Public Water Systems

Emergency Response Plan of Action

For PWS Serving less than 500

Facility _____

PWSID # _____

Date _____

Maine Center for Disease Control and Prevention

An Office of the Department of Health and Human Services

Template Revision Number: DWP0094 –C

Maine Public Water Systems

Definition of Emergency: Any event that causes a public water system to lose the ability to supply safe drinking water to its consumers.

There are many situations that may cause impairment of water quality. Here in Maine the most common is loss of water pressure or contamination of the water supply, source or lines. Some common examples include main breaks, power outage, treatment failure, numerous types of contamination, extreme weather and or structural damage, floods and equipment failure.

An **Emergency Response Plan** or **Action Plan** is critical for a Public Water System to quickly work through the emergency and address **two** required aspects of emergencies:

1) Delegate staff/resources to the issuance of a Public Health Advisory immediately to limit the use of contaminated water currently in distribution lines.

2) Delegate staff expertise to the technical difficulties of repair and returning operations to normal.

The combined focus on both aspects, leads to increased resiliency that benefits the Public Water System, and the consumers served.

Emergency External Contact List

Title	Phone Number	Alternate Contact
Designated Operator		
Maine Drinking Water Program	207-287-2070	After Hours: 207-557-4214
Maine Rural Water Association	207-737-4092	
Maine WARN		
Remote Maintenance Worker		
Heavy Equipment Operator		
Well Pump Service		
Local Emergency Director		
Local Town Office		
Local Hospital		
Laboratory/Water Testing		
Emergency 24 Lab		
Local Radio Station		
Newspaper		
Local TV		
County EMA		
(ICS Trained Staff)		

Drinking Water Source, Pumping, Treatment

Groundwater Source	**Well #1:**	**Well #2:**
Location		
Depth/Description		
Well Service Company		
Contact Phone		

Surface Water Source	**Source #1:**	**Source #2:**
Location		
Description		

Pump Information

Well Pump Mfr.	
Well Pump Model	
Location	
Pump Service Company	
Contact Phone	

Treatment System

Component	
Location	
Description	
Mfr./Model Number/Installed by	
Service Company	
Contact Phone	
Repair and/or Vendor(s)	
Contact Phone	

Diagram of Water System (pipes, valves, tanks) located at:

Public Water System Emergencies

The most common emergencies for small PWS are:
Loss of Pressure - Transmission or main break / Distribution line break
Bacterial Contamination - Flood or Wellhead Submerged / Dead Animal in groundwater source or finished water storage
Extreme Weather Event - Power Outage **/** Structural Damage
Equipment/Pump Failure - Chlorine Treatment Failure
Chemical Contamination – Pump malfunction

Regardless of the Emergency, there are some steps to take as a Plan of Action:

1. Confirm and analyze the type and severity of the emergency

❑	(site, location. scale..)
❑	

2. Take immediate actions to protect lives, reduce injuries, protect property, ensure safety.

❑	
❑	
❑	Contact list

3. Collaborate with others on Public Health Notifications if needed

❑	*DWP- Boil Water Order needed?*
❑	if yes-*Public notification*
❑	

4. Make repairs based on priority demand.

❑	
❑	

5. Return the system to normal operation.

❑	*Re-establish filtration and or disinfection.*
❑	*Continued sampling until acceptable water quality levels are met*
❑	
❑	

Notes:

Alternate Water Sources

A severe emergency may mean you need to find another source for water for your consumers. All public water systems should plan ahead how they will provide alternate safe water during an emergency. A contingency plan may include bottled water, bulk water hauled, emergency connections opened, emergency backup well, mutual aid or other suppliers. Take time to determine how long it will take to get this alternate source to the consumer. Alternative sources must be approved by the Drinking Water Program.

Alternate Source:	
Emergency Connection is:	
Second Emergency Connection:	
Emergency Bulk Water Hauler:	
Bottled Water Supplier:	
Bulk Water SOP:	

Plan Appendix Documents

Additional Information Attached:

- **Well Disinfection-Shock Chlorination**
- **Emergency Bulk Water Hauling**

Procedure for Shock Chlorination of Water Systems Using Bedrock Wells

Shock chlorination is a disinfection treatment recommended when a drinking water system has been contaminated with total coliform or E. coli bacteria. The presence of bacteria in a well is usually caused by the intrusion of surface water contaminated by decayed material, animal/ human waste, or other materials. This intrusion can sometimes be attributed to a defective or damaged well casing or casing seal, improperly installed pitless adapter, a casing that terminates too close to ground level, or a shallow bedrock fracture. If any of these situations exist, then no amount of shock chlorination will permanently solve the problem, and a licensed water professional should be consulted.

Frequently, bacteria can be introduced during the well drilling process, installation of the pump system, subsequent servicing of the well pump, pipe repairs, storage tank replacement, or an inadequate well cap installation allowing vermin and insects access to the well casing. Any cause or causes for contamination should be fully investigated prior to shock chlorination, since contamination will likely reoccur if the cause is not addressed.

HOW TO EFFECTIVELY SHOCK YOUR WELL

Shock chlorination of a well is an involved process that cannot be rushed. It requires time, planning, preparation, proper methods, and proper materials. Carefully read these directions before starting the shock chlorination process. Be sure you understand them completely, or consider hiring a well contractor or other licensed water professional for assistance. **It will be necessary to provide an alternate source of drinking water until the well shocking process is completed; use of the water system must be minimized since very high levels of chlorine will be present. Highly chlorinated water should not be used for drinking, bathing, or cooking.** Remember, the objective is to disinfect the entire water system (not just the well). Prior to disinfection, ensure that the entire well and piping system has been running with sufficient flow to purge any sediment, foreign matter, or corrosive material (due to unsanitary construction, repair, or an extended period of idleness). These substances can react with the chlorine solution and decrease its effectiveness in destroying bacteria. **NOTE:** When shocking a water system that has treatment, bypass the treatment equipment so that the heavily chlorinated water does not come in contact with the treatment media, and refer to manufacturer's recommendations on how to disinfect the treatment equipment and media.

1. PREPARATION: Determine the correct amount of liquid bleach (6% sodium hypochlorite) needed by using the following dosages, which are based on the depth of a typical six-inch diameter bedrock well:

Disinfection Dosage per Depth in Feet

DEPTH	50ft	100ft	150ft	200ft	250ft	300ft
DOSAGE	1 Qt	1 1/2 Qts	2 Qts	2 1/2 Qts	3 Qts	3 1/2 Qts

Note: *If using Clorox "Concentrated" Bleach (8.5% sodium hypochrite), use ⅔ of the amounts shown above.*

Do not use bleach in excess of the recommended amount, since this will only require additional flushing before the system is ready for use. Use proper personal protective equipment, which will include gloves and eye protection. Prepare the chlorine solution by mixing the specified amount of bleach to about 10 gallons of water - typically in two, five-gallon pails. Follow the manufacturer's recommendations for handling and mixing disinfectant. Switch off power to the well pump, and drain as much water from the system as possible. If the system has a hydropneumatic pressure tank, check with the manufacturer to determine if the chlorine solution will harm the tank's membrane material. For air-over-water pressure tanks, release the air to allow the tank to be completely filled with chlorinated water. After switching off electrical power (or gas or oil burners), drain all water heaters to allow the solution to circulate through the hot water system as well.

2. APPLICATION: Remove the well cap, carefully pour the chlorine solution into the well and allow it to "settle" into the well (and its bedrock fractures) for three hours while the well is allowed to remain undisturbed. Attach a hose to a nearby sill cock, restore power to the well pump, and circulate chlorinated water through the hose only, thoroughly wetting the inside of the well casing, supply pipe, pitless adapter, your gloved hands, and the well cap. After washing down the well casing for a minimum of 30 minutes, carefully reinstall the well cap. Obtain spare replacement gaskets or other parts as necessary to properly re-cap the well before proceeding. If there are other outside faucets, go to the furthermost from the well, open the faucet and run the water until chlorine odor is detected. Repeat this procedure for all other outside faucets before going to all inside plumbing fixtures to conduct the same process; this includes cold and hot water valves (hot water heater turned off), showerheads, laundry fixtures, dishwashers, and toilets. Allow the chlorinated water to stand in the well and the entire water system for a minimum of 12 hours (24 hours is recommended) during which time the system, with the exception of moderate toilet use, should be considered unusable. After 12-24 hours, chlorinated water can be flushed from the system through the furthermost outside faucet until the chlorine odor is no longer present. Once the chlorine odor is no longer detectable at all outside faucets, repeat the process for all indoor faucets and fixtures taking care not to discharge large amounts of heavily chlorinated water into a septic system, nearby lakes, rivers, ponds, or any surface waters, onto lawns, gardens, or sensitive plants. When no chlorine odor can be detected at any inside faucet or fixture, restore power to water heaters.

3. FOLLOW-UP ACTIONS: After waiting at least one week for the chlorine to dissipate, collect a water sample for Total Coliform and E-Coli (bacteria) analysis by a state-certified laboratory, following proper sampling procedures. The

laboratory will likely reject a sample containing even a trace of chlorine, so the use of a chlorine residual test kit is recommended to ensure that chlorine is not present, before taking the sample. If bacterial contamination is detected in this sample, repeat the entire shock chlorination process, followed by a second bacteria test. A third positive bacteria test is a likely indication that a structural problem exists within the well or the source aquifer is contaminated. Upon a third positive bacteria sample, contact a well professional to thoroughly evaluate the condition of the well. If no problems are found that can be corrected, the installation of a continuous disinfection (chlorination) system will be necessary to ensure a safe supply of drinking water. If problems are found and corrected, shock chlorinate the system per this procedure, before taking a bacteria sample to ensure that the repairs have been effective.

4. ADDITIONAL IMPORTANT CONSIDERATIONS: The chlorine solution must come into direct contact with the bacteria that it is intended to eradicate. If there is a significant amount of scale or slime ("biofilm") on the surfaces of the casing or bedrock, it will effectively shield the bacteria and prevent the chlorine solution from coming in direct contact with it. In this situation, mechanical cleaning and purging of the well may be required prior to any attempt at shock chlorination (contact a well professional).

As mentioned previously in this document, when shocking a water system that has treatment, bypass the treatment equipment so that the heavily chlorinated water does not come in contact with the treatment media (which could potentially cause damage to the media), and refer to manufacturer's recommendations on how to disinfect the treatment equipment and media.

Another important factor, frequently overlooked, is the effect of well water pH on the disinfection process. Chlorine's effectiveness as a disinfectant decreases dramatically in high pH water. Chlorine is 100% effective as a biocide when used in water having a pH of 5.5, but only 34% effective at a pH of 7.6, and only about 10% effective at a pH of 8.1. Chlorine itself has a high pH: when a 50 ppm solution is added to water with a pH of 7.2, the pH of the mixture rises to 7.6, further reducing the chlorine's biocidal effectiveness. Typically, the deeper the well the higher the pH. To effectively shock chlorinate a well with high pH water, consult a licensed water professional for

assistance.

FOR FURTHER INFORMATION, CONTACT THE DRINKING WATER PROGRAM AT 287-2070.

Emergency Bulk Water Hauling

BACKGROUND:

At some point, pump failure, water quality, or quantity problems may make it necessary to transport bulk water to supplement a potable water supply at a public water system (PWS). When an emergency occurs, hauling water to the PWS should only be considered a temporary solution to supplement a water shortage problem. 22 M.R.S. §2660-A authorizes the DWP to determine when the emergency ends.

POLICY:

1. DWP Notification: In case of an emergency, any person may transport water as necessary for the duration of the emergency, but the person transporting the water **must inform** the Drinking Water Program (DWP) within 3 days of the emergency. The DWP is authorized to determine when the emergency is over. DWP notification includes: when transport will occur, how much water is expected to be transported, the source of the water being hauled, PWS supplier's name and phone number, PWS recipient's name and phone number, and water hauler's name and phone number.

2. Source of Water: Transported water must come from a public water system currently regulated by the DWP. If the source of transported water is not a regulated public water system, the receiving public water system must contact the DWP prior to receiving the water. A Do Not Drink Order must be issued prior to serving the water to any customers and the PWS recipient must comply with the DWP Drinking Water Order Policy #DWP0061.

3. Dedicated Equipment: Water transport must be completed using equipment (tank, tanker truck, pumps, hoses, valves, etc.) dedicated for potable water use only. Water haulers (i.e. tanker truck businesses) available for bulk water transport using equipment dedicated to potable water use are listed on the DWP website (www.medwp.com).

4. Non-dedicated Equipment: When equipment (tank, tanker truck, pumps, hoses, valves, etc.) that has not been dedicated exclusively to potable water use (i.e. milk, pond water, etc.) must be used for water transport, the equipment must be disinfected using the procedure in this document. An appropriate Drinking Water Order (Boil Water Order, Do Not Drink Order) may be required by the DWP (reference: DWP Drinking Water Order Policy #DWP0061).

5. Bulk Water Delivery: The transfer of water from the tank or tanker truck to the PWS must be completed using sanitary practices:

    - Mobile bulk water storage container (MBSC) left on-site should be labeled with the PWS's owner's name and phone number. MBSC should be sited in a shaded area or have temporary overhead cover to prevent direct

sunlight (bacteria, algae growth), and away from other potential sources of contamination (e.g. petroleum products, agriculture, etc.). MBSC should be secured with a lock to prevent unauthorized access. After 1 week on-site, MBSC may need to be drained out and replenished with fresh potable water.

- It is recommended that a direct hose-fitting connection between the MBSC tank or tanker truck and the public water system be used.
- MBSC water tanks used in this process must be NSF/ANSI Standard 61 certified or must be made of "food grade" compatible material, polyethylene plastic, or stainless steel. Exceptions may require a drinking water order e.g., Do Not Drink Order (reference: DWP Drinking Water Order Policy #DWP0061).
- Water may <u>not</u> be delivered directly into a well [pursuant to: 38 MRS §570-L].
- Any unsanitary conditions observed by the PWS, water hauler, the DWP, or DWP designee such as MRWA, may result in a drinking water order e.g., a Do Not Drink Order (reference: DWP Drinking Water Order Policy #DWP0061).

6. Disinfection Residual: If water is intended for consumption, transported water may have a free chlorine residual between 0.2 – 1.0 mg/liter, measured at the point of departure after the bulk water tanker is filled, or if water is obtained from a PWS disinfecting with ozone, an adequate ozone residual between 0.2 – 1.0 mg/liter.

7. Inspection: Review and inspection of an emergency bulk water transport process and any equipment utilized for this purpose may be initiated and completed by the DWP staff (or DWP designee such as MRWA) at any time.

8. Completion: The DWP must be notified when the bulk water transport is finished and the water shortage emergency has been resolved.

9. Violation: Per 22 MRS §2660-A, Any person who transports water in violation of this section (statute) is guilty of illegal transport of water. Illegal transport of water is a Class D Crime. Each shipment or day of transport, if by pipeline, is a separate offense.

10. DWP staff document emergency bulk water transport events by sending an e-mail to the DEH Drinking Water Orders distribution list.

PROCEDURE: The following procedure must be used for disinfection and filling MBSC tanks, piping and equipment used in the process of emergency bulk water transport:

1. Visual and Olfactory Inspection: Conduct a thorough inspection (observation and smelling inside) of the MBSC bulk water tanker and equipment to be sure it is water tight, free of debris and not contaminated with foreign substances.

2. Safety Precautions: Use personal protective equipment (PPE) in accordance with OSHA standards.

3. Disinfection Procedure: Disinfect the inside surface of the MBSC bulk water tanker and wetted surfaces of equipment using a 200 mg/l chlorine/water solution. [Adding 1/3 gallon (3 pints) of 6% Clorox bleach to 100 gallons of water will yield a 200 mg/liter solution. For 8% Clorox Bleach, add ¼ gallon (2 pints) of 8% Clorox bleach to 100 gallons of water to yield a 200 Mg/liter solution. Mix the solution thoroughly.] Allow chlorinated water to flow through all MBSC tank, pipes and overflows for at least 30 minutes. All equipment used for emergency bulk water transport must be appropriately cleaned. For more information about disinfection procedures, refer to AWWA Standard C652. An alternative disinfection procedure may be used with prior approval by the DWP.

4. Flushing: Drain and thoroughly rinse out the MBSC tank, pipes and overflows with potable water. Properly dispose of the chlorinated water (contact the Department of Environmental Protection for more information). As necessary, use a HACH DPD free chlorine residual test kit to ensure excessive residual chlorine is removed from the MBSC tank.

5. Potable Water Fill: Fill the MBSC tanker with potable water from an approved public water system.

6. Disinfection Residual: It is recommended that transported water maintain a free chlorine residual between 0.2 – 1.0 mg/liter, measured at the point of departure after the MBSC bulk water tanker is filled, or if water is obtained from a PWS disinfecting with ozone, an ozone residual between 0.2 – 1.0 mg/liter. Adjust the disinfection residual by increasing chlorine or ozone as needed, and measure concentration using a HACH test kit or equivalent (mentioned in Step 4 above). It is recommended that the water hauler maintain records of chlorine or ozone residual: date and concentration (in mg/liter).

Bulk Water Haulers

Please note that this is only a partial list, and is not an official endorsement of these trucking companies. Services and prices may vary. You may check the yellow pages of your local telephone directory under "Trucking" "Water Hauling" or "Water Companies".

A. Hood & Son, Inc. DBA. "Splash"
Warren Hood
41 Hood Dr.
Turner, ME 04282
Tel: 207-225-2157

Cole Farm Dairy
Gordon Cole
11 Cole Farm Road
Dayton, ME 04005
Tel: 207-282-5251

Crystal Spring Water Co.
Derek Laliberte
P.O. Box 1450
Auburn, ME 04211
Tel: 207-782-1521
Cell: 207-754-7719

Hilltop Pools
Dennis Henderson
36 N. Paris Rd.
West Paris , ME 04289
Tel: 207-647-3060

Lyle Pierce Trucking
Lyle Pierce
P.O. Box 37
Newport, ME 04953
Tel: 207-278-8611

M.A. Haskell & Sons, LLC Trucking
Jesse Haskell
174 Mann Rd
China, ME 04358
Tel: 207-993-2269
Cell: 207-592-0069
Fax: 207-993-3006

Pequawket Water Co.
Erik Eastman
PO Box 603
Fryeburg, ME 04037
Tel: 207-935-4157
Cell: 207-890-2633

Poland Spring
Mark DuBois
123 Preservation Way
Poland Spring, ME 04274
Tel: 207-998-6324
Cell: 207-831-4525

Roderick Lander
155 Guilford Ctr. Rd.
Guilford , ME 04443
Tel: 207-876-4288

Shackley Hill Spring
Jean Castonguay
340 Fayette Rd
Livermore Falls, ME 04254
Tel: 207-897-4283

Theriault's Water Hauling
Alan Theriault
1278 Woodman Hill Rd.
Minot, ME 04258
Tel: 207-966-3003


Maine Center for
Disease Control and Prevention
An Office of the
Department of Health and Human Services
MAINE