Works Association (AWWA). The City believes that the time and money invested in training, certification, and professional organizations are repaid many times in improved safety, skills, and confidence.

**Table 8-1
Personnel Certification**

| Certified Operators | Certifications ¹ | | | | | | | | |
|---|-----------------------------|-----|-----|--------|--------|-------|-------|-------|-------|
| | BAT | BTO | CCS | WTPO 2 | WTPO 1 | WDS 2 | WDM 1 | WDM 2 | WDM 3 |
| David Cihak | | X | X | X | | | | | X |
| Samuel Roseberry | | | X | X | | | | | X |
| Joseph Lovett | | | X | | X | | X | | |
| Ursula Ronscavage | X | | X | | X | | | | X |
| James Miracle | | | | | X | | | | X |
| Gregg Ridge | | | X | | | | | X | |
| Eric Meyer | | | X | X | | | | | X |
| Julian Ingham | | | X | | | | | X | |
| Sean Russell | | | X | | X | | | X | |
| William Strand | | | | | | X | | | |
| H.D. Messinger | X | | | | | | | | |
| Note: ¹ Abbreviations: BAT - Back Flow Assembly Tester BTO - Basic Treatment Operator CCS - Cross Connection Specialist WTPO 2 - Water Treatment Plant Operator Level 2 WTPO IT - Water Treatment Plant Operator In-training WDS 2 - Water Distribution Specialist Level 2 WDM 1 - Water Distribution Manager Level 1 WDM 2 - Water Distribution Manager Level 2 WDM 3 - Water Distribution Manager Level 3 | | | | | | | | | |

Available Equipment

The Water Division has several types of equipment available for daily routine O&M of the water system. The equipment is stored at the City’s Public Works Shop. If additional equipment is required for specific projects, the City will rent or contract with a local contractor for the services needed. A stock of supplies in sufficient quantities for normal system O&M and short-term emergencies is stored at the Public Works Shop. A list of major equipment and chemicals used in the normal operation of the water system is shown in **Table 8-2 – Water Division Equipment List**.

**Table 8-2
Water Division Equipment List**

| Year and Description | Manufacturer |
|--|--------------|
| Water Department Equipment | |
| 1995 Service Truck | Ford |
| 1995 1-Ton Dump Truck | Ford |
| 1998 EXTCAB 4x4 Pickup | Ford |
| 2005 Pickup | Ford |
| 2000 2WD Pickup | Dodge |
| 2002 Towed Air Compressor | ATLAS |
| 2003 Loader Backhoe | John Deere |
| 2013 F250 4x4 Pickup | Ford |
| 2007 Pickup | Ford |
| 2004 4000LB Forklift | Hyster |
| 2005 (Diesel) Service Truck | Ford |
| 2006 10YD Vac/Jetter | VACCON |
| 2009 Extended Cab Pickup F550 Flatbed | Ford |
| 2008 F350 Water Service Truck | Ford |
| 2015 Transit Connect XL Mini Cargo Van | Ford |
| 2015 F-250 4x4 Supercab 3/4 Ton | Ford |
| 2011 F350 4x4 Supercab | Ford |
| 2008 Truck | Jeep |
| 2010 Truck | Jeep |
| 2016 Transit Cargo Mini Van | Ford |
| 60 LB Jack Hammer | ATLAS CO PO |
| 90 LB Jack Hammer | ATLAS CO PO |
| Pavement Cutter | Concut Inc. |
| Pavement Cutter | Target |
| Portable Cut-off Saw | STIHL |
| Portable Compactor | Case |
| Miscellaneous small tools, etc. | NA |
| <i>Continued on Next Page</i> | |

**Table 8-2
Water Division Equipment List (continued)**

| <i>Continued from Previous Page</i> | |
|---|--------------------|
| Equipment Available from Sewer Departments | |
| 1986 Utility Tractor with wood sides | |
| 2008 Backhoe / Loader | John Deere |
| 1993 1 Ton Service Truck | Chevrolet |
| 1995 12-yard Dump Truck | Freightliner |
| 2005 Supercab | Ford |
| 2005 Service Truck (Dually) | Chevrolet |
| 2008 F350 Service Truck | Ford |
| 2008 F550 2-Line Sign Board | Ford |
| Tow Diesel 50kW Generator | Cummins |
| Tow Diesel 50kW Generator | Cummins |
| Tow Diesel 50kW Generator | Cummins |
| Miscellaneous small tools, etc. | NA |
| Equipment Available from Public Works Multi-Department | |
| 2004 Loader/Backhoe | John Deere |
| 2004 Flail Boom Mower | Ferri |
| 2004 Hydraulic Breaker | John Deere |
| 2004 Front Bucket Broom | Sweepster |
| 2004 Pallet Fork | John Deere |
| 2007 Ford F-550 Chassis 4x4 | Ford |
| 2004 Diesel Flatbed Dump Truck | Ford |
| 1995 Tommy Lift Flatbed | Chevrolet |
| 2005 Slope Mower | Harper/Deweze |
| 1985 Farm Tractor | John Deere |
| 1985 Flail Boom Mower | Bomford |
| 2006 Motor Grader | Noram |
| 2005 Hoe Pac | Breaker Tech. Inc. |
| 2004 Pallet Fork | John Deere |
| 2018 Trailer Mounted LED | ADDCO |
| 1987 Towed Equipment Trailer | Eager Beaver |
| 2006 Olympic Trailer | Olympic |
| 2002 7-yard Dump Truck | Freightliner |
| <i>Continued on Next Page</i> | |

**Table 8-2
Water Division Equipment List (continued)**

| <i>Continued from Previous Page</i> | |
|--------------------------------------|---------------|
| 2007 Cargo Van | Ford |
| 2009 7-yard Dump Truck & 9-yard Dump | International |
| Line Trimmer | STIHL |
| Line Trimmer | STIHL |
| Back Pack Blower | Husqvarna |
| Gas Portable Power Washer | John Deere |
| Sprayer Unit | Hydro Eng. |
| Chemical Inventory | |
| Sodium Hydroxide (50% and 25%) | |
| Sodium Hypochlorite (12.5% and 0.8%) | |
| Communications Equipment | |
| Cell Phones with Two-Way Radios | |
| Two-Way Radios in All Vehicles | |

The following representatives typically provide supplies and chemicals to the City.

- Supplies: H.D. Fowler
- Supplies: Consolidated Supply
- Supplies: HD Supply
- Supplies: Ferguson
- Sodium Hydroxide (50 and 25 percent): Cascade Columbia (Jones Chemical as alternate)
- Sodium Hypochlorite (12.5 and 0.8percent): Cascade Columbia (Jones Chemical as alternate)
- Salt for Hypochlorite Production: Cascade Columbia

The Water Division utilizes several different types of communications equipment to ensure a reliable and redundant means of communication within the department. All vehicles are equipped with mobile two-way radios. In addition, all Public Works employees are equipped with cell phones. The phones provide the capability for personnel to communicate, as necessary, with other cities, Pierce County, and Washington State Department of Health (DOH).

Routine Operations

Routine operations involve the analysis, formulation, and implementation of procedures to ensure facilities are functioning efficiently, and meeting pressure and water quality requirements, and other demands of the system. The utility's maintenance procedures are good, with repairs being made promptly so customers receive high-quality water service.

The City should strive to develop standard operating procedures for all routine operations to facilitate and document how all operation, maintenance, monitoring, and reporting tasks are performed by staff. Detailed checklists and sample documents will ensure that City staff completes all tasks appropriately and will also help pass procedures and “institutional knowledge” on to new staff members.

Continuity of Service

As a municipality, the City has the structure, stability, authority, and responsibility to ensure that water service will be continuous. For example, changes in City council or staff would not have a pronounced effect on the City’s customers or quality of service.

Routine Water Quality Sampling

The DOH has adopted federal regulations that specify minimum monitoring requirements for water systems. The sampling requirements depend on the population served, source type, and treatment provided. The specific requirements are contained in WAC 246-290-300, and the minimum monthly routine coliform sampling requirements are summarized in Table 2 (page 69) of the April 1999 “Drinking Water Regulations.” The City currently performs all routine coliform sampling throughout the distribution system. A total of 40 samples are taken each month. A further discussion of the water quality monitoring program is contained in **Chapter 6 – Water Source and Quality** and **Appendix F – Coliform Monitoring Plan** of this Water System Plan (WSP).

Cross-Connection Control

The City update its cross-connection control program in 2018 to comply with WAC 246-290-490, pertaining to contamination of potable water due to cross-connections. Currently, the City’s Water Division works closely with the City’s Building Department to arrive at mutual agreement on cross-connection control requirements. Backflow prevention devices are required at service connections where a potential for contamination exists. The City’s program is included in **Appendix E – Cross-connection Control Plan**. Ursulla Ronscavage is the program coordinate and is supported by David Cihak, Sam Roseberry, Eric Meyer, Julian Ingham, Joseph Lovett, Sean Russell, and Gregg Ridge who are all certified Cross-connection Control Specialists, as shown in **Table 8-1 – Personnel Certification**.

Recordkeeping and Reporting

The DOH has enacted regulations for recordkeeping and reporting procedures for operations and water quality testing that may be found in WAC 246-290-480.

Recordkeeping

The City maintains, at a minimum, the following records for the specified time period.

Water Quality Analysis

- Bacteriologic 5 years
- Inorganic Chemical Permanently
- Volatile Organic Chemical Permanently
- Synthetic Organic Chemical Permanently
- Radionuclides Permanently
- Chlorine Residuals 5 years
- Lead and Copper Permanently

Source/Treatment Data

- Well Logs 10 years
- Intertie Readings 10 years

Customer Records

- Meter Readings 6 years
- Service Account Records Permanently
- Complaints and Concerns 6 years
- Cross-connection/Backflow Assembly Reports Permanently

Other Records

- Meter Test Records Life of Meter
- Maps and Drawings Useful Life
- Comprehensive Water System Plan 12 years
- Water Quality Monitoring Plans Useful Life
- Equipment Maintenance Manuals Life of Equipment
- Valve Records Life of Valve
- Hydrant Records Life of Hydrant
- Wellhead Protection Program Permanently

All records are maintained on file at the Public Works office.

Reporting

1. The City must report the following to the DOH.
 - Within 48 hours: A failure to comply with the primary standards or treatment technique requirements specified in Chapter 246-290 WAC.
 - Within 48 hours: A failure to comply with the monitoring requirements specified in Chapter 246-290 WAC.
 - Within 48 hours: A violation of a primary maximum contaminant level (MCL).
 - Within one (1) business day: A backflow incident, per WAC 246-290-490(8)f.
 - As soon as possible, but no later than 24 hours after the violation is known: National Primary Drinking Water Regulation (NPDWR) violations and situations with significant potential to have serious adverse effect on human health as a result of short-term exposure, which require Tier-1 public notices, per 40 Code of Federal Regulations (CFR) 141.202.
2. The City must submit to the DOH all applicable reports required by Chapter 246-290 WAC. Monthly reports are due by the 10th day of the following month, unless otherwise specified.
3. Daily source meter readings must be made available to the DOH on request.
4. Total annual water production records for each source must be made available to the DOH upon request.
5. Water facilities inventory and report form (WFI) must be submitted to the DOH within 30 days of any change in name, category, ownership, or responsibility for management of the water system.
6. The City must notify DOH of the presence of:
 - Coliform in a sample within 10 days of notification by the testing laboratory; or
 - Fecal coliform or *E. coli* in a sample by the end of the business day in which the City is notified by the testing laboratory.
7. When a coliform MCL violation is determined, the City must:
 - Notify the DOH within 24 hours of determining acute coliform MCL violations;
 - Notify the DOH before the end of the next business day when a non-acute coliform MCL is determined; and
 - Notify water customers in accordance with WAC 246-290-71001 through 71007 and the U.S. Environmental Protection Agency's (EPA's) Public Notification Rule.
 - Conduct a Level 1 assessment if coliform is present in more than 5 percent of routine and repeat samples.
 - Conduct a Level 2 assessment if there is an *E. coli* violation or if a water system incurs a second treatment technique trigger in a rolling 12-month period.

8. If volatile organic chemical (VOC) monitoring is required, a copy of the results of the monitoring, and any public notice, must be sent to the DOH within 30 days of receipt of the test results.

Other Reports

Several other reports are required for Washington state agencies, including the Department of Revenue, Department of Labor and Industries, Department of Social and Health Services, Department of Ecology, and the Employment Security Department. All of these reports are completed according to their instructions.

O&M Records

Facilities O&M Manuals

O&M manuals are available for staff members. These manuals are kept on file at the water treatment plant and utilities office. The City intends to maintain its policies of requiring complete O&M manuals for all new equipment and facilities.

Mapping and As-built Drawing Records

Maintenance of drawings is essential to maintenance crews, City planners, developers, and others requiring knowledge of how the water system is laid out throughout the City. The drawing records are stored in files at the Public Works Shop. In addition, they have been scanned, and electronic copies are available through the Public Works Department. The City's Geographic Information System (GIS) Department has surveyed the entire distribution system and maintains an updated map. New developments or changes to the system are regularly included.

Storage of O&M Records

Records are stored at the utilities office for the following items.

- Backflow and cross-connection devices
- Confined spaces
- Hydrant repairs
- Hydrant meter forms
- Hydrant databases
- Pump motor tests
- Well-sounding and static-water levels
- Precipitation
- Water usage
- Water used for construction

- Water consumable inventory
- Water maintenance
- Water main notes
- Water worksheets
- Water main flushing
- Bacteriological tests
- Inorganic chemical tests
- Volatile organic compound tests
- Synthetic organic compound tests
- Water samples from new developments
- Lead and copper tests
- Chlorination levels
- Customer complaints
- Vandalism forms

Safety Procedures and Equipment

Safety is the concern and responsibility of all water O&M staff. To maintain the highest level of safety, the City has taken steps toward educating its staff and providing resources to ensure a safe working environment. The City will strive to improve its safety program on an on-going basis. The AWWA publishes a manual entitled, *Safety Practices for Water Utilities (M3)*, which describes safety programs and provides guidelines for safe work practices and techniques for a variety of water utility work situations. All staff attend monthly safety meetings.

The following sections identify procedures to be followed for O&M tasks that involve the most common potential work place hazards in the City's water system.

Use of Chlorine, Chlorine Products, Primary Coagulant and Filter Aide

Standard Procedure – Handle with care, provide adequate ventilation, and wear safety glasses and rubber gloves. Detailed handling procedures are found in the respective Safety Data Sheets (SDS).

Sodium Hydroxide

Standard Procedure - Handle with care, provide adequate ventilation, and wear safety goggles, apron, and rubber gloves. Keep container tightly closed, and store in a dry, corrosion-proof area. Protect from unintentional contact with water. Never return contaminated material to its original container. Immediately contact the chemical supplier or manufacturer for handling instructions if drums of caustic material appear to be swollen. Detailed handling procedures are found in the respective SDS.

Working in Confined Spaces

Standard Procedure – Follow state requirements for confined-space entry.

Working Around Heavy Equipment

Standard Procedure – Obtain proper training and follow all safety procedures. Use noise protection equipment.

Working in Traffic Areas

Standard Procedure – Wear proper clothing and provide adequate signage and flagging for work area. Refer to the *Manual of Uniform Traffic Control Devices (MUTCD)* for current requirements.

Working On or Around Water Reservoirs

Standard Procedure – Follow proper safety harness procedures for working on tall structures.

Working In or Around Pump Stations

Standard Procedure – Obtain proper training and follow all safety procedures for working on pumps and electrical equipment. Use noise protection equipment.

Working On Asbestos Cement (AC) Water Main

Standard Procedure – Obtain proper training and follow all safety procedures for working with asbestos materials.

The water utility personnel are required to take training courses regarding the following topics: asbestos cement pipe handling; confined spaces; hazardous waste; fall protection; hearing protection; competent persons; lab safety; electrical hazards; heavy equipment operation; CPR; first aid; traffic flagging; lockout-tagout; and blood-borne pathogens.

The City’s facilities are equipped with confined space entry equipment, oxygen gas meters, and lockout-tagout equipment. Each City vehicle is equipped with first-aid and blood-borne pathogen handling kits. The City also owns flagging signs and equipment for safe handling of traffic.

The Public Works Department follows all appropriate Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) regulations in its day-to-day operations and complies with the following state requirements.

- WAC 296-62-145 to 14529 Part M – Entry into confined spaces.
- WAC 296-155-650 to 66411 Part N – Shoring of open ditches.
- WAC 296-155-429 – Lockout-tagout for work on energized or de-energized equipment or circuits.
- WAC 296-155 Part C1 – Fall restraint for access to the top of the City’s water reservoirs.

- MUTCD – Traffic control for work in the public right-of-way.

EMERGENCY OPERATIONS

Capabilities

The City is well equipped to accommodate short-term system failures and abnormalities. Its capabilities are as follow.

Multiple Supply Capability

Except for peak periods during the summer, the City could lose the operation of one of its groundwater wells or springs sources without adversely impacting its ability to meet the normal demands of its customers. The City also has emergency interties with the Tacoma Public Utilities that could be used to augment supply to the system in the event that a source is out of service.

Multiple Reservoirs

Water storage is provided by four active reservoirs that are located at three different sites. The duplication of reservoirs in the 748 Zone provides sufficient redundancy to prevent service disruption when one of the reservoirs is out of service for cleaning, painting, or repairs. The Ponderosa 800 Zone Booster Pump Station (BPS) provides the capability to distribute water to the 800 Zone when the 800 Zone Reservoir is out of service.

Distribution System

The City has attempted to loop water mains wherever possible to improve water circulation (i.e., water quality) and minimize impacts to the system in the event that a portion of the distribution system must be taken out of service for maintenance or repairs.

Emergency Equipment

The City is equipped with the necessary tools to deal with common emergencies. If a more serious emergency should develop, the City will hire a local contractor who has a stock of spare parts necessary to make repairs to alleviate the emergency condition.

Emergency Telephone

The Water Division has a published emergency phone number for the public to directly contact water department personnel. The police or other City departments can reach the water department via mobile phones or home contact numbers. Emergency contact information, including cell phone, and home phone numbers, is provided to each City department.

On-call Personnel

The "on-call" personnel is equipped with a service vehicle and required to respond to a call within 30 minutes, but can often respond to a call within 15 minutes. A list of emergency telephone numbers is provided to each "on-call" employee. New employees are not placed "on-call" until they are familiar with the water system and maintenance procedures, and are properly certified by the State of Washington, as may be required.

Material Readiness

Some critical repair parts, tools, and equipment are on-hand and kept in fully operational condition. As repair parts are used, they are reordered. Inventories are kept current and are adequate for most common emergencies that reasonably can be anticipated. The City has ready access to an inventory of repair parts, including parts required for repair of each type and size of pipe within the service area. Additionally, the City has been provided with after-hours emergency contact phone numbers for key material suppliers, which gives the City 24-hour access to parts not kept in inventory.

Emergency Response Program

The City has an Emergency Response Plan (ERP) on file and available to staff members. The ERP contains a vulnerability assessment of the City's water system facilities, a contingency operation plan for responding to emergency events, a list of water personnel responsible for making decisions in emergency situations, and other elements. For security reasons, the ERP is not included in this WSP. The ERP is available for review at the DOH by request.

Public Notification

The Federal Safe Drinking Water Act (SDWA), WAC 246-290-495, and the EPA Public Notification Rule require purveyors to notify their customers if any of the following conditions occur.

- Failure to comply with a primary MCL described under WAC 246-290-310.
- Failure to comply with a surface water treatment technique.
- Failure to comply with monitoring requirements under Chapter 246-290 WAC.
- Failure to comply with testing requirements.
- Failure to comply with a DOH order.
- Failure to comply with a variance or exemption schedule from DOH.
- If a system is identified as a source of waterborne disease outbreak.
- If DOH issues the system a category red operating permit.
- If DOH issues an order.
- If the system is operating under a variance or exemption.

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Specific notice content, distribution channels, and time limit requirements, as specified in WAC 246-290-495 and the EPA's Public Notification Rule, must be in compliance when notification is required.

In case of a water quality emergency, such as a waterborne disease outbreak, boil water orders, etc., a written public notice will be distributed by City personnel to all customers. Notice is also to be published in the Tacoma News Tribune, and given to radio and television stations serving the area as soon as possible. In all cases, public notification will comply with WAC 246-290-330. Further, the following entities are to be notified within 24 hours of a water quality emergency.

Washington State Department of Health
 NW Drinking Water Operations (253) 395-6757

Pierce County Health Department
 Communicable Diseases (253) 798-6410

PREVENTIVE MAINTENANCE

The City recently transitioned into using the maintenance management software Cityworks. Maintenance schedules that meet or exceed manufacturers' recommendations have been established for all critical components in the water system. The following schedule is used as a minimum for preventive maintenance, and manufacturers' recommendations should be followed where conflict exists.

Storage Facilities

| | |
|-----------|---|
| Daily | Visual and audio inspections. Check security and inspect facilities for proper operation. |
| Monthly | Check interior condition, vents, hatches, etc., on tanks. |
| As Needed | Clean and/or repaint interior and exterior, as needed, on tanks (estimated 10- to 20-year frequency). |

Distribution System

| | |
|-----------------------|--|
| Water Mains | |
| Annually or As Needed | Leak survey. |
| Semi-annually | Flush. |
| Wells | |
| Daily | Log and record volume delivered and current supply rate; visual and audio inspection; check oil level; check packing; check security; and check for excessive heat and vibration of pump motors. |
| Annually | Check all valves and screens; check control valve settings; |

| | |
|------------------------------|---|
| | re-grease; and change oil. |
| As Needed | Maintain electrical and mechanical equipment; paint structures and piping; calibrate equipment; and replace o-rings and diaphragms in equipment. |
| Water Treatment Plant | |
| Daily | Log and record run hours, motor starts, chemicals used, chemicals added, chlorine solution generated, fuse indicators, backwash volumes, volume delivered, and current supply rate; visually inspect pumps; check pump packing; check pump oil levels; check all equipment for proper function and operation; and check security. |
| Quarterly | Measure treatment train media. |
| Annually | Check all valves and screens; check control valve settings; re-grease pumps; and change pump oil. |
| As Needed | Maintain electrical and mechanical equipment; paint structures and piping; calibrate equipment; and maintain and repair indoor and outdoor facility. |
| Booster Pump Stations | |
| Daily | Visual and audio inspection; check security; and check pump motors for excessive heat and vibration. |
| Weekly | Observe and record motor current draw (three phases); log and record volume delivered and pump motor hours; check motor oil level; measure and record discharge pressure; and check motor noise, temperature, and vibration. |
| Annually | Change motor oil. Take inventory of parts, pumps, and motors. |
| As Needed | Calibrate flow meter; maintain electrical and mechanical equipment; paint structures and piping; and routine maintenance of equipment. |
| Engine Generator Sets | |
| Bi-weekly | Operate to achieve normal operating temperatures; and observe output. |
| Semi-annually | Routine maintenance in accordance with manufacturer's recommendations. |
| As Needed | Replace fluids and filters in accordance with manufacturer's recommendations (or more frequently depending on amount of use). |

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| | Perform tune-up; replace parts as necessary. |
| Pressure Reducing Stations | |
| Annually | Flush and check all valves and screens; check pressure settings; and rebuild and paint every 5 years, or as necessary. |
| Interties | |
| As Needed | Review intertie procedures with adjacent utility. |
| Isolation Valves | |
| Annually | Operate full open/closed; uncover where buried; clean out valve boxes and repair, as necessary. Repair and/or install valve marker posts, as necessary. |
| Hydrants | |
| Annually – performed by the Fire Department | Check for leakage and visual damage. Operate and flush; check drain rate; lubricate as necessary; measure pressure; paint as necessary. Check nozzle and cap threads; clean and lubricate per manufacturer’s recommendations. Replace lost or damaged gaskets. Check and operate auxiliary valve in accordance with the valve maintenance schedule. Leave in open position. Inspect drain system to ensure proper drainage and protection from freezing weather. |
| Meters | |
| 1- to 20-year Intervals | Time and measure volume of meter-delivered flow; dismantle, clean, and inspect all parts; replace worn or defective parts; retest meter for accuracy. Frequency varies based on meter size. Customer meters shall be replaced when reading problems are encountered. |
| Air and Vacuum Release Valve Assemblies | |
| Annually | Flush and inspect, repair as needed. |
| Blow-off Assemblies | |
| Annually | Flush and inspect, repair as needed. |
| Telemetry and Control System | |
| Daily | Back-up program and data. |
| Monthly | Visually inspect cabinets and panels for damage, dust, and debris. |
| Semi-annually | Inspect inside of cabinets and panels for damage, dust, and debris. Vacuum clean all modules. Test alarm indicator units. Clean and |

| | |
|----------|--|
| | flush all pressure sensitive devices. Visually inspect all meters to coordinate remote stations. |
| Annually | Check master and remote telemetry unit (RTUs) for proper operation; repair as necessary. |

Tools and Equipment

| | |
|----------------------|--|
| Rolling Stock | |
| As Needed | Check all fluid levels and brakes. Fluid levels and brakes are checked each time the equipment is used. |
| As Needed | Replace fluids and filters in accordance with manufacturers' recommendations (or more frequently depending on type of use); and perform preventive maintenance per manufacturers' recommendations. |
| Tools | |
| As Needed | Clean after each use; lubricate and maintain as necessary; inspect for damage and wear before each use; preventive maintenance performed per manufacturers' recommendations. |

STAFFING

The preventive maintenance procedures, as well as the normal and emergency operations of the utility, are described in the previous sections. The hours of labor and supervisory activity required to effectively carry out the work of these on-going O&M schedules form the basis for determining adequate staffing levels.

Current Staff

Current staff includes management personnel, supervisory personnel, operators, maintenance workers, and office personnel engaged in operating and maintaining the water system. There are currently ten maintenance workers, two meter readers, and two lead workers and one assistant superintendent in the O&M organization that support the City's water system.

Staffing Requirements

The estimated hours of work required to achieve optimum O&M of the water system (excluding time required for clerical tasks) is shown in **Table 8-3 – Staffing Requirements**. The upper section of the table identifies the staffing time requirements for preventive maintenance tasks, and the lower section identifies the staffing time requirements for operations tasks.

To achieve the level of O&M shown in **Table 8-3 – Staffing Requirements**, approximately 17.4 full-time personnel are required for the water system alone. This is slightly inadequate to

meet these requirements. At the current staffing level, the City is only capable of adequately operating the water system and complying with the minimum requirements of the DOH. However, the preventive maintenance tasks listed in **Table 8-3 – Staffing Requirements** have not been accomplished at the desired frequency shown in the table due to the staff shortage. As the water system expands in the future, the need for additional staff will become even greater. The City plans to add more staff to optimize preventive maintenance and meet the additional requirements from system expansion, as the budget allows.

O&M IMPROVEMENTS

Telemetry and supervisory control improvements are needed to enhance the operation of the water system. The City is updating its existing hard wire telephone-based telemetry system to a hybrid radio/digital subscriber line (DSL)-based telemetry system. Radio telemetry is more reliable in an earthquake and major storms than hard wire telemetry, which is vulnerable to ground faulting, settlement, slides, and underground construction activities.

The Water Division staff spends a considerable amount of time, approximately 20 percent of the total O&M time, reading customer water meters every month, and will spend more time as the population of the City grows. The City is in the process of installing radio-read meters throughout the system. Approximately 45 percent of the meters have been replaced. The projected goal is for full replacement by 2023. If more funding becomes available, the City will have a fully operational Automatic Meter Reading (AMR) system sooner.

In 2018, the City started to utilize the Cityworks asset management and work management program.

Other proposed improvements not mentioned above are addressed in **Chapter 9 – Water System Improvements** and included in the City’s Capital Improvement Program (CIP).

**Table 8-3
Staffing Requirements**

| Description | Total Units in System | Frequency | Time/Unit | Time/Year |
|-------------------------------------|--------------------------|------------------|-----------|-----------|
| | | (times per year) | (hours) | (hours) |
| Preventive Maintenance | | | | |
| Hydrants | 1,754 | 1 | 0.5 | 877 |
| Isolation Valves, Hydrant Valves | 4,893 | 1 | 0.25 | 1,223 |
| Air and Vacuum Release Valves | 210 | 1 | 0.5 | 105 |
| Blow-off Assemblies | 210 | 1 | 0.25 | 53 |
| Meters | 13,574 | 0.1 | 2 | 2,715 |
| Leak Survey of Water Mains | 205 miles | 1 | 0.5 | 103 |
| Flushing Water Mains | 205 miles | 1 | 5 | 1,025 |
| Booster Pump Stations | 7 | 1 | 40 | 280 |
| Pressure Reducing Stations | 28 | 1 | 6 | 168 |
| Interties | 11 | 1 | 6 | 66 |
| Sources | 4 | 1 | 50 | 200 |
| Filtration Plant | 1 | 1 | 770 | 770 |
| Reservoirs | 5 | 1 | 30 | 150 |
| Telemetry and Control System | 1 | 1 | 40 | 40 |
| Operations | | | | |
| Monitor System | 8 | 260 | 0.3 | 624 |
| False Alarm Response | 1 | 12 | 2 | 24 |
| Meter Reading | 13,574 | 6 | 0.1 | 8,144 |
| Grounds Keeping | 8 | 12 | 6 | 576 |
| Inventory | 1 | 1 | 40 | 40 |
| Meter Repair and Replacement | 679 | 1 | 4 | 2,715 |
| <i>Table Continued on Next Page</i> | | | | |

**Table 8-3
Staffing Requirements (continued)**

| <i>Table Continued from Previous Page</i> | | | | |
|---|--------------------------|------------------|-----------|---------------|
| Description | Total Units in System | Frequency | Time/Unit | Time/Year |
| | | (times per year) | (hours) | (hours) |
| Operations (continued) | | | | |
| Main Breaks | 1 | 4 | 8 | 32 |
| System Failures | 1 | 4 | 8 | 32 |
| Hydrant Repairs | 35 | 1 | 8 | 281 |
| Service Connections | 500 | 1 | 8 | 4,000 |
| Main Connections | 10 | 1 | 24 | 240 |
| Water Quality Sampling | 38 | 12 | 0.5 | 228 |
| Administration | 1 | 260 | 8 | 2,080 |
| Total Requirements | | | | |
| Total Hours Required | | | | 26,790 |
| Total Full-Time Staff Required (based on 1,540 hours per year, per person) | | | | 17.4 |
| Time Available Per Year, Per Person | | | | |
| <i>Beginning Hours Available</i> | | | | 2,080 |
| Less average vacation of 3 weeks per year | | | | -120 |
| Less average sick leave of 2 weeks per year | | | | -80 |
| Less holidays of 10 days per year | | | | -80 |
| Less average training of 40 hours per year | | | | -40 |
| Less average small tasks other than above of 1 hour per day | | | | -220 |
| <i>Net Total Available Hours Per Year, Per Person</i> | | | | 1,540 |