

MAIN LEAK AND REPAIR PROGRAM

For Public Drinking Water Systems



Missouri Safe Drinking Water Regulations require all public water systems to disinfect all new, cleaned, or repaired water mains and include detailed procedures for the adequate flushing, disinfection, and microbiological testing of all water mains. All public water systems are required to maintain a minimum positive pressure of twenty pounds per square inch (20 psi) throughout the distribution system under all normal operating conditions. All water lines, pipes, and equipment which convey or store potable water must be disinfected in accordance with current AWWA Standards. The purpose of the Main Leak and Repair Program is to ensure distribution system repairs are adequately conducted and that inconvenience and sanitary hazards to customers will be minimized during repairs and emergency maintenance. Having a written and formalized Main Leak and Repair Program benefits the water system by ensuring compliance with the regulations and ensuring new operators, contract operators, back up operators from other water systems, and/or excavating contractors understand how your water system expects water distribution repairs and emergency maintenance to be performed.

The Main Leak and Repair Program was developed to assist water systems in meeting minimum regulatory requirements associated with distribution system repairs, emergency maintenance, flushing, public and department notification, sampling, and boil advisories and orders. The Main Leak and Repair Flow Chart provides guidance on necessary actions the water system should take during distribution system repair and emergency maintenance to ensure compliance with the Missouri Safe Drinking Water Regulations. It is the responsibility of the water system to ensure that all chemicals, coatings, valves, hydrants, flush outs, pipes and other appurtenances used by the water system are approved for drinking water use and conform to the department's standard.

For more information regarding department standards on materials and construction standards refer to the Design Guide for Community Water Systems. For more information regarding boil advisories and boil orders refer to the Boil Order Manual. Both are located at www.dnr.mo.gov. This program also includes the following worksheets and guidance to assist water systems:

- Main Leak and Repair Flow Chart
- Boil Advisory Information Sheet
- Report of Low Water Pressure
- Discharging Chlorinated Water Best Management Practices

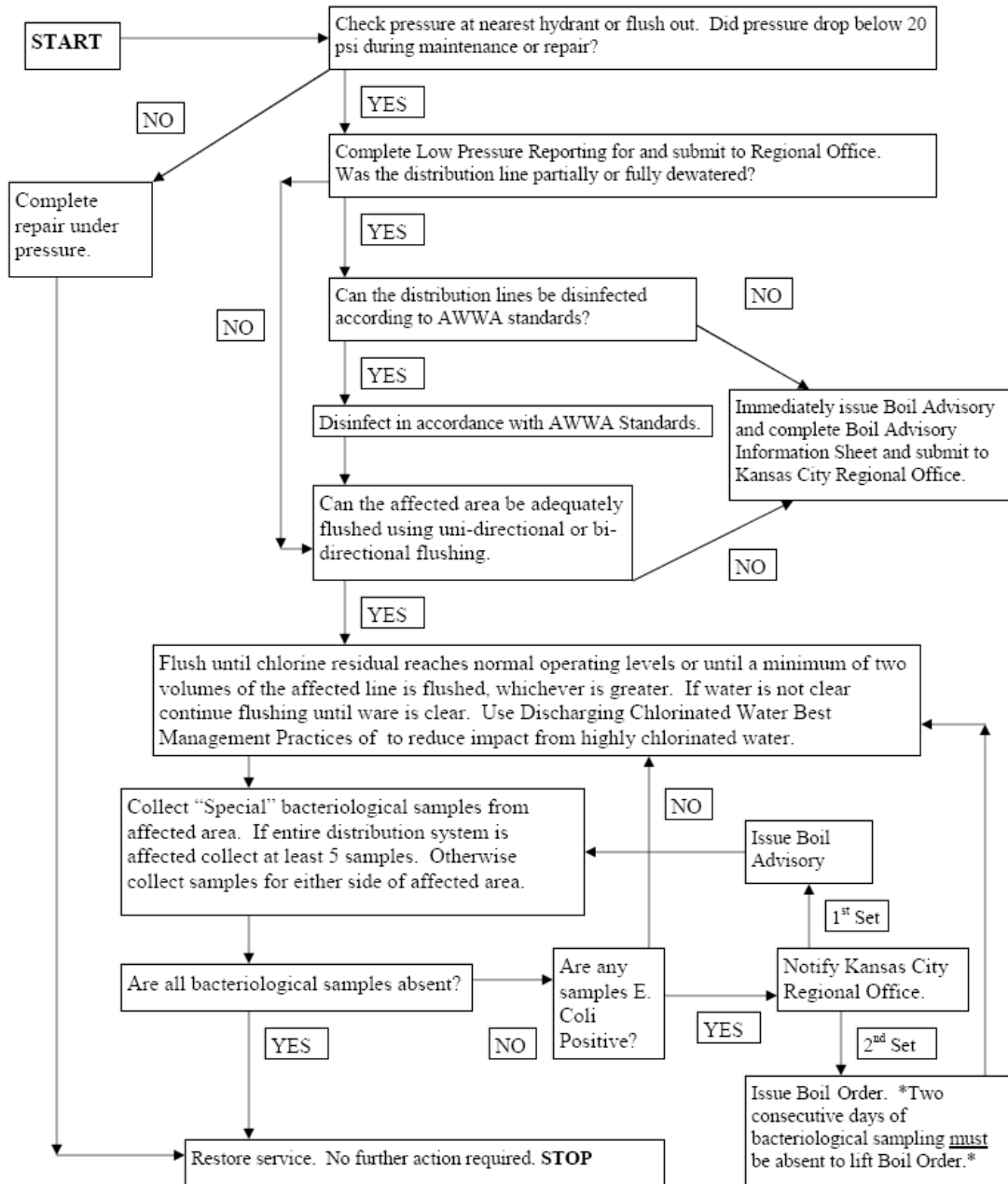
If a boil advisory is issued or pressure drops below 20 psi during distribution repairs or emergency maintenance, the water system should complete the necessary forms and fax them to the following:

Kansas City Regional Office
Public Drinking Water Unit
(816) 622-7044

A copy of this plan and the other procedures should be easily accessible to all staff performing distribution repairs and emergency maintenance. This plan must also be made available to the department upon request.

This program does not include safety procedures for trenching and shoring or spare part management, operator training, and budgeting control for distribution repairs and emergency maintenance. The water system should develop comprehensive procedures to ensure distribution repair and emergency maintenance is conducted safely, that equipment and necessary parts are available, operators and other personnel are adequately trained, and that the water system has necessary funds.

Main Leak and Repair Program Flow Chart



BOIL WATER ADVISORY INFORMATION

Water systems need to supply the following information to the Kansas City Regional Office when reporting the issuance of a boil water advisory. This sheet can be faxed to (816) 622-7044 or the information conveyed over the phone (816) 622-7000 to a Public Drinking Water Program staff member.

Date: _____ Time: _____

Supply Name: _____ ID #: _____

County: _____

Contact Person(s) Name & Daytime Phone #: _____

Reason for Advisory (Brief Description): _____

Has problem been resolved? (If main break- what size, was it disinfected and flushed?):

Brief Description of Service Area Affected & Names of any Priority Customers:

Method of customer notification (if by television, radio, or newspapers please provide specific names and city locations):

Anticipated Number of days advisory will be in place: _____

Number of samples that will be taken: _____

Location of samples that will be taken: _____

Name of testing lab: _____

REMEMBER TO CONTACT THE KANSAS CITY REGIONAL OFFICE WITH NOTIFICATION WHEN
THE ADVISORY IS LIFTED AND PROVIDE COPIES OF THE BAC-T SAMPLE RESULTS.

APPENDIX G



MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SERVICES DIVISION
REPORT OF LOW WATER PRESSURE

FOR OFFICE USE ONLY

PROJECT ID NUMBER

DATE RECEIVED

SYSTEM SPECIFICS

Missouri Public Drinking Water Regulation 10CSR60-7.010(2) requires that public water systems notify the department within 48 hours of a failure to comply with any regulation or monitoring requirement. Since the regulation 10CSR60-4.080(9) requires all public water systems to maintain a minimum pressure of 20 psi, all public water systems must notify the department when pressures in their system fall below 20 psi. Use this form to report low pressure events directly to the Department Regional Office in your area.

SYSTEM NAME	PWS ID#	COUNTY
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REPORTED BY	DATE REPORTED (MM/DD/YYYY)
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DESCRIBE NATURE OF PROBLEM

LOWEST PRESSURE READING (PSI)	DURATION OF LOW PRESSURE (HOURS/MINUTES)	DATE AND TIME OF PROBLEM ONSET	NUMBER OF SERVICES AFFECTED
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LOCATION AND AREA AFFECTED

CORRECTIVE ACTION TAKEN

DATE AND TIME OF CUSTOMER NOTIFICATION

METHOD OF CUSTOMER NOTIFICATION (IF NOTICE WAS DONE BY HAND DELIVERY ATTACH A COPY OF THE NOTICE TO THIS SHEET)

I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete and accurate.

SIGNATURE	DATE
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MAIL OR FAX COMPLETED COPY TO APPROPRIATE REGIONAL OFFICE:

ST. LOUIS REGIONAL OFFICE – 7545 S. Lindbergh, Ste 210, St. Louis, MO 63125; Phone 314-416-2960; FAX 314-416-2970
KANSAS CITY REGIONAL OFFICE – 500 NE Colbern Road, Lee's Summit, MO 64086-4710; Phone 816-622-7000; FAX 816-622-7044
SOUTHWEST REGIONAL OFFICE – 2040 W. Woodland, Springfield, MO 65807-5912; Phone 417-891-4300; FAX 417-891-4399
SOUTHEAST REGIONAL OFFICE – 2155 N. Westwood Blvd., Poplar Bluff, MO 63901; Phone 573-840-9750; FAX 573-840-9754
NORTHEAST REGIONAL OFFICE – 1709 Prospect Drive, Macon, MO 63552-2602; Phone 660-385-8000; FAX 660-385-8090

The objective of disinfection and flushing programs is to maintain a high level of water quality delivered to customers. The Department of Natural Resources Public Drinking Water Program encourages public water systems to conduct routine water main flushing, particularly on those water mains that do not receive enough water demand to scour the pipe surface or maintain chlorine residual. Unfortunately, discharging large volumes of chlorinated water may have adverse effects on property owners and the environment.

Flushing occurs when new facilities are installed as well as on a routine basis to maintain existing facilities. Flushing disinfected water from treatment, storage, and distribution facilities may have serious consequences on the environment receiving the discharged chlorinated water. Moderate levels of chlorine in streams and lakes can be detrimental to aquatic life.

The Missouri Clean Water Commission Regulation 10 CSR 20-2.010(22) defines a discharge as the causing or permitting of one or more water contaminants to enter waters of the state. Chlorine has specific limits for discharge into water of the state (10 CSR 20-7.031 Table A). A typical maximum concentration of chlorine that may be discharged to waters of the state is 0.02 milligrams per liter (mg/l). Specific limits for chlorine discharges should be provided by the Missouri Department of Natural Resources Water Pollution Control Program.

It is important for public water supplies to know that discharging contaminant to water of the state is a violation of the Missouri Clean Water Commission Regulations and may result in fish kills. Although flushing procedures do not require a permit from the department, fish kills are enforceable offenses that may be pursued by the Water Pollution Control Program. Therefore, system operators and contractors discharging chlorinated water must consider the receiving environment.

Please understand that very few discharges from routine water main flushes require dechlorination when best management practices are used as referenced in item number two below. The following items should be considered when discharging chlorinated water:

1. If disposing of heavily chlorinated water, inspect the environment to which the water will be discharged in accordance with American Water Works Association (AWWA) Standard C651-99, Sec. 4.5.2. Disposing of Heavily Chlorinated Water.
2. Determine the impact of the discharge to the environment. If the water to be discharged has low levels of chlorine and will not reach the waters of the state, dechlorination may not be necessary.
3. If it is determined to be necessary, dechlorinate in accordance with AWWA Standard C652 Disinfection of Water Storage Facilities Appendix B or as prescribed by your operations professional.

4. Avoid over chlorinated or over applying disinfectants when disinfection. AWWA Standard C651 Disinfecting Water Mains Appendix B contains recommended amounts of chemicals to produce various chlorine concentrations.
5. Contractors need to follow the best management practices for discharging chlorinated water and the applicable flushing procedures established by the public water supply.
6. Flushing procedures and dechlorination must be considered during the design of large water mains and storage facilities.
7. Develop a water main flushing program and maintain a flushing manual for the public water supply. Identify the necessary equipment, chemicals, and retention tanks needed for routine flushing procedures within this manual.
8. If possible, spray the interior of the tanks with a chlorine solution to reduce the volume of water to dechlorinate.
9. When possible, divert flush water from storm drains and ditches. If flush water is to enter a combined sewer, the receiving wastewater treatment facilities must be considered.
10. Avoid personal property damage, which includes flooding basement and yards to washing out lawns and flower beds.
11. Be aware of possible ice hazards on streets, sidewalks, and driveways when flushing during winter months.

It is important to remember that each flushing scenario is unique because of three factors. The first factor is the volume of water to be discharged. The second factor is the amount of disinfectant in the water to be discharged. And the final factor is the downstream environment that may be affected. It is the responsibility of each public water supply to prevent contamination of the waters of the state and to protect not only public health and our water systems but also our environment.

APPENDIX B

Disposal of Heavily Chlorinated Water

This appendix is for information only and is not a part of AWWA C652.

1. Check with local sewer department for conditions of disposal to sanitary sewer, and with the state regulatory agency for conditions of disposal to natural drainage courses.
2. Chlorine residual of disposed water will be neutralized by treating with one of the chemicals listed in Table B.1.

Table B.1. Amounts of chemicals required to neutralize various residual chlorine concentrations in 100,000 gal (378.5 m³) of water								
Residual Chlorine Concentration	Chemical Required							
	Sulfur Dioxide (SO ₂)		Sodium Bisulfite (NaHSO ₃)		Sodium Sulfite (Na ₂ SO ₃)		Sodium Thiosulfate (Na ₂ S ₂ O ₃ ·5H ₂ O)	
mg/L	lb	(kg)	lb	(kg)	lb	(kg)	lb	(kg)
1	0.8	(0.36)	1.2	(0.54)	1.4	(0.64)	1.2	(0.54)
2	1.7	(0.77)	2.5	(1.13)	2.9	(1.32)	2.4	(1.09)
10	8.3	(3.76)	12.5	(5.67)	14.6	(6.62)	12.0	(5.44)
50	41.7	(18.91)	62.6	(28.39)	73.0	(33.11)	60.0	(27.22)

APPENDIX B

Chlorine Dosages

This appendix is for information only and is not a part of AWWA C651.

Table B.1 Amounts of chemicals required to produce various chlorine concentrations in 100,000 gal (378.5 m³) of water*

			Sodium Hypochlorite Required						Calcium Hypochlorite Required	
Desired Chlorine Concentration in Water	Liquid Chlorine Required		5% Available Chlorine		10% Available Chlorine		15% Available Chlorine		65% Available Chlorine	
mg/L	lb	(kg)	gal	(L)	gal	(L)	gal	(L)	lb	(kg)
2	1.7	(0.77)	3.9	(14.7)	2.0	(7.6)	1.3	(4.9)	2.6	(1.18)
10	8.3	(3.76)	19.4	(73.4)	9.9	(37.5)	6.7	(25.4)	12.8	(5.81)
50	42.0	(19.05)	97.0	(367.2)	49.6	(187.8)	33.4	(126.4)	64.0	(29.03)

* Amounts of Sodium hypochlorite are based on concentrations of available chlorine by volume. For either sodium hypochlorite or calcium hypochlorite, extended or improper storage of chemicals may have caused a loss of available chlorine.

Table B.2 Amounts of chemicals required to produce chlorine concentration of 200 mg/L in various volumes of water*

				Sodium Hypochlorite Required						Calcium Hypochlorite Required	
Volume of Water		Liquid Chlorine Required		5% Available Chlorine		10% Available Chlorine		15% Available Chlorine		65% Available Chlorine	
gal	(L)	lb	(g)	gal	(L)	gal	(L)	gal	(L)	lb	(kg)
10	(37.9)	0.02	(9.1)	0.04	(0.15)	0.02	(0.08)	0.02	(0.08)	0.03	(13.6)
50	(189.3)	0.1	(45.4)	0.2	(0.76)	0.1	(0.38)	0.07	(0.26)	0.15	(68.0)
100	(378.5)	0.2	(90.7)	0.4	(1.51)	0.2	(0.76)	0.15	(0.57)	0.3	(136.1)
200	(757.1)	0.4	(181.4)	0.8	(3.03)	0.4	(1.51)	0.3	(1.14)	0.6	(272.2)

* Amounts of Sodium hypochlorite are based on concentrations of available chlorine by volume. For either sodium hypochlorite or calcium hypochlorite, extended or improper storage of chemicals may have caused a loss of available chlorine.