

SECTION 6

OPERATION AND MAINTENANCE PROGRAM

Water System Management and Personnel

Management of the City of Battle Ground's (City's) Water System is led by the City Council with each member serving staggered 4-year terms. The Public Works Director (Director) leads the public works department which includes the water system. The Director reports to the City Manager. Key public works personnel are as follows:

- Public Works Director
- City Engineer
- Associate Civil Engineer
- Engineering Technician II
- Operations Manager
- Public Works Supervisor

Public Works Director

The Public Works Director is ultimately responsible for all functions of the public works department including water, wastewater, streets, storm drainage, fleet, facilities and parks. The Director has the authority to implement both daily and long range water utility policy in a manner most beneficial to the water utility and its customers. The Public Works Director evaluates and selects long range water utility planning programs for conformance with the water utility goals, objectives, and budgetary constraints.

City Engineer, Associate Civil Engineer

The engineering positions are responsible for all system design as well as plan and specification review for customer and utility improvement projects. The engineers manage all capital improvement projects from planning to construction. The City Engineer handles requests for customer service, develops engineering drawings and coordinates construction of new services.

Engineering Technician II

The Engineering Technician coordinates and inspects the installation and repair of mains by contractors hired by the water utility. This individual oversees the laying of all new water mains, system tie-ins, installation of services, and pressure tests to ensure that all material and work conforms to the water utility's standard specifications.

Operations Manager

The Operations Manager is responsible for daily field operations, employee safety, and budget management for the Public Works Operations Center, including the water department. The Operations Manager oversees scheduling and dispatching of all crews, equipment, and material

for water utility operations. This position is also responsible for all Washington State Department of Health (DOH) water sampling and reporting, follow up on water system complaints, and implementation of maintenance and safety training programs for the water utility.

Public Works Supervisor

The Public Works Supervisor manages the operation and maintenance of all aspects of the water system. These duties include overseeing the water meter program, late shift duties, the cross connection control program, distribution system maintenance, water quality sampling, crew training, and customer inquiries. The supervisor is responsible for scheduling, monitoring, and testing of the distribution system and all sources of supply. This individual has an understanding of the DOH water testing regulations and reporting requirements for the system. This position is recognized by the DOH as being in charge of the daily operational activities of the water system and carries a Water Distribution Manager (WDM) III certification as required by DOH.

Waterworks Certification

In accordance with Chapter 246-290 WAC, Waterworks Operator Certification, all public water systems with more than 100 services are required to have a certified operator. Certified personnel are required for positions in charge of managing the water system and positions assigned to the lead responsibility for monitoring or improving water quality.

The City's water operations staff currently includes personnel with WDM, Water Distribution Specialist (WDS) and Cross Connection Control Specialist (CCS) certifications as summarized in Table 6-1. Battle Ground is working with DOH to identify the appropriate treatment plant operator certification level for the City's existing iron and manganese treatment and Wells 6, 7, 8 and 9. Once this determination is complete, Battle Ground will proceed with obtaining the required Water Treatment Plant Operator (WTPO) certification.

**Table 6-1
Water System Operator Certifications**

Operator Name	Certifications	Certificate Number
Cal Newton – Public Works Supervisor	WDM III, WDS II	3445
Shawn Scott	WDS, WDM I and CCS	5700
Don Risto	WDM II, CCS	10303
Chuck Kraus	WDS	7761
Ron Buma	WDS, CCS	7373
Bobby Miller	WDS	11621

System Operation

System Overview

As presented in Section 1, the City has eight (8) wells, six (6) reservoirs, and two (2) booster pump stations. Wells 1, 2, 4, 5 and 6 all pump to the Tukes Mountain Reservoirs which supply the Main Pressure Zone by gravity. Wells 7, 8 and 9 pump to the Horsethief Reservoir. The Horsethief Pump Station supplies water from the Horsethief Reservoir up to the Tukes Mountain Reservoirs. The Tukes Mountain Pump Station pumps water from the Main Pressure Zone to supply the homes on Tukes Mountain that are too close in elevation to the reservoirs to receive adequate pressure by gravity. Greater than 95 percent of all water system connections are in the Main Zone, served by gravity from the Tukes Mountain Reservoirs, which are operated at a nominal hydraulic grade of 544 feet. High service pressures in the Main Zone require individual pressure reducing valves (PRVs) on all service connections with pressure over 80 pounds per square inch (psi) at the meter.

The City maintains one (1) active supply connection to adjacent water provider Clark Public Utilities (CPU) at NE 199th Street (SW Eaton Boulevard) and SW 10th Avenue (SR503) at the Maple Grove School. This intertie has been used in recent years as an emergency source during periods of peak summertime demand. The City has a second emergency connection to CPU at NE Grace Avenue (142nd Avenue) and NE 10th Street. The City’s former connection to the City School District has been abandoned. The City is currently planning a new intertie with CPU on NE 219th Street at the water service area’s western boundary. The City has received DOH project review and approval for this improvement. This project is expected to begin construction as soon as other local permitting and access approvals have been completed.

Routine Operation

The City has an automated telemetry system that monitors and operates the water system, including signaling wells and booster pumps to turn on and off based on predetermined settings such as reservoir water levels. This telemetry system is monitored by CPU at their Operations

Center at 8600 NE 117th Avenue. Remote screens at the Battle Ground Operations Center allow City staff to monitor the telemetry system and intercept alarms or otherwise note water system operating conditions.

Well pumps are turned on as needed to maintain reservoir levels. The City uses Wells 7, 8 and 9 as the primary wells, followed by Wells 1 and 2 and then Wells 4 and 5. Well 6 is not operated due to high levels of iron bacteria, except for high demand periods in the summer. Wells 7, 8 and 9 fill the Horsethief Reservoir during the day. During normal operation the Horsethief Pump Station supplies water from the Horsethief Reservoir to the Tukes Mountain Reservoirs in the evening. The Tukes Mountain Pump Station is operated based on demand in the Tukes Mountain Pressure Zone. This pumping schedule allows the City to operate pumps during non-peak power times. During high water demands the wells and booster pumps operate as needed to keep the reservoirs as full as possible.

Operation and Maintenance Procedures

Table 6-2 lists the major water system components along with operation, maintenance, and equipment information about each component.

**Table 6-2
Operation and Maintenance Table**

Component	Operations	Maintenance	Equipment
Wells 1, 2 and 6	<ol style="list-style-type: none"> 1) Daily flowmeter readings 2) Daily inspection for leaks 3) Refill sodium hypochlorite tanks as needed 	<ol style="list-style-type: none"> 1) Repair leaks as needed 2) Repair any problems with sodium hypochlorite ASAP 3) Maintain well buildings 4) Maintain pumps per specs 	<ol style="list-style-type: none"> 1) Well Pumps 2) Disinfection system 3) Telemetry Equipment 4) Pipes and accessories 5) Sodium hypochlorite tanks
Wells 4, 5, 7, 8 and 9	<ol style="list-style-type: none"> 1) Daily flowmeter readings 2) Daily inspection for leaks 3) Add sodium hypochlorite as needed 	<ol style="list-style-type: none"> 1) Repair leaks as needed 2) Repair any problems with sodium hypochlorite ASAP 3) Maintain well buildings 4) Maintain pumps per specs 	<ol style="list-style-type: none"> 1) Well Pumps 2) Disinfection system 3) Telemetry Equipment 4) Pipes and accessories 5) Sodium hypochlorite tanks
Reservoirs	<ol style="list-style-type: none"> 1) Daily inspection for leaks, vandalism, intrusion, etc. 2) Daily recording of reservoir levels 	<ol style="list-style-type: none"> 1) Clean reservoir every 3-5 years. Use divers to eliminate the need to take reservoirs out of service. 2) maintain vents, overflows, and other components in proper working condition 	<ol style="list-style-type: none"> 1) Reservoir floats 2) Vent screens 3) Overflow and drainage systems 4) Telemetry equipment
Horsethief Booster Pumps	<ol style="list-style-type: none"> 1) Daily flowmeter reading. 2) Daily inspection for leaks, proper valve operation, etc. 	<ol style="list-style-type: none"> 1) Maintain pumps and valves per manufacturer specs 2) Repair any leaks or worn out piping, valves, ports, etc. 	<ol style="list-style-type: none"> 1) Booster Pumps 2) Control valves 3) Gate valves 4) Telemetry equipment 5) Flowmeter 6) Pressure transducer
Tukes Mountain Booster Pumps	<ol style="list-style-type: none"> 1) Daily flowmeter reading. 2) Daily inspection for leaks, proper valve operation, etc 	<ol style="list-style-type: none"> 1) Maintain pumps and valves per manufacturer specs 2) Repair any leaks or worn out piping, valves, ports, etc. 	<ol style="list-style-type: none"> 1) Booster Pumps 2) Control valves 3) Gate valves 4) Telemetry equipment 5) Flowmeter 6) Surge tanks

Comprehensive Water Quality Monitoring Plan

The City takes all necessary samples to comply with DOH and the Federal Safe Drinking Water Act (SDWA) and to ensure a safe supply of water for its customers. Water quality sampling requirements are outlined in Table 6-3.

**Table 6-3
Battle Ground Water System (ID#047005)
Water Monitoring Plan**

Parameter	Required	Battle Ground Monitoring	Comments
Inorganic Chemicals (IOC)	Monitor each well every three (3) years	Each well monitored every three (3) years	Monitor per DOH schedule
Volatile Organic Chemicals (VOCs)	Monitor each well every three (3) years or as required by DOH sampling schedule	Each well monitored every three (3) years except Wells 1 and 2 which are tested annually	Monitor per DOH schedule
Synthetic Organic Chemicals (SOCs)	Monitor each well once every nine (9) years with waiver	Currently on a waiver	Renew Waiver as indicated by DOH
Nitrate	Annual testing of each well	Each well monitored annually for nitrate	Monitor per DOH schedule
Lead and Copper	Every three (3) years	Done in 2011, retest in 2014	Monitor per DOH schedule
Disinfection By-Products (TTHM and HAA5)	Stage 2 Compliance Monitoring begins – Oct. 2013	4 samples taken quarterly	Monitor per DOH
Radionuclides	Monitor each well every three (3) years	Each well monitored every three (3) years	Monitor per DOH schedule
Coliform	Monitoring of 20 sites per month from the distribution system	Samples collected monthly according to the Coliform Monitoring Plan	See Appendix E

Water Quality Sampling Procedures

Coliform

The City takes routine monthly distribution samples along with investigative samples for newly constructed water mains. Samples are taken from interior faucets, if possible, which were identified according to a written coliform monitoring plan (See Appendix E). If present, remove strainers and washers from the faucet taps before taking the samples. The sample tap is sprayed with a sodium hypochlorite solution, then flushed for several minutes before taking samples.

Samples are collected in 100 milliliter (ml) bottles, as furnished by the testing lab. These bottles have been sterilized and care is taken not to contaminate the sample by touching either the underside of the cap or the top edge of the bottle or rinsing out the bottle prior to use.

Instructions for taking the sample are on the back of the form. With each sample collected, the person taking the sample completes a lab sample form and sends it to the testing lab within 12 to 24 hours. The sampler needs to fill out the lab form completely, and be sure to indicate the source of the sample, and the type of analysis requested.

Inorganic Chemicals

Samples are taken at the source, before treatment, in two (2) one-quart containers per source. Samples are taken while the well pumps are in operation. These sample containers are provided by the analytical laboratories. The samples are submitted to the lab with sampling forms that are completed at the time of sampling by the person doing the sample collection.

Disinfection By-Products

The water utility is required to collect four (4) trihalomethane (TTHM) and haloacetic acid (HAA5) samples each quarter beginning in October 2013, in compliance with the Stage 2 Disinfectants/ Disinfection By-Products Rule. The City currently collects four (4) samples per year in compliance with the Stage 1 Rule requirements.

Lead and Copper

One (1) round of lead and copper sampling is required every three (3) years, unless DOH provides a waiver. The City does not exceed the action level for these contaminants and has optimized the treatment system for corrosion control. The last round of samples was conducted in 2011, with the next set due in 2014. As with other sampling, the person collecting the sample is responsible for completing the lab form at the time of sample collection.

Organic Chemicals

Volatile organic chemical (VOC) sampling is required once every three (3) years for all wells except Wells 1 and 2 which are currently sampled each year. The City has a waiver from DOH requiring synthetic organic chemical (SOC) sampling once every nine (9) years. That waiver will soon expire and the City plans to retest in order to renew this 9-year waiver.

Radionuclides

Gross alpha chemical sampling is required once every three (3) years from each well, or as otherwise required by the DOH.

Reporting, Follow-up Action and Public Notification

The water utility is required to provide periodic reports to DOH which summarize the results of water quality testing. If a maximum contaminant level (MCL) or maximum residual disinfectant level (MRDL) standard is exceeded, follow-up action is required including consultation with DOH and possible public notification. Follow-up action after exceeding an MCL and procedures for DOH consultation and public notification are specified in WAC 246-290-320, WAC 246-290-480 and 40 CFR 141 Subpart Q respectively.

Contaminants are divided into three tiers of public notification requirements generally based on the potential for adverse effects on human health. Tier 1 public notices are required for contaminants which may cause adverse health effects with short term exposure including fecal coliform and nitrate. Tier 1 notices must be issued within 24 hours of a violation. Tier 2 and 3 public notices are applied to MCL violations whose potential for adverse health effects is more long term and for failure to comply with testing requirements. Tier 2 notices must be issued within 30 days of a violation and Tier 3 notices within one year.

The City will seek assistance and concurrence from DOH in developing appropriate public notifications. At a minimum each notification will state the sampling criteria, identify when the violation occurred, identify what corrective measures have been taken, and inform the customers what, if any, precautionary steps have been taken.

Coliform Monitoring

Groundwater Rule

Source water monitoring is required under the Groundwater Rule when any of the City's routine coliform samples is total coliform positive. Samples are taken at each of the City's wells, prior to treatment, and tested for E. coli within 24 hours of a total coliform positive. If one of these triggered source samples is E. coli positive, DOH will establish corrective action and additional sampling requirements. An E. coli positive source sample will require a Tier 1 public notification and inclusion in the City's annual consumer confidence report (CCR).

Acute Coliform Violation

An acute coliform violation occurs when a water system exceeds the MCL for fecal coliform or E. coli. This means at least one (1) positive routine sample and at least one (1) positive repeat sample, with one (1) of the samples being positive for fecal coliform or E. coli. If any sample is positive for fecal coliform or E. coli then DOH must be notified as soon as possible but no later than 24 hours after the violation is known. If an acute coliform violation occurs the following steps need to be taken:

1. Three (3) samples shall be taken at the following locations:
 - Site of previous sample with a coliform presence
 - Within five (5) active services upstream of site of sample with a coliform presence
 - Within five (5) active services downstream of site of sample with a coliform presence.
2. Notify DOH immediately at (360) 236-3030 during work hours or (877) 481-4901 at all other times. Notify the DOH Coliform Lead (Currently Sandy Brentlinger) at (360) 236-3044.
3. Notify system users within 24 hours using a boil water advisory with mandatory health effects language as shown in CFR 141 Subpart Q Appendix B.
4. Determine possible causes for the violation and correct the situation as soon as possible.

Non-Acute Coliform Violation

A non-acute coliform violation occurs when a water system exceeds the MCL for total coliform, calculated on a monthly basis. The City collects 20 routine samples each month. For systems with less than 40 routine samples monthly, a non-acute violation occurs if two or more routine or repeat samples have coliform present. If a non-acute coliform violation occurs the following steps need to be taken:

1. Notify DOH at (360) 236-3030, by the end of the next business day after determining that the violation occurred. Notify the DOH Coliform Lead (Currently Sandy Brentlinger) at (360) 236-3044.
2. Notify system users as soon as practical, no later than 30 days after the water system determines that a violation occurred.
3. Determine possible causes for the violation and correct the situation as soon as possible.

Inorganic Chemical and Physical Substances

Follow-up action for inorganic chemical and physical substances is dictated based on whether the substance is a primary or secondary contaminant. Primary contaminants generally present a greater risk to human health with a short-term exposure. Nitrate, a primary contaminant, has specific follow-up action outlined in *WAC 246-290-320*.

Primary inorganic chemicals for a groundwater system like Battle Ground's include:

- antimony
- arsenic
- asbestos
- barium
- beryllium
- cadmium
- chromium
- cyanide
- fluoride
- mercury
- nickel
- nitrate
- nitrite
- selenium
- sodium
- thallium

Secondary inorganic chemical and physical substances include:

- chloride
- color
- hardness
- zinc
- iron
- manganese
- specific conductivity
- silver
- sulfate
- total dissolved solids

Inorganic Substances Other Than Nitrate

If any routine sampling result for a primary inorganic chemical exceeds the MCL, a confirmation sample needs to be taken at the same sampling point as soon as possible but not to exceed two (2) weeks following the routine sample. Compliance will be based on an average for the routine and confirmation sample results. If an MCL is exceeded for a primary inorganic chemical, contact DOH within 48 hours and provide a Tier 2 public notification as soon as practical but no later than 30 days after the violation is known. DOH will provide guidance on additional sampling and/or repeat public notifications as needed for primary inorganic chemical MCL violations. If a secondary inorganic chemical or physical substance MCL violation occurs, the City will consult with DOH to determine what follow-up action is required.

The City has two (2) treatment systems for the secondary inorganic chemicals iron and manganese. Monthly testing is required for iron and manganese at each source, after treatment but before the water enters the distribution system. If iron and/or manganese levels exceed the secondary MCL four (4) months or more out of the year then DOH needs to be notified and follow up action may be needed.

Nitrate

If an annual nitrate sample result is five (5) milligrams per liter (mg/l) or greater, then quarterly sampling at that site will be required for at least one (1) year. Sampling can be reduced to annually by the state if four (4) consecutive quarterly samples are reliably below the MCL of 10 mg/l.

If a nitrate sample exceeds the MCL of 10 mg/l, then a confirmation sample needs to be taken within 24 hours. Compliance with the MCL will be based on the average of the two (2) results. If the MCL is exceeded the following steps need to be taken:

1. Begin consultation with DOH as soon as possible, but no later than 24 hours after the violation is known
2. Provide public notification within 24 hours by area radio and television stations
3. Develop a plan to either treat the contaminated water or discontinue use of the source
4. Provide additional public notification as established through consultation with DOH

Disinfection By-Products

When the annual running average for TTHMs is greater than 80 micrograms per liter (ug/l) or for HAA5s is greater than 60 ug/l, the system is in violation and a Tier 2 public notification is required within 30 days. The system will consult with DOH regarding follow up action, including public notification and additional monitoring as required.

Lead and Copper

The City is currently in compliance with the testing requirements of the Lead and Copper Rule, with a current 5-year testing waiver from the DOH.

The general public notification requirements of the SDWA also apply to the Lead and Copper Rule. Tier 2 notification is required for violations of treatment techniques. Tier 3 notification is triggered by failure to comply with testing and monitoring requirements.

Organic Chemicals

If any routine sample of a synthetic or volatile organic chemical (SOC or VOC) posts a detection exceeding 0.0005 mg/l, then quarterly sampling will be required for that sampling point. If one (1) or more of the two (2) carbon organic chemicals are detected (trichloroethylene, tetrachloroethylene, cis-1,2 dichloroethylene, trans-1, 2-dichloroethylene, and 1,1-dichloroethylene) then vinyl chloride sampling will be required for that source. Quarterly sampling may be reduced to annually by the state if a minimum of two quarterly samples show organic chemicals to be reliably and consistently below the MCLs. If the City has three (3) annual samples with no detections they will apply to the state for a waiver.

When sampling quarterly, an MCL violation is determined by the running annual average for each sampling point. When monitoring annually or less frequently, a detection of organic chemicals will trigger quarterly sampling, the system is then considered in violation if the running average for one year of sampling exceeds an MCL. With any routine sample organic chemical detection, DOH may require a confirmation sample. The average of the routine and confirmation sample are used to determine compliance.

DOH must be consulted within 48 hours of a detection exceeding 0.0005 mg/l to establish required follow-up monitoring. If an MCL violation occurs as described in the previous paragraph, a Tier 2 public notification is required as soon as practical but no later than 30 days after the violation is known. If the City does not follow required monitoring and testing procedures, a Tier 3 public notice is required within one year.

Radionuclides

If a gross alpha sample is greater than five (5) picocuries per liter (pCi/L) notify DOH and conduct follow up sampling as requested by DOH. An MCL exceedance will require a Tier 2 public notification.

Disinfection

The City doses the water at all their wells with sodium hypochlorite to disinfect and provide a chlorine residual in the water system. The City is required to monitor the residual in the water system every day, and to provide monthly reports to DOH. Measurable chlorine residual must be present in all parts of the distribution system.

Emergency Response Plan

The water utility has developed an Emergency Response Plan that is capable of reacting to major or catastrophic system malfunctions, in accordance with WAC 246-290 Emergency Measures. The development, publication, and wide distribution of standard operating procedures, emergency alert rosters, and contingency planning are essential elements of the overall Emergency Response Plan. The plan describes an organizational and communications network that has sufficient flexibility to respond to the wide range of emergency conditions.

Introduction

The Emergency Response Plan is intended to guide public works employees in restoring water service during a major emergency. A major emergency is an event that results in loss of water to a large service area or numerous small areas, and requires the total mobilization of the public works department and outside agencies and resources to restore service. Emergencies may result from natural causes of extreme intensity, duration, and extent or from man-made events, such as civil disorder or system contamination.

During a declared emergency condition, all the water system operations will be carried out through the Water Command Center, located within the Operations Center. The functions of the water staff and their locations during an emergency are summarized in the following paragraphs. Table 6-4 presents a list of contacts to be used during a City emergency. A summary of system components potentially impacted by various types of emergencies is shown in Table 6-5.

**Table 6-4
Water System Emergency Contact List**

Description	Contacts	Phone Number
City Hall	City Manager	(360) 342-5000
Public Works Department	Public Works Director	(360) 342-5075
On Call Cell Number (635-7076)	Public Works Operations Manager, Water Supervisor, Water Operations	(360) 342-5355
Clark County Health Water Program	County	(360) 397-8428
CPU Water Operations	CPU Water Staff	(360) 992-8022
ODW Southwest Region	Regional Engineer	(360) 236-3035
ODW Emergency Hotline	After Hours and Weekends	(877) 481-4901

**Table 6-5
Potential Disaster Effects**

Disaster Type	Wells	Storage	Transmission Network	Distribution System	Telemetry & Control	Power Supply Systems
Earthquake	x	x	x	x	x	x
Severe Windstorm	x	x			x	x
Ice/Snow Storm (Freezing Conditions)	x	x		x	x	x
Flooding	x		x	x		x
Fire	x	x			x	x
Volcanic Eruption	x	x	x	x	x	x
Drought	x					
Water Supply Contamination	x	x	x	x		
Water Main Break	x	x	x	x	x	x
Vandalism	x	x	x	x	x	x
Explosion/Bomb	x	x	x	x	x	x
Nuclear Warfare	x	x	x	x	x	x

Inventory status report and list of material suppliers are to be kept up-to-date and readily accessible to avoid unnecessary delay in restoration of service. Throughout the emergency, voice contact will be maintained between work crews, the Public Works Supervisor, the Public Works Operations Manager, and other key personnel to enhance coordination of work efforts. It is important that the Public Works Director and City Hall are kept apprised of the emergency to permit proper public notification.

Boil Water Advisories

Events Requiring Boil Water Advisory

Boil water advisories are established in response to a repeat positive sample for fecal coliform bacteria according to the sampling procedures described in the City's Coliform Monitoring Plan in Appendix E of this Water System Plan. Emergencies such as floods, earthquakes, and other disasters can result in damage to water system infrastructure, thereby also warranting a boil water advisory as a cautionary measure.

Initiating Advisory

Chain of Command

The Public Works Supervisor (Supervisor), upon receiving notice of a repeat positive coliform sample or qualifying emergency, is responsible for immediately contacting the Operations Manager and Public Works Director (Director) and consulting with the Washington State Department of Health Office of Drinking Water (DOH). The Director is responsible for issuing a boil water advisory based on the evidence presented by the Supervisor and direction provided by DOH. In the Director's absence, the City Engineer is responsible for issuing boil water advisories.

DOH contacts for Drinking Water Emergencies:

- During business hours: Southwest Regional office (360) 236-3030
- After hours emergency hotline: (877) 481-4901

Public Notification

DOH will be consulted prior to release of information to the public. A consensus will be reached with DOH regarding information to be released and actions to be taken. It is important not to release conflicting information so as not to confuse the public. Clark County Public Health will be notified of the boil water advisory prior to public notification so they may respond to potential public inquiries.

Clark County Public Health Contacts:

- During business hours: (360) 397-8428
- After hours emergency hotline: (888) 727-6230

As a courtesy, Clark Public Utilities (CPU) should also be informed of a boil water advisory from Battle Ground as some City residents receive their water from CPU and may be confused about what action they need to take.

Boil water advisories are issued to the public through radio, television and newspapers using the Flash Alert Assistance program for the local area.

- www.flashalert.net
- (360)834-1953

Public notification is also displayed prominently on the City's website. Citizens who have signed up for the City's emergency alert option will receive an automatic e-mail message. Door hangers with the advisory information may be provided to residents in the affected area at the Director's discretion.

An initial press release will be issued following initiation of a boil water advisory to inform the public of the situation, action being taken by the City to resolve it and action the public needs to take to protect their health. Consolidated press releases, announced on morning and evening television and radio news broadcasts, will also be used to keep the public informed of any updates. Press releases, public notification flyers and related document templates are available in the DOH's Coliform Public Health Advisory Packet:

<http://www.doh.wa.gov/ehp/dw/Coliform/coliform.htm>

Lifting Advisory

Criteria for Lifting Advisory

The City will repair any infrastructure damage identified as the possible source of contamination, disinfect the related facilities and/or flush distribution system piping as needed. Once repair and disinfection is complete, a boil water advisory will be rescinded following two consecutive days of no detection of coliform bacteria in the system.

Chain of Command

The Director is responsible for rescinding a boil water advisory. In the Director's absence, the City Engineer is responsible for lifting boil water advisories.

Public Notification

Once the boil water advisory is rescinded, a notice is developed to inform the public regarding appropriate measures for use of the water supply including flushing of pipes and fixtures as required.

Follow-up

A thorough investigation of the contamination source should be conducted and strategies developed to avoid similar future occurrences. The public should be informed and given updates regarding investigation findings in order to restore confidence in the quality of water provided by the City.

The City is required to submit a Public Notice Certification form to the DOH within 10 days of initiating the boil water advisory. The form is available from DOH as Form #331-264. It is also included in the DOH's Coliform Public Health Advisory Packet:

<http://www.doh.wa.gov/ehp/dw/Coliform/coliform.htm>

Major Emergency During Non-Working Hours

All water system staff will report and attend to their assigned trouble centers. Water system crews will report to work only upon notification. The notification can occur by phone, person, or media broadcasts.

Sequence of Events

1. Declaration of a major emergency by the City Manager
2. Dispatch notified of water outage and area
3. Dispatch notifies crew person on the on-call list
4. Crew person investigates and determines severity and extent of outage
5. Public Works Operations Manger or Public Works Supervisor notifies Public Works Director of emergency. If Public Works Director cannot be reached, Public Works Operations Manager or Public Works Supervisor notifies the City Engineer, who makes the decision on the declaration of an emergency. If the Public Works Director or City Engineer are not available then the Public Works Operations Manager or Public Works Supervisor may declare an emergency of the water utility.
6. Emergency stations are manned. Highest level staff member notifies City Hall and the City Manager.

Emergency Duties

Public Works Director

REPORTS TO – City Manager

1. RESPONSILBILITIES

- A. Receives and logs service outage calls.
- B. Ensures reported outages are on service restoration priority.
- C. Transmits information from office records to field crews as required.
- D. Provides message service to field crews and their families.

2. STAFF SUPPORT

Engineering and Customer Service Personnel

3. DIRECT CONTACTS

- A. Other Emergency Service Personnel, as required.
- B. Members of the general public or water system customers

4. LOCATION

Either at City Hall at 109 SE 1st Street, or the Public Works Operations Center at 1308 SE Grace Avenue, or alternatively as directed by the City Manager, at the Police Dept. EOC – 505 SW 1st Street.

Public Works Operations Manager

REPORTS TO – Public Works Director

1. RESPONSIBILITIES

- A. In charge of emergency operations of water, sewer, streets, and park services.
- B. Aids Public Works Director in setting restoration priorities.
- C. Dispatches crews to restore service in established order of priority.
- D. Advises City Hall of progress in restoration of water service.
- E. Monitors telemetry and control system in water command center.
- F. Makes field inspections of damage to water utility facilities and reports condition to Water Command Center.
- G. Ensures crews have necessary materials and equipment to restore service.
- H. Coordinates material and equipment purchases with suppliers.

2. STAFF SUPPORT

Operations Public Works Clerk
Public Works Supervisor

3. SUPERVISES

Water Utility Field Crews

4. DIRECT CONTACTS

Public Works Director
Public Works Supervisor
Clark Public Utilities (360) 992-8000

5. LOCATION

At Public Works Operations at 1308 SE Grace Avenue
Alternate Location: EOC at the Police Dept, at 505 SW 1st Street, or at City Hall – 109 SW 1st Street.

Public Works Supervisor (DOH Responsible Charge Person)

REPORTS TO – Public Works Operations Manager

1. RESPONSIBILITIES

- A. Has overall control of water utility resources.
- B. Assess damage to water system.
- C. Set priorities for restoration of water service.
- D. Coordinate efforts to restore water service.
- E. Make arrangements for mutual aid.
- F. Provide emergency status updates to public works operations and city hall.
- G. Contact DOH Engineer immediately if emergency may cause, or threatens to cause, water loss or threatens public health (WAC 246-290). DOH number is (360) 664-0768, or after hours number is (877) 481-4901.
- H. Contact Clark County Dept of Health (360) 397-8428.
- I. Advise local fire districts of emergency if water flow for firefighting is impaired.

2. SUPERVISES

Maintenance Crews

3. DIRECT CONTACTS

Public Works Operations Manager

Maintenance Workers

Clark Public Utilities (360) 992-8000

Members of the general public or water system customers

4. LOCATION

Public Works Operations at 1308 SE Grace Avenue

Alternate Location: City Hall – 109 SW 1st Street

Emergency Response Procedures

A series of potential disasters and other emergency conditions that could impact the City's water system as well as actions to be taken in the event of each emergency are presented below.

Emergency restoration priorities apply for all types of emergencies.

Emergency Restoration Priorities

Supply

Wells and booster pumps will be restored insofar as practicable, in the following order:

- 1. Wells 7 and 8 and Horsethief Pump Station
- 2. Well 9
- 3. Wells 1 and 2
- 4. Wells 4 and 5
- 5. Well 6

Emergency Services and Priority Customers

1. Transmission mains from wells to reservoirs
2. Life support system patients, such as, kidney dialysis and Vancouver Clinic
3. Major fire mains along SR502, Rasmussen, E Main, Onsdorff Boulevard, NE 10th Street, SW 20th Avenue and NW 20th Avenue, and Grace Avenue
4. Water Services to all lift stations, starting with Lift Station No.1 and Gardner
5. Individual customer water services

Identified Life Support Systems

A list needs to be developed of all the patients who currently have dialysis machines or respirators in the City's water system service area. In case of emergency situations, they will be instructed to call 911.

Emergency: Earthquake

Description

A major earthquake, with a magnitude of 5.0 or higher, and an intensity of 9 on the Modified Mercalli scale, could disrupt the source, transmission, pumping, storage, distribution, and telemetry components of the water system. In addition, power failures and interruption may occur to conventional communications such as the above ground fiber optic cable that links the Water Operations Center to the server at City Hall.

Response

Water personnel will anticipate critical water use needs for firefighting or medical facilities resulting from an earthquake. Since they are hidden from view and at least as susceptible to ground movement as aboveground structures, pipelines, wells, and other buried facilities require closer attention in the event of an earthquake. The system will be checked thoroughly for any unexplained drop in line pressure, reduction in flow rate, pump failure, leakage, or other signs of damage.

Emergency: Power Failure/Outage

Description

Short and long term interruptions in the power supply can occur for a variety of reasons. These can affect the water system and may or may not be associated with other emergencies. In addition, power outages may be localized to one (1) or more blocks or may affect the entire region. Facilities most affected by this type of emergency include source and booster pumping, telemetry equipment, and communication systems.

Response

In addition to their field response, water personnel will immediately contact the electric utility to determine the nature, extent, and expected duration of the power outage. Depending on the impact to the City's sources of supply, water utility staff may also contact CPU and investigate the possibility of opening the emergency intertie connection at NE 199th Street and Maple Grove School.

Available Back-up Generators

1. CPU – Auxiliary Generators may be available if not in use by CPU.
 - A. 180 kilowatt (kW)
 - B. 125 kW
 - C. 50 kW
 - D. 50 kW

2. Other Equipment – In addition to CPU's auxiliary generators, the following firms may have backup generators as noted:
 - A. Hanson Drilling – (1) 15 kW, (1) 30 kW
 - B. Mather & Sons – (1) 15 kW
 - C. Halton Tractor, Portland – up to 930 kW
 - D. E.C. Distributing, Portland – up to 75 kW
 - E. R.S.C. Rentals – up to 125 kW

Emergency Generator Start-up Procedures

Before leaving the yard:

- A. Unhook battery charger electric cord
- B. Turn battery charger on/off switch to off
- C. Check oil level
- D. Check fuel level

Notes: The Hand-Off-Auto switch is on the pump electric panel inside the pump house. Use the Man/Aux switch inside the pump house to switch all power from the CPU power system, to the backup generator, or vice versa.

Procedure at Well or Pump Station Site:

- A. Turn H/O/A switch to "OFF"
- B. Turn Man/Aux switch to "OFF"
- C. Plug in Power cord to panel, and lock into position
- D. Remove right front door panel
- E. Open the back door on the Pump Station generator
- F. Set and lock hand throttle to approximately one half throttle
- G. Switch engine control switch to manual; engine will start and automatically shut off starter
- H. Run at half throttle until engine is warmed up

- I. Adjust throttle to obtain 60 Hz on meter
- J. Switch MAN/AUX switch to AUX
- K. Start Pump by switching HOA switch to HAND

Procedure after using the generator:

- A. Top off and fill fuel tank
- B. Check the oil level
- C. Turn the battery charger on/off switch to ON
- D. Plug in the battery charger and make sure it is working

Emergency: Water Transmission Main Damage

Description

Rupture or leakage in the transmission lines from wells could be a result of earthquake, pressure surge, vandalism, bomb blast, construction, soil scour during a flood, corrosion, or material failure. A major break could drain connected storage facilities and present a flood and erosion threat to nearby areas. It is unlikely that the entire system would be affected.

Response

Such an event requires prompt action by the water utility personnel to isolate the damaged section and, thus, minimize the disruption of service for the rest of the system. If transmission paths from wells are shut down, the affected wells will be turned off manually, and a red tag placed on the telemetry system. The size and nature of the rupture must be evaluated promptly to ensure that adequate repair materials, excavation equipment, dewatering facilities, and trained personnel are deployed immediately. A field response will also address the need to re-route traffic and warn businesses and residences possibly affected by the break. Floods may also result in transmission main ruptures at the crossings with Mill Creek. All creek crossing will be checked if system damage is suspected. Ruptured pipeline crossings may be secured until flooding subsides and working conditions are safe.

When the water system loses positive pressure there is a heightened potential for water contamination. A boil water advisory will be needed until the safety of the water supply is verified through coliform sampling. DOH will be consulted to evaluate whether a water outage requires an advisory, the extent of the system that should be included in the advisory and when the advisory should be lifted.

Emergency water supplies can also be provided at strategic hydrants by installing hydrant meters within affected areas. For prolonged outages, arrangements may be made to haul water by tankers to impacted areas. Proceed with restoration of service in accordance with the service restoration priorities.

Emergency: Structural Damage to a Reservoir

Description

Reservoirs are designed to withstand earthquakes that can be expected within our seismic zone. Severe earthquakes may result in the buckling of steel plates, and possible cracks in reinforced concrete resulting in minor leaks in the tanks.

Response

In the event of an earthquake, each reservoir will be checked for signs of damage. If any damage is evident, the water level in the reservoir will be drawn down below the level of the damage. The tank will be taken out of service if necessary, until it can be inspected and repaired. A report of all repairs will be completed and sent to the Public Works Director and City Engineer. In addition to the field response, DOH and other applicable health agencies should be contacted to advise them of the situation.

Emergency: Contamination of Source of Supply

Description

Sources of contamination may occur in the aquifer or the wells, and can be the result of either manmade or natural occurrences. A partial list of possible sources for well contamination includes: effluent from septic tank drainfields, runoff from storm drainage facilities, leachate from pesticide use and/or landfills, spills from fuel storage tanks, other chemical or petroleum spills, contamination from animal wastes, vandalism, volcanic fallout, undesirable aquatic organisms.

Response

The initial response will be to isolate the contaminated facilities from the rest of the system. Other appropriate measures will be determined according to the type, location, nature, and entry path of the contaminant. In addition to field response, water system personnel must contact the appropriate health authorities. They need to determine, if possible, the extent of contamination in the system and prepare an appropriate public information program.

Emergency: High Water Demand

Description

Pumps and reservoirs are not keeping up with water demand. The water levels in all reservoirs are declining.

Response

During periods of high water demand, the City will purchase wholesale water supply through our approved interties with CPU, according to our wholesale water purchase agreements. The City will also continue to implement public education goals from the Water Use Efficiency program, including installing seasonal Conservameter signs, publishing water conservation advertising in the Reflector and on the City's web page, and making available to the public any other water conservation information that may be requested. Seasonal irrigation reduction will also be implemented at city parks, and other facilities, to emphasize the importance of conservation.

Safety Procedures

The City water system currently uses sodium hypochlorite for disinfection at all facilities, to eliminate the inherent problems with use and storage of chlorine gas. At this time most of the major water system hazards are prevented through the safe handling and storage of the sodium hypochlorite materials used in the disinfection process.

Other potential hazards are related to lifting out and reinstalling treatment or pumping equipment for repair. Each site has various pumps and pipeline components that, when removed for maintenance, require special lifting equipment and preparation for safe handling. Proper workplace lifting techniques are used during any water system maintenance project. The Horsethief Pump Station and the soon to be constructed CPU Intertie on NE 219th Street both include a portable lift capable of lifting any of the pumps and piping pieces inside the building. Journeyman electricians are hired in the event work is needed in the electrical control panel, and in the case of the telemetry system, CPU staff are contacted.

Additionally, the City ensures that operations staff are up to date in all their first aid training and provides each vehicle with a first aid kit. Each operator also gets annual training in Blood Borne Pathogens, Confined Space Entry, and other required training. The City is continuously working to bring in certified instructors, to provide required safety training and maintain currency for all the training requirements of each operations position.

Cross Connection Control Program

The City operates a cross connection control program to reduce the risk of backflow into the water system. City ordinance BMC 13.112.110 establishes the cross connection control program and the City currently employs three (3) certified CCS. There are over 1,086 double check valve backflow assemblies (DCVA) and over 146 reduced pressure backflow assemblies (RBPA) on the system. The City also requires DCVAs on all irrigation systems. During the building permit review process at City Hall, City staff check for new plumbing connections, to verify that there will not be any that are cross connected. The City also has a strong program to enforce the annual backflow testing requirement and regularly achieves good compliance through the use of three (3) successive reminder notices and eventually a lock-out notice. Table 6-6 below lists the status of the City's Cross Connection Control Program in regard to the minimum elements required by *WAC 246-290-490*.

**Table 6-6
Cross Connection Control Program Status**

Element	Status
Ordinance Establishing Authority	Ordinance now adopted, BMC 13.112
Procedures for evaluating new and existing connections	Within BMC 13.112.119 and written program, see Appendix F
Procedures for eliminating cross connections	Written program is attached in the Appendix F
Provide at least one (1) CCS on staff	City currently employs three (3) certified CCS
Procedures for Testing Requirements	All backflow assemblies are tracked in asset management database
Assembly Testing Quality Control	Local backflow testers are tracked in asset management database
Procedures for responding to backflow incidents	Included in Public Works Operations Procedures Manual
Cross Connection education program	Educational materials are provided with the annual testing notices
Database of cross-connection control records	Managed in the asset management database
Extra requirements for reclaimed water	Not applicable

Customer Complaint Response Program

All customer complaints are taken by the Public Works Department and written down. The complaint is then entered in the GBA asset management system through a work request form. With this form, the operator visits the site of the complaint and investigates as much as possible to determine the cause. If the operator is able to solve the problem he proceeds with a solution. If he is unable to determine the cause, or determine that the problem is not the City's to repair, then he will explain this to the customer and submit a short report to close out the work request record. If the operator needs assistance in resolving the complaint he will typically call in for additional help.

All complaints are recorded and kept on file at the Public Works office at 1308 Grace Avenue. Most of complaints related to the water system are related to either failed PRV, which are on the customer side of the meter, leaking services which are usually on the City side, and occasionally complaints of colored water related to the iron and manganese in the water supply.

Record Keeping and Reporting

The City meets at a minimum the record keeping requirements of the DOH Drinking Water Program, *WAC 246-290-480*. These record keeping requirements are:

- Coliform results are kept for five (5) years.
- Chemical analysis results are never discarded.
- Daily source meter readings are kept for 10 years.
- Other records of operation and analysis are kept for three (3) years, including records of action taken by the system to correct violations of primary drinking water standards.
- Copies of sanitary surveys and any record associated with a sanitary survey will be kept for 10 years.
- Project reports, construction documents, drawings, inspection reports, and approvals of water system facilities will be kept for the life of the facility.
- Daily chlorine residual readings are kept for a minimum of three (3) years.

Reporting requirements to DOH for the City include:

- Any failure to comply with monitoring requirements or the violation of a primary MCL.
- Copies of water quality monitoring results required by DOH.
- Copies of information relating to the status of monitoring waivers.
- The City shall submit an annual Water Facilities Inventory (WFI) form.
- The City shall submit an updated WFI to the department within thirty days of any change in the WFI.
- The City will notify DOH of any positive coliform sample. Reporting requirements are in the coliform monitoring plan included in Appendix E.

O&M Improvements

The City's capital improvement program in Section 8, does not include any improvements to the operation or maintenance of the system. Although some of the capital projects will change the operation and maintenance of the system, the projects will not necessarily improve the actual O&M costs of the system.

The City has previously considered the option of creating a pressure zone with a lower hydraulic grade than the Main Zone within the City, to reduce leakage in the Main Zone and save money on pumping costs. The option of splitting the Main Zone includes additional costs because a new intermediate pumping facility would be needed. Additionally, all private fire protection systems within the City would need to be re-designed to accommodate the lower supply pressure in order to continue to supply the fire flows that they were originally designed to provide. The impact on existing fire systems and costs for a new pump station have been determined to outweigh the savings from reduced pumping and leakage. The City has decided to maintain the existing established pressure zones.

No other O&M related enhancements have been considered with this updated water system plan, with the exception of facility upgrades related to security fencing at the Tukes Mountain Reservoirs.