

Emergency Response Plan

City of Mosier Water System

Wasco County, Oregon



April 2018
(Revised)

For more information or additional copies of this report contact:

City of Mosier
PO Box 456
Mosier, OR 97040
541-478-3505

The City would like to acknowledge the State of Washington Department of Health for providing a template used in preparation of this plan.

Prepared by John Grim P.E. – City Engineer.

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Section 1. Emergency Response Mission and Goals

Emergency response mission and goals

Mission statement for emergency response	In an emergency, the mission of the City water utility is to protect the health of our customers by being prepared to respond immediately to a variety of events that may contaminate the water or disrupt our water supply.
Goal 1	Be able to identify an emergency quickly and initiate timely and effective response action.
Goal 2	Be able to notify local, state, and federal agencies quickly so they can assist in the response, if necessary.
Goal 3	Protect public health by quickly being able to determine whether the water is unsafe to drink or use, notify customers of the situation immediately and effectively, and advise them of appropriate protective action.
Goal 4	Quickly respond and repair damages to minimize system down time.



Section 2. System Information

Keep this basic information readily available for when you need it for emergency responders, repair people, and the news media.

System information

System identification number	00543	
System name and address	City of Mosier PO Box 456 Mosier, OR 97040	
Directions to the system	Mosier is on I-84 in the Columbia River Gorge 5 miles east of Hood River and about 60 miles east of Portland, OR. It is also 18 miles to the west of The Dalles, OR. Take Exit 69 off of I-84. Go south from the off ramp on US 30 to Washington Street. Turn right and City Hall is on the right.	
Basic description and location of system facilities	The water system is comprised of nearly 100% relatively new PVC pipeline. It is fed from a single groundwater supply well (Well No. 4) which is located adjacent to Mosier Creek Road outside of town. An emergency backup well (Well No. 2) is located in town adjacent to the school on 3 rd Ave. The City has three storage tanks, four PRV stations and two booster pump stations.	
Population served and service connections	450 People	189 Connections
System owner Should be a person's name	Colleen Coleman – City Manager - (541) 490-9758 Cell	
Name, title, and phone numbers of person responsible for maintaining and implementing the emergency plan.	John Grim P.E. City Engineer Water Operator Nathan Pope	<u>(541) 993-5421</u> Phone <u>(541) 980-9321</u> Cell () - Pager



Section 3. Chain of Command and Lines of Authority

The first response step in any emergency is to inform the person at the top of this list, who is responsible for managing the emergency and making key decisions.

Chain of command and lines of authority

Name and title	Responsibilities during an emergency	Contact numbers
City Manager	Contact staff, public/media sole point of contact, customer notification, water quality notices, final decision maker.	<u>(541) 478-3505</u> Phone <u>(541) 490-9758</u> Cell _____
John Grim - City Engineer	Evaluate emergency and identify response procedures. Coordinate response. Contact relevant regulatory agencies as needed. Contact utilities, contractors, etc. as needed.	<u>(541) 993-5421</u> Phone () - Cell () - Pager
Nathan Pope - Water Operator	Initial response and evaluation of emergency. Characterize the situation; e.g. watermain break, damage assessment, flowrate, location, hazards, storage tank levels, well status, pump station status, pressure status, etc. Coordinate repair work. Water quality sampling.	<u>(541) 980-9321</u> Phone () - Cell () - Pager
Witt Anderson- Standby Water Staff	Assist City water operator as needed. Water operator on standby.	<u>(503) 334-6677</u> Phone () - Cell () - Pager
Jayme Bennett	High level emergencies only. Assist City Manager with customer notifications and misc. coordination.	<u>(541) 490-7411</u> Phone () - Cell () - Pager



Section 4. Events that Cause Emergencies

The events below may cause water system emergencies.

Events that cause emergencies

Type of event	Probability or Risk (High, Medium, Low)	Comments
Normal power Failure	High probability, low risk.	Common in the winter due to ice storms and high winds.
Extreme Power Failure	Low probability, high risk.	Severe ice storms occur in the Gorge every few years. Pacific Power will provide City-wide backup generator for long-term power outages. Unknown if generator will provide power to Well No. 4.
Watermain Break	Low probability, medium risk.	Uncommon in Mosier. Likely due to contractor accidents.
Pump Failure	High probability, medium risk.	Common at the Eastside BPS. Uncommon at Well 4 and MB BPS.
Water Quality Event-Distribution System	Low probability, risk varies.	Water quality events are typically coliform contamination due to distribution system problems.
Water Quality Event - Well No. 2	Medium probability, medium risk.	Backup well has history of coliform problems. Poor wellhead protection.
Water Quality Event - Well No. 4	Low probability, high risk.	Well 4 has excellent water quality and wellhead protection.
Frozen water services and leaks.	High probability, low risk.	Many of the City's water services are vulnerable to freezing and leaking.
PRV Station Failure.	Low probability, medium risk.	Fail open, high pressure. Fail close, low pressure. Adequate redundancy and surge relief valves in place for failure event.
Earthquake	Low probability, high risk.	Major quake possible on the coast, could impact Mosier.



Section 5. Severity of Emergencies

System personnel should collaborate when determining the severity of an incident, but the person in charge of the emergency makes the ultimate decision. The information for making the decision will accumulate over time, and may result in changing the severity assessment.

Communicate each severity assessment immediately to all those dealing with the emergency. Make sure staff have cell phones, pagers, or radios when they are in the field.

Level 1: The system experiences a routine emergency, such as a line break or power outage. System personnel can handle the problem with minimal outside assistance and the situation is unlikely to immediately jeopardize public health. Although it is important to begin responding, system personnel should remain calm and thoroughly work through the situation. Routine emergencies can usually be resolved within 24 hours. (Definition)

Description: The Mosier water system considers the following as Level 1 emergencies:

- Distribution system pipeline breaks.
- Short power outages (less than 48 hours).
- Minor mechanical problems in pump houses.
- Other minor situations unlikely to jeopardize public health or cause a large water outage.
- A positive total coliforms sample.

The system identified specific response activities for these types of emergencies, including proper sampling and disinfection activities. The responsible person advises and directs system personnel to work on the problem. They usually can resolve the problem within 24 hours. If they determine it will take longer than 48 hours to resolve the problem and storage is likely to draw down below a safe operating level, they elevate the situation to Level 2.

Level 2: The system experiences a minor supply disruption or indications of possible contamination. The system may need to coordinate with North County Public Health District (NCPHD) and consider issuing a health advisory to customers. These types of emergencies may jeopardize public health, so it is important for system personnel to be on alert and initiate a quick response. Minor emergencies can usually be resolved within 72 hours. (Definition)

Description:

The Mosier water system considers the following to be Level 2 emergencies:

- A lengthy power failure (longer than 48 hours).
- A positive E. coli sample.
- An initial primary chemical contaminant sample.
- A minor act of vandalism.
- Loss of storage volume in Tank No. 2, 3 or 4.

Level 3: The system experiences significant mechanical or contamination problems and a supply disruption is inevitable. It is important to work with NCPHD and OHA to issue a health advisory to protect public health. Report major emergencies to OHA as soon as possible to determine the best available ways to protect customers' health. Direct system personnel to the situation, and notify outside entities to aid in the response. Resolving a significant emergency may take more than 72 hours. (Definition)

Description: The Mosier water system considers the following Level 3 emergencies:

- Supply disruption, such as a transmission main break, pump failure with a potential for backflow and loss of pressure.
- Failure of the Well No. 4 pump or other mechanical and electrical equipment with no possibility to repair the problem in less than 72 hours.
- The need to use Well No. 2 (the backup supply well).
- Loss of storage volume in Tank No. 2 and Tank No. 4.
- Contamination of the groundwater supply aquifer at levels not exceeding public health advisories.
- Over-pressurization of pressure zone 300 resulting in widespread damage to indoor plumbing and/or water system facilities.

Level 4: The system experiences major damage or contamination from a natural disaster, accident, or terrorist act. These events require immediate action. You must notify local law enforcement and local emergency management services right away. You also must quickly issue health advisories and declare a water supply emergency to protect public health. It often takes several days or weeks to resolve these issues and return the system to normal operation. (Definition)

Description: The Mosier water system considers the following Level 4 emergencies:

- Contamination of the groundwater supply aquifer which results in a public health risk.
- An earthquake resulting in damage of the water system facilities.
- Criminal activity that affects the water system facilities ability to function normally.
- A severe wildfire spreading into the City.
- A severe water outage exceeding 72 hours and affecting a significant part of the City, for example an entire pressure zone (not including the 600 zone).



Section 6. Emergency Notification

Notification call-up lists

Use these lists to notify important parties of an emergency.

Local notification list

Local law enforcement	Day () -911	Night () -911
Fire department: Fire Chief – Mike Renault	Day <u>(541) 490-8077</u>	Night () -
Ambulance service	Day () -911	Night () -911
Local Health Department North County Public Health District (NCPHD)	Day <u>(541) 506-2600</u>	After hours <u>(541) 993-5665</u>
Water testing laboratory (Wicks lab in The Dalles). Coliform testing.	Day <u>(541) 298-2248</u>	After hours () -
Local emergency management. Wasco County.	Day <u>(541) 506-2790</u>	After hours () -911
Water system operator. Andy Wells.	Day <u>(541) 705-5049</u>	Night () -
Neighboring water system. Hood River.	Day <u>(541) 386-2383</u>	Night <u>(541) 506-2555</u>
Neighboring water system. The Dalles.	Day <u>(541) 296-5401</u>	Night () -
Wasco County Public Works.	Day <u>(541) 506-2640</u>	Night <u>(541) 296-5454</u>
News media contact: The Dalles Chronical.	<u>(541) 296-2141</u>	
Local radio station: Bi-coastal media radio station contact.	<u>(541) 296-2211</u>	
Other: BSK water testing Lab in Vancouver.	<u>(360) 750-0055</u>	

State notification list

State police	Day (<u> </u>) <u> </u> -911	Night (<u> </u>) <u> </u> -911
Oregon Health Authority (OHA) Drinking Water Services Emergency Contact	Day <u>(971) 673-405</u>	After hours <u>(971) 246-1789</u>
ODOT (emergency is affecting Hwy 30)	Day <u>(541) 296-2215</u>	After hours <u>(541) 383-0121</u>
Other: State of Oregon Emergency Response System	Other: <u>(800) 452-0311</u>	

Service and repair notification list

Electrician/Telemetry: Coburn Electric in Hood River (Jon Carter, telemetry contact)	Day <u>(541) 354-1163</u>	Night <u>(541) 399-3687</u>
Electric utility: Pacific Power	Day <u>(877) 508-5088</u>	Night (<u> </u>) <u> </u> - <u> </u>
Telephone utility: Century Link (Joey Shelton)	Day <u>(503) 568-3406</u>	Night (<u> </u>) <u> </u> - <u> </u>
Telephone utility: Century Link (Dyrk Pritchett)	Day <u>(541) 387-9255</u>	Night (<u> </u>) <u> </u> - <u> </u>
Pump specialist: Mather & Sons	Day <u>(360) 256-1310</u>	Night <u>(503) 242-1734</u>
Watermain repair: Summit Excavation (Jake Strain)	Day <u>(541) 993-5253</u>	Night (<u> </u>) <u> </u> - <u> </u>
Watermain repair: Waits Excavation (Kyle Waits)	Day <u>(541) - 490-7453</u>	Night (<u> </u>) <u> </u> - <u> </u>
Generator rental: Peterson CAT (Cliff Kinnaman)	Day <u>(503) 280-1569</u>	Night <u>(503) 502-4486</u>
Generator fuel delivery: Hattenhauer Energy CO. LLC	Day <u>(541) 296-3515</u>	Night (<u> </u>) <u> </u> - <u> </u>
Other: GC systems (PRV repair)	<u>(800) 525-9425</u>	

Notification procedures

Notify water system customers

<p>Who is Responsible:</p>	<p>The City Manager with the Water Operator's input must make the decision to notify customers about a potential water shortage and the need for water-use restrictions. The water system manager should consult with the City Engineer, drinking water agency staff and field staff to make the decision. After making the decision, we will initiate notification procedures.</p>
<p>Procedures:</p>	<p>City Manager organizes staff to develop the message delivered to the customers. Working with the Financial Director, notify the public as follows:</p> <ul style="list-style-type: none"> • Post notice of water shortage on City web sites. • Post sandwich board notices in affected areas. • For extreme, extended water outages (more than 48 hours), notify the media and post door hangers. • Water system engineer consults with local and/or state drinking water staff about the problem. • City Manager, with help from staff, prepares door hangers, signs, and radio message. • Water system operator continues to investigate problems and make repairs as necessary. <p>To distribute the water shortage notification:</p> <ol style="list-style-type: none"> 1. City staff will place "water shortage notices" on doors and along travel routes. 2. Staff will place signs on main travel routes into the community. 3. City Manager will ask radio station to issue the water shortage notice and a request to curtail water use. 4. Administrative support person will provide a pre-scripted message to phone callers and log in each phone call. <p>Water system operator continuously updates the water system manager on water shortage.</p> <p>City Manager and staff re-notify customers when water shortage is resolved.</p> <p>See Water Shortage Curtailment section below.</p>

Alert local law enforcement, state drinking water officials, and local health

Who is Responsible:	City Manager.
Procedures:	Consult with the City Engineer and the City Water Operator to identify the level of risk, public health impacts, public safety impacts and regulatory requirements. Then alert the appropriate agencies. Do not call 911 unless there is an imminent threat to public safety or a crime has been committed.

Contact service and repair contractors

Who is Responsible:	City Engineer and City Water Operator
Procedures:	Isolate the damaged area if possible. Identify the level of risk to public health and safety and to infrastructure. Contact appropriate contractors depending on the level of repair work necessary. For example, for a major system failure contact larger contractors with adequate in-house resources to complete repair work. For smaller system failures contact small contractors familiar with the City's water system and staff.

Contact neighboring water systems (if necessary)

Who is Responsible:	City Water Operator and City Manager
Procedures:	Identify the level of risk to public health, safety and infrastructure. Identify the scope of the repair work. Contact The Dalles or Hood River public works departments for assistance with water system operation, testing, sourcing materials and repair work.

Procedures for issuing a health advisory

Who is Responsible:	City Manager
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Procedures:	<p>Working with the City Engineer and the City Water Operator, identify the level of risk to public health. Identify regulatory notification requirements per the enclosed materials. Contact John Zalaznik at North Central Public Health District for assistance. Request assistance from the State Drinking Water Program as necessary. Issue the health advisory utilizing the public notification templates in this document or those provided by public health agencies. Follow public notification procedures, specified herein.</p> <p>Contact local radio and newspapers - City Manager.</p> <p>Place door hangers on all homes - Financial Director, City Councilors, and other Volunteers.</p> <p>Place notices on sandwich boards at the Mosier Creek Bridge (both sides), the I-84 ramps, at the corner of Hwy 30 and Center St, at 3rd Ave and Huskey Road - Water Operator.</p> <p>Place a notice on the City's website and Facebook page - City Manager.</p> <p>Place a notice in the Mosier Valley Newsletter - City Manager.</p>
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Other procedures (as necessary)

Who is Responsible:	Media Contact - City Manager
Procedures:	Contact The Dalles Chronical, Mosier Valley Newsletter, radio stations as necessary depending on the level of emergency.



Section 7. Water Quality Sampling

If you suspect contamination, notify and work with the local health department and OHA to identify the testing you should do. This may help prevent illness or even death.

Water quality sampling

Sampling parameter	Do we have procedures?	Basic sampling steps (sites, frequency, procedures, lab requirements, lab locations, contacts, and so on.)
Coliform Bacteria	Yes or No	Yes, need to update CMP.
Heterotrophic Plate Count (HPC)	Yes or No	No, not required typically. Investigative procedure if necessary.
Chlorine Residual	Yes or No	Yes, test at each tank, at the school, at Well 4 and at the WWTP.
Chlorine Demand	Yes or No	No.
Nitrate or Nitrite	Yes or No	Yes, annual test required. Send to BSK Assoc. lab for analysis.
Total Organic Carbon (TOC)	Yes or No	No, not applicable.
Total Halogenated Organic Carbon (TOX)	Yes or No	No, not applicable. Annual test for DBPs required and done at BSK Assoc. lab.
Cyanide	Yes or No	Yes, send to BSK Assoc. for analysis.



Section 8. Effective Communication

Communication with customers, the news media, and the public is a critical part of emergency response.

Designated public spokesperson

Designate a spokesperson (and alternates) to deliver messages to the news media and the public (see Section 6 for news media contacts in local notification list).

Designate a spokesperson and alternates

Spokesperson	Alternate 1	Alternate 2
City Manager	Mayor	Council President

Key messages

Develop possible messages in advance, and update them as the emergency develops:

We are taking this incident seriously and doing everything, we can to resolve it.

- Our primary concern is protecting our customers' health.
- Another important concern is keeping the system operational and preventing damage.
- What we know right now is _____
- The information we have is incomplete. We will keep you informed as soon as we know more.
- We have contacted state and local officials to help us respond effectively.
- If you think you may be ill or need medical advice, contact a physician.
- We are sampling the water and doing tests to determine whether there is contamination.

Do not:

- Speculate on the cause or outcome of an incident.
- Blame or debate.
- Minimize or brush-off customer concerns.
- Treat inquiries from interested parties as an annoying distraction from the real business of emergency response.

Health advisories

If water quality and human health are in question, your water system may need to issue a health advisory to let customers know how they can protect themselves. Water system or state or local health officials issue these advisories when they believe health risks are sufficient to warrant such advice.

Most health advisories take the form of a drinking water warning or boil water advisory. Communication during these times is critical. Health advisories should always be well thought out and provide very clear messages.



Section 9. The Vulnerability Assessment

This is an evaluation of each water system component to identify weaknesses or deficiencies that may make them susceptible to damage or failure during an emergency. It also assesses facilities for security enhancements that may guard against unauthorized entry, vandalism, or terrorism.

Facility vulnerability assessment and improvements identification

System component	Description and condition	Vulnerability	Improvements or mitigating actions	Security improvements
Source	Well No. 4. Excellent condition.	Power Failure and availability of a standby generator (for rent).	Installed standby generator receptacle.	None required.
Source	Well No. 2. Manual operation only. Poor aesthetic water quality.	Power failure. Manual operation only. Limited service area.	City is replacing this Well in 2019.	None required.
Storage	The City has 3 water storage tanks.	Vulnerable to failure in a major earthquake.	Installation of automatic shut off valves for seismic events.	None required.
Treatment	Disinfection by calcium hypochlorite using a tablet chlorinator.	Pump/VFD failure.	Purchase and store an inexpensive diaphragm feed pump.	None required.
Pump house and pumping facilities	Mosier Bluffs BPS.	Power Failure.	Installed standby generator receptacle.	Fencing is needed. Intrusion alarm is needed.
Pump house and pumping facilities	Eastside BPS.	Power failure. Pump failure. Telemetry failure.	City is replacing in 2019.	

System component	Description and condition	Vulnerability	Improvements or mitigating actions	Security improvements
Computer and telemetry system	Hybrid PLC and Tone FSK telemetry and alarm systems.	Tone FSK system is prone to failure.	City is embarking on a project to replace this system.	None required.
Other considerations	PRV Stations	Vulnerable to mechanical failure.	Increase maintenance frequency. Add high/low pressure alarms to 300 Zone.	



Section 10. Response Actions for Specific Events

In any event, there are a series of general steps to take:

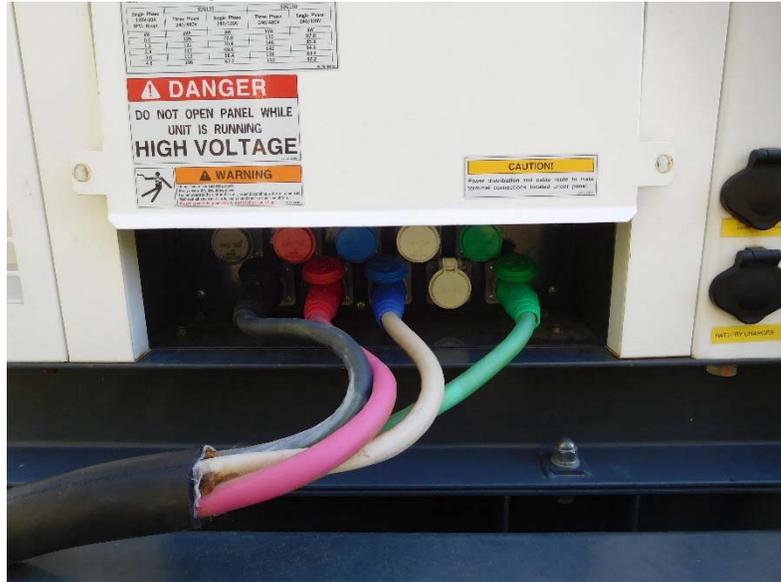
1. Confirm and analyze the type and severity of the emergency.
2. Take immediate action to reduce injuries, save lives, and prevent system damage.
3. Make repairs based on priority demand.
4. Return your system to normal operation.

The following tables identify the assessment, set forth immediate response actions, define necessary notifications, and describe important follow-up actions.

A. Power outage

Assessment	<p>The water system is vulnerable to power outages, experiencing several each year that last several hours. The system does not have a back-up generator but it has a generator connection with a manual transfer switch, so it can rent a generator, plug it into the system, and isolate the utility power supply while the generator is in use. Most of the time, storage can supply the system for a few days until power is restored.</p> <p>On the eastside of Mosier, in pressure zone 400, there is no backup power capability. An extended power outage in this area will require immediate and mandatory conservation measures. It is estimated that the water storage tank will be depleted after a six day power outage under normal winter season water demands.</p>
Immediate actions	<p>Contact Pacific Power and assess whether the outage is likely to last more than 24 hours. If not, be on alert for changing conditions and monitor storage tanks. If yes, complete the following steps:</p> <ul style="list-style-type: none"> • Implement Tier 1 water shortage notifications. • Call equipment rental company (Peterson CAT – see notifications section) to request delivery of a trailer-mounted back-up generator. Our backup generator requirements at Well No. 4 are as follows: <ul style="list-style-type: none"> ○ Our big load is a 30 hp motor (22 kW). The total design load for all equipment is 265 amps at 460V. ○ Service is 3 phase 460 Volts. ○ Let them know we are using a VFD to start the pump. VFDs require more gen set capacity. ○ Also let them know we have sensitive electronics in the building. ○ Need a 100 kW diesel generator. • Our backup generator requirement at the Mosier Bluffs BPS is as follows: <ul style="list-style-type: none"> ○ 240V single phase. ○ 5 hp pump. ○ The genset for Well 4 will also work for the BPS. • Obtain generator and secure sufficient generator fuel. See notifications for fuel delivery service. • Connect generator to system and resume operations.

- Connect to Well 4 as follows:
 - Install generator pigtail into facility receptacle. Connect generator pigtail leads into generator per the picture below. The pigtail is equipped with quick connectors (push and turn). The green lead is always ground. The picture shown is for the RDG125 FlexPro genset.



Well 4 Pigtail Connection Configuration

- Start the generator per the generator instructions. Adjust the generator settings per the on-board instructions. Check to make sure generator voltage, frequency and phase are set to match facility.
- Turn the facility pump to off.
- Operate the manual transfer switch. Use the instructions as shown in the attached documents.
- Reset the pumps due to an alarm notification for Phase/Power fail and then turn the pump to hand to verify it will work. Once verified put the facility in auto mode.
- Run the generator until water tanks are full. Then turn it off. Monitor tank levels until it needs to be turned on again.
- Connect to the Mosier Bluffs BPS as follows:
 - Check pump rotation under grid power.
 - See pigtail connection picture below for the BPS connection configuration. This is for the RDG125 FlexPro genset. Contact Coburn Electric as shown in the notifications to ensure connections are correct.
 - Start the generator per the generator instructions. Adjust the generator settings per the on-board instructions. Check to make sure generator voltage and phase are set to match facility. Single phase 240V.
 - Turn the facility pump to off.

- In the manual transfer switch panel **while in the off position**, check generator voltage phase to phase and phase to ground to ensure connections are correct.
- Operate the manual transfer switch to the generator position.
- Turn the pump to hand to verify it will work. Check for correct rotation and flow. Once verified put the facility in auto mode.
- Run the generator until water tanks are full. Then turn it off. Monitor tank levels until it needs to be turned on again.



Mosier Bluffs BPS Pigtail Connection Configuration

<p>Notifications</p>	<ol style="list-style-type: none"> 1. Customers: Cut back on water usage until power is back on. No outdoor water use. 2. Equipment rental company: Obtain generator. 3. Pacific Power Company: Report that a public water system is experiencing an outage. Explain that you will keep a generator turned on until Pacific Power restores power.
<p>Follow-up actions</p>	<ol style="list-style-type: none"> 1. Turn pumps to off. 2. Return system to utility power supply via the generator connection's manual transfer switch. 3. Hit the pump reset button if necessary to restart pumps. Turn pumps to auto. 4. Turn off and disconnect back-up generator. 5. Inspect reservoirs and pumping facilities to ensure proper operation. 6. Notify customers that utility service has been restored. 7. Return generator to rental company.

B. Transmission main break

<p>Assessment</p>	<p>To be performed by all City staff.</p> <ul style="list-style-type: none"> • Evaluate pipeline break nature and cause. • Assess the potential public health threat and threat to the environment from the break. • Assess the potential impact to traffic. • Identify required notifications, regulatory, emergency response, contractors, staff, etc. • Assess the potential water shortage from the break. • Assess the potential for a backflow event. • Identify resources necessary to repair the break.
<p>Immediate actions</p>	<p>Note that the transmission main is on Wasco County roadways from the Well to Huskey Road.</p> <ul style="list-style-type: none"> • Take pictures of the impacted area. • Turn off Well No. 4. • Isolate the break using valves. Isolate the smallest area possible. • Contact City Manager. • City Manager to contact Wasco County public works, City Engineer, Fire Chief and backup water operator. • Work with Wasco County and others on implementing traffic control safety measures, warning signs and road closed signs if necessary. • City Engineer to contact small works contractors (see notifications) for assistance with repair of pipeline and roadway, if necessary. Coordinate with Wasco County. • Monitor construction activity and document carefully. Take a lot of pictures! • Implement disinfection and flushing of affected pipelines. • Collect coliform samples and deliver to lab. • City Manager to issue public notices based on the assessment of the public health threat. Loss of pressure will require a boil water notice to those affected. • City Manager to issue public notices based on the assessment of the water shortage potential. • City Manager/City Engineer to make regulatory notifications depending on level of risk to the public health. • Implement Well No. 2 startup plan if a water shortage is imminent.

Follow-up actions	<p>To be conducted by all staff.</p> <ul style="list-style-type: none">• Upon completion of repair work open valves very slowly.• Turn Well No. 4 on.• Evaluate extent of low pressure event.• Based on the above evaluation identify potential backflow events.• Conduct follow-up water quality testing accordingly. Coordinate with regulatory agencies.• Review coliform bacteria testing results. Conduct follow-up sampling if results were positive.• Issue public notices if coliform results are positive. Coordinate with regulatory agencies.• Issue public notice that all has returned to normal and water is safe to drink.• Evaluate cause of pipeline failure and any necessary follow up projects to prevent another break.
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C. Distribution line break

<p>Assessment</p>	<p>To be performed by all City staff.</p> <ul style="list-style-type: none"> • Evaluate pipeline break nature and cause. • Assess the potential public health threat and threat to the environment from the break. • Assess the potential impact to traffic. • Identify required notifications, regulatory, emergency response, contractors, staff, etc. • Assess the potential water shortage from the break. • Assess the potential for a backflow event. • Identify resources necessary to repair the break.
<p>Immediate actions</p>	<p>Note that Wasco County is responsible for 3rd Ave from Idaho St to the east. ODOT is responsible for the Hwy 30 and Rock Creek roadways. Take pictures of the impacted area.</p> <ul style="list-style-type: none"> • Turn off Well No. 4 if it is feeding the leak directly (the leak is between Well 4 and Tank No. 4). • Isolate the break using valves. Isolate the smallest area possible. Be sure to turn off any pump stations feeding the affected area first. • Contact City Manager. • City Manager to contact: Wasco County public works or ODOT if the break is on their roadways, City Engineer, Fire Chief and backup water operator. • Work with Wasco County, ODOT and others on implementing traffic control safety measures, warning signs and road closed signs if necessary. • City Engineer to contact small works contractors (see notifications) for assistance with repair of pipeline and roadway, if necessary. Coordinate with Wasco County and ODOT if applicable. • Monitor construction activity and document carefully. Take a lot of pictures! • Implement disinfection and flushing of affected pipelines. • Collect coliform samples and deliver to lab. • City Manager to issue public notices based on the assessment of the public health threat. Loss of pressure will require a boil water notice to those affected. • City Manager to issue public notices based on the assessment of the water shortage potential. • City Manager/City Engineer to make regulatory notifications depending on level of risk to the public health. • Implement Well No. 2 startup plan if a water shortage is imminent.

Follow-up actions	<p>To be conducted by all staff.</p> <ul style="list-style-type: none"> • Upon completion of repair work open valves very slowly. • Turn pump stations back on, if applicable. • Evaluate extent of low pressure event. • Based on the above evaluation identify potential backflow events. • Conduct follow-up water quality testing accordingly. Coordinate with regulatory agencies. • Review coliform bacteria testing results. Conduct follow-up sampling if results were positive. • Issue public notices if coliform results are positive. Coordinate with regulatory agencies. • Issue public notice that all has returned to normal and water is safe to drink. • Evaluate cause of pipeline failure and any necessary follow up projects to prevent another break.
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D. Chlorine treatment equipment failure

Assessment	<p>The City of Mosier is not required to disinfect its water system. Therefore failure of the chlorination system is not considered an emergency. Disinfection is done as a precautionary measure only.</p> <p>If Well No. 2 is in use, it must be chlorinated due to infrequent use and poor wellhead protection.</p>
Immediate actions	<p>Contact the PPG Accu-tab tablet chlorinator supplier for assistance with evaluation and repair of equipment. The supplier is: Correct Equipment – 503.582.0555.</p>
Notifications	<p>None required.</p>
Follow-up actions	<ol style="list-style-type: none"> 1. If the disinfection system is down for more than 2 days in the summer or 5 days in the winter, take an investigative sample for coliforms and disinfection residuals and follow standard procedures if the sample is positive. 2. After restart of the chlorinator, increase the dosage until disinfection residual sampling indicates residuals are back to normal.

E. Source pump failure

Assessment	Well No. 4 Pump Failure Scenario:
Immediate actions	<ol style="list-style-type: none"> 1. Contact City Engineer. Observe the startup sequence and identify any unusual operating characteristics; e.g. it starts then quickly shuts down. Check the VFD screen for operating messages such as Phase Fail, Over Current, Under Load, etc. Check the telemetry alarms for any messages, such as PLC fail, pump run - low flow, etc. Check the telephone for a dial tone. Check the pump control valve for normal operation. 2. Evaluate the problem and identify the likely cause. Work with City Contractors to evaluate the problem. 3. Order repair work. 4. Estimate the duration of the failure. 5. Implement water shortage response steps accordingly. If the failure will be longer than three days in the summer or 5 days in the winter, begin Well No. 2 startup sequence. 6. If Well No. 2 will be used, provide public notification regarding poor aesthetic water quality and mandatory water conservation measures. Take coliform source sample at Well 2.
Notifications	<ol style="list-style-type: none"> 1. If the problem appears to be telemetry related contact Jon Carter at Coburn Electric. 2. If the problem appears to be a failed pump contact Mather and Sons. 3. If the problem appears related to the pump control valve, contact GC Systems. 4. Notify the public if Well No. 2 will be used. Issue: <ol style="list-style-type: none"> a. Water quality advisory for poor aesthetic water quality. b. Water shortage advisory – mandatory conservation. 5. Contact backup operator if Well No. 2 will be used.

Follow-up actions	<p>To be conducted by all staff.</p> <ol style="list-style-type: none"> 1. Upon completion of repair work turn Well 4 back on. 2. Begin flushing watermains, if necessary, to eliminate aesthetic water quality problems. 3. Evaluate extent of low pressure event, if applicable. 4. Based on the above evaluation identify potential backflow events. 5. Conduct follow-up water quality testing accordingly. Coordinate with regulatory agencies. 6. Review coliform bacteria testing results. Conduct follow-up sampling if results were positive. 7. Issue public notices if coliform results are positive. Coordinate with regulatory agencies. 8. Issue public notice that all has returned to normal and water is safe to drink. <p>Evaluate cause of pump failure and any necessary follow up projects to prevent another failure.</p>
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F. Microbial (coliform, *E. coli*) contamination

Assessment	See Coliform Monitoring Plan.
Immediate actions	
Notifications	NCPHD
Follow-up actions	

G. Chemical Contamination of Well No. 4 Water Supply

<p>Assessment</p>	<p>Identify the contaminant, the concentration, the MCL and health risks. Identify the source of contamination - it may be obvious.</p>
<p>Immediate actions</p>	<ol style="list-style-type: none"> 1. Contact local and state drinking water agencies for assistance and to obtain required regulatory response actions. 2. Most chemical contamination events require a Tier 2 public notification (see attached template). Issue notifications 3. Eliminate the source of contamination if it is easily identified; e.g. a spilled tank of gas, etc. Conduct clean up with assistance from regulatory agencies, in particular DEQ. 4. Identify the need for installation of emergency treatment equipment. Note that the City cannot simply stop using Well No. 4 as there is no adequate backup source of supply. 5. Work with OHA drinking water staff on design and startup of emergency treatment system.
<p>Notifications</p>	<p>Conduct the following notifications:</p> <ul style="list-style-type: none"> • City Engineer. • Public notification per attached template. • Media (newspaper, radio, internet, etc.). • Drinking water agencies. • DEQ water quality staff. • Consultants/Contractors as needed for emergency treatment system design and installation.
<p>Follow-up actions</p>	<p>There is a long list of potential follow up actions that will depend on the nature of contamination and level of risk. The City will work with drinking water agencies and consultants to identify an action plan subsequent to dealing with the emergency.</p>

H. Vandalism

Assessment	Identify the damage and how it affects normal water system operations and the need for immediate action to protect the public health and environment and to reduce further damage.
Immediate actions	<ol style="list-style-type: none"> 1. Eliminate further damage; e.g. close valves to eliminate a damaged water service, etc. 2. Contact the police. 3. Preserve evidence, take pictures before taking actions, if critical, to preserve evidence. 4. Contact drinking water agencies if there is a public health risk. 5. Issue public notifications if there is a health risk. 6. Conduct repairs.
Notifications	<ol style="list-style-type: none"> 1. Police. 2. City Engineer. 3. Drinking water agencies. 4. Public notifications as warranted depending on the risk. 5. Repair Contractors.
Follow-up actions	Identify any reasonable precautionary measures that could be taken to prevent the act of vandalism. Budget for and implement measures.

J. Earthquake

Assessment	Evaluate the integrity of the water system, from tanks to pump stations and wells and watermains. Identify and map all structural failures and grade the damage from highest to lowest priority.
Immediate actions	<p>Isolate any part of the water system that has failed as follows:</p> <ol style="list-style-type: none"> 1. Turn off Well No. 4. 2. Obtain assistance and conduct a system damage survey. 3. Prioritize system isolation actions. 4. Isolate watermains that are leaking. 5. Drain tanks that are in immediate danger of failing. 6. Isolate tanks that are structurally sound and not leaking to preserve water storage. Close the outlet valves. 7. Identify means and methods to bring the water system back on line.
Notifications	<ol style="list-style-type: none"> 1. Notify the fire department of water outages, if any. 2. Contact the Oregon Emergency Response agency. 3. Issue public notifications for boil water advisory and water shortage. 4. Contact contractors for repair work (if roads are open). 5. Contact Pacific Power and Century Link if there are power/phone outages. 6. Notify drinking water agencies if there are public health risks. 7. Contact Wasco County and ODOT if there are roadway failures related to pipeline breaks.
Follow-up actions	There is a long list of potential follow up actions that will depend on the level of damage and risk. The City will work with drinking water agencies and consultants to identify an action plan subsequent to dealing with the immediate effects of the earthquake.

K. Hazardous materials spill in vicinity of sources or system lines

Assessment	Identify the hazardous material. Assess the potential for contamination of water system infrastructure; particularly groundwater and pipelines.
Immediate actions	<ol style="list-style-type: none"> 1. Contact regulatory agencies including DEQ and OWRD (if a source is at risk). 2. If a pipeline or a source is at risk request immediate approval from DEQ for excavation and removal of contaminated soil. 3. Identify the vulnerability of pipelines; particularly PVC and HDPE pipes to petroleum based contaminants.

	<ol style="list-style-type: none"> 4. Conduct water quality testing if the water system integrity was compromised. 5. Flush watermains if contaminated. Coordinate with DEQ. 6. Issue public notifications if warranted.
<p>Notifications</p>	<ol style="list-style-type: none"> 1. Contact the fire department. Call 911. 2. Contact DEQ spill response hot line. 3. Issue public notification if there is a water quality threat. Coordinate with drinking water agencies. 4. Contact OWRD if the groundwater supply source is threatened. 5. Request assistance from contractors if soil excavation is necessary.
<p>Follow-up actions</p>	<p>There is a long list of potential follow up actions that will depend on the level of damage and risk. The City will work with regulatory agencies and consultants to identify an action plan subsequent to dealing with the immediate effects of a spill.</p>

L. Telemetry failure

<p>Assessment</p>	<p>Investigate for obvious causes of the failure, for example loss of telephone service due to construction activities or a power failure. Observe telemetry panels and note any alarm conditions, such as PLC fail, etc. Coordinate with the City's system integrator, Coburn Electric, as needed to identify the cause of the failure.</p>
<p>Immediate actions</p>	<ol style="list-style-type: none"> 1. Work with Century Link if the problem is a loss of communication. 2. Work with Coburn Electric if it appears to be a hardware or software failure. 3. Manually operate the pump station and Well No. 4 until the system is operational. 4. Acquire assistance for operation and monitoring. 5. If the failure will be several days in length issue a water shortage advisory and request conservation measures be taken. 6. Contact residents who live near tanks and request volunteer monitoring of tank levels with periodic reporting. 7. Manually fill tanks in this order of priority: <ol style="list-style-type: none"> 1. Tank No. 4 2. Tank No. 2 3. Tank No. 3
<p>Notifications</p>	<ol style="list-style-type: none"> 1. Issue public notification of water shortage emergency and implementation of conservation measures if the telemetry failure will last several days or more. Ban outdoor water use. 2. Contact Century Link. 3. Contact Coburn Electric. 4. Contact backup water operator.
<p>Follow-up actions</p>	

M. Wildfire/Structural Fire

<p>Assessment</p>	<p>Identify the current status of the water tank storage volume. Identify if Well No. 4 is at risk. Determine if there is a risk of power failure.</p>
<p>Immediate actions</p>	<ol style="list-style-type: none"> 1. Immediately contact the Mosier Fire District Fire Chief to coordinate use of the City's water system to fight the fire and to identify risk to City facilities, if any. 2. Communicate the maximum allowable use of the City's water storage per City policy. For structural fires the water system is designed to provide 1,000 gpm for 60 minutes. Greater rates and volumes are available under certain circumstances. Under no conditions should Tank No. 4 and/or Tank No. 2 be completely drained. The water system is not designed for fighting wildfires. However, the City can provide fire flow capacity for filling tankers, etc. if no structures in the water system service area are at immediate risk. 3. Monitor pressures in the water system near hydrants that are in use as the tanks are drawn down. 4. Consider using Well No. 2 if storage replenishment from Well No. 4 is not adequate. 5. Acquire a generator for Well No. 4 if power supply fails. 6. Confirm lag PRVs are working properly between pressure zones as necessary to move storage between zones. Manually operate if necessary.
<p>Notifications</p>	<ol style="list-style-type: none"> 1. Notify the fire department. 2. Issue a boil water advisory if a low pressure event occurs. Coordinate with drinking water agencies. 3. For a long term fire scenario (more than several days) issue a water conservation order. Ban outdoor water use except for homes at risk.
<p>Follow-up actions</p>	<p>Conduct coliform testing and water system flushing if a low pressure event occurred.</p>



Section 11. Alternative Water Sources

Emergency source evaluation

Complete this evaluation form for each emergency source you may activate in an emergency:

Source Number:	Source Name: Well No. 2
Engineering design approval status: Approved for use by OHA.	
Is the emergency source an intertie with an approved Group A water system? Yes or No If yes, skip the remainder of this evaluation.	
The person(s) in authority who will decide to activate the emergency source and begin supplying the distribution system: John Grim P.E. - City Engineer	
Describe the conditions when you will activate and use the emergency source to supply the distribution system: See the Well No. 2 Emergency Operation Plan (attached).	

The operational steps you will take before you activate and use the emergency source to supply the distribution system: See the Well No. 2 Emergency Operation Plan (attached).
The water quality sampling you perform on an on-going basis and the sampling you will perform immediately before activating the emergency source to supply the distribution system: See the Well No. 2 Emergency Operation Plan (attached).

Steps the system will take to notify the public and the Office of Drinking Water before activating the emergency source to supply the distribution system, including the content of the public notice:

See the Well No. 2 Emergency Operation Plan (attached).

Attribute of Source Well No. 2	Current Status
Is the emergency source physically connected to the distribution system?	Yes or No
Is the emergency source a drilled and cased well?	Yes or No
Is there an isolation valve between the source and the distribution system?	Yes or No
If so, is the valve secured in the fully closed position?	Yes or No
Is the motor starter locked-out and tagged-out in the off position isolating the pump from the power supply?	Yes or No

Summary of all possible alternative source(s) of water

Alternative source	Names	Phone	Availability	Is the water safe to drink?
Tanker Trucks	Bishop Services in Goldendale	(509) 773-4707	24 hours a day	<input checked="" type="radio"/> Yes or No
Bottled Water	H2Oregon – The Dalles	1-800-829-9287	Normal Hours	<input checked="" type="radio"/> Yes or No



Section 12. Curtailing Water Usage

Curtailing water use

Definitions:

Tier 1 – Minor shortage. Goal of 10% reduction. Voluntary.

Tier 2 – Moderate shortage. Goal of 25% reduction total. Implement Tier 1 AND Tier 2 measures. Mandatory.

Tier 3 – Severe shortage. Goal of 25% to 50% reduction total. Implement Tier 1, Tier 2 AND Tier 3 measures. Mandatory.

Water curtailment measures	Actions
Tier 1: Restrict outside water usage including watering lawns, washing cars, and so on. Ask customers to limit inside usage.	<ol style="list-style-type: none"> 1. Draft door hanger with limitation messages. 2. Post on customer doors. 3. Contact radio stations to announce curtailment message. 4. Post message on websites and Mosier Valley Newsletter. 5. Monitor system usage and spot-check meter usage if time is available. 6. Issue bill stuffers. 7. Continue message as long as necessary.
Tier 1: Restrict City use.	<ol style="list-style-type: none"> 1. Stop water system flushing. 2. Check meters to identify residential leakage. 3. Assist residents with repairs.
Tier 2: Implement mandatory curtailment measures.	<ol style="list-style-type: none"> 1. No unfixed leaks. 2. No hosing of paved surfaces. 3. No fountains, pools, etc. 4. No water running on streets. 5. Adopt landscape irrigation restrictions incorporating time of day limitations) e.g. 7 pm to 7 am, etc.). 6. No irrigation runoff. 7. Fines for violating mandatory conservation measures.

<p>Tier 3: Declare Water Shortage Emergency.</p>	<ol style="list-style-type: none">1. Draft and adopt ordinances allowing a utility to declare a water emergency and requiring some or all of the measures below:2. Fixed consumption allotments or percentage cutbacks (rationing).3. All homes and businesses to have retrofitted showers and toilets.4. All public water uses not required for health or safety prohibited unless using tank truck water supplies or reclaimed waste water.5. Irrigation of public parks, cemeteries, etc., severely restricted.6. Main flushing allowed only for emergency purposes.7. Reduce system pressure to minimum permissible levels, e.g. 20 psi.8. Rate surcharges.9. Disconnection of violators for one day then reconnection after a warning and a house call.10. Implement a moratorium on all new connections.
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Section 13. Returning to Normal Operation

Returning to normal operations

Action	Description and actions
Inspect, flush, and disinfect the system,	Water system operator and support staff will inspect all system facilities and ensure that all water quality tests, and necessary system flushing and disinfection are complete. Afterwards, the water system operator will report to the City Engineer.
Verify water quality	Water system operator verifies water quality sampling results and decides whether the system is ready to resume normal operations.
Coordinate with local and state health departments	Water system operator coordinates with health departments on system condition and water quality results.
Notify customers	Water system operator meets with City Manager and communications lead to write notice to customers. City Manager distributes the public notices.



Section 14. Training and Rehearsals

Training

Identify staff training needs and expectations.

Position	Training needs and expectations
City Manager	Emergency response communications, emergency response planning, issuing health advisories.
Water System Operator	Emergency response communications, emergency response planning, suspicious activity training.
City Manager, Engineer and Operator	Conduct desktop emergency response training.
City Engineer and Operator	Conduct full scale Well 2 startup operations.
City Engineer and Operator	Conduct full scale standby generator operations at Well 4 and Mosier Bluffs BPS (Done, April 2018).



Section 15. Plan Approval

Plan approval

This plan is official when the following people review, approve, and sign it:

Name and Title	Signature	Date
Vacant Position – Water Operator		
Colleen Coleman – City Manager		
Arlene Burns - Mayor		

Emergency Response Plan – Appendices

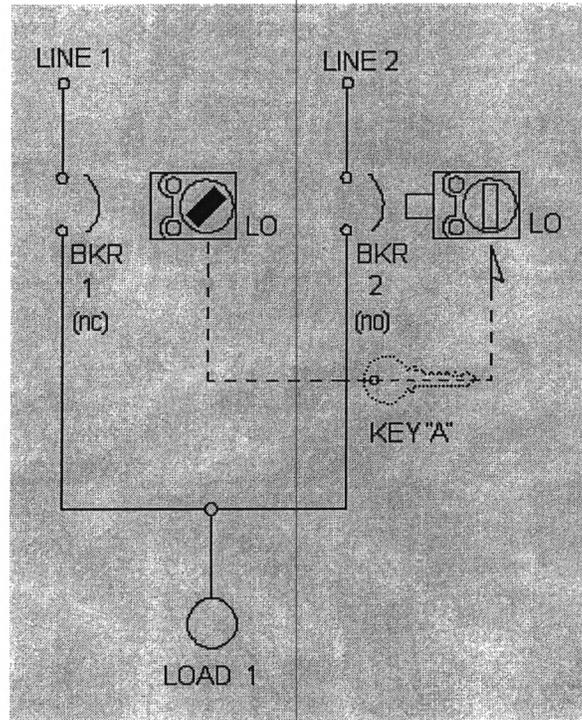
1. Operations
 - a. Well 2 Operation Plan
 - b. Well 4 Transfer Switch Instructions
2. Inventory
 - a. Hydraulic data
 - b. Tank physical data
 - c. PRV setpoints
 - d. Control system setpoints
 - e. Eastside BPS alarm process
 - f. Mosier Bluffs BPS and Well 4 alarm dialer process
 - g. All facilities – list of alarms
3. Notices & Response Procedures
 - a. Backflow event public notice
 - b. Backflow event response
 - c. Watermain break response
 - d. BMP info for watermain breaks
 - e. Loss of pressure boil water notice
 - f. OHA boil water notice
 - g. OHA boil water notice FAQ
 - h. OHA e-coli Tier 1 public notice template
 - i. OHA coliforms failure to investigate Tier 2 public notice template
 - j. OHA coliforms fact sheet
 - k. EPA public notice instructions for emergency disinfection of drinking water
 - l. OHA Tier 1 public notice template for nitrates
 - m. OHA Tier 2 public notice template for chemicals
 - n. Translated public notice phrases
 - o. Shock chlorination of tanks worksheet
 - p. Well disinfection steps
 - q. Truck transportation of drinking water
 - r. Responding to a threat against the water system

Emergency Response Plan – Operations

Main Circuit Breaker Interlock

Kirk Key General Operation

Scheme A



This scheme is used to prevent two Mains or a Generator and a Main or two Generators from being tied together through their own associated switch or breaker. This scheme prevents two switches or breakers from being closed simultaneously.

Initial Conditions: The load is fed from line #1 through breaker #1

which is normally closed with its respective interlock key "A" captive. Breaker #2 is locked open with no interlock key present.

Switching the load to line 2 through breaker 2: Open breaker #1 and lock thereby releasing the "A" key. Use the "A" key to unlock and close breaker #2. Reverse to restore the initial condition.

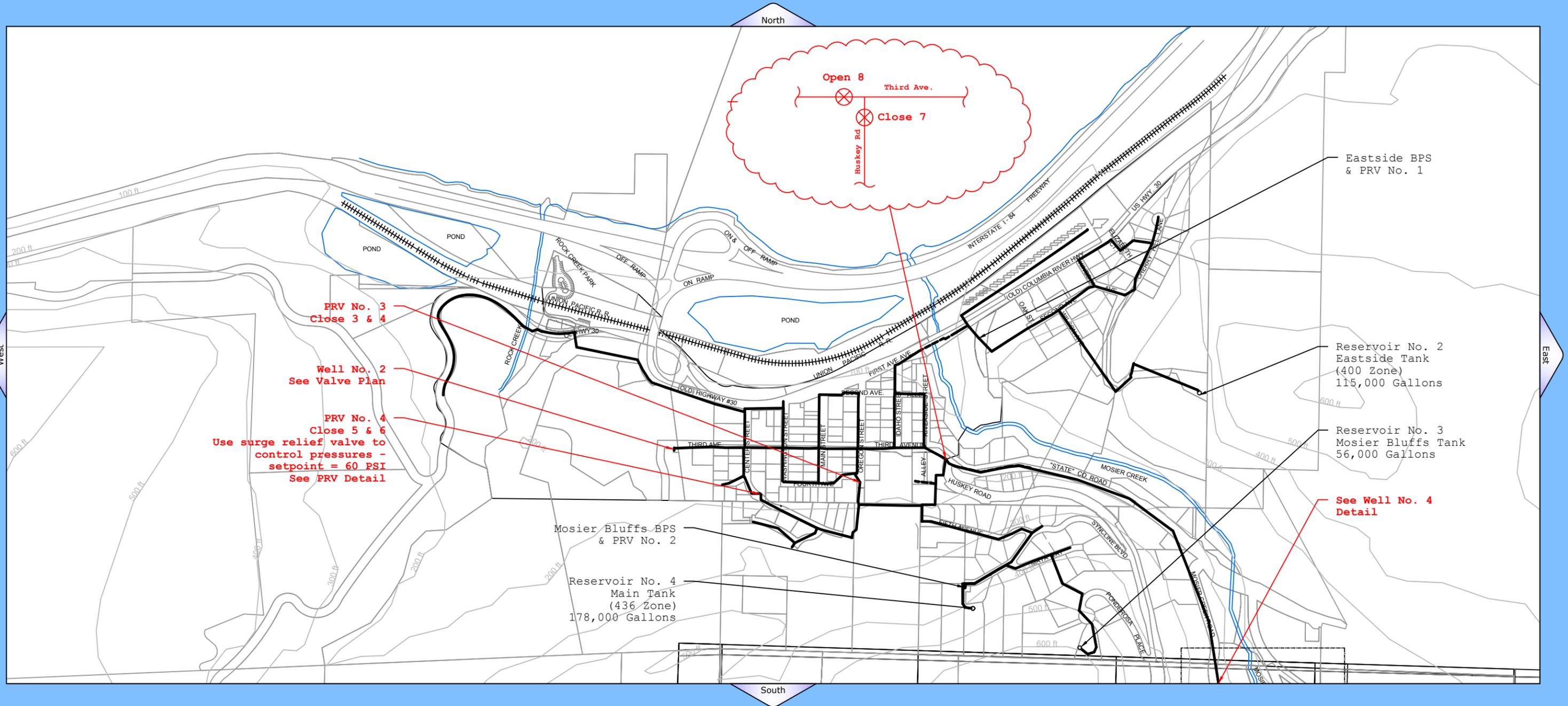
Procedure:

1. Open switch or breaker #1
2. Lock open by extending locking bolt - this releases key "A"
3. Insert key "A" into lock on breaker #2
4. Unlock and retract locking bolt - this allows breaker #2 to be closed
5. Reverse above procedure to restore to original condition

City of Mosier
 Well No. 2 Emergency Operation Plan
 Updated: Feb 2, 2018 - JG

Steps	Description	Valve Number	Open or Close it	Comments
1	Well 4 is down and will be down for a significant duration.			Pump failure, transmission pipeline break, water quality event, etc. A significant duration could be a week long event in the summer or 2+ weeks in the winter.
2	Public Notices - mandatory conservation			City Manager and City Clerk (see ERP). Also notify public water is safe but may not be palatable.
3	Open artesian flow bypass at Well 4.	1	Open it	
		2	Open it	Confirm water will flow into system using a hydrant on Mosier Creek Rd.
4	Isolate 436/600 Zones from 312 Zone.			
	PRV No. 3	3	Close it	2" upstream valve
		4	Close it	6" upstream valve
	PRV No. 4	5	Close it	2" upstream valve
		6	Close it	6" upstream valve. Pressures in the 312 Zone will drop rapidly. Eastside PRV should open
	Distribution system valve.	7	Close it	At Huskey Rd and 3rd Ave. Valve on south leg of tee.
5	Open 312 Zone to artesian flow from Well 4.	8	Open it	At Huskey Rd and 3rd Ave. Valve on west leg of tee. Open SLOWLY!!!
				Monitor zone pressure at PRVs 3 or 4. If P < 20 psi, check Eastside PRV.
6	Well No. 2 operation.			Do not operate unless artesian supply is inadequate (low pressures).
	School irrigation valve.	9	Close it	
	Wellhead valve to City system.	10	Open it	
	Pump to waste			Using blowoff outside of Well No. 2. Pump to waste for 15 minutes. Collect coliform sample.
	Distribution system valve.	11	Open it	
	Turn Well 2 On			Turn on disinfection system. Turn on Eastside BPS simultaneously.
				Monitor pressures in 312 zone at Well No. 2 and at PRV No. 4.
				Throttle pump as necessary to prevent high pressures in 312 Zone.
				Check surge relief valves at PRV No. 3 and 4 for operation. Use PRV No. 4 for surge relief preferably. Setting = 60 psi. Check for damage caused by surge flows.
				Open hydrant if necessary to relieve excessive pressures (70 psi or more).
				Monitor levels in all tanks.
	Turn Well 2 Off			When Eastside tank is full.
Other Steps	Move water from 600 zone to 436 zone.			Only if Main Tank is getting very low. Note PRV should do this automatically. If not manually operate it.

See attached drawings for valve and facility locations. The use of Well No. 2 will require constant monitoring. If pressures are stable and above 20 psi in the 312 zone, Well No. 2 can be turned off. This might be an option overnight or if the artesian flows are adequate to meet demands. Once Tank No. 2 calls for water; Well No. 2 must be used to provide adequate supply for the Eastside BPS. During this operation the Eastside BPS should be in manual mode. If the surge relief valve at PRV No. 4 is able to stabilize pressures in the 312 zone and there is no runoff damage then Well No. 2 operation will not require constant monitoring.

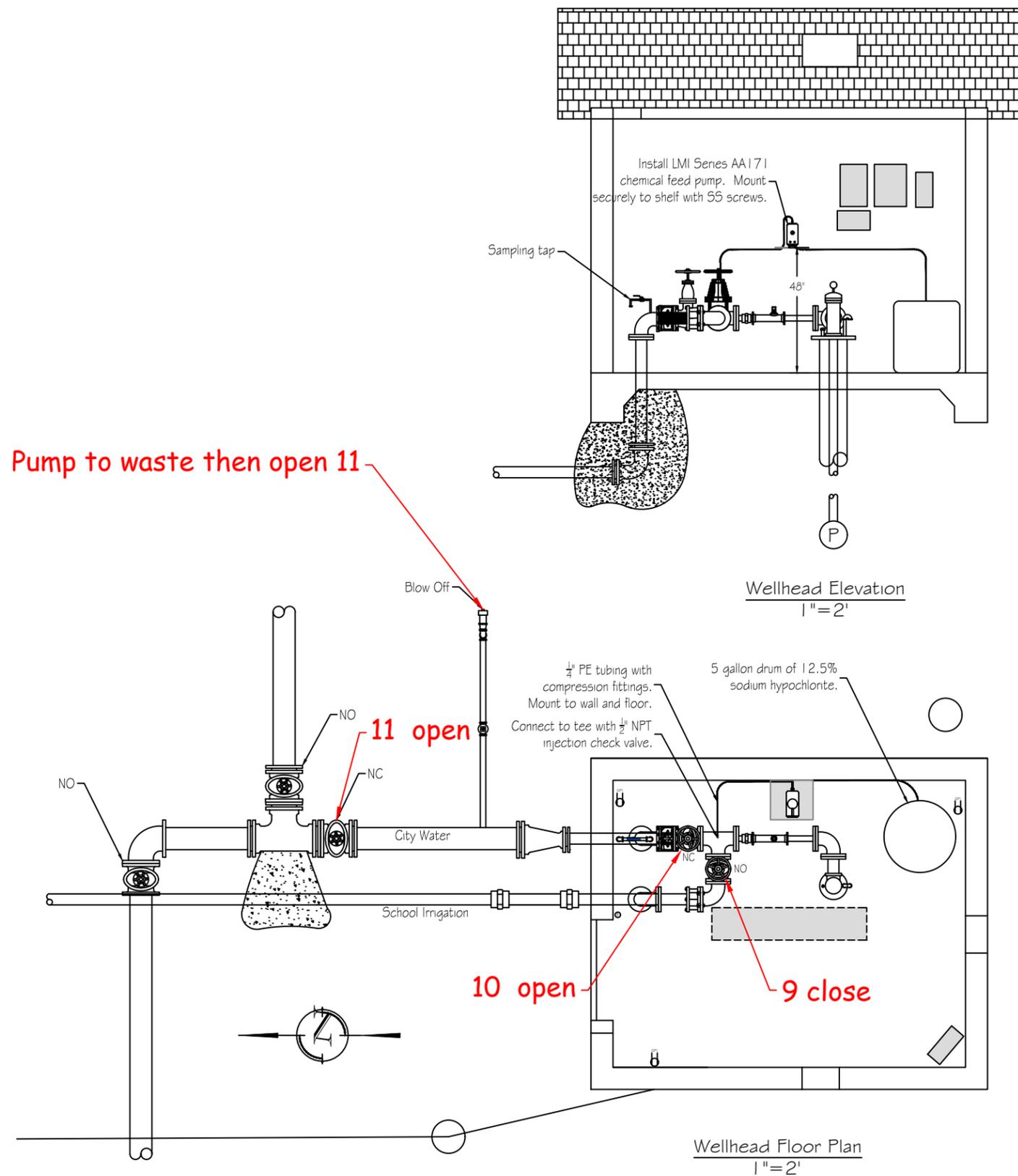


MOSIER WATER SYSTEM WELL No. 2 - ERP



JOHN GRIM & ASSOCIATES
Civil Engineering Consultants
PO Box 955
407 State St.
Lyle, Washington 98635
Phone: (509) 365-5421
E-mail: jgrim@johngrimassociates.com

CITY OF MOSIER WASCO COUNTY, OR



Pump to waste then open 11

- CONSTRUCTION NOTES**
- All existing pipe, fittings, and valves are 4-inch diameter GI or CI unless otherwise called out.
 - Location of existing equipment as shown on the drawings is approximate. Contractor shall verify location of existing equipment prior to beginning construction.
 - The location and configuration of the proposed improvements is approximate. This drawing is intended as a schematic presentation only. The contractor will field locate all improvements during construction.
 - The disinfection system will be manually operated. The water operator will turn the chemical feed pump on whenever Well no. 2 is used as a backup source of supply for the City's water system.
 - The feed pump will not be hard wired into the pump circuit.
 - The feed pump will not be used when the school is operating the well for irrigation.
 - Chemical Feed Pump Design Parameters:
 - Q = 0.10 gph
 - Solution Strength = 12.5% sodium hypochlorite
 - Target dosage = 1 ppm
 - Well pump rate = 130 gpm



WELL NO. 2 DISINFECTION SYSTEM
CITY OF MOSIER

WELL NO. 2 ERP

JOHN GRIM & ASSOCIATES
Civil Engineering Consultants

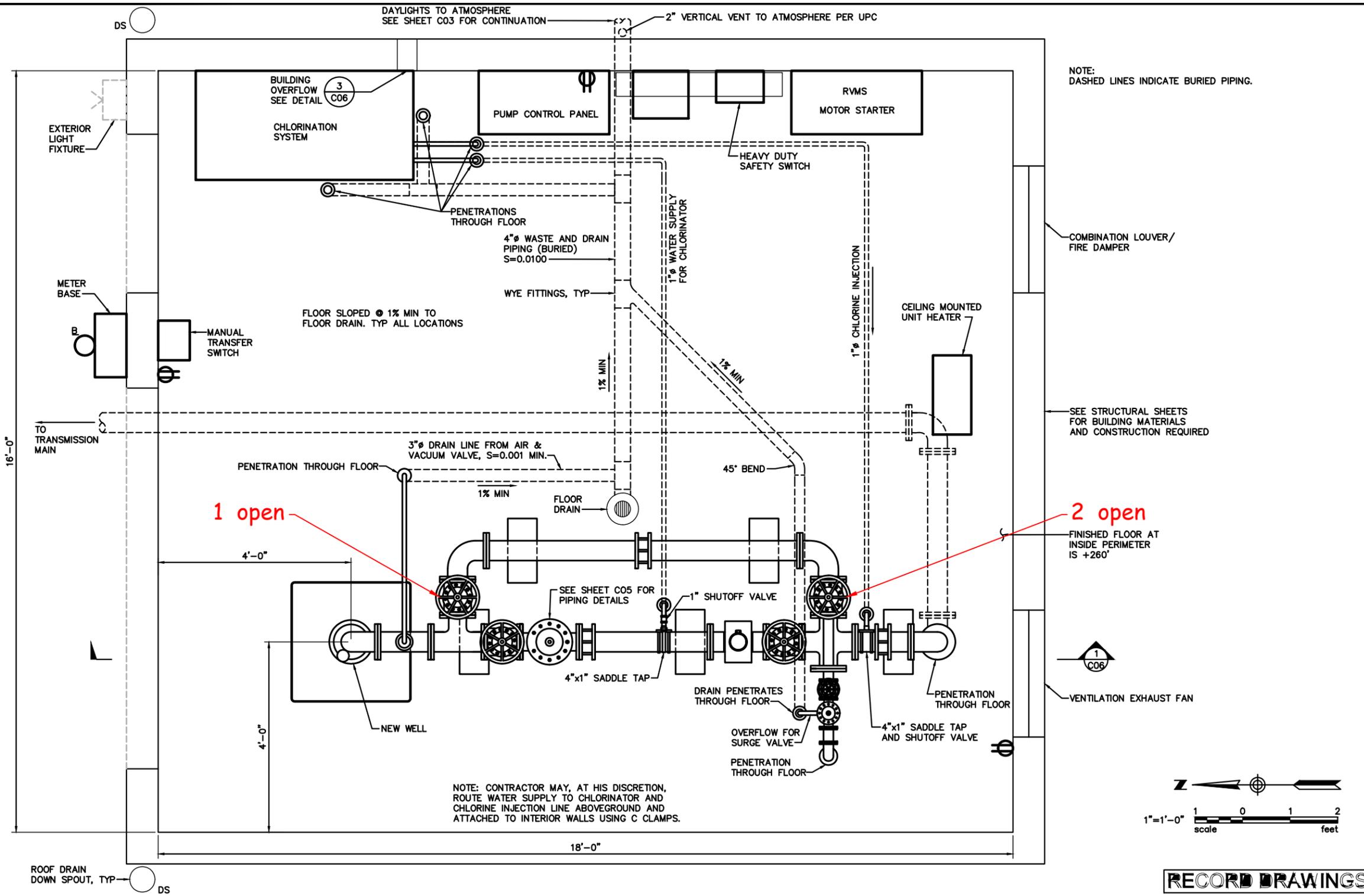
Phone: (509) 365-5421
Fax: (509) 267-4202
Email: jg@jgassoc.com

PO Box 955
407 3rd St.
Lytle, Washington 98635

REVISION DESCRIPTIONS

DATE	MARK

DRAWN	JG	DESIGN	JG
FILE NAME	Well 2 ERP Details		
Project	Well 2 ERP	SHEET	1 OF 1
Last Revised	Feb. 8, 2018	ALIGNMENT	
Scale	1" = 24"		



MARK	REVISION DESCRIPTION	BY	APP.	DATE
Δ	PIPING MODIFICATION			2/14/08

BERGER/ABAM
ENGINEERS INC.

830 NE HOLLAMAY ST, SUITE 140
PORTLAND, OREGON
97232-2107
VOICE: (503)731-6041
FAX: (503)731-8902

DRAWN BY LCR
DESIGN BY MLE
CHECK BY BCB
PROJ MGR TRW

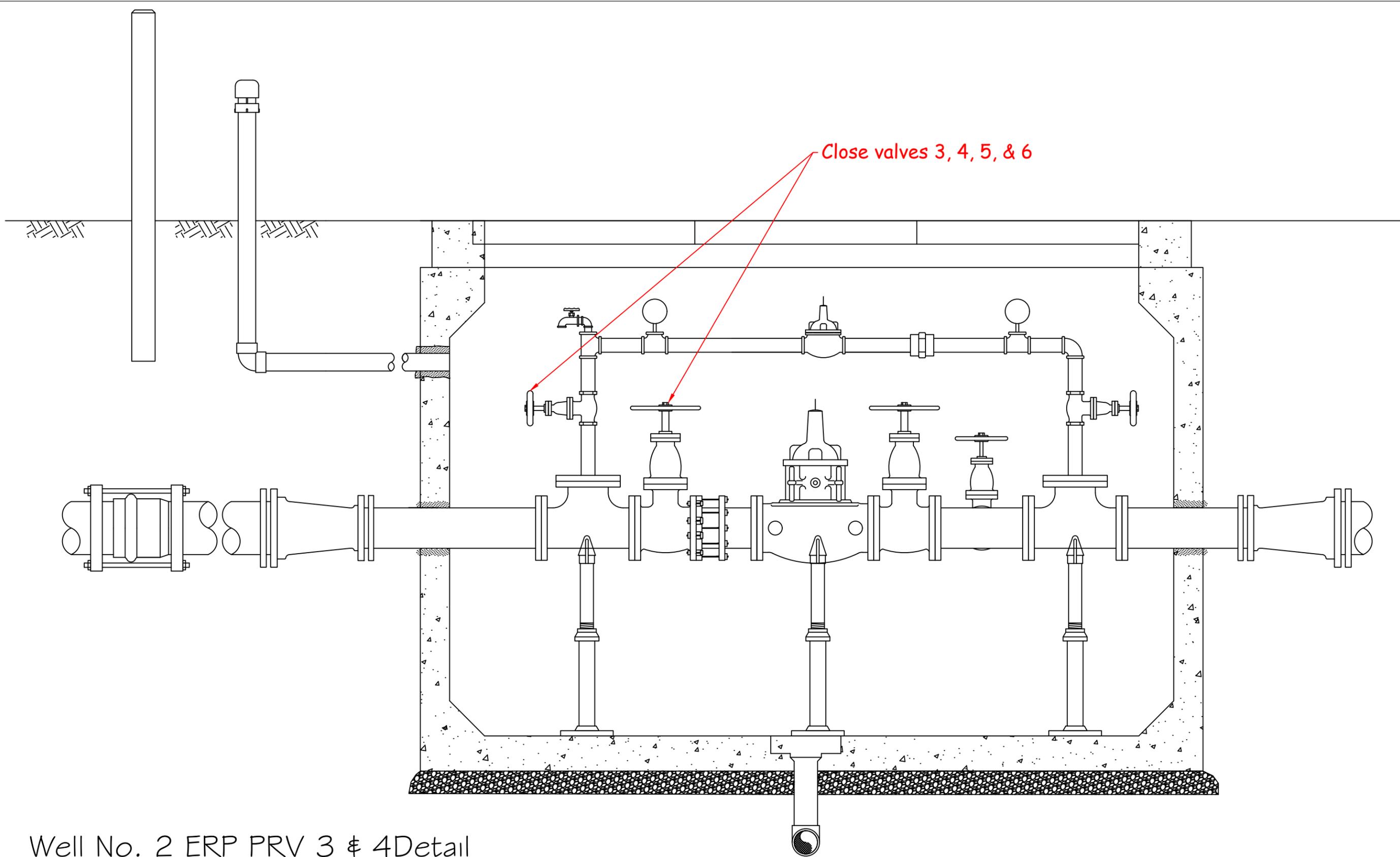
Well No. 4 Artesian Flow Operation

Revised: 2/8/2018

RECORD DRAWINGS

DRAWING NO. C04
PROJECT NO. PAPOR-04-125
DATE: 02/14/08
SHEET NO. 6 OF 22

Last Saved on Wed Apr 25 2007 at 02:38:09 by JenniferLambert File Name: C:\2004\papor-04-125\CAD\sheet02.dwg Scale: 1



Well No. 2 ERP PRV 3 & 4 Detail



Mosier City <mosiercityhall@mosierwinet.com>

Well No. 2 Operation Plan

1 message

John Grim <jgrim@johngrimassociates.com>

Tue, Oct 6, 2015 at 10:48 AM

To: "mosiercityhall@mosierwinet.com" <mosiercityhall@mosierwinet.com>, "Matthew (mosierowls@mowinet.com)" <mosierowls@mowinet.com>, Dave Griffin <dwdmanager@gmail.com>

Team, attached is the Well No. 2 operation plan revised per our meeting yesterday. Kathy please attach to the associated maps and drawings. The spreadsheet is also attached for your use.

I updated the chlorinator feed rate calcs and came up with the following:

- Solution tank chlorine strength of 1% (dilute 12.5% chlorine with 13 gallons of water).
- Dosage is 1 ppm.
- Set chlorinator pump to feed at a rate of 0.72 gallons per hour.
- Volume used will be about 4 gallons per day during normal demand periods.

Thanks everyone and let me know if you have any questions.

John Grim P.E.

John Grim & Associates

PO Box 955 – 407 State St.

Lyle, WA 98635

(509) 365-5421

2 attachments

 **Emergency Operation Plan Well No. 2.pdf**
113K

 **Emergency Operation Plan Well No. 2.xlsx**
12K

Emergency Response Plan – Inventory

City of Mosier
As-Built Hydraulic Data/Setpoints

2-19-15, JG

PRV Data & Hydraulics

PRV Number and (Model Number)	Location	Elevation	Upstream Pressure (psi)	Downstream Pressure (psi)	Setpoint (psi)	Pressure Zone Up	Pressure Zone Down	Hydraulic Grade at Setpoint (ft)	Actual Hydraulic Grade (ft)	Status	Pressure Drop to Open (ft)
PRV No. 1 (RV-1)	Eastside BPS	155	120	66	60	400	300	294	307	Lag No. 2	14
PRV No. 2 (RV-4)*	Mosier Bluffs Subdivision	355	107	34	22	600	436	406	434	NA	28
PRV No. 3 (RV-2)	Oregon St PRV	205	95	45	45	435	300	309	309	Lead	NA
PRV No. 4	Tanawashee Subdivision	180	107	50	49	435	300	293	296	Lag No. 1	2

Note: PRV No. 3 has a backpressure sustaining feature with a setpoint of 70 psi and a pressure relief valve with a setpoint of 60 psi. PRV No. 4 has a backpressure setpoint of 80 psi and a pressure relief valve with a setpoint of 60 psi. PRV No. 4 setpoints are based on running in lag mode. Set it so that it will normally be open except during very low flows. (slight lag). PRV No. 1 is set to be the 2nd lag valve to the 300 zone. The setpoint for PRVs No. 3 and 4 shown is for the 2" valve. The 6" setpoints are 5 psi lower for each.

Tank Data & Hydraulics

Tank Name and (Model Number)	Location	Base Elevation	Full Elevation	Pressure Zone	Diameter (ft)	Volume (gallons)	Max. Elevation Served	20 psi Tank Level (ft)	30 psi Tank Level (ft)	Tank level to open PRV No. 2 (ft)
Tank No. 1	Westside	288	300	300	38	101,747				
Tank No. 2 (T-2)	Eastside	370	400	400	26	119,080				
Tank No. 3 (T-4)	Mosier Bluffs - Phase 1	576	600	600	20	56,369				
Tank No. 4 (T-3)	Mosier Bluffs - Tract B	391	435	436	26	174,651	360	406	429	406

Mosier Bluffs BPS Hydraulics

Pump = Grundfos CR10-5

Head and Flow Conditions

Condition	Static Head (ft)	Pump Rate (gpm)	Suction Head (ft)	Static Pressure at Pump Discharge (psi)
Tank No. 4 Normal	165	62	80	106
Tank No. 4 Low	194	53	51	
Tank No. 4 Empty	209	47	36	
Both pumps running	165	100	80	
Minimum Required Suction Head (ft) =		10		

*** Mosier Bluffs PRV Setpoints**

The Mosier Bluffs PRV opening setpoint is based on keeping Tank No. 4 full enough to maintain a min. static pressure of 20 psi at the highest 436 zone service elevation. The PRV will close when the Tank No. 4 level rises above elev. 406' (15' of water).

Well No. 4 Control Valve

Valve Item	Setpoints	Comments
2" 50G-01	Inlet pressure is 98 psi	Pressure relief setpoint is 115 psi
4" 60G-11BY	Inlet pressure is 98 psi	At 300 gpm

City of Mosier
 2016 WSP
 Tank Data
 Updated 5-27-16 JG

Tank Data & Hydraulics

Tank Name	Location	Base Elevation	Full Elevation	Pressure Zone	Diameter (ft)	Height (ft)	Volume (gallons)	Year Constructed	Source of Water	Source Pressure Zone	Type
Tank No. 2	Eastside	370	400	400	26	30	119,080	1997	Eastside BPS	300	Mount Baker Silo
Tank No. 3	Mosier Bluffs - Phase 1	576	600	600	20	24	56,369	2006	MB BPS	436	Mount Baker Silo
Tank No. 4	Mosier Bluffs - Tract B	391	435	436	26	44	174,651	2014	Well No. 4	NA	Mount Baker Silo

Mount Baker Silo Inc. is a tank erection company that constructs reinforced concrete tanks. Tanks 3 and 4 have inlet mixing systems. Tank No. 4 is the City's primary storage tank. It feeds all pressure zones either directly or indirectly. The 300 pressure zone is fed by PRVs; it does not float off a gravity storage tank.

CITY OF MOSIER
CONTROL VALVE SETTINGS

PRV #3 OREGON STREET (NEW 2014)

1 – 2" 92G-05BVY	INLET 95	SET 45 FLOWING CRL 70
1 – 6" 92G-05BVY	INLET 95	SET 40 CRL 70
1 - 4" 50G-01		SET @ 60

PRV #4 CENTER ST (NEW 2016)

1 – 2" 92G-05BVY	INLET 100	SET 45 FLOWING CRL 70
1 – 6" 92G-05BVY	INLET 100	SET 43 CRL 70
1 - 4" 50G-01		SET @ 60

MOSIER BLUFF BOOSTER STATION(NEW 2006)

1 – 6" 90G-01BCSY	INLET 110	SET @ 22 BACK 25
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WELL 4 (NEW 2006)

1 - 2" 50G-01	INLET 95/98	SET @ 115
1 – 4" 60G-11BY	STATIC 85 PUMPING 95/98	300 GPM

EAST SIDE PRV

1 – 4" 92G-01B	INLET 120	SET @ 63 BACK 70 CRL NOT USED
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Facility[1]	Operational Control	Set Point
Well No. 4 – Primary Supply	Pump on automatically based on water level in Reservoir No. 4	39' of water.
	Pump off automatically based on water level in Reservoir No. 4	43' of water. Overflow elevation is 44' of water.
	Pump off based on OL/UL motor protection in VFD.	Set points are default.
	Pump off based on pump run and low flow.	Flow less than 200 gpm.
	Pump restarts automatically if called to run after a power outage (under voltage).	Up to 5 times with a 10 second delay.
	Pump off based on timeout.	60 seconds
Chlorinator @ Well 4	Pump on based on operation of Well 4 pump.	Well 4 pump on
	Pump off based on operation of Well 4 pump	Well 4 pump off
Well No. 2 – Backup Supply	Manual operation only. Operate per ERP.	NA
600 Zone BPS – Mosier Bluffs	Pump on automatically based on water level in Tank No. 3. Each pump alternates.	19' of water.
	Pump off automatically based on water level in Reservoir No. 3	21' of water. Overflow elevation is 24' of water.
	Both pumps on if water level continues to decrease after one pump is on.	17' of water.
	Pump off automatically based on pump run low flow rate.	40 gpm.
	Pump off automatically based on high pressure on discharge side of pump.	120 psi.
400 Zone BPS - Eastside	Pump on automatically based on water level in Reservoir No. 2	Unknown
	Pump off automatically based on water level in Reservoir No. 2	Unknown
Center St. PRV (PRV No. 4)	2" PRV normally open. 6" PRV is 1 st lag to 300 zone.	2" = 49 psi.
		6" = 44 psi.
Oregon St. PRV (PRV No. 3)	2" PRV normally open. 6" PRV is lead to 300 zone.	2" = 45 psi.
		6" = 40 psi.
Eastside PRV (PRV No. 1)	Normally closed valve. Opens automatically on low discharge pressure (low pressure in the 300 zone).	60 psi.
Mosier Bluffs PRV (PRV No. 2)	Normally closed valve. Opens automatically on low discharge side pressure (low level in Tank No. 4.)	22 psi (15' of water in Tank No. 4)

[1] For detailed PRV data see Chapter 5 – Pressure Zones.

John Grim

From: H2O Mosier <h2omosier@gmail.com>
Sent: Monday, February 13, 2017 11:41 AM
To: Mosier City; Dave Griffin; John Grim
Subject: East auto dialer

Hello everybody,

I wanted to let you know I've reprogrammed the auto dialer in the Mosier fire hall. We've had some hiccups as of late with power surges that led to alarms going off. All is well now and back up to normal operations besides the short-cycling of the booster pump station. Hopefully, I'll be up on top of the reservoir soon to take a look and see if I can figure out what's happening with the floats.

Below is a list of the auto dialer list. If indeed the call makes it to you, the only way to clear the alarm so it doesn't keep forwarding down the list is to hit "555". That gives the dialer confirmation that you've acknowledged there is a problem. The attachment below is the list of alarms inside the auto dialer panel. I've removed the West reservoir alarms that were still activated since they haven't been needed for many years it seems. All alarms were on except for #8, which I turned back on and got an immediate call. I asked Matthew about it and he confirmed he turned it off years ago since it was always going off. Currently I have it back off, but will try and rectify the issue with further research about the system.

Auto Dialer call list:

1. Beeper
2. Andy Wells cell
3. Dave Griffin cell
4. John Grim cell
5. Kathy Fitzpatrick cell
6. City Hall

If there is a preferred number you'd like to have the dialer call, please let me know.

I've used everyone's cell phone #'s for now. It shouldn't call beyond myself unless I am out of coverage for some reason. There is 1 more available # that can be programmed if there is someone that you think should be on the list. Obviously, Matthew has been removed.

 [IMG_7665.JPG](#)

MOSIER BLUFFS BOOSTER PUMP STATION ALARM DIALER

Dialer Number:	(541) 478-0130		
<u>POSITION</u>	<u>NAME</u>	<u>NUMBER</u>	<u>ACKNOWLEDGEMENT CODE</u>
1	Andy Wells Beeper	(541) 386-8678	Call dialer, let ring 10 times or use code: 11111
2	Andy Wells	(541) 705-5049	22222
3	Dave Griffin	(509) 250-3946	33333
4	Kathy	(541) 400-0124	44444
<u>ZONE NUMBER</u>	<u>ALARM NAME</u>		<u>NOTES</u>
1	Tank 3 High Level		Set at 24'
2	Tank 3 Low Level		Set at 15'
3	BPS Pump Fail		A. (See Below)
4	Intrusion		
5	PLC Fail or Fault		
6	Tank 4 High Level		Set at 44'
7	High Pressure Lockout		
8	Tank 4 Low level		Set at 31'
	Power Fail		Built into dialer

A. Pump call, no run and/or pump run, low flow conditions for both pumps cause this alarm.

WELL 4 ALARM DIALER

Dialer Number:	(541) 478-0470		
<u>POSITION</u>	<u>NAME</u>	<u>NUMBER</u>	<u>ACKNOWLEDGEMENT CODE</u>
1	Andy Wells Beeper	(541) 386-8678	000
2	Andy Wells	(541) 705-5049	000
3	Dave Griffin	(509) 250-3946	000
4	Kathy	(541) 400-0124	000

Facility	Alarm Condition	Set Point
Well No. 4 – Primary Supply	Pump fail	Pump called to run but doesn't operate.
	Intrusion	Door opened and intrusion alarm not reset
	VFD OL/UL	An overload/underload condition exists.
	Power fail	NA
	UPS fail	NA
Chlorinator @ Well 4	Empty Hopper	Tablet hopper is empty (weight sensor).
Tank No. 4 – 436 Zone	High level	44' of water in tank
	Low Level	31' of water in tank
Tank No. 2 – 400 Zone[1]	Low level	Unknown
	Carrier fail	NA
Eastside BPS	No alarms	
Mosier Bluffs BPS	Pump fail	Pump call, no run and/or pump run low flow.
	Intrusion	NA
	PLC fail/fault	NA
	High pressure lockout	120 psi
	Power fail	NA
Tank No. 3 – 600 Zone	High level	24' water level
	Low level	15' water level

[1] [The alarm system is flawed; it works intermittently](#)

Emergency Response Plan – Notices and Response Procedures

Drinking Water Warning: Backflow Incident

Public Notification

The _____ Water System, ID _____, located in _____ County may be contaminated because of a backflow incident in which _____ (describe the substance) flowed back into the drinking water system. You are located in the service area potentially affected by this backflow incident.

Do Not Use Tap Water for Drinking, Laundry, or Bathing Until Further Notice. Use only purchased bottled water for drinking, making ice, brushing teeth, washing dishes, food preparation, and hand washing.

When backflow occurs, microbial or chemical contamination can be drawn into the water system. These contaminants can cause severe injury or illness.

What caused the backflow incident?

What is the affected area?

What are we doing to correct the problem?

Where can customers get bottled water?

What should you do before you begin using your tap water?

We will notify you when the water is safe to use.

For more information, please call _____ at () ____-____ or email _____.

Please share this notice with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments and businesses). You can post it in a public place, share copies by hand, or mail it.

The _____ Water System sent this notice to you on ___/___/___

For Water Utility Use Only:

Backflow Incident Public Notice Certification Form Within 10 days of notifying your customers, please complete this certification form and send a copy of each type of notice you distributed (hand-delivered notices, new releases, email, phone transcript, etc.) to our regional office. Call 1-800-521-0323 for the regional office address.		
Distribution was completed on ___ / ___ / ____. Were the water users notified within 24 hours? <input type="checkbox"/> Yes <input type="checkbox"/> No	Check all that apply: <input type="checkbox"/> Hand delivery, <input type="checkbox"/> News release (TV, radio, newspaper, etc.), <input type="checkbox"/> Posting at _____ <input type="checkbox"/> Other _____ + _____	
_____ Signature of owner or operator	_____ Position	_____ Date

DOH Form (331-495) 6/14

For people with disabilities, this form is available on request in other formats. To submit a request, please call 800-525-0127 (TDD/TTY 711).



Questions & Answers

Responding to a Backflow Incident

What is a backflow incident and what causes it?

Engineers design water systems so that water flows from the distribution system to customers. However, unusual conditions can cause the water to flow backwards—from a customer’s plumbing system into the public water system. Backflow can occur at any potential physical “cross connection” between a public water system or the customer’s water system and any source of liquid, solid, or gas that could contaminate the water supply.

Conditions that cause backflow:

- **Backsiphonage:** Occurs when pressure in the public water system drops below a customer’s plumbing system pressure.
- **Backpressure:** Occurs when pressure in a customer’s plumbing system rises above the public water supply pressure.

Should water system operators be concerned about a backflow incident?

Yes. Backflow incidents can pose a serious threat to public health. Microbial, chemical, or physical contaminants that enter the distribution system through unprotected cross connections, or through openings in the underground piping system, may cause widespread illness, injury, or worse.

How do I know whether backflow occurred?

If a backflow incident occurs, customers may call to express concerns about degraded water quality or loss of pressure. You should respond quickly and investigate all potential backflow incidents.

Customer complaints and your own observations may be clues that a backflow event occurred.

- **Discolored or unusual looking water.** Listen for words such as discolored, cloudy, soapy, foamy, or oily.
- **Taste and odor problems.** Listen for words such as fuel, chemical, medicinal, or salty, especially after a low-pressure event.
- **Low or no chlorine residual in the distribution system.** Measure and record free chlorine residual at locations around a pressure-loss event or water quality complaint. Lower residuals may mean chlorine is reacting with substances that entered the water system.

How can an operator prevent a backflow incident?

To protect public health, state drinking water rules require water systems to develop and implement cross-connection control programs (WAC 246-290-490). Cross-connection control programs rely on backflow preventers to isolate the public water system from potential sources of contamination.



HELPING TO ENSURE SAFE AND RELIABLE DRINKING WATER

When you implement a cross-connection control program, you take proven steps to prevent backflow incidents. In the process, you will minimize the health risks associated with backsiphonage and backpressure events. It takes a determined effort to protect your water system from backflow. Use the resources below to develop your own cross-connection control program.

What should water system operators do if a backflow incident occurs?

- **Find** the cause of backflow and **assess** the risk.
- **Identify** the affected area and work to limit the spread of contamination.
- **Call** our regional office (working hours) or our after-hours number. See numbers below. We'll help you decide which customers you need to contact and whether to issue a health advisory. Your first priority is to protect your customers' health.
- **Communicate** with affected customers about what happened. Tell them what they should do to protect their health, and what the water system is doing to correct the situation.

If the risk assessment points to the possibility of chemical contamination, including a substance capable of causing bodily harm, use the *Drinking Water Warning: Backflow Incident* public notice referenced below. If you are certain the risk is limited to microbial contamination, you may use a different public notice that allows customers to use the tap water if they boil it first.

- **Flush** affected parts of the distribution system to remove any contaminants. Your flushing plan should effectively move any known contaminants to the nearest discharge point without unnecessarily spreading contamination through the distribution system.
- **Disinfect** affected parts of the system to reduce the risk of waterborne disease. If you don't normally disinfect, you should notify your customers before adding a disinfectant.
- **Collect** water quality samples after you restore normal operating pressure, including coliform and possibly certain chemical samples, to confirm your system meets drinking water standards.

What resources can I use to develop a cross-connection control program?

You can access these and other publications online at

<https://fortress.wa.gov/doh/eh/dw/publications/publications.cfm>

- *Cross Connection Control for Small Water Systems* (331-234)
- *Small Water System Management Program Guide* (331-134)
- *Noncommunity Small Water System Management Program Guide* (331-474)
- *Responding to a pressure-loss event* (331-338)
- *Drinking Water Warning: Loss of pressure* (331-493)
- *Drinking Water Warning: Backflow Incident* (331-495)
- *Coliform Public Health Advisory Packet* (331-260)
- *Emergency Disinfection of Small Systems* (331-242)

Other resources are on our [Cross-Connection Control and Backflow Prevention](#) webpage.

If you need help, or have questions, call our nearest regional office

Eastern Region: 509-329-2100

Southwest Region: 360-236-3030

Northwest Region: 253-395-6750

After-hours emergency: 1-877-481-4901

For people with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TDD/TTY call 711).

Pipeline

Recap of the 2009 Legislature

by Dave Leland

The 2009 Legislature adjourned on June 29, concluding a very active session on the state budget and public health initiatives, including drinking water.

The state budget occupied center stage, as successive revenue forecasts showed a declining General Fund and a record-breaking projected shortfall of \$4.2 billion. State agencies were asked to identify program reduction options of up to 30 percent. In the end, the 2009-11 budget was balanced by reducing programs, increasing taxes and tapping the rainy day fund. The Legislature is

Continued on page 2

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Best management practices for service outages

In an effort to better identify and agree on best management practices to protect public health during water service outages or interruptions, the Drinking Water Advisory Committee (DWAC) formed a subcommittee in 2008. The committee's charge was to prepare guidelines describing best practices to consider, and to reach out to water suppliers and encourage them to incorporate best practices into their regular operations. Members of the subcommittee include Todd Heidgerken (large water systems); Mike Kurtz (Special Districts Assoc. of Oregon); Steve Weaver (League of Oregon Cities); Ed Butts (Oregon Assoc. of Water Utilities); Bob Fuller (American Council of Engineering Companies); Brian Stahl (Pacific NW Section, American Water Works Assoc.); and Dave Leland (DHS Drinking Water Program).

The subcommittee identified three categories of service outages that would benefit from the development of best practices guidelines:

- Cutting Into or Repairing Existing Water Mains
- Service Outages due to Reduced Pressure Events
- Disinfection or Filtration Treatment Interruption

Continued on page 4

The subcommittee started work on best practices for cutting into or repairing existing water mains because this is the most common service interruption that occurs and was of most interest to water suppliers. The completed guideline was approved by the Drinking Water Advisory Committee and published in the fall 2008 Pipeline.

The Service Outage due to Reduced Pressure Events guideline was approved by the DWAC at its July 2009 meeting and is published below.

The subcommittee is now focusing on the last guideline, "Disinfection or Filtration Treatment Interruption," to be considered by DWAC at its October meeting. Those interested in this guideline are encouraged to contact one of the subcommittee members or the Drinking Water Program.

BEST MANAGEMENT PRACTICES FOR SERVICE OUTAGES DUE TO REDUCED PRESSURE EVENTS FINAL 7/15/09

Example Service Outage Scenarios:

- Pump Station Failure
- Water Storage Outage
- Source Water Outage
- Main transmission pipeline or intertie failure (see water main BMPs)
- Electrical Malfunction

Service Interruption thresholds:

- 1) Maintain normal service pressure
- 2) Maintain positive pressure throughout affected service area
- 3) Loss of positive pressure

Management Scenarios:

- 1) Prevent service outages with backup facilities and power, maintain normal operating pressure (best)
- 2) Recognize service outage and correct as soon as possible, maintaining positive service (desirable)
- 3) Shut off customer services before positive pressure lost, make corrective actions and restore service, flush, verify pressure and chlorine residuals (less desirable-applicable mainly to service outages affecting few users)
- 4) Complete loss of service pressure, notify users to take personal protective action, re-establish pressure and verify water safety (least desirable)

1) Prevent service outages with backup facilities and power

- Recognize service interruption immediately, either directly or through auto monitoring/alarms
- Engage standby facilities/power or activate interties to restore service
- Verify service pressure, and chlorine residuals if applicable

BEST MANAGEMENT PRACTICES FOR SERVICE OUTAGES DUE TO REDUCED PRESSURE EVENTS FINAL 7/15/09

2) Recognize service outage and correct as soon as possible, maintain positive pressure

- Recognize service interruption, either directly or through auto monitoring/alarms
- Advise affected users to conserve water to maintain positive pressure, if applicable
- Make temporary or permanent corrective actions to restore service
- Verify service pressure, and chlorine residuals if applicable
- Advise users to resume normal water use
- Inform state drinking water program

3) Loss of service pressure, chlorinated systems

- a) Shut off service meters before complete loss of service pressure, and re-establish pressure
- Recognize loss of service pressure
 - Shut off customer services before positive pressure is lost
 - Notify affected water users of service outage, if practical
 - Make temporary or permanent corrective actions to restore service
 - Flush affected area to remove any infiltrated water and restore chlorine residuals
 - Restore service, verify service pressure and chlorine residuals
 - Collect a coliform bacteria sample to provide a record of corrective action effectiveness. Mark as a "special sample" and retain in utility records for 2 years.
 - If the post-corrective action coliform sample result shows the presence of coliforms, resample per coliform sampling procedures. If second sample results show presence of coliforms, contact state drinking water program to consult on corrective action.
- b) Complete loss of service pressure, notify users to take personal protective action, and re-establish pressure (least desirable)
- Recognize loss of service pressure
 - Notify affected users to take personal protective action (do not use water, boil water, or use bottled water). Unless all affected users can be quickly notified, conduct additional wider notification by media or other means
 - Notify and consult with state drinking water program
 - Make temporary or permanent corrective actions to restore service
 - Flush affected area to remove any infiltrated water and restore chlorine residuals
 - Restore service, verify service pressure and chlorine residuals
 - Collect coliform samples to demonstrate water safety, obtain coliform-absent results before proceeding
 - Consult with state drinking water program
 - Notify users that water is safe to use after they flush their household plumbing

BEST MANAGEMENT PRACTICES FOR SERVICE OUTAGES DUE TO REDUCED PRESSURE EVENTS FINAL 7/15/09

4) Loss of service pressure, non-chlorinated systems

a) Shut off service meters before complete loss of service pressure, re-establish pressure and apply temporary chlorination

- Recognize loss of service pressure
- Shut off customer services before positive pressure is lost
- Notify affected water users of service outage, if practical
- Make temporary or permanent corrective actions to restore service
- Flush affected area to remove any infiltrated water, apply temporary chlorination
- Restore service, verify service pressure and chlorine residuals
- Collect a coliform bacteria sample after chlorine residual returns to zero to provide a record of corrective action effectiveness. Mark as a "special sample" and retain in utility records for 2 years.
- If the post-corrective action coliform sample result shows the presence of coliforms, resample per coliform sampling procedures. If second sample results show presence of coliforms, contact state drinking water program to consult on corrective action.

b) Complete loss of service pressure, notify users to take personal protective action, and re-establish pressure (least desirable)

- Recognize loss of service pressure
- Notify affected users to take personal protective action (do not use water, boil water, or use bottled water). Unless all affected users can be quickly notified, conduct additional wider notification by media or other means
- Notify and consult with state drinking water program
- Make temporary or permanent corrective actions to restore service
- Flush affected area to remove any infiltrated water
- Restore service, verify service pressure
- Collect coliform samples to demonstrate water safety, obtain coliform-absent results before proceeding
- If coliform samples are coliform-present, apply temporary chlorination
- Consult with state drinking water program
- Notify users that water is safe to use after they flush their household plumbing

Why Clorox®?

by Fred Kalish

The Drinking Water Program (DWP) has encountered many small public water systems that have historically disinfected with household liquid bleach (e.g., Clorox®), widely and inexpensively available as a 5.25% sodium hypochlorite solution.

According to State of Oregon Public Water System Regulations 333-061- 0087(6) Product Acceptability Criteria:

Products added to public water systems for treatment, purposes including but not limited to disinfection, oxidation, filtration, scale control, corrosion control, pH adjustment, softening, precipitation, sequestering, fluoridation, coagulation, flocculation, and water well treatment, shall meet the requirements of **National Sanitation Foundation Standard 60 – Drinking Water Treatment Chemicals – Health Effects (Revised, October 1988)** or equivalent.

Does Clorox® meet these criteria?

In reviewing product standards and certifications it turns out that the National Sanitation Foundation (NSF) is not the only organization that certifies (or approves) products to NSF Standard 60. In accordance with the International Organization for Standardization (ISO) guidelines, the American National Standards Institute (ANSI) has developed a program that provides accreditation to other “bodies” which provide testing of a variety of codes, products and chemicals to different

standards. Included in the list of organizations that qualify as “ANSI-accredited bodies” and that test for water quality chemicals and other water quality products are NSF International, Underwriters Laboratories (UL), Water Quality Association (WQA), International Association of Plumbing Officials Evaluation Service (IAPMO ES), as well as others.

Evaluating the acceptability of household bleach requires reviewing each of the potential organizations’ Web sites and searching to find which (if any) household bleach products have received NSF Standard 60 approval. As it turns out, the Water Quality Association has approved both “Clorox® Regular Bleach,” and “Clorox® Ultra Bleach” to NSF Standard 60. Therefore, at this time either of these products are acceptable for use as disinfectants in Oregon public water systems. The Clorox® product should be used within 90 days of purchase, since the concentration of the available chlorine decreases over time.

It is important to note that other household bleach solutions, *including other Clorox® products*, **are not** acceptable for use in drinking water unless and until the specific bleach product has received approval by at least one of the accredited bodies listed in this article. Also, in no case should any *scented* bleach be used in a public water system.

Stay clean!

*Fred Kalish is a civil engineer in the Technical Services Unit of the Drinking Water Program
541-726-2587 ext. 27 or fred.n.kalish@state.or.us*



Water Main Break Response Protocol for Chlorinated Systems

331-583 • 1/1/2017

Our water infrastructure continues to age faster than it is replaced, resulting in ever-aging water distribution systems. Water main breaks remain a major issue for water utilities despite improved asset management and financial planning. By some estimates, over 700 water mains break in the United States every day and need repair. Water utilities repair these types of breaks quickly and without interruption in water service or risk to water quality. Some breaks, like those that make the news, can affect water service to many people and businesses and present a significant risk to public health.

The water industry recognizes the need to classify water main breaks in terms of public health significance. We established four categories of water main breaks to standardize communication and response efforts in Washington State. These categories describe public health risk across the spectrum of water main failure impacts to utility operations. They are consistent with the Water Research Foundation study—Effective Microbial Control Strategies for Main Breaks and Depressurization (Kirmeyer et al. 2014).

The attached tables describe the recommended response, communication, and repair procedures for each type of water main break. We recommend water utilities incorporate these protocols into their standard operating procedures. The guidance for responding to each type of break is consistent with the requirements of WAC 246-290-451(1).

For more information

Our publications are online at <http://www.doh.wa.gov/drinkingwater>.

Contact our nearest regional office from 8 a.m. to 5 p.m. Monday through Friday. If you have an after-hours emergency, call (877) 481-4901.

Eastern Region, Spokane Valley (509) 329-2100 Adams, Asotin, Benton, Chelan, Columbia, Douglas, Ferry, Franklin, Garfield, Grant, Kittitas, Klickitat, Lincoln, Okanogan, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman, and Yakima counties.

Northwest Region, Kent (253) 395-6750 Island, King, Pierce, San Juan, Skagit, Snohomish, and Whatcom counties.

Southwest Region, Tumwater (360) 236-3030 Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Kitsap, Lewis, Mason, Pacific, Skamania, Thurston, and Wahkiakum counties.



If you need this publication in an alternative format, call 800.525.0127 (TDD/TTY call 711). This and other publications are available at www.doh.wa.gov/drinkingwater.

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Main Break Categories

Type I Break	Type II Break	Type III Break	Type IV Break
Positive pressure maintained through completion of repair.	Controlled pipe repair with limited depressurization during pipe segment shutdown.	Uncontrolled loss of pressure at break site or depressurization elsewhere in the system.	Catastrophic main break or water loss event resulting in the complete loss of water service.
Pressure maintained in pipe during repair.	Pressure maintained at break site until pipe is exposed and trench dewatered. Shutdown limited to immediate valved off area. No loss of pressure elsewhere.	Pressure loss at break site while pipe is still buried or submerged and/or pressure loss elsewhere in the system.	Extensive water loss compared to system capacity, with no pressure/no water. Storage loss leaves limited flushing capacity.
Contamination is unlikely.	Limited possibility of contamination.	Significant possibility of contamination.	Contamination likely or certain.

Type I Main Break Response

Assess environmental impacts and respond accordingly.

Call Washington 811.

Excavate to below break. Maintain pit water level below break.

Disinfect repair parts and repair site by swab/spray with 1% chlorine solution.

Complete repair with pipe still pressurized.

Restore residual disinfectant level at break to background levels by flushing.

Boil Water Advisory (BWA) and bacteriological sampling not needed.

Type II Main Break Response

Assess environmental impacts and respond accordingly.

Call Washington 811.

Excavate to below break. Maintain pit water level below break.

Isolate/shut off customer services in affected area.

Provide customer notification using door hanger, personal contact, email, or reverse 911.

Follow established utility procedures to perform controlled shutdown of broken pipe segment.

Disinfect repair parts and repair site by swab/spray with 1% chlorine solution. If pipe replacement, disinfect from both ends by swabbing.

Complete repair.

Conduct low velocity flush to displace water in affected piping. Discharge to waste.

Flush to restore residual disinfectant level at the break to background levels.

Advise customers to flush plumbing when water service returns. Verify service is restored to all isolated customers.

If utility shuts off customer services in affected area and positive pressure is maintained throughout the system prior to depressurizing the break site, a boil water advisory is not needed.

Collect bacteriological/heterotrophic plate count samples to validate repair procedures. The utility may restore service before getting results.

Type III Main Break Response

Assess environmental impacts and respond accordingly.

Call Washington 811.

Provide generic water main break notification and customer response steps on utility's website or directly to customers by door hanger, personal contact, email, or reverse 911 as soon as possible.

Review cross connection control program status, particularly compliance with premise isolation of high health hazards and assess risk of back siphon/backflow accordingly.

Call DOH and local health jurisdiction. Decide appropriate public notification message and methods.

Issue a boil water advisory and update the utility's website to show impacted area(s).

Evaluate firefighting capacity and sanitation impacts and communicate with appropriate entities.

Isolate/shut off customer services at the break site (if practical).

Disinfect repair parts and repair site—swab/spray with 1% chlorine solution. If pipe replacement, disinfect from both ends by swabbing.

Complete repair.

Complete post-repair disinfection of the distribution system, applying AWWA Standard C651 Section 4.11.3.3, Water Research Foundation Project 4307, or other applicable standard for guidance on disinfectant levels, if:

- Pressure is lost at the break before dewatering the trench and isolating the break.
- The break results in loss of pressure at points beyond break site, depending on degree of risk associated with extent, duration, and type of services affected.

Conduct a scour flush (at least three feet/second) to remove break-related sediment. This may not be practical for pipes greater than a 12-inch diameter. Flush at maximum practical flow rate until at least three pipe volumes are displaced and flush water runs clear.

Conduct a low velocity flush throughout area(s) subject to low pressures to displace water and restore background chlorine residual.

Restore residual disinfectant level at the break to background levels.

Check residual disinfectant level throughout the distribution system.

Advise customers to flush household plumbing when water service returns.

Collect bacteriological samples to verify effectiveness of response and provide basis for lifting the boil water advisory. The number of samples should reflect the impacted service population and service area.

Rescind BWA based on water quality monitoring results.

Type IV Main Break Response

A Type IV break is a Type III break, with significant impact on system-wide performance. Follow Type III response plus the following.

Assess utility capacity to deal with event and seek aid as soon as possible.

Notify local fire authority of current and expected status of storage volume and system pressure.

Depletion of stored water may affect flushing capacity following repairs, delaying full restoration of water service and lifting the BWA.

Utility may need to include conservation messages with BWA notification.

Continually assess storage, source, and distribution capacity as related to post-repair flushing needs.

DRINKING WATER WARNING: LOSS OF PRESSURE

Public Notification

The _____ Water System, ID _____, located in _____ County may be contaminated because of a loss of pressure in the water system. Even if you didn't lose water pressure, your tap water may still be contaminated.

Until Further Notice, Boil Your Tap Water Before Drinking. Bring all water to a roiling boil for one minute. Let it cool before using. You should use boiled or purchased bottled water for drinking, making ice, brushing teeth, washing dishes, and food preparation. Boiling kills bacteria and other organisms in the water.

When pressure loss occurs, contamination from the environment or from human or animal waste can be drawn into the water system. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems. These symptoms are not only caused by organisms in drinking water. If you experience any of these symptoms and they persist, you may want to seek medical advice. People at increased risk should seek advice about drinking water from their health care provider.

What caused the pressure loss?

What is the affected area?

What are we doing to correct the problem?

What should you do when we restore pressure to the water system?

We will notify you when you no longer need to boil the water.

For more information, please call _____ at () ____-____ or email _____.

Please share this notice with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments and businesses). You can post it in a public place, share copies by hand, or mail it.

The _____ Water System sent this notice to you on ___/___/___

For Water Utility Use Only:

Pressure Loss Public Notice Certification Form Within 10 days of notifying your customers, please complete this certification form and return a copy of each type of notice you distributed (hand-delivered notice, news release, email, phone transcript, etc.) to our regional office. Call 1-800-521-0323 for the regional office address.		
Distribution was completed on ___ / ___ / ____.	Check all that apply:	
Were the water users notified within 24 hours? <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Hand delivery, <input type="checkbox"/> News release (TV, radio, newspaper, etc.), <input type="checkbox"/> Posting at _____ <input type="checkbox"/> Other _____	
_____ Signature of owner or operator	_____ Position	_____ Date

Contact: Name
Title
Phone: ()
Email: @

Street Address
City, State, Zip
Web Address

SYSTEM NAME

DRINKING WATER WARNING

Boil Your Water Before Using

Due to loss of water pressure in the distribution system on Date, potentially harmful bacteria could be present in the water supply. If these bacteria are present, they could make you sick, and are a particular concern for people with weakened immune systems. The affected area is limited, but if you have received this notice directly from your water provider, you are in the affected area.

Do not drink the water without boiling it first.

Customers should bring water to a rolling boil for 1 full minute, allow the water to cool before using, and store the cooled water in a clean container with a cover. Customers should use boiled water that has cooled or bottled water for:

- Drinking
- Brushing teeth
- Washing fruits and vegetables
- Preparing food and baby formula
- Making ice
- Cleaning food contact surfaces

Describe corrective action. We will inform you when tests show no bacteria and you no longer need to boil your water. We anticipate resolving the problem within estimated time frame.

This boil water advisory is a precaution. To limit risk to health, customers should follow the instructions contained in this advisory.

For more information, go to information website or contact Name, Title at Water System, phone number or email. General guidelines on ways to lessen the risk of infection by contaminants in drinking water are available from the EPA Safe Drinking Water Hotline at 1-800-426-4791 or the Oregon Health Authority, Drinking Water Services at 971-673-0405.

Commonly Asked Questions Following A Boil Water Notice

The following information is provided to answer questions from the public about how they should respond to public boil water advisories issued under the USEPA/OHA advisory rules. Public water systems are required to issue boil water notices under the following circumstances:

Failure of a system to meet microbial standards

Failure of a system to meet treatment or turbidity standards

Failure of a system to adequately disinfect drinking water

Failure of a system to maintain positive pressure in distribution

In some cases the hazards will be more acute than others, but not generically different. The presence of organisms is conclusive evidence of potential harm, lack of disinfectant implies that viable organisms may reach customers, and high turbidity interferes with disinfection which can lead to viable organisms surviving and reaching the customer. When boil water notices are in place, customers need to know what uses they can safely continue, and what uses require boiling of the water before use. Since any of the above scenarios result in inadequately treated water reaching households, our advice about safe uses should be consistent. **Water used for activities that require boiling should be brought to a rolling boil for 1 minute.**

Activities that <u>do</u> require boiled water:	Activities that <u>do not</u> require boiled water:
Drinking	Showering
Washing food served without cooking or baking	Tub bathing
Adding water to food without cooking or baking	Dish washing or rinsing*
Ice making	Laundering
Cleaning food contact surfaces	General cleaning or mopping
Rinsing your mouth or gargling	Hand washing
Eye washing	Pet watering
Taking water with medications	Pet bathing
Tooth brushing	Plant water or irrigation

*Clean dishes and utensils should be rinsed in water that contains 1 tablespoon of household bleach per gallon of water (100-200 ppm chlorine) and allowed to air dry before use.

Home treatment devices that do not boil or chemically disinfect the water with acceptable disinfectants are not considered reliable alternatives to boiling the water.

Note: Facilities licensed by the county health department or Department of Agriculture may have additional sanitary requirements. Check with the appropriate regulatory agency for details.

Instructions for public notice after exceeding the MCL for *E. Coli*

Template on Reverse

Exceeding the maximum contaminant level for *E. coli* requires a Tier 1 public notice. You must provide public notice to persons served as soon as practical but within 24 hours after you learn of the violation [OAR 333-061-0042(3)]. During this time, you must also contact the Oregon Health Authority at 971-673-0405 and your local health department or Department of Agriculture health specialist. You may have to modify the template if you also have high nitrate levels or other chemical MCL violations because boiling water could increase concentrations of chemical contaminant. You must use one or more of the following methods to deliver the notice to consumers [OAR 333-061-0042(3)]:

- Radio
- Television
- Hand or direct delivery
- Posting in conspicuous locations

You may need to use additional methods (for example, newspaper, delivery of multiple copies to hospitals, clinics, or apartment buildings), since notice must be provided in a manner reasonably calculated to reach all persons served.

The notice on the reverse is appropriate for hand delivery or a newspaper notice. However, you may wish to modify it before using it for a radio or TV notice. If you do, you must still include all required elements and leave the health effects language in italics unchanged. This language is mandatory [OAR 333-061-0042(4)]. If you post or hand deliver, print your notice on letterhead, if you have it.

What happened?

Provide a description of the situation, including the number of samples with *E. coli* bacteria present and where they were collected.

Population Served

Make sure it is clear who is served by your water system--you may need to list the areas you serve.

What Should I Do?

This section provides guidance to water users and must not be changed except when you are advised to do so by your regulatory official.

What Does This Mean?

This section provides required health effects language and must not be changed.

What is being done?

In your notice, describe the corrective actions you are taking. Listed below are some steps commonly taken at water systems with *E. coli* contamination, use one or more of the following actions if appropriate or develop your own:

- We are chlorinating and flushing the water system.
- We are switching to an alternate drinking water source.
- We are increasing sampling for coliform bacteria to determine the source of the contamination.
- We are repairing the wellhead seal.
- We are repairing the storage tank.
- We are restricting water intake from the river/lake/reservoir to prevent additional bacteria from entering the water system and restricting water use to emergencies.

After Issuing the Notice

Send a copy of each type of notice and a certification that you have met all the public notice requirements to the Oregon Health Authority within ten days from the time you issue the notice [OAR 333-061-0040(1)].

It is recommended that you notify health professionals in the area of the violation. People may call their doctors with questions about how the violation may affect their health, and the doctors should have the information they need to respond appropriately. In addition, health professionals, including dentists, use tap water during their procedures and need to know of contamination so they can use bottled water.

It is a good idea to issue a "problem corrected" notice when the violation is resolved.

DRINKING WATER WARNING
[Water system name] water is contaminated with *E. coli* bacteria
BOIL YOUR WATER BEFORE USING

What happened?

E. coli bacteria were found in our water system on [date]. These bacteria can make you sick, and are a particular concern for people with weakened immune systems. As our customers, you have a right to know what happened and what we are doing to correct this situation. [Provide specific information about the situation here].

What should I do?

DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST. Bring all water to a boil, let it boil for one minute and let it cool before using, or use bottled water. Boiled or bottled water should be used for drinking, making ice, brushing teeth, washing dishes, and food preparation **until further notice**. Boiling kills bacteria and other organisms in the water.

People with severely compromised immune system, infants, or the elderly may be at increased risk and should seek advice about drinking water from their health care providers. General guidelines on ways to lessen the risk of infection by microbes are available from EPA's Safe Drinking Water Hotline at (800) 426-4791, or contact Oregon Health Authority, Drinking Water Services at (971) 673-0405. If you have specific health concerns, consult your doctor.

What does this mean?

E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, some of the elderly, and people with severely-compromised immune systems.

The symptoms above are not caused only by organisms in drinking water. If you experience any of these symptoms and they persist, you may want to seek medical advice. People at increased risk should seek advice about drinking water from their health care providers.

What is being done?

[Describe corrective actions taken]. We will inform you when tests show no bacteria and you no longer need to boil your water. We anticipate resolving the problem within [estimated time frame] and will provide information about any additional steps you should be taking.

For more information, please contact [name of contact] at [phone number] or [mailing address].

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by [water system name].
State Water System ID#: _____.

Date distributed: _____

Instructions for public notice after failing to complete a Level 1 Coliform Investigation or correct sanitary defects

Template on Reverse

Failing to complete a coliform investigation or correct sanitary defects found during an investigation requires a Tier 2 public notice. You must provide public notice to water users as soon as practical but no later than 30 days after you learn of the violation [OAR 333-061-0042(3)].

For community water systems, notice must be delivered using either method #1 or #2. For non-community water systems, notice may be distributed using method #3 if everyone served by the water system will view the notice where it is posted [OAR 333-061-0042(3)]:

- 1) Hand or direct delivery
- 2) Mail, as a separate notice or included with the bill
- 3) Posting in conspicuous locations

In addition, both community and non-community systems must use *another* method reasonably calculated to reach others if they would not be reached by the first method [OAR 333-061-0042(3)]. Such methods could include newspapers, e-mail, or delivery to community organizations. If you mail, post, or hand deliver, print your notice on letterhead, if available.

The notice on the reverse is appropriate for hand delivery or mail. However, you may wish to modify it before using it for posting. If you do, you must still include all the required elements and leave the health effects language in italics unchanged. This language is mandatory [OAR 333-061-0042(4)].

What Happened?

Provide a description of the situation and why the investigation was necessary and if applicable, what sanitary defects were not corrected in the time allowed, including the number of samples with bacteria present and where they were collected as described in the following table.

<u>If you collect less than 40 samples a month</u>	<u>If you collect more than 40 samples a month</u>
State the number of samples testing positive for coliform. The standard is that no more than one sample per month may be positive.	State the percentage of samples testing positive for coliform. The standard is that no more than five percent of samples may test positive each month.

Population Served

Make sure it is clear who is served by your water system--you may need to list the areas you serve.

What Does This Mean?

This section provides required health effects language and must not be changed.

What Should I Do?

This section provides guidance to water users and must not be changed.

What is being done?

In your notice, explain when you are planning to conduct the investigation or, if it was already completed whether any sanitary defects were found and if any sanitary defects were found but not corrected. Also, describe any other corrective actions you have taken or are planning to take.

After Issuing the Notice

Make sure to send a copy of each type of notice along with a certification that you have met all the public notice requirements to your privacy agency within ten days after issuing the notice [OAR 333-061-0040(1)].

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

[Water system name] failed to [conduct a coliform investigation [or] correct sanitary defects following a coliform investigation]

What happened?

On [date], we were required to conduct an investigation of our water system due to the presence of coliform bacteria. [Provide specific information about the situation]. As our customers, you have a right to know what happened and what we are doing to correct this situation.

What does this mean?

This is not an emergency. If it had been, you would have been notified immediately. However, the failure to conduct a coliform investigation or correct all the sanitary defects found in an investigation has the potential to lead to additional contamination in our water system.

Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the drinking water distribution system. We found coliforms indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct investigations to identify problems and to correct any problems that are found. [Include one of the following statements exactly as written.]

- *We failed to conduct the required investigation.*
- *We completed the required investigation but we failed to correct all identified sanitary defects that were found during the coliform investigation that we conducted.*

What should I do?

- **You do not need to boil your water or take other corrective actions.** However, if you have specific health concerns, consult your doctor.
- People with severely compromised immune systems, infants, and some elderly may be at increased risk. These people should seek advice about drinking water from their health care providers. General guidelines on ways to lessen the risk of infection by microbes are available from EPA' Safe Drinking Water Hotline at (800) 426-4791 or contact Oregon Health Authority, Drinking Water Services at (971) 673-0405.

What is being done?

[Describe corrective actions taken]. We will keep you informed and provide information on any additional steps you should be taking.

For more information, please contact [name of contact], at [phone number] or [mailing address].

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by [water system name]. Date distributed: _____.
State Water System ID#: _____.

WATERBORNE DISEASE AND MICROORGANISMS

Microorganisms are widely spread over the earth and throughout its atmosphere. Microorganisms include bacteria, viruses, and protozoan parasites; they are microscopic and therefore invisible to the naked eye. They are found in all surface waters, including lakes, streams, and rivers. They can be found in shallow and unprotected wells and springs and, less often, in deep and protected well waters. Many microorganisms can survive extremes of climate. Most microorganisms in the environment and found in water are not harmful, but enough of them are harmful that we try to keep drinking water nearly microorganism-free.

The microorganisms that have the most significance to human health are those that cause disease, which are called pathogens. Examples of common pathogens include bacteria such as *Salmonella* and *Shigella*, protozoans such as *Giardia* and *Cryptosporidium*, and viruses such as hepatitis A and Norwalk. Most of these pathogens are transmitted by what is called the fecal-oral route of exposure; this means that feces from an infected person or animal somehow (directly or indirectly) get into a person's mouth. An example of direct transmission would be changing diapers and then not washing your hands before sticking your finger in your mouth. An example of indirect transmission might be drinking water from a stream contaminated with runoff from a field being grazed by cows upstream

It is not possible to test drinking water regularly for the presence of disease-causing organisms because they exist in very low numbers in water, are hard to isolate and detect, and there are so many different kinds it would be impractical and expensive to test for them all. Consequently, public health agencies and water suppliers in this country generally test only for certain kinds of bacteria that are known as "indicator organisms". These indicators do not themselves cause disease, but are markers for fecal pollution that are easier to test for.

The most common of these test organisms is the broad class of bacteria called coliforms. The presence of coliforms in drinking water suggests microbiological contamination of the source water, a failure of the water treatment system, a break or

leak in the water mains, or contamination of the water distribution system by backflow from households or commercial establishments. When coliforms are detected in drinking water, immediate action should be taken to identify the source or sources of the bacteria and eliminate them.

TOTAL COLIFORM BACTERIA

Total coliform bacteria, often called merely "coliforms", are very widely distributed in nature. Most coliforms live in the intestinal tract of man and other warm-blooded animals, so they are found in significant numbers wherever fecal (intestinal) waste or contamination is present. A few of the bacteria in this class are associated with natural plant material and therefore may be found even where fecal contamination is absent. Coliforms are the most commonly used indicators of contamination in drinking water. Water that contains total coliforms should immediately be tested further for fecal coliforms or *E. coli* (see below). If total coliforms persist in the absence of fecal coliforms or *E. coli*, steps should be taken promptly to identify and eliminate the source of the total coliforms.

FECAL COLIFORM BACTERIA

This is a subgroup of total coliform bacteria consisting of those that can grow at a temperature too warm for most coliforms (44.5 degrees C, or 112 degrees F.). The organisms found by this method are more likely to be associated with fecal contamination than are total coliforms, although again it is not a perfect marker. Some fecal coliforms are associated with woody plant material. But in general, fecal coliforms are a better indicator of fecal contamination than total coliforms in drinking water. Although it doesn't necessarily imply that pathogens are present, water containing fecal coliform is risky to drink unless it is disinfected. Bringing contaminated water to a boil for one minute is a reliable way of disinfecting it.

Escherichia coli (E. coli)

E. coli is one of the fecal coliforms. It lives in the digestive tract of warm-blooded animals and humans. It is present in the feces of almost all warm-blooded animals and

humans. Its presence in drinking water is a clear indication of fecal contamination and that the organisms in that waste are still living in the water. Water that tests positive for *E. coli* could contain pathogens and would be risky to drink without adequate disinfection. Bringing contaminated water to a boil for one minute is a reliable way of disinfecting it.

PATHOGENIC *E. coli*

There are hundreds of different kinds of *E. coli*. Most are harmless, but some can cause illness. The most well-known pathogenic *E. coli* is called *E. coli* O157:H7. Outbreaks caused by this organism often make the news, and are often linked to undercooked meat, raw milk, or other foods contaminated by cattle feces. There have been several outbreaks in the U.S. of *E. coli* caused by contaminated drinking water. All occurred either when people drank untreated water or where water disinfection procedures were not followed properly. Routine water testing methods do not distinguish between pathogenic *E. coli* and the harmless indicator strains. Water containing any *E. coli* is risky to drink without water disinfection. Bringing contaminated water to a boil for one minute is a reliable way of disinfecting it.

ELIMINATING COLIFORMS FROM WELLS

Construction or maintenance work, such as pump replacement in an existing well, can temporarily contaminate well water with coliform bacteria. Bacteria from soil, vegetation, and the tools and hands of the maintenance crew could enter the well. Before using the water, disinfect and flush the entire system and then sample for coliform. The safest temporary measure to kill coliform and other microorganisms in drinking water is to bring water to a rolling boil for one full minute. Chlorination or other chemical disinfection techniques can eliminate coliforms from properly constructed wells.

The procedure for chlorinating a well to eliminate coliforms follows:

For each 100 gallons of well water, add two cups (16 ounces) of household bleach (5% sodium hypochlorite) available from grocery stores.

EXAMPLE: How much bleach is needed to disinfect a well with a 6 inch diameter casing and now has 65 feet of water? Answer: The table below shows there are 1.5 gallons of water for each foot of water depth for a 6" diameter well. Multiply the total water depth of 65 feet X 1.50 gallons per foot = 97.5 gallons of water in this 6" diameter well. Since 97.5 feet is about 100 gallons, add 2 cups of 5% bleach to the well to disinfect it.

Calculate the gallons of water in the well by using the following table:

Well Casing Diameter (inches)	Gallons of Water per Foot of Depth
4	0.65
6	1.50
8	2.60
10	4.10
12	5.90
14	8.00

1. Add the bleach to 4-5 gallons of water and pour in the well. Use a plug or casing vent hole in the top of the sanitary seal.
2. Be sure the bleach mixes thoroughly with the well water. Attach a hose from pump or service line and run water into the well. Use the same hole in the top of the sanitary seal used to add the bleach.
3. After 15 or 20 minutes, open each fixture served by the well until you can detect a bleach smell in the water then close the valves. Let the bleach stand in the well and plumbing for adequate contact time - at least 8 hours.
4. **Thoroughly flush the system.**
5. Sample for total coliform. A good sample location is a bathroom faucet with the aerator removed. Wait until lab results are negative for total coliforms before using the water.

It is difficult to flush an entire system when it is large. The well should be isolated, disinfected, flushed and sampled for total coliform. If total coliform samples are positive, repeat the disinfection process until samples are negative. The repeat procedure must be followed in sequence: disinfect, flush all bleach, and wait for sample results before resuming service. Schedule maintenance in advance so there is adequate time to disinfect and be sure water is safe for use. **Warning:** Be sure bleach used in this process is flushed thoroughly from all service lines. Remember that bleach contains chlorine and chlorine is harmful to aquarium fish.

If repeated efforts to disinfect a well fail to eliminate coliform organisms or if the organisms return, there could be problems with its construction or protection. Consult a well construction professional for advice on correcting these problems. Identifying and correcting well construction problems is generally a better long-term solution than installing and relying on permanent water treatment equipment.

EMERGENCY DISINFECTION OF DRINKING WATER

In an emergency situation where regular water service has been interrupted – like a hurricane, flood, or water pipe breakage – local authorities may recommend using only bottled water, boiled water, or disinfected water until regular water service is restored. The instructions below show you how to boil and disinfect water to kill most disease-causing microorganisms that may be present in the water. However, boiling or disinfection will not destroy other contaminants, such as heavy metals, salts, and most other chemicals.

ONLY USE WATER THAT HAS BEEN PROPERLY DISINFECTED FOR DRINKING, COOKING, MAKING ANY PREPARED DRINK, WASHING DISHES, AND FOR BRUSHING TEETH.

❑ Use **bottled water** or water you have properly prepared and stored as an emergency water supply.

❑ **Boil water**, if you do not have bottled water. Boiling is sufficient to kill pathogenic bacteria, viruses and protozoa (WHO, 2015).

- If water is cloudy, let it settle and filter it through a clean cloth, paper towel, or coffee filter.
- Bring water to a rolling boil for at least one minute. At altitudes above 5,000 feet (1,000 meters), boil water for three minutes.
- Let water cool naturally and store it in clean containers with covers.
- To improve the flat taste of boiled water, add one pinch of salt to each quart or liter of water, or pour the water from one clean container to another several times.



❑ **Disinfect water using household bleach**, if you can't boil water. Only use regular, unscented chlorine bleach products that are suitable for disinfection and sanitation as indicated on the label. Do not use scented, color safe, or bleaches with added cleaners.

- If water is cloudy, let it settle and filter it through a clean cloth, paper towel, or coffee filter.
- Locate a clean dropper from your medicine cabinet or emergency supply kit.
- Locate a fresh liquid chlorine bleach or liquid chlorine bleach that is stored at room temperatures for less than one year. The label should say that it contains 8.25% of sodium hypochlorite.
- Use the table on the next page as a guide to decide the amount of bleach you should add to the water, for example, add 6 drops of bleach to each gallon of water. Double the amount of bleach if the water is cloudy, colored, or very cold.
- Stir and let stand for 30 minutes. The water should have a slight chlorine odor. If it doesn't, repeat the dosage and let stand for another 15 minutes before use.
- If the chlorine taste is too strong, pour the water from one clean container to another and let it stand for a few hours before use.

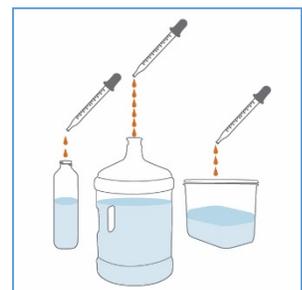


Table 1: Bleach to Water Dose Guidance

Volume of Water	Amount of Liquid Bleach to Add [†]
1 quart/liter	2 drops
1 gallon	6 drops
2 gallons	12 drops (1/8 teaspoon)
4 gallons	1/4 teaspoon
8 gallons	1/2 teaspoon

[†] Bleach contains 8.25% sodium hypochlorite.

ADDITIONAL WATER GUIDANCE FOR EMERGENCIES

Prepare and store an emergency water supply. Visit the Federal Emergency Management Agency (FEMA) website www.ready.gov/managing-water for additional guidance on preparing and storing an emergency water supply.

Look for other sources of water in and around your home. Although bottled water is your best choice, you may be able to find other sources of water by melting ice cubes or draining your hot water tank or pipes. You should not use water from toilet flush tanks or bowls, radiators, waterbeds, swimming pools, or spas.

You can also use river or lake water. It is generally better to use flowing water than still, stagnant water. However, do not use water with floating material in it or water that has a dark color or questionable odor.

Regardless of the source, treat the water by following the instructions on the previous page.

If you have a well on your property that has been flooded, make sure to disinfect and test the well water after the flood. Contact your state or local health department for advice or go to water.epa.gov/drink/info/well/whatdo.cfm.

Consider how the water looks and how to filter it if needed. Disinfection does not work as well when



water is cloudy or colored. If water is cloudy, let it settle. Then filter the water through a clean cloth, paper towel, or coffee filter. Store the settled and filtered water in clean containers with covers.

OTHER DISINFECTION METHODS

If you don't have liquid bleach, you can use one of the other disinfection methods described below.

- **Granular calcium hypochlorite.** The first step is to make a chlorine solution that you will use to disinfect your water. For your safety, do it in a ventilated area and wear eye protection. Add one heaping teaspoon (approximately ¼ ounce) of high-test granular calcium hypochlorite (HTH) to two gallons of water and stir until the particles have dissolved. The mixture will produce a chlorine solution of approximately 500 milligrams per liter. To disinfect water, add one part of the chlorine solution to each 100 parts of water you are treating. This is about the same as adding 1 pint (16 ounces) of the chlorine solution to 12.5 gallons of water. If the chlorine taste is too strong, pour the water from one clean container to another and let it stand for a few hours before use. CAUTION: HTH is a very powerful oxidant. Follow the instructions on the label for safe handling and storage of this chemical.
- **Common household iodine (or “tincture of iodine”).** You may have iodine in your medicine cabinet or first aid kit. Add five drops of 2% tincture of iodine to each quart or liter of water that you are disinfecting. If the water is cloudy or colored, add 10 drops of iodine. Stir and let the water stand for at least 30 minutes before use.
- **Water disinfection tablets.** You can disinfect water with tablets that contain chlorine, iodine, chlorine dioxide, or other disinfecting agents. These tablets are available online or at pharmacies and sporting goods stores. Follow the instructions on the product label as each product may have a different strength.

MORE INFORMATION

World Health Organization (WHO), 2015. *Technical Briefing on Boil Water*.

Safe Drinking Water Hotline 1-800-426-4791
water.epa.gov/drink/hotline

Template on Reverse

Since exceeding the nitrate maximum contaminant level is a Tier 1 violation, you must provide public notice to persons served as soon as practical but no more than 24 hours from learning of the violation [OAR 333-061-0042(3)(a)]. During this time period you must also contact your primacy agency. You should also coordinate with your local health department. This template is also applicable to nitrite and total nitrate and nitrite violations. You must use one or more of the following methods to deliver the notice to consumers [OAR 333-061-0042(3)(a)(D)]:

- X Radio
- X Television
- X Hand or direct delivery
- X Posting in conspicuous locations

You may need to use additional methods (e.g., newspaper, delivery of multiple copies to hospitals, clinics, or apartment buildings), since notice must be provided in a manner reasonably calculated to reach all persons served. If you post or hand deliver, print your notice on your system's letterhead, if available.

The notice on the reverse provides suggested public notice content and format and is appropriate for hand delivery or for publication in a newspaper. However, you may wish to modify it before using it for a radio or TV broadcast. If you do modify the notice on the reverse, you must still include all required PN elements from OAR 333-061-0042(4)(d) and leave the mandatory language unchanged (see below).

Mandatory Language

Mandatory language on health effects [OAR 333-061-0097] must be included as written (with blanks filled in) and is presented in this notice in italics and with an asterisk on either end.

You must also include standard language to encourage the distribution of the public notice to all persons served, where applicable [OAR 333-061-0042(4)(d)]. This language is also presented in this notice in italics and with an asterisk on either end.

Alternative Sources of Water

If you are selling or providing bottled water, your notice should say where it can be obtained. Remember that bottled water can also be contaminated. If you are providing bottled water, make sure it meets US Food and Drug Administration (FDA) and/or state bottled water safety standards.

Repeat Notices

If this is a repeat notice (as required by your primacy agency), or if your system's nitrate levels fluctuate around the MCL, you may wish to include an explanation similar to the following:

You were initially notified of high nitrate levels on [give date]. Since that time we have been monitoring the nitrate concentration every three months. Seasonal fluctuations in nitrate concentrations have been observed, due to nitrates contained in fertilizer. It appears that high nitrates occur during the later summer and fall. Note that prior to [give year] we were meeting drinking water standards for nitrate.

Corrective Action

In your notice, describe corrective actions you are taking. The bullet below describes one action commonly taken by water systems with nitrate/nitrite violations. You can use the following language, if appropriate, or develop your own: (We are investigating water treatment and other options. These may include drilling a new well, mixing the water with low-nitrate water from another source, or buying water from another water system.)

After Issuing the Notice

Send a copy of each type of notice and a certification that you have met all the public notice requirements to your primacy agency within ten days after you issue the notice [OAR 333-061-0040(1)(h)].

You should notify health professionals in the area of the violation. People may call their doctors with questions, and the doctors should have the information they need to respond appropriately. They also need to make sure the water is not provided to infants in their care.

It is also a good idea to issue a “problem corrected” notice when the violation is resolved.

DRINKING WATER WARNING

[System] water has high levels of nitrate

**DO NOT GIVE THE WATER TO INFANTS UNDER 6 MONTHS OLD
OR USE IT TO MAKE INFANT FORMULA**

Results of a water sample collected [give date], showed nitrate levels of [level] milligrams per liter. This is above the nitrate standard, or maximum contaminant level (MCL), of 10 milligrams per liter. Nitrate in drinking water is a serious health concern for infants less than six months old.

What should I do? What does this mean?

- **DO NOT GIVE THE WATER TO INFANTS.** **Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.** Blue baby syndrome is indicated by blueness of the skin. Symptoms in infants can develop rapidly, with health deteriorating over a period of days. If symptoms occur, seek medical attention immediately.
- Water, juice, and formula for children under six months of age should not be prepared with tap water. Bottled water or other water low in nitrates should be used for infants until further notice.
- **DO NOT BOIL THE WATER.** Boiling, freezing, filtering, or letting water stand does not reduce the nitrate level. Excessive boiling can make the nitrates more concentrated, because nitrates remain behind when the water evaporates.
- Adults and children older than six months can drink the tap water (nitrate is a concern for infants because they can't process nitrates in the same way adults can). However, if you are pregnant or have specific health concerns, you may wish to consult your doctor.

What is being done?

Nitrate in drinking water can come from natural, industrial, or agricultural sources (including septic systems and run-off). Levels of nitrate in drinking water can vary throughout the year. We'll let you know when the amount of nitrate is again below the limit.

[Describe corrective action and when system expects to return to compliance.]

For more information, please contact [name of contact] at [phone number] or [mailing address].

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being provided by [system]. State Water System ID#: 41- _____

Date distributed: _____

Template on Reverse

Most chemical or radiological maximum contaminant level (MCL) violations require Tier 2 notification. You must provide public notice to persons served as soon as practical but within 30 days after you learn of the violation [OAR 333-061-0042 (3)(b)]. You must issue a repeat notice every three months for as long as the violation persists. The Oregon Health Authority Drinking Water Services (DWS) may have more stringent requirements for MCL violations (e.g., it may require you to provide water from an alternate source). Check with DWS to make sure you meet all requirements. **Contact DWS for fluoride MCL violations.**

Community systems must use one of the following methods [OAR 333-061-0042(3)(b)(E)]:

- Hand or direct delivery
- Mail, as a separate notice or included with the bill

Noncommunity systems must use one of the following methods [OAR 333-061-0042(3)(b)(E)]:

- Posting in conspicuous locations
- Hand delivery
- Mail

In addition, both community and noncommunity systems must use *another* method reasonably calculated to reach others if they would not be reached by the first method [OAR 333-061-0042(3)(b)(E)]. Such methods could include newspapers, e-mail, or delivery to community organizations. If you mail, post, or hand deliver, print your notice on your system's letterhead, if available.

The notice on the reverse is appropriate for mailing, posting, or hand delivery. If you modify this notice, you must still include all required PN elements from OAR 333-061-0042(4)(d) and leave the mandatory language unchanged (see below).

Mandatory Language

Mandatory language on health effects (from Appendix - OAR 333-061-0097) must be included as written (with blanks filled in). This notice includes a placeholder for a specific contaminant's health effects language.

You must also include standard language to encourage the distribution of the public notice to all persons served, where applicable [OAR 333-061-0042(4)(d)]. This language is also presented in this notice in italics and with an asterisk on either end.

Corrective Action

In your notice, describe corrective actions you are taking. Do not use overly technical terminology when describing treatment methods. Listed below are some steps commonly taken by water systems with chemical or radiological violations. Depending on the corrective action you are taking, you can use one or more of the following statements, if appropriate, or develop your own text:

- We are working with [local/state agency] to evaluate the water supply and are researching options to correct the problem. These options may include treating the water to remove [contaminant] or connecting to [system]'s water supply.
- We have stopped using the contaminated well. We have increased pumping from other wells, and we are investigating drilling a new well.
- We have increased the frequency that we will test the water for [contaminant].
- We have since taken samples at this location and had them tested. These samples show that we meet the standards.

Repeat Notices

If this is an ongoing violation and/or you fluctuate above and below the MCL, you should give the history behind the violation, including the source of contamination, if known. List the date of the initial detection, as well as how levels have changed over time. If levels are changing as a result of treatment, you can indicate this.

After Issuing the Notice

Make sure to send DWS a copy of each type of notice and a certification that you have met all public notification requirements within ten days after issuing the notice [OAR 333-061-0040(1)(i)].

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

[System] Has Levels of [Contaminant] Above Drinking Water Standards

Our water system recently violated a drinking water standard. Although this is not an emergency, as our customers, you have a right to know what happened, what you should do, and what we did (or are doing) to correct this situation.

We routinely monitor for the presence of drinking water contaminants. On [give date] we received notice that the sample collected on [give date] showed that our system exceeds the standard, or maximum contaminant level (MCL), for [contaminant]. The standard for [contaminant] is [MCL]. The average level of [contaminant] over the last year has been [provide level]. **OR** [Contaminant] was found at [provide level].

What should I do?

- There is nothing you need to do. You do not need to boil your water or take other corrective actions. Boiling the water does not reduce the chemical level. Boiling the water can make the chemical more concentrated, because the chemical remains behind when the water is evaporated. However, if you have specific health concerns, consult your doctor.
- If you have a severely compromised immune system, have an infant, are pregnant, or are elderly, you may be at increased risk and should seek advice from your health care providers about drinking this water.

What does this mean?

This is not an emergency. If it had been, you would have been notified within 24 hours. However, [insert relevant health effects language for the contaminant from the Appendix of this document.]

What is being done?

[Describe corrective action.] We anticipate resolving the problem within [estimated time frame].

For more information, please contact [name of contact] at [phone number] or [mailing address].

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by [water system]. State Water System ID#: 41 _____.
Date distributed: [give date].

Appendix
Standard Health Effects Language for Public Notification
(from OAR 333-061-0097)

Contaminant	MCLG mg/L	MCL mg/L	Standard Health Effects Language for Public Notification
National Primary Drinking Water Regulations (NPDWR):			
A. Inorganic Chemicals (IOCs)			
1. Antimony	0.006	0.006	Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar.
2. Arsenic	0.0	0.010	Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.
3. Asbestos (10 µm)	7 MFL	7 MFL	Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps.
4. Barium	2	2	Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure. 12. Beryllium 0.004 0.004 Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions.
5. Beryllium	0.004	0.004	Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions.
6. Cadmium	0.005	0.005	Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage.
7. Chromium (total)	0.1	0.1	Some people who use water containing chromium well in excess of the MCL over many years could experience allergic dermatitis.
8. Cyanide	0.2	0.2	Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid.
9. Fluoride	4.0	4.0	[Contact DWS for fluoride MCL violations.] Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine years old. Mottling, also known as dental fluorosis, may include brown staining and/or pitting of the teeth, and occurs only in developing teeth, before they erupt from the gums.
10. Mercury(inorganic)	0.002	0.002	Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage.
11. Nitrate	10	10	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and bluebaby syndrome.
12. Nitrite	1	1	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and bluebaby syndrome.
13.Total Nitrate and Nitrite	10	10	Infants below the age of six months who drink water containing nitrate and nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
14. Selenium	0.05	0.05	Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation.
15. Thallium	0.0005	0.002	Some people who drink water containing thallium in excess of the MCL over many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver.

Appendix Standard Health Effects Language for Public Notification (from OAR 333-061-0097)			
Contaminant	MCLG mg/L	MCL mg/L	Standard Health Effects Language for Public Notification
B. Lead and Copper Rule			
16. Lead	Zero	TT	Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.
17. Copper	1.3	TT	Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.
C. Synthetic Organic Chemicals (SOCs)			
18. 2,4-D	0.07	0.07	Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could experience problems with their kidneys, liver, or adrenal glands.
19. 2,4,5-TP (Silvex)	0.05	0.05	Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems.
20. Alachlor	Zero	0.002	Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, or experience anemia, and may have an increased risk of getting cancer.
21. Atrazine	0.003	0.003	Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties.
22. Benzo(a)pyrene (PAHs)	Zero	0.0002	Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer.
23. Carbofuran	0.04	0.04	Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems.
24. Chlordane	Zero	0.002	Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver, or nervous system, and may have an increased risk of getting cancer.
25. Dalapon	0.2	0.2	Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes.
26. Di (2-ethylhexyl)adipate	0.4	0.4	Some people who drink water containing di (2-ethylhexyl) adipate well in excess of the MCL over many years could experience toxic effects such as weight loss, liver enlargement or reproductive difficulties.
27. Di(2-ethylhexyl)phthalate	Zero	0.006	Some people who drink water containing di (2-ethylhexyl) phthalate in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer.
28. Dibromochloropropane (DBCP)	Zero	0.0002	Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
29. Dinoseb	0.007	0.007	Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties.
30. Dioxin (2,3,7,8TCDD)	Zero	3x10	Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
31. Diquat	0.02	0.02	Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.
32. Endothall	0.1	0.1	Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines.

Appendix
Standard Health Effects Language for Public Notification
(from OAR 333-061-0097)

Contaminant	MCLG mg/L	MCL mg/L	Standard Health Effects Language for Public Notification
33. Endrin	0.002	0.002	Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
34. Ethylene dibromide	Zero	0.00005	Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and may have an increased risk of getting cancer.
35. Glyphosate	0.7	0.7	Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or reproductive difficulties.
36. Heptachlor	Zero	0.0004	Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer.
37. Heptachlor epoxide	Zero	0.0002	Some people who drink water containing heptachlor epoxide in excess of the MCL over many years could experience liver damage, and may have an increased risk of getting cancer.
38. Hexachlorobenzene	Zero	0.001	Some people who drink water containing hexachlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer.
39. Hexachlorocyclopentadiene	0.05	0.05	Some people who drink water containing hexachlorocyclopentadiene in excess of the MCL over many years could experience problems with their kidneys or stomach.
40. Lindane	0.0002	0.0002	Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver.
41. Methoxychlor	0.04	0.04	Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties.
42. Oxamyl (Vydate)	0.2	0.2	Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects.
43. Pentachlorophenol	Zero	0.001	Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer.
44. Picloram	0.5	0.5	Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver.
45. Polychlorinated biphenyls (PCBs)	Zero	0.0005	Some people who drink water containing PCBs in excess of the MCL over many years could experience changes in their skin, problems with their thymus gland, immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer.
46. Simazine	0.004	0.004	Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood.
47. Toxaphene	Zero	0.003	Some people who drink water containing toxaphene in excess of the MCL over many years could have problems with their kidneys, liver, or thyroid, and may have an increased risk of getting cancer.
D. Volatile Organic Chemicals (VOCs)			
48. Benzene	Zero	0.005	Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer.
49. Carbon tetrachloride	Zero	0.005	Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
50. Chlorobenzene (monochlorobenzene)	0.1	0.1	Some people who drink water containing chlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys.
51. o-Dichlorobenzene	0.6	0.6	Some people who drink water containing o-dichlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys.

excess of the MCL over many years could experience problems with their liver, kidneys, or circulatory systems.

Appendix
Standard Health Effects Language for Public Notification
 (from OAR 333-061-0097)

Contaminant	MCLG mg/L	MCL mg/L	Standard Health Effects Language for Public Notification
52. <i>p</i> -Dichlorobenzene	0.075	0.075	Some people who drink water containing <i>p</i> -dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys, or spleen, or changes in their blood.
53. 1,2-Dichloroethane	Zero	0.005	Some people who drink water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer.
54. 1,1-Dichloroethylene	0.007	0.007	Some people who drink water containing 1,1-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
55. <i>cis</i> -1,2Dichloroethylene	0.07	0.07	Some people who drink water containing <i>cis</i> -1,2-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
56. <i>trans</i> -1,2 Dichloroethylene	0.1	0.1	Some people who drink water containing <i>trans</i> -1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their liver.
57. Dichloromethane	Zero	0.005	Some people who drink water containing dichloromethane in excess of the MCL over many years could have liver problems and may have an increased risk of getting cancer.
58. 1,2-Dichloropropane	Zero	0.005	Some people who drink water containing 1,2-dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.
59. Ethylbenzene	0.7	0.7	Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys.
60. Styrene	0.1	0.1	Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys, or circulatory system.
61. Tetrachloroethylene	Zero	0.005	Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer.
62. Toluene	1	1	Some people who drink water containing toluene well in excess of the MCL over many years could have problems with their nervous system, kidneys, or liver.
63. 1,2,4-Trichlorobenzene	0.07	0.07	Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could experience changes in their adrenal glands.
64. 1,1,1-Trichloroethane	0.2	0.2	Some people who drink water containing 1,1,1-trichloroethane in excess of the MCL over many years could experience problems with their liver, nervous system, or circulatory system.
65. 1,1,2-Trichloroethane	0.003	0.005	Some people who drink water containing 1,1,2-trichloroethane well in excess of the MCL over many years could have problems with their liver, kidneys, or immune systems.
66. Trichloroethylene	Zero	0.005	Some people who drink water containing trichloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
67. Vinyl chloride	Zero	0.002	Some people who drink water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer.
68. Xylenes (total)	10	10	Some people who drink water containing xylenes in excess of the MCL over many years could experience damage to their nervous system.
E. Radioactive Contaminants			
69. Beta/photon emitters	Zero	4 mrem/ yr	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.
70. Alpha emitters	Zero	17pCi/L	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing

alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.

Appendix
Standard Health Effects Language for Public Notification
 (from OAR 333-061-0097)

Contaminant	MCLG mg/L	MCL mg/L	Standard Health Effects Language for Public Notification
71. Combined radium (226 & 228)	Zero	5 pCi/L	Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.
72. Uranium	Zero	30 µg/L	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.
F. Disinfection Byproducts (DBPs), Byproduct Precursors, and Disinfectant Residuals: Where disinfection is used in the treatment of drinking water, disinfectants combine with organic and inorganic matter present in water to form chemicals called disinfection byproducts (DBPs). EPA sets standards for controlling the levels of disinfectants and DBPs in drinking water, including trihalomethanes (THMs) and haloacetic acids (HAA5s).			
73. Total trihalomethanes (TTHMs)	N/A	0.0801	Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.
74. Haloacetic Acids (HAA5s)	N/A	0.060	Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.
75. Bromate	Zero	0.010	Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer.
76. Chlorite	0.08	1.0	Some infants and young children who drink water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorite in excess of the MCL. Some people may experience anemia.
77. Chlorine	4 (MRDLG)	4.0 (MRDL)	Some people who use water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort.
78. Chloramines	4 (MRDLG)	4.0 (MRDL)	Some people who use water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chloramines well in excess of the MRDL could experience stomach discomfort or anemia.
79a. Chlorine dioxide, where any 2 consecutive daily samples taken at the entrance to the distribution system are above the MRDL.	0.8 (MRDLG)	0.8 (MRDL)	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. <i>Add for public notification only:</i> The chlorine dioxide violations reported today are the result of exceedances at the treatment facility only, not within the distribution system which delivers water to consumers. Continued compliance with chlorine dioxide levels within the distribution system minimizes the potential risk of these violations to consumers.
79b. Chlorine dioxide, where one or more distribution system samples are above the MRDL	0.8 (MRDLG)	0.8 (MRDL)	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. <i>Add for public notification only:</i> The chlorine dioxide violations reported today include exceedances of the EPA standard within the distribution system which delivers water to consumers. Violations of the chlorine dioxide standard within the distribution system may harm human health based on short-term exposures. Certain groups, including fetuses, infants, and young children, may be especially susceptible to nervous system effects from excessive chlorine dioxide exposure.

Appendix
Standard Health Effects Language for Public Notification
(from OAR 333-061-0097)

Contaminant	MCLG mg/L	MCL mg/L	Standard Health Effects Language for Public Notification
80. Control of DBP precursors (TOC)	None	TT	Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (TTHMs) and haloacetic acids (HAA5s). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer.
G. Other Treatment Techniques			
81. Acrylamide	Zero	TT	Some people who drink water containing high levels of acrylamide over a long period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer.
82. Epichlorohydrin	Zero	TT	Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer.

Translated Drinking Water Warnings

DOH PUB. # 331-246
July 2004

English	This report contains important information about your drinking water. Have someone translate it for you, or speak with someone who understands it.	Boil your water before using.	Don't drink the water.	Children under 12 months old should not drink the water. Don't use the water to make formula.
Amharic	ይህ ዘገባ ስለሚጠብቅ ውሃ ጠቃሚ መረጃዎችን ይዟል ። ሌላ ጉዳዩን የሚረዱሰው አንዲተረጉሙልዎት ወይም አንዲያስረዱዎት ያድርጉ ።	ውሃዎን ከመጠቀምዎ በፊት ያፍሉት ።	ውሃውን አይጠቡ ።	ዕድሜያቸው ከ12 ወራት በታች የሆኑ ልጆች ውሃውን መጠጣት የለባቸውም ። የልጆቹን ምግብ (ፎርሙላ) ለማሰናዳት ውሃውን አይጠቀሙ ።
Arabic	هذا التقرير يحتوي على معلومات مهمة عن ماء الشرب الذي تستخدمه. اطلب من شخص ما ان يترجمه لك او يستطيع فهمه.	اغلي الماء قبل استعماله	لا تشرب الماء.	يجب ان لا يشرب الأطفال اللذين أعمارهم أقل من 12 سنة هذا الماء. لا تستخدم هذا الماء لتحضير الفورملا (حليب الأطفال).
Cambodian (Khmer)	រាយការណ៍នេះ មានសារៈសំខាន់ណាស់ គឺស្តីអំពីទឹកដែលលោក-អ្នកទទួលបាន ។ ចូររកជនណាម្នាក់ឲ្យបកប្រែជូនលោក-អ្នក ឬក៏និយាយជាមួយជនណាម្នាក់ ដែលយល់នូវន័យនេះច្បាស់លាស់ ។	ចូរដាំទឹកឲ្យពុះសិន មុននឹងប្រើប្រាស់ ។	ចូរកុំទទួលបានទឹក ។	ក្មេងក្រោមអាយុ១២ខែ មិនគួរឲ្យញ៉ាំទឹកទេ ។ ចូរកុំប្រើទឹកលាយជាមួយម្សៅទឹកដោះ ។
Chinese Simplified	此报告包含有关您的饮用水的重要信息。请人帮您翻译出来，或请看懂此报告的人将内容说给您听。	将水煮开后才使用。	不要喝这些水。	不满 12 个月大的小孩不应该喝这些水。不要用这些水做配方。
Chinese Traditional	此報告包含有關您的飲用水的重要資訊。請人幫您翻譯出來，或請能看懂此報告的人將內容說給您聽。	將水煮開後才使用。	切勿喝這些水。	不滿 12 個月大的小孩不應該喝這些水。切勿用這些水做配方。
Farsi	این گزارش شامل اطلاعات مهمی درمورد آب اشامیدنی شما میباشد. از شخصی بخواهید که به شما ترجمه کنند و یا با شخصی که این موضوع را میفهمند صحبت کنید.	قبل از استفاده آب اشامیدنیتان را به جوش بیاورید.	آب را نخورید.	کودکان زیر ۱۲ ماهه نبایستی آب را بخورند. آب را برای درست کردن غذای بچه (فرمولا) استفاده نکنید.

French	Ce rapport contient des informations	Faire bouillir l'eau	Ne pas boire l'eau.	Les enfants des moins de 12 mois ne
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English	This report contains important information about your drinking water. Have someone translate it for you, or speak with someone who understands it.	Boil your water before using.	Don't drink the water.	Children under 12 months old should not drink the water. Don't use the water to make formula.
	importantes à propos de votre eau potable. Demander à quelqu'un de traduire ces informations pour vous ou discuter avec une personne qui comprend ces informations.	avant de l'utiliser.		doivent pas boire l'eau. Ne pas utiliser l'eau dans une préparation lactée pour nourrisson.
Greek	Αυτή η αναφορά περιλαμβάνει σημαντικές πληροφορίες σχετικά με το πόσιμο νερό σας. Ζητήστε από κάποιον να σας τη μεταφράσει, ή μιλήσετε με κάποιον που την καταλαβαίνει.	Βράζετε το νερό πριν το χρησιμοποιήσετε.	Μην πίνετε το νερό.	Τα παιδιά κάτω των 12 μηνών δεν θα πρέπει να πίνουν το νερό. Μη χρησιμοποιήσετε το νερό για να φτιάξετε κάποια συνταγή.
Hebrew	זוהי דו"ח חשוב בנוגע למי השתייה שלכם. בקשו ממישהו שיתרגם אותו עבורכם, או שוחחו עם מישהו שמבין את תוכנו.	יש להרתיח את המים לפני השימוש.	אין לשותות את המים.	המים אסורים לשתיה לילדים מתחת לגיל 12. אין להשתמש במים להכנת תחליף חלב-אם לתינוקות.
Hindi	यह रिपोर्ट में आपके पीने वाले पानी के बारे में जरूरी जानकारी है। किसी से जिसे इसका अनुवाद करना आता हो उस से बात करें।	पानी इसतेमाल करने से पहिले उबाल लें।	पानी न पीएं।	12 महीने से कम उमर के बच्चों को पानी नहीं पीना चाहिए। फारमूला बनाने के लिए पानी का इसतेमाल न करें।
Hmong	Dlaim ntawv tshaabxu nuav muaj lug tseemceeb heev nyob rua huv kws has txug cov dlej mej haus. Kuas ib tug paab txhais rua koj, los nrug ib tug kws paub lug thaam.	Uantej kws yuav siv mej cov dlej nuav yuav tau muab nwg rhaub kuas npau.	Tsi txhob haus cov dlej nuav.	Cov mivnyuas kws tsi tau muaj 12 xyoo tsi txhob haus cov dlej nuav. Txhob muab cov dlej nuav moog tov mig.
Japanese	このレポートには飲料水に関する重要な情報が記載されています。この英文を訳してもらおうか、またはどなたか英語が分かる方にたずねてください。	水は使用する前に煮沸してください。	水を飲まないでください。	12か月未満のお子様には水を飲ませないでください。水を使って乳児用ミルクを作らないでください。
Korean	이 보고서에는 귀하의 식수에 대한 중요한 내용이 실려있습니다. 그러므로 이 보고서를 이해할 수 있는 사람한테 번역해 달라고 부탁하시기 바랍니다.	사용하기 전에 물을 끓이십시오.	물을 마시지 마십시오.	12세 미만의 아이들에게 물을 마시게 하지 마십시오. 휘발라를 섞을 때 물을 사용하지 마십시오.
Laotian	ໃບລາຍງານໃບນີ້ມີຂໍ້ມູນສຳຄັນກ່ຽວກັບນ້ຳດື່ມຂອງທ່ານ. ໃຫ້ຄົນໃດຄົນນຶ່ງແປພາສາໃຫ້ທ່ານຟັງ, ຮຽນ ເວົ້ານຳຄົນ ໃດຄົນນຶ່ງຜູ້ທີ່ເຂົ້າໃຈມັນ.	ຕົ້ມນ້ຳຂອງທ່ານກ່ອນໃຊ້.	ຢ່າສູ້ດື່ມນ້ຳ.	ເດັກນ້ອຍອາຍຸຕໍ່າກວ່າ 12 ເດືອນຄວນຈະບໍ່ດື່ມນ້ຳ. ຢ່າສູ້ໃຊ້ນ້ຳເພື່ອຈະເຮັດນ້ຳນົມ.
Oromo	Gabaasii kun odeeffanno barbachisa wa'ee	Bisaan oso	Bisaan kan	Daa'imman baatii(ji'aa) 12 hingahiin bisaan

English	This report contains important information about your drinking water. Have someone translate it for you, or speak with someone who understands it.	Boil your water before using.	Don't drink the water.	Children under 12 months old should not drink the water. Don't use the water to make formula.
	bisaan dhugaatii qaba. Akkaa isinii turjumaa'uu gaafadhaa yokaan nama afaan keessan dubbatuu dubbisaa.	hindhuggneen duraa akka danffisttan.	hindhuginaa.	kan dhuguun isaan irra hinjiru. Bisaan kana foormmularaa(Nyaata Ijoollee) qopheessuf itii hinfayyadamina.
Polish	Następujący raport zawiera ważną informację na temat wody pitnej. Proszę poprosić kogoś o przetłumaczenie lub porozmawiać z kimś kto rozumie.	Należy przegotować wodę przed spożyciem.	Proszę nie pić wody.	Dzieci w wieku poniżej 12 miesięcy nie powinny pić tej wody. Proszę nie używać tej wody do przygotowywania formuły.
Punjabi	ਇਸ ਰੀਪੋਰਟ ਵਿਚ ਤੁਹਾਡੇ ਪੀਣ ਵਾਲੇ ਪਾਣੀ ਬਾਰੇ ਜ਼ਰੂਰੀ ਜਾਣਕਾਰੀ ਹੈ। ਕਿਸੇ ਕੋਲੋਂ, ਜਿਸ ਨੂੰ ਸਮਝ ਆਉਂਦੀ ਹੋਵੇ ਇਸ ਦਾ ਅਨੁਵਾਦ ਕਰਵਾ ਲਵੋ ਜਾਂ ਉਸ ਨਾਲ ਗਲ ਕਰੋ।	ਪਾਣੀ ਨੂੰ ਇਸਤੇਮਾਲ ਕਰਨ ਤੋਂ ਪਹਿਲਾਂ ਉਬਾਲ ਲਵੋ।	ਪਾਣੀ ਨਾ ਪੀਵੋ।	12 ਮਹੀਨੇ ਤੋਂ ਘੱਟ ਉਮਰ ਦੇ ਬੱਚਿਆਂ ਨੂੰ ਪਾਣੀ ਨਹੀਂ ਪੀਣਾ ਚਾਹੀਦਾ। ਫਾਰਮੂਲਾ ਬਣਾਉਣ ਵਾਸਤੇ ਪਾਣੀ ਦਾ ਇਸਤੇਮਾਲ ਨਾ ਕਰੋ।
Russian	В этом сообщении содержится важная информация о воде, которую вы пьёте. Попросите кого-нибудь перевести для вас это сообщение или поговорите с человеком, который понимает его содержание.	Кипятите воду, прежде чем пользоваться ею.	Не пейте воду.	Детям в возрасте до 12 месяцев не следует пить воду. Не используйте воду для приготовления адаптированной детской смеси ("формулы").
Samoaan	O le lipoti lenei o lo'o iai ni mea e sili ona taua e uiga i le vai o lo'o e taumafaina nei. Su'e se tagata e fa'aliliuina mo oe, po'o lou talatalanoa i seisi e iai sona malamalamaga i lenei mataupu.	Tunu le vai ia pupuna ona fa'atoa inu lea.	Aua le inuina le vai.	Tamaiti uma lava e i lalo o le 12 tausaga e le tatau ona inuina le vai. Aua le fa'aaogaina le vai e sui ai ni vaila'au po'o le palu ai o ni mea tausama.
Serbo-Croatian	Ovaj izvještaj sadrži važnu informaciju u vašoj vodi za piće. Neka vam neko prevede, ili popričajte sa nekim ko se u ovo razumije.	Proključajte vodu prije upotrebe.	Ne pijte vodu.	Djeca ispod 12 mjeseci starosti ne bi trebala piti vodu. Ne koristite vodu za pripremljanje hrane u flašici za bebe.
Somali	Warbixintan waxay wadataa macluumaad muhiim ah ee la xiriira biyaha aad cabtid. Cid ha kuu tarjunto ama la hadl cid fahmaysa.	Karkari biyaha inta aadan isticmaalin.	Ha cabin biyaha.	Carruurta sannad jir ka yar ma aha inay biyaha cabaan. Ha u isticmaalin biyaha inaad kula qastid caanaha ama raashinka la qaso ee carruurta.

Spanish	Este informe contiene información importante acerca de su agua potable. Haga	Haga hervir el agua antes de usarla.	No beba el agua.	Los niños menores de 12 meses de edad no deben beber el agua. No use el agua para
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English	This report contains important information about your drinking water. Have someone translate it for you, or speak with someone who understands it.	Boil your water before using.	Don't drink the water.	Children under 12 months old should not drink the water. Don't use the water to make formula.
	que alguien lo traduzca para usted, o hable con alguien que lo entienda.			preparar la fórmula para bebés (biberón).
Tagalog	Naglalaman ang report na ito ng importanteng impormasyon tungkol sa iyong iniinom na tubig. Magkaroon ng isang tao na isasalin ito sa iyong wika para sa iyo, o makipag-usap sa isang tao na nakakaintindi dito.	Pakuluin ang inyong tubig bago gagamitin.	Huwag inumin ang tubig.	Ang mga bata na kulang sa 12 na buwan ang gulang ay hindi dapat na iinumina ang tubig. Huwag gagamitin ang tubig sa paggawa ng pormula.
Thai	รายงานนี้มีข้อมูลสำคัญเกี่ยวกับน้ำดื่มของท่านโปรดขอให้บุคคลในครอบครัวหนึ่งแปลข้อความให้ท่าน หรือปรึกษาผู้ที่เข้าใจข้อความนี้	ต้มน้ำให้เดือดก่อนนำไปใช้	อย่าดื่มน้ำนี้	เด็กที่อายุต่ำกว่า 12 เดือน ต้องไม่ดื่มน้ำนี้ อย่าใช้น้ำนี้ในการผสมนมเลี้ยงเด็ก
Tigrigna	ከዚ ትሕዳ ብዛዕባ ተሰቲይዎ ማይ ኣገዳሊ ኣበሬታ ኣለዎ። ዘተርጉሙልኩም ወይ ዘረዳኣኩም ሰብ ድለዩ።	ማይ ኣፍሊሒኩም ሰቲዩ።	ካብዚ ማይ ኣይተሰቲዩ።	ተሕቲ 12 ወርሒ ዝኮኑ ሕጻናት ካብዚ ማይ ኣለቲዩ የብሉዎን። በዚ ማይ ንሕጻን ጸባ ንምብጽባጽ ኣይተጠቀሙ።
Ukrainian	Це повідомлення містить важливу інформацію про воду, яку ви п'єте. Попросіть кого-небудь перекласти вам це повідомлення або поговоріть з людиною, яка розуміє його зміст.	Кип'ятіть воду до користування.	Не пийте воду.	Діти у віці до 12 місяці в не повинні пити воду. Не користуйтеся водою для приготування адаптованої дитячої суміші ("формули").
Vietnamese	Tài liệu này có tin tức quan trọng về nước uống của quý vị. Hãy nhờ người dịch cho quý vị, hoặc hỏi người nào hiểu tài liệu này.	Đun sôi nước trước khi dùng.	Đừng uống nước này.	Trẻ em dưới 12 tháng không nên uống nước này. Đừng dùng nước này để pha sữa formula.

The water glass and faucet may be useful in a posted notice that would be seen by many non-English speaking people to illustrate that they should not drink the water.



Basics for Small Water Systems in Oregon: Storage Tank Chlorination

Disinfection concentrations and times are based on AWWA Standard C652 for storage tanks cited in: OAR 333-061-0050 "Construction Standards" (10)(d) dated 19 Apr 2010, page 297

Question: How much chlorine is added to a tank?

Volume to be disinfected = **500** gallons

(input tank volume above in yellow shaded cell)

Chlorination Dose for Storage Tank of Volume Specified Above	Method A ^b	Method B ^c	Units
Chlorine Concentration	10	50	mg/L
Method Exposure Time	6 ^a or 24	6	hours
Chlorine Source Material...			
Bleach 5% Solution	0.10	0.50	gallons ^d
Bleach 8.25% Solution	0.06	0.30	gallons ^d
Bleach 12.5% Solution	0.04	0.20	gallons
Dry Chlorine (65% by wt)	0.06	0.32	pounds
	0.029	0.147	kilograms

Options for Disinfection by Chlorination:

Method A. Filling the tank or reservoir with a **10 mg/L** chlorine solution and allowing it to remain for **6^a** or **24 hours** (see Table).

Method B. Filling the reservoir with a **50 mg/L** chlorine solution and allowing it to stand for **6 hours** (see Table).

Method C. Spraying or brushing on a **200 mg/L** chlorine solution and allowing it to remain for **3 hours** (calculation not provided).

(Chlorine Concentration values [yellow, or grey, cells] can be changed for custom calculations)

☞ Note that to achieve Method concentration **add more** chlorine than specified here.

Important: Measure chlorine concentration to confirm Method's target concentration. Test strips used in restaurant inspection (for detecting higher chlorine levels) may be useful, or dilute a sample to your test kit range

^a Six (6) hours for addition by continuous feed during tank filling.

^b For **Pipes**, Method A using **24 hours** is applicable (shorter time at higher dose may be allowed, see Guidance).

^c For **Wells**, Method B using **24 hours** is applicable (shorter time at higher dose may be allowed, see Guidance).

^d Gallons to Cups conversion:
(gal x 16 = cups)

Gallons	Cups
1.6	25.6

Weight of dry chlorine with a lower percentage than 65% can be calculated by dividing 65% by the product's % chlorine (e.g., 65%/47%) times result in table.

Oregon Health Authority

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800 NE Oregon Street #611
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TECHNICAL BULLETIN

WELL DISINFECTION

Prepared by:
Oregon Health Authority
DRINKING WATER SERVICES

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WELL DISINFECTION

For More Information Contact:

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Drinking Water Services
(971) 673-0405

How to Disinfect a Well in Three Steps

1. Calculate the amount of water in the well: To obtain this information, you must know the well casing diameter (in inches) and the total depth of the water in the well (in feet). Table 1 below converts well casing diameter to gallons of water per foot of well depth. Well water depth can be determined by the following method:
 - a. Depth of well (**feet**) – static water level (**feet**) = well water depth (**feet**)
[**Note:** The well depth & static water level are listed on your well log from the time of drilling. Use the static water level from the well log if you do not have a current static water level reading from your well. If you do not have access to your well log, please see the following Water Resources Department search tool at: http://apps.wrd.state.or.us/apps/gw/well_log/Default.aspx, or contact Drinking Water Services (DWS) for assistance at (971) 673-0405. Use the total depth of the well if the depth of the water alone cannot be determined.]
 - b. Multiply the well water depth by the number in Table 1 that corresponds to your well casing diameter.

Table 1: Converting Well Casing Diameter into Gal. of Water/ft Well Water Depth:

Well Casing Diameter (inches)	Gal. of Water per Feet of Well Water Depth
4	0.65
6	1.5
8	2.6
10	4.1
12	5.9
14	8.00

2. Add the correct amount of bleach: After determining well water volume, add one cup (8 oz) of normal household bleach (containing approximately 8.25% sodium hypochlorite) for every 100 gallons of well water to create a chlorine concentration of approximately 50 parts per million (ppm). Do not use bleach that is more than a few months old, because its strength dissipates over time. Before pouring into the well, mix the bleach into 4-5 gallons of water to aid the disinfection process (this will improve mixing in the well). Below is an example calculation of well water volume (in gallons), and the correct amount of bleach to be added:

Example: A 6-inch diameter well casing contains 65 feet of water. How much normal household bleach should be added to disinfect well?

Answer: Based on Table 1 there are 1.5 gallons of water per foot of water depth in a 6-inch diameter well casing. To determine the number of gallons, multiply the total water depth (65 feet) by the number of gallons of water per foot of well depth (1.5 gal/ft).

Gallons in well = Total water depth x number of gallons of water per foot of well depth
= 65 ft x 1.5 gal/ft = **97.5 gallons of water**

Since 97.5 gallons is about 100 gallons, add one cup of normal household bleach (8.25%) to disinfect this well.

[Warning: Bleach used during disinfection must be flushed thoroughly from all service lines. Human exposure to strong bleach solutions (over 4 ppm chlorine) may cause severe irritation to eyes and skin, and can be harmful if swallowed. Bleach solutions are also deadly to organisms living in water and soil. Please use appropriate protection and precautions when handling bleach, and provide notification to any customers who may be receiving highly chlorinated water before the system is flushed. This procedure is for shock disinfection only, and should not to be used on a regular basis.]

3. Follow the disinfection process:

- a. Add bleach to 4-5 gallons of water, mix together, and pour into well through a plug or casing vent hole at the top of the sanitary seal.
- b. To thoroughly mix the bleach solution with the well water, attach a hose to the nearest tap downstream, prior to any unpressurized storage reservoirs (if this is not possible contact DWS or a water system maintenance professional for further technical consultation). Recirculate water from the tap back into the well by running water through the same hole at the top of the sanitary seal that was used to add the bleach solution. If possible, make sure the chlorinated water also contacts the inside of the well casing above the static water level (to the top of the casing) by running water down the inside walls of the casing with a special hose fitting inserted through the vent hole. This will result in more thorough disinfection.
- c. To disinfect the distribution system in addition to the well, after 15-20 minutes of recirculation, open each plumbing fixture served by the well until you can detect 50 ppm chlorine (if you don't have a chlorine test kit just make sure you can smell bleach at each faucet). When you are able to detect bleach at its maximum strength close all taps. Let the bleach stand in the well and piping for at least eight hours. To determine the amount of chlorine solution needed to disinfect a storage tank, see: <http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Operations/Pages/hockchlorination.aspx> (contact DWS or a water system maintenance professional for additional consultation on disinfection of storage tanks).
- d. After at least eight hours, thoroughly flush the well, tank (if applicable) and distribution piping to remove all chlorine (see Warning above). Make sure strong chlorine solutions are disposed of in accordance with Department of Environmental Quality guidelines at: <http://www.deq.state.or.us/wq/pubs/bmps/chlorwaterdisp.pdf>.
- e. Collect a representative number of coliform samples (after ensuring a zero chlorine residual, by either sampling with an approved test kit, or waiting at least five days after the well was disinfected and flushed). Remember that it can be difficult to thoroughly disinfect a large system. If total coliform samples are still positive, repeat the disinfection process above until sample tests are negative.

For additional technical information see the *American Water Works Association Standard C654-03* or the *U.S. Environmental Protection Agency Groundwater Rule Corrective Action Guidance Manual, November 2008, Section 3.1.3.4 (p. 3-11)* at <http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1002YAV.txt>, or contact Drinking Water Services at (971) 673-0405.

Disinfecting trucked water

All trucked water must maintain a free chlorine residual of at least 0.5 ppm to the point of delivery. To accomplish this, the hauler must add ½ cup of 8.25 percent hypochlorite bleach to each 1,000 gallons of water that does not have a free chlorine residual. The bleach must be unscented and without additives. Add the bleach in proportion to the quantity of water at the beginning of each haul during filling to ensure uniform distribution.

For more information

If you have questions, call our nearest regional office:

- Eastern Region:** Spokane Valley
509-329-2100
- Northwest Region:** Kent
253-395-6750
- Southwest Region:** Tumwater
360-236-3030

Office of Drinking Water publications are online at <https://fortress.wa.gov/doh/eh/dw/publications/publications.cfm>



For people with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TDD/TTY call 711).

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Truck Transportation

Emergency water supply for public use

January 2017
DOH 331-063
Revised

Public water systems that receive potable water for the public during emergencies must



follow drinking water standards (WAC 246-290-451(2)).

The Washington State Department of Health doesn't allow trucked water as a long-term source of drinking water. We do recognize that it may be the only option as a temporary source in response to some emergencies.

Before a water system can receive potable water for the public during an emergency, it must receive permission from one of the following:

- Our nearest regional office
- The local health officer or designee
- The state emergency management agency
- The local emergency management agency

To protect public health, water systems thinking about receiving trucked water must consider the following:

- The source and quality of the water
- Personnel
- Documentation
- Recordkeeping
- The truck container, including disinfection and condition
- The receiving container

Source and quality of water

Trucked emergency water must come from an approved Group A public water system operating in compliance with WAC 246-290. If there is no other option, and there is a formal written agreement between the receiving water system and the state or local health department, hauled water may be from an unapproved source.

The water system must prove to the health agency that the intended unapproved source is safe to use when treated to the minimal levels described in "Disinfecting trucked water," on page 7.

The water system must confirm that the:

- Truck hauler is familiar with proper handling procedures at the supply source and during transport.
- Delivered trucked water contains a free chlorine residual of at least 0.5 ppm.

The water system must reject the water if it believes the hauler failed to take the steps necessary to ensure the water remains potable.

Personnel

The water system must have the certified operator coordinate the receiving process, collect documentation, and keep records. These procedures must be in the water system's emergency response program (WAC 246-290-415(2)(d)).

Documentation

The water system must document and keep proper records of the trucked water operation. This includes the:

- Hauler's name and contact information
- Amount of water delivered per trip
- Chlorine test results
- Name of the approved water source or water system
- Date and time of delivery

Recordkeeping

The water system should keep the following records for at least one year after the emergency water hauling operation ends.

- Documents to show proper disinfection of the water for each trip.
- Confirmation of initial tanker disinfection method and follow-up coliform monitoring results.
- The free chlorine residual in the container at the start of the haul.
- The free chlorine residual of the water at point of delivery.
- Any conditions observed about the receiving tank.

Records must be available on request for review by health agencies, haulers, or the supplying water system.

Containers designed and used only for potable water service

Properly designed and maintained truck containers dedicated to hauling only potable water may be used without initial tanker cleaning, disinfection, and testing for bacteria.

The truck container must be contaminant-free and maintained to prevent potential water contamination.

The hauler must fill and empty all truck containers through an air gap or other approved method. All containers must be completely enclosed and tightly sealed with lockable lids or hatches. Containers open to the atmosphere during hauling cannot be used.

Truck container

Truck containers used for hauling petroleum products, surfactants, or other non-food grade products may not be used for hauling potable water.

Trucks used for hauling food-grade products other than potable water must be evaluated on an individual basis. At minimum, a truck container used to haul a food-grade product other than potable water must be disinfected as directed in "Initial tanker disinfection," right.

Initial testing must show absence of coliform bacteria before using the truck to haul water. We may require additional water quality analysis depending on a truck's prior use.

After emergency hauling begins and safety measures are in place to prevent contamination, any health authority can require repeat testing at any time. An extended water-hauling emergency warrants additional water quality monitoring, including chlorine residuals.



Initial tanker disinfection

Truck containers used to transport food-grade products other than potable water must be cleaned and disinfected before potable water hauling operations begin.

1 Rinse and flush all water-hauling containers, hoses, truck-mounted pumps, and other equipment until they are free of rust, sediment, and other matter.

2 Use water with chlorine levels of at least 50 parts per million (ppm) to completely fill the tank, pumps, hoses, and other hauling equipment that will contact potable water. About ¾ gallon of liquid bleach is required in every 1,000 gallons of water to produce 50 ppm. To accomplish this, bleach must be 8.25 percent hypochlorite with no scent, cleaning enhancer, or other additives. Add the bleach to the water while filling the tank to ensure uniform distribution.

All surfaces that will contact potable water must be disinfected with the chlorine solution for at least 4 hours.

All equipment used to collect, transport, and deliver drinking water must be designed to handle potable water and endure disinfection.

3 After 4 hours, flush the chlorine solution from the tank and all pieces of equipment. Do not discharge directly into a stream because the chlorine in the water can kill fish and plants. To dechlorinate the water, treat it with citric acid or thiosulfate before discharging it.

4 When the tank, hoses, pipes, and pumps are empty, refill them with potable water and test for coliform bacteria. If coliform are present, repeat the disinfection steps. If coliform is still present after a second attempt to disinfect, the tanker cannot be used to haul potable water.

Handling

All hoses and other handling equipment used in the operation must always be stored off the ground. Hoses must be capped at each end when not in use.

All surfaces that contact potable water, including fill-point equipment, containers, caps, valves, filters, fittings, and other plumbing attachments, must be inspected regularly and disinfected or replaced as needed.

Receiving container

Inspect the water system's receiving tanks to confirm water quality during filling and later distribution to consumers. Clean and disinfect receiving tanks using the disinfection steps in "Initial tanker disinfection," at left.

Secure and protect the receiving tanks from contamination throughout the emergency response process. Keep written records of any comments about the receiving tanks.

The water system must inspect each water delivery for appearance or odor problems, check the chlorine residual, and fill water through an air gap or other approved method.

Responding to a threat against a water system

Dec. 2012

DOH 331-183
Update

*Guidance for Office of Drinking Water staff and water systems
to use when responding to suspected vandalism or terrorism*

These guidelines appear in sequential order, but you can adjust the steps and actions to meet the needs of each situation. Office of Drinking Water staff and water system personnel must work closely and collaboratively when determining specific actions appropriate to any incident.

Identify the threat

- Take any suspicious activity or evidence of vandalism or sabotage seriously.
- Notify your chain of command immediately.
- Designate a response coordinator.
- Document what you see and take notes as you go.

Immediately notify officials

- Contact local law enforcement.
- Call our regional office (numbers listed on page 2). Use the after-hours number, (877) 481-4901, if necessary.
- Alert other officials needed to protect public health, such as the local health jurisdiction.

Assess and respond to the threat

- Inspect facilities, but do not disturb any evidence.
- Consult with local law enforcement to determine whether the threat is credible. If there is strong evidence of sabotage or terrorist activity, call the FBI at (206) 622-0460.
- Refer to your emergency response plan.
- Pull together a response team with expertise in the areas needed to resolve the situation.
- Determine whether there is biological or chemical contamination, or damage that disrupts supply.
- Consult with us to determine immediate actions needed to protect public health. Examples include notifying customers, isolating affected areas, shutting down critical facilities, and issuing “boil water” or “do not drink” advisories.
- See page 2 for a list of water tests to take if you suspect contamination.
- Collect samples and store them appropriately (for example, refrigerate).
- Conduct a full assessment of the situation, facilities and water quality.
- Develop a communication strategy and communicate with affected people regularly.
- If necessary, determine alternative sources of water supply for your customers.
- If appropriate, drain, clean, repair and disinfect the water system. Get professional help if necessary.

Communicate with others

- Designate one public spokesperson that is able to control his or her emotions, remain calm, stay in control, and be firm but polite.
- Identify key messages and keep them current.
- Anticipate possible questions and prepare answers ahead of time.
- Never assume what you say will be “off the record.”
- Avoid assumption and blame.
- Keep your communications clear and to the point.

Consider additional water testing

Intentional contamination of drinking water falls into four categories: 1) Inorganic, such as metals or cyanide, 2) Organic, such as pesticides or volatile compounds, 3) Radionuclide, and 4) Pathogenic microbiological organisms.

Even if you suspect contamination, it is unlikely the evidence will point to a particular contaminant. Instead, you may have to decide what tests to run for contaminants. Below are possible tests and information they can give you about contaminants that may cause acute health effects.

Coliform Bacteria: This test indicates whether microbial contamination was introduced into the water system, especially from fecal origins.

Heterotrophic Plate Count (HPC): This test provides the number of bacteria that may have been introduced into the water. HPC counts greater than 500 signal the need to be wary. Very high levels (1,000 to 10,000 and greater) suggest a problem that requires immediate evaluation.

Chlorine Residual: In chlorinated water systems, this test indicates whether materials introduced into the water have created a demand for chlorine. Lower-than-normal or no residual signals the need for further evaluation.

Chlorine Demand: For water systems that do not routinely chlorinate, this test reveals unusual demands on the oxidizing capability of added chlorine. Unusual demand indicates the presence of a contaminant that warrants further investigation.

Nitrate or Nitrite: This easy test will tell you if either nitrate or nitrite is present at a level that could harm infants.

Total Organic Carbon (TOC): This test is relatively simple. Normal expected levels of TOC for surface water are 0.2 to 4 mg/L, and for groundwater 0.01 to 2.0 mg/L. Higher levels may indicate the presence of organic materials that pose a health concern.

Total Halogenated Organic Carbon (TOX): This simple test measures halogenated organic substances, including disinfection by-products such as trihalomethanes and haloacetic acids. High levels suggest contamination has occurred or that precursor organic materials have been added to enable formation of disinfection by-products.

Cyanide: Although this test is more complex, do it immediately if you suspect cyanide contamination. Cyanide is very toxic, causing rapid death upon ingestion.

Office of Drinking Water Regional Offices

Southwest Region 360-236-3030
Northwest Region 253-395-6750

Eastern Region 509-329-2100
After-hours 877-481-4901