CHAPTER 7

OPERATION AND MAINTENANCE PROGRAM

WATER SYSTEM MANAGEMENT AND PERSONNEL

The City is governed by a Mayor and a seven member City Council. The Public Works Department consists of the Public Works Director, who is also the City engineer, and seven water utility staff members. The water system public works staff and their certifications are shown below:

Mr. Glen Baker (Certificate No. 4265)

- Water Distribution Specialist 1
- Water Distribution Manager 3
- Cross-Connection Control Specialist 1
- Commercial Drivers License
- CPR and First Aid
- Competent Person and Cave-in Protection
- Traffic Control

Mr. Mike Hostetter (Certificate No. 7567)

- Water Distribution Specialist 1
- Water Distribution Manager 2
- Cross-Connection Control Specialist 1
- Commercial Drivers License
- CPR and First Aid
- Competent Person & Cave-in Protection
- Traffic Control

Mr. Jeffery Thomas (Certificate No. 8197)

- Water Distribution Specialist 1
- Water Distribution Manager 3
- Basic Treatment Operator
- Water Treatment Plant Operator 1
- Cross-Connection Control Specialist 1
- Commercial Drivers License
- CPR and First Aid
- Competent Person and Cave-in Protection
- Traffic Control

Mr. Darrin Zumach (Certificate No. 11252)

- Water Distribution Specialist 1
- Commercial Drivers License
- CPR and First Aid
- Competent Person and Cave-in Protection
- Traffic Control

Mr. Greg Theer (Certificate No. 011927)

- Water Distribution Specialist 1
- Water Distribution Manager 1
- Commercial Drivers License
- CPR
- Competent Person and Cave-in Protection
- Traffic Control

Mr. Ken Ganancial (Certificate No. 011583)

- Water Distribution Specialist 1
- Commercial Drivers License
- CPR and First Aid

In addition to these staff members, the water utility has one additional staff person who is not yet water distribution system certified.

CERTIFICATION REQUIREMENTS

Minimum public water system staff certification requirements have been enacted by the state legislature. These requirements are contained in Chapter 246-292 of the Washington Administrative Code (WAC), entitled the "Water Works Operator Certification Regulations." In terms of this legislation, the City's water system is classified as "Group 2" according to the population served, which is almost 8,000 persons.

According to WAC 246-292-050 (1) and (4), the City's water system must have a Water Distribution Manager of Level 2 or greater in responsible charge of daily operations. At the present time three out of seven employees have the necessary level of certification to fulfill this requirement. The City is also required to have a cross-connection control specialist (CCS) for implementing the cross-connection control program. As indicated above, three staff members are certified as CCS 1.

PROFESSIONAL GROWTH REQUIREMENTS

In order to promote and maintain expertise for the various grades of operator certification, Washington State requires that all certified operators complete not less than three Continuing Education Units (CEUs) within each 3-year period. Programs sponsored by both Washington Environmental Training Resources Center (WETRC) and the American Waterworks Association (AWWA) Pacific Northwest Subsection are the most popular source of CEUs for certified operators in Washington State.

Operator training is an important component in maintaining a safe and reliable water system. At a minimum, all personnel performing water system related duties should receive training in the following areas.

- Confined space
- Trenching and shoring
- Traffic Flagging
- Asbestos cement pipe safety
- Cross-Connection Control

The City's water system operators typically complete more than the required CEUs within a given period. All utility workers are certified in asbestos cement pipe safety, CPR and first aid, and all are certified in traffic flagging. Other utility staff have expressed interest in and are encouraged to become certified as WDM-1 and CCS. Each year, the City allocates approximately $2,500 for training for the water system operators.

SYSTEM OPERATION AND CONTROL

MAJOR SYSTEM COMPONENTS

The locations of the major system components are shown on Figure 1-6. A description of the normal operation of each facility is given in the following sections.

Source of Supply

The City obtains its water from six active wells, an additional emergency well, and two interties. Six of these wells are located in the lowland western portion of the service area within the 330 zone. Three of the lowland wells (Nos. 7, 10 and 12) are located by the City maintenance shop, northeast of the Porter Way and Kent Way intersection. Well No. 3 is located just west of Fife Way. The other lowland wells (Corridor Wells 1 and 2) are located on the east side of 5th Avenue approximately 400 feet north of the intersection of 1st Street East. The sixth active well (No. 5) is located in the upland central portion of the service area within the 434 pressure zone, between 19th and 20th Avenues and approximately 500 feet south of Emerald Street.

The City has an emergency intertie with Lakehaven Utility District located at the northwestern boundary of the retail service area. This intertie can provide fire flows in an emergency situation. The City has a second intertie with Mt. View-Edgewood Water Company, located at the southeast boundary of the retail service area. This intertie can provide up to 400 gpm during peak day conditions.

TABLE 7-1

Active Well Characteristics

Well No.	Pressure Zone	Date of Construction	Elevation (ft above MSL)	Well Screen Depth (ft)	Wellfield Capacity (gpm)	Normal Output (gpm)
3	330	1948	20	71	Unknown	225
5	434	1961	300	246	150 (12hr) 100 (24hr)	120
10	330	1986	30	154	1,000	500
12	330	2002	30	155	970	475
Corridor 1	330	1984	40	108	450	500
Corridor 2	330	2005	57	95	300	200

Water Treatment

Water from Well Nos. 3, 10 and 12 is treated for corrosion control at a treatment plant located adjacent to Wells No. 10 and 12. Treatment consists of pH adjustment by the addition of sodium hydroxide, with a target pH of 7.0 to 7.5, and addition of chlorine gas for disinfection.

Dosage of the caustic soda, based on flow, is regulated by a control signal from the in-line, Mag type flow meter. In turn, the electronic signal will adjust the rate on the variable speed motor that drives the metering pump. In addition, a pH sensor is installed to monitor the pH after the addition of the caustic soda.

The Corridor Wells receive pH control through aeration and disinfection with sodium hypochlorite. The target pH is 6.4 to 7.5. Treated water from these wells and Well Nos. 3, 10 and 12 is blended with supply Well No. 5, and a finished water pH of 7.1 is obtained (the raw water pH is approximately 6.3).

Reservoirs

As described in Chapter 1, the City operates three welded steel reservoirs with capacities of 2.0 MG, 1.0 MG and 0.35 MG. Water is normally pumped from the lower wells (Nos. 3, 10, 12 and the Corridor Wells) into the 15th Avenue Reservoir. Water is then pumped through the 15th Avenue Booster Station into the 434 pressure zone and to the

1.0-MG and 2.0-MG Reservoirs. Well No. 5 also supplies water to the two reservoirs in the 434 pressure zone.

TABLE 7-2

Reservoirs

Location	Capacity (MG)	Overflow Elevation (feet)	Base Elevation (feet)	Height at Overflow (feet)	Diameter (feet)
18th Street Court East	2.0	434	364	70	70
20th Avenue, north of Milton Way	1.0	428	352	76	47
15th Avenue, north of Oak Street	0.35	330	290	40	39

Transmission and Distribution

The City of Milton has approximately 300,000 feet of existing waterline. The length of installed pipe in lineal feet is designated in Table 1-8 by pipe diameter and material type. There are dead end lines within the water system. The City has concentrated on removing various dead end sections of the water system since the completion of the 1994 Water System Plan. The City does not have a standardized main flushing program. Mains are usually flushed in areas of known problems or in response to customer complaints about taste and odor.

Booster Pump and Pressure Reducing Valve Stations

The 15th Avenue Booster Station is located in a concrete block building on the eastern side of 15th Avenue (0.35 MG), just north of Oak Street. It pumps water from the 15th Avenue Reservoir, in the 330 pressure zone, to the 1.0 MG Reservoir, in the 434 pressure zone. The station contains two 20-hp pumps, each capable of delivering 440 gpm at a total dynamic head of 120 feet. The maximum capacity of this pump station with both pumps operating and the reservoir full is approximately 800 gpm. The pumps discharge into an 8-inch pipeline on 15th Avenue. There is auxiliary power in the form of a standby generator for the 15th Avenue Booster Station.

The 1.0-MG Reservoir Booster Station is located on 20th Avenue, north of Milton Way, next to the 1.0-MG Reservoir. The station is the primary source of water for the 520 zone and has a jockey pump and lead pump. The jockey pump provides up to 250 gpm of flow to the 520 zone under normal conditions. The pumps in the booster station are designed to maintain a pressure of 72 psi in the 520 zone. When the pressure on the discharge side of the booster station drops to 68 psi, the lead pump in the booster station turns on and the jockey pump turns off. The lead pump in the booster station is capable of providing approximately 1,400 gpm of flow. The pumps are equipped with variable frequency drives which allow the pumps to match the demand in the upper zone, up to a capacity of 1,400 gpm. When there is sufficient demand to activate the lead

pump, the lead pump is activated and the jockey pump shuts off. This provides energy efficient operation for the distribution of water into the upper zone. However, if the 520 zone demand is greater than that of the pumps' capacities, the pumps in the 2.0-MG Reservoir Booster Station will be activated.

The 2.0-MG Reservoir Booster Station is located adjacent to the City's 2.0-MG Reservoir. There are three pumps in the booster station. The 2.0-MG Reservoir Booster Station works in conjunction with the 1.0-MG Reservoir Booster Station. The lead pump is called on when the 1.0-MG Reservoir Booster Station cannot meet demands in the 520 zone.

Normal system operation has the 1.0-MG Reservoir Booster Station as the first booster station to supply water to the upper zone. However, the system operator can choose to operate the 2.0-MG Reservoir Booster Station to supply these needs by manually switching between the 1.0-MG Reservoir Booster Station and the 2.0-MG Booster Station.

When the 2.0-MG Reservoir Booster Station is in the lead role for the 520 zone, the 15-hp jockey pump provides the 520 zone with its daily demand and pressure requirements. The booster station is also equipped with two 50-hp pumps which are equipped with variable frequency drives to provide system pressures and flow rates up to 1,600 gpm to meet the anticipated fire demands.

When the 2.0-MG Reservoir Booster Station is in a supporting role, the lead pump (one of the 50-hp pumps) turns on when the pressure in the 520 zone falls to 52 psi. These conditions are most likely to occur during peak hour demands and fire flow conditions.

The 2.0-MG Reservoir Booster Station is equipped with a diesel powered emergency generator to supply the upper zone with water in the event of a power outage in the system. The diesel generator has the capacity to supply the full load booster station demands for a 24-hour period.

The 11th Avenue PRV station is located in the 8-inch line on 11th Avenue, near the intersection of Oak Street. It consists of a 6-inch pressure reducing valve and a 2-inch bypass valve. The upstream pressure is normally 90 psi and the downstream pressure setting is 50 psi. There is no flow meter at the station.

The Emerald Street PRV station is located in the 4-inch line on Emerald Street, near the intersection of 19th Avenue. It consists of a 4-inch pressure-reducing valve with no bypass valve. The upstream pressure is normally 60 psi and the downstream pressure setting is approximately 50 psi.

A second PRV is located in the 8-inch line downstream of the Emerald Street PRV on Emerald Street near the intersection of 12th Avenue. It consists of a 6-inch pressure

reducing valve and a 2-inch bypass valve. The upstream pressure is normally 110 psi and the downstream pressure is approximately 70 psi.

The Hylebos Avenue PRV station is located in the 8-inch line on Hylebos Avenue near the intersection of 19th Avenue Court. It consists of a 6-inch pressure reducing valve. The upstream pressure is normally 100 psi and the downstream pressure is approximately 60 psi.

The 20th Street East PRV station is located in the 8-inch line on 20th Street East near the intersection of 92nd Avenue East. It consists of a 6-inch pressure reducing valve and a 4-inch bypass valve. The upstream pressure is normally 100 psi and the downstream pressure is approximately 50 psi.

The 15th Avenue Booster Station PRV is located in the booster station near the 15th Avenue Reservoir. It consists of a 6-inch pressure reducing valve. The upstream pressure is normally 60 psi and the downstream pressure is approximately 20 psi.

Telemetry

The City updated its telemetry and SCADA system in 2008. The system now monitors levels in the storage facilities and the status of the booster stations and groundwater wells. The central control for the system is located at Well No. 12 and can be monitored from the Public Works maintenance center. The system uses programmable control software, which can be controlled by a personal computer at the office building or by a wireless laptop. It monitors and controls reservoir levels, wells status, well flow rate, booster pump flow rate, pump status, treatment, and alarm conditions. Well No. 5 and the 1-MG Reservoir are hardwired to the 1-MG Booster Station, and the water treatment building and Well No. 10 are hardwired to Well No. 12, which is then hardwired to the maintenance center office. All other facilities are radio-based. Figure 1-8 provides a schematic of the City's current telemetry system.

PREVENTIVE MAINTENANCE PROGRAM

The most cost-effective method for maintaining a water system is to conduct a planned preventive maintenance (PM) program. A planned PM program can provide the optimum level of maintenance activities for the least total maintenance cost.

The City has implemented a customer complaint process that helps resolve problems at the first request. All work orders are taken at City Hall and directed to the Public Works Department. After approval (authorization), two copies are forwarded to the Public Works crew. The field crew is responsible for resolving the complaint and noting on the work order the corrective actions taken. The completed work order is then returned to the Public Works Department. In the end, three copies of the work order are reattached and filed. Investigation and resolution of all complaints is a prudent maintenance strategy because it can prevent more serious problems from developing.

Separate from the customer complaint process, Milton conducts routine maintenance activities. The procedures for each system component are as follows:

Wells and Treatment Plant

Table 7-3 provides a list of the maintenance tasks associated with the wells and the treatment plant within the water system.

TABLE 7-3

Well and Treatment Plant Task List

Location	Frequency	Task
Wells	Daily	Time and Date Discharge Pressure Flow Gallons Per Week Check Pumps Check Motors Hours of Pump Running Time Kilowatt Power Usage Check Motor Noise, Temperature, and Vibration of Pumps Check Telemetry Check Security
	Weekly	Observe for Any Irregularity
Treatment Plant	Daily	Time and Date Chlorinator Rotometer Reading Daily Water Demand Total Chlorine Usage in 24 Hours Check Alarm Panel Record Chlorine Residual at Faucet Record Turbidity Level Record Water Temperature at Faucet Check Water Discharge Pressure at Station Taste Water Check Security Record pH Level at Faucet

Reservoirs

An improperly maintained reservoir can cause contamination in public water systems. Contaminants can enter the reservoir through cracks or openings at the vent, overflow or drain screens. Deteriorating hatch covers and vandalism can also compromise reservoir security and water quality. Poorly designed and maintained reservoirs can hamper the

emergency operation of a water system. If reservoir drains are not functioning properly, it may be impossible to purge a contaminant from the system. Table 7-4 provides a list of daily and weekly maintenance tasks associated with the reservoirs within the water system.

Periodic maintenance of the reservoirs includes the following:

- The internal coating is checked every 5 to 8 years.
- The check involves a video inspection of these interior walls.
- The exterior of the reservoirs is pressure washed every 5 years to remove the build-up of moss.
- The vent screens are checked every year and drains in the reservoir are checked every 3 to 5 years to ensure they are clean and functioning properly.

The 2.0-MG tank was constructed in 1995 and the 1.0-MG reservoir was repainted in 1998. All reservoirs were video inspected in September 2006 and it was decided that repainting was not needed at the time.

TABLE 7-4

Reservoir Task Lists

Location	Frequency	Task
Reservoir	Daily	Check Security Check Telemetry
	Weekly	Time and Date Tank Level Flow Gallons Per Week

Distribution System Valve and Hydrant Maintenance

The Public Works staff currently exercises valves in the system as time allows. The City exercises valves by hand and records the valve maintenance on a maintenance form. All fire hydrants in the system are exercised on a semi-annual basis and after any construction in the immediate area of the hydrant. Samples of the maintenance forms for valves and hydrants are included in Appendix O.

Valves that do not close tight will be removed, repaired, or replaced. An important aspect of distribution system valve maintenance is to ensure distribution valves are completely open. A partially closed valve can seriously reduce peak day operation and fire flow supply.

Distribution System Flushing Program

Traditionally, utilities have implemented line cleaning or flushing programs as corrective measures in response to customer complaints or to expel contaminants from the system. There is a growing consensus among industry purveyors that flushing programs should be included as best management practice for preventive maintenance of water distribution systems.

The City does not currently have a regular flushing program. Lines are flushed only in response to customer complaints and concerns. However, the City would like to initiate an annual flushing program to help improve water quality and pipe condition. The desired program would be a unidirectional flushing system which would clean the entire system every 3 years.

Unidirectional flushing is used to clean water mains with an organized, sequential valve and hydrant operation which starts at a clean water source and works toward the system extremities, always using clean water to create high-pressure flows. It is very effective at removing deposits in pipes and uses 30 to 40 percent less water than conventional flushing. However, it requires extensive planning to implement the program.

A thorough understanding of the distribution system hydraulics, flow patterns, and valves must be reached. The distribution system maps will be used to identify flushing loops, and valves to be opened or closed to attain the desired flushing patterns. In addition to planning flushing patterns, coordination among the stakeholders needs to be established prior to the program's start. Stakeholders include preventive maintenance staff, the fire department and water department. Checking fire flow and hydrant maintenance is important, therefore it is possible that the fire department staff could coordinate with the water system staff and add an extra person to the team. The program can also be coordinated with other distribution system preventive maintenance such as tank cleaning, valve and hydrant exercising, hydrant testing and street sweeping/inlet cleaning.

Based on other water system's flushing program, it is estimated that two people can flush between 7,500 to 9,000 lineal feet of pipe per day. The City has approximately 300,000 lineal feet of pipe. In order to flush the entire system every three years, two staff members will need to spend 2 to 3 weeks each year conducting the program.

Booster Pump Stations

Table 7-5 lists the routine tasks performed at each of the City's three booster stations.

TABLE 7-5

Booster Pump Station Task Lists

Location	Frequency	Task
Booster Station	Daily	Check Pumps Check Motors Check Telemetry Check Security Check SCADA
	Weekly	Time and Date Suction Pressure Discharge Pressure Tank Level Flow Gallons Per Week Hours of Pump Running Time Kilowatt Power Usage Check Motor Noise, Temperature, and Vibration of Pumps

Meters

Accurate water metering is essential to the financial and conservation components of the water system infrastructure. Substantial revenue may be lost through inaccurate metering of residential, commercial, and industrial accounts. Accurate master or source meter readings are critical to the operation of the water system. Without accurate master or source meter readings, the water utility cannot determine lost and unaccounted for water volumes.

The City has master meters located at all of its wells and at the treatment plant to quantify the amount of water pumped from the station. TSI Instruments will calibrate the meter when requested by the City.

The City is in the process of replacing all service meters with Automatic Meter Reading (AMR) meters. Approximately 57 percent of meters have been replaced so far. Many of the old meters are Precision PMM dry head models, which are read manually. Old meters can also range from 10 to 30 years old. The City hopes to have replaced all old meters with AMR meters by 2012. The largest domestic meters within the system are 2 inch in size, which should be tested every 1 to 3 years, depending on usage and customer classification.

Inventory of Materials

City has sufficient supplies to repair DI pipes in the system of sizes ranging from 6 inch to 12 inch. The City also has service saddles ranging from 2 inch to 12 inch with varying tap sizes.

Recommended Schedule

Table 7-6 is a schedule of normal maintenance and operations activities. The frequency listed is a minimum and the actual frequency will be adjusted as necessary to meet system requirements.

TABLE 7-6

Preventive Maintenance Schedule

Maintenance	Frequency
Check distribution system and note any suspected leaks.	Daily
Check and record chlorine and NaOH levels at the water treatment plant	Daily
Booster stations, reservoirs and wells	At least twice weekly
Flush dead-end lines	Upon request or as required
Exercise valves	As time allows
Video inspect, drain and clean the City reservoirs	8-year interval

EMERGENCY RESPONSE PROGRAM

Water utilities have the responsibility to provide an adequate and reliable quantity and quality of water at all times. To meet this requirement, utilities must reduce or eliminate the effects of natural disasters, accidents, and intentional acts. Although it is not possible to anticipate all potential disasters affecting the City's water system, formulating procedures to manage and remedy common emergencies is appropriate.

A Water System Plan Emergency Checklist is included in Appendix O and further describes the City's emergency program.

WATER SYSTEM PERSONNEL EMERGENCY CALL-UP LIST

Table 7-7 is the emergency phone list. In the event of a contaminant spill, the phone list provided in the City's Wellhead Protection Plan (Appendix M) under the heading Incident Response Management should also be consulted.

TABLE 7-7

Water System Emergency Phone List

Agency/Group/Business	Contact	Phone Number
Fire/Police Emergency	--	911
City of Milton Police Department	--	(253) 922-8735
Pierce County Sheriff	--	(253) 798-4721
King County Police	--	(206) 296-3311
Washington State Patrol	King County Pierce County	(425) 649-4370 (253) 536-6210
Lakehaven Utility District		(253) 941-1516
City of Milton Fire Department	--	(253) 922-0944
Edgewood Fire District 8	--	(253) 927-2313
Federal Way Fire District 39	--	(253) 927-3118
City of Fife Water		(253) 922-9315
Mt. View-Edgewood Water Co.	(answering service)	(253) 863-7348 (253) 620-4000
Pierce County Sewer		(253) 565-3440
Telemetry and Meter Calibration	T.S.I.	(425) 775-5696
Chemical Supplies	Jones Chemical	(253) 274-0104
Chemical Supplies	Univar	(253) 892-5075
Pump Repair	Pump Tech, Inc.	(206) 644-8501
Pipe/Fitting Supplies	HD Water Supply	(253) 531-1144
Control Valve Repair and Maintenance	G.C. Systems, Inc.	(253) 939-8322
Testing Lab (Coliform)	Water Management Labs (after hours)	(253) 531-3121 (253) 841-0732
Washington State Department of Health	NW Regional Office, John Ryding	(253) 395-6757
	After-hours (Utility staff use only)	(877) 481-4901
Washington State	Emergency Management	(800) 258-5990
King County	Emergency Management	(206) 296-3830
Pierce County	Emergency Management	(253) 798-7470
State Wide One-Call	Utility Locates	(800) 424-5555
Milton Public Works – Director of Public Works	Letticia Neal	(253) 922-8738
Milton Public Works – Water System Supervisor	Glen Baker	(253) 517-2716
City of Milton After Hours Dispatch	Fife Police Department	(253) 922-6656
Gray & Osborne, Inc.	Steve Clarke	(206) 284-0860

EMERGENCY PROCEDURES

In the case of an emergency, the Public Works Director has the authority to "change, reduce or discontinue the use of water," according to section 13.28.530 of Milton's Municipal Code. This authority is given with the provision that proper notice will be given to customers if possible.

In the event that an emergency situation should arise, the City has interties with the Lakehaven Utility District for fire flow and emergency use, and with Mt. View-Edgewood Water Company for meeting peak day demands and emergency use. The City can receive water from these sources while arrangements are being made to rectify the problem the City is experiencing with its water supply. Chapter 3 also discusses the possibilities of other sources of emergency water.

Contamination of Water Supply

Bacterial contamination of the water supply can result from such items as main breaks or pollution from an isolated source. Table 7-8 provides the appropriate action that will be taken in the event of the contamination of the water supply.

TABLE 7-8

Water Contamination Response

Distribution System Contamination
• Perform chemical and free chlorine residual analysis at various locations within the system, including the reservoirs and the system extremities
• Disinfect distribution lines as dictated by the nature of the contamination
• Routine and repeat sampling to confirm continued presence or absence of contaminant
Reservoir Contamination
• Isolate reservoir from system
• Resample to confirm contamination
• Check distribution system for presence of contamination
• Inspect vent screens, hatches, and piping to identify source of contamination
• If reservoir water is contaminated and therefore considered unsuitable for consumption, drain and clean reservoir.
• Consider disinfecting reservoir if bacteriological standards are exceeded. Follow AWWA Standards. A 50-ppm chlorine solution in the reservoir can be obtained by adding 97 gallons of 5.25-percent chlorine bleach per 100,000 gallons of storage.

Bacteriological Presence Detection Procedure

Procedures for notifying system customers, the local health department, and DOH of water quality emergencies are an important component of an emergency response program. Many public water systems will occasionally detect positive coliform samples. A positive response is mainly a result of minor contamination in distribution mains or sample taps, or improper bacteriological sampling procedures. However, the persistent detection of coliforms in the water supply, particularly E. coli or fecal bacteria, may require issuing a "public boil water notice" to ensure the health and safety of the water customers. Emergencies such as floods, earthquakes, and other disasters can affect water quality as a result of damage to water system facilities. Under these circumstances, a boil water order may be warranted. A sample boil water notification is included in Appendix J. WAC 246-290-320 requires water utilities to follow specific procedures in the event coliform bacteria are detected in the water system. These procedures are outlined in Table 7-9.

TABLE 7-9

Bacteriological Presence Detection Procedures

Routine #1	Routine #2	Repeat #1	Repeat #2	Repeat #3	Violation	Required Action[2]
Coliform detected, No *E.coli*/Fecal	None detected	None detected			No Violation	No Required Notification
Coliform detected, No *E.coli*/Fecal	Coliform detected, No *E.coli*/Fecal	None detected			Non Acute	Public Notification as soon as practical (required by 30 days)[3]
Coliform detected, No *E.coli*/Fecal	None detected	Coliform detected - No E.coli/Fecal in 1, 2, or 3 of the samples			Non Acute	Public Notification as soon as practical (required by 30 days), Certification form within 10 days[3]
Coliform detected, *E.coli*/Fecal detected[1]	None detected	Coliform detected - No E.coli/Fecal in 1, 2, or 3 of the samples			Acute	Public Notification Within 24 Hours, Boil Water Advisory, Certification form within 10 days[3]

TABLE 7-9 – (continued)

Bacteriological Presence Detection Procedures

Routine #1	Routine #2	Repeat #1	Repeat #2	Repeat #3	Violation	Required Action[2]
Coliform detected, No *E.coli*/Fecal	None detected	**Coliform detected - E.coli/Fecal detected in 1, 2, or 3 of the samples[1]**			Acute	Public Notification Within 24 Hours, Boil Water Advisory, Certification form within 10 days[3]
Coliform detected, *E.coli*/Fecal detected[1]	None detected	None detected			No Violation	No Required Notification, Contact DOH after Routine Results
Coliform detected, *E.coli*/Fecal detected[1]	**Coliform detected, *E.coli*/Fecal detected[1]**	None detected			Non Acute	Public Notification as soon as practical (required by 30 days), Recommended Boil Water Advisory[3]

(1) Contact DOH immediately after receiving a sample testing positive for Fecal or *E. coli* Presence.
(2) The required action following detection of *ANY* type of coliform is to increase monitoring the following month to five routine samples.
(3) Notification forms are available from DOH.

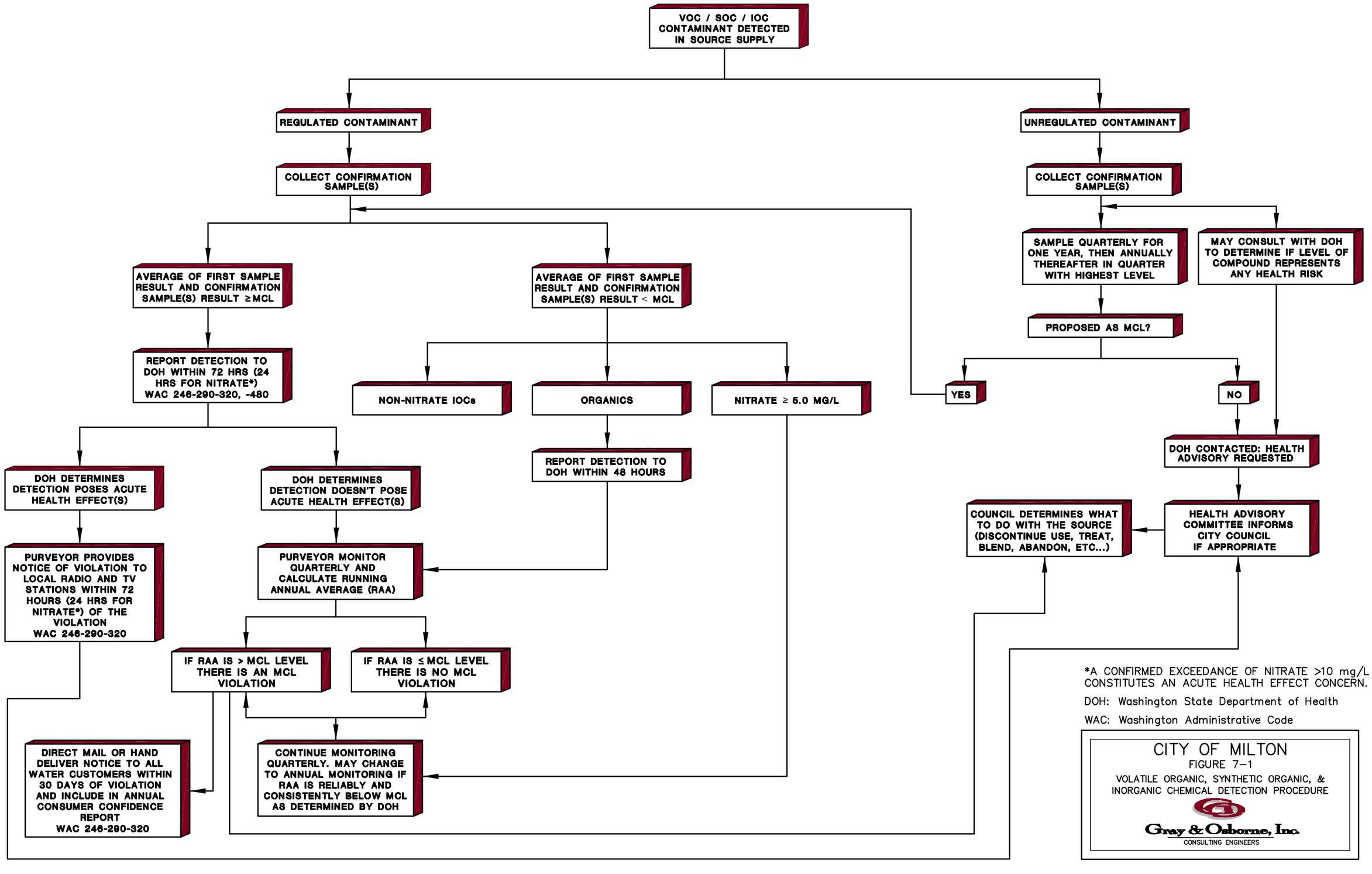
VOC/SOC and Inorganic Chemical/Physical Characteristics Detection Procedures

In the event of a volatile organic, synthetic organic or inorganic chemical event, a procedure to comply with DOH requirements is presented in Figure 7-1.

Power Failure

Various types of weather can cause a loss of power. These weather conditions include wind, lightning, freezing rain, or freezing snowstorm. Additionally, power can be lost through traffic accidents. During a City-wide power outage, the combined storage of 3.35 MG will provide water service in the City for 2.3 days of average demand based on the projected demands of 2029. In 2008, when the reservoirs are full, the City has storage for over four days of average daily use.

In the event of a power outage, public works staff will first check reservoir levels visually on a reader board at the tanks. The City electrical department will be contacted to determine the length of the power outage. Priority should be given to Feeder No. 1, which supplies power to the main well field and the booster pumps that serve the 520 pressure zone. The customers will be notified of the emergency and water



*A CONFIRMED EXCEEDANCE OF NITRATE >10 mg/L CONSTITUTES AN ACUTE HEALTH EFFECT CONCERN.

DOH: Washington State Department of Health

WAC: Washington Administrative Code

CITY OF MILTON

FIGURE 7-1

VOLATILE ORGANIC, SYNTHETIC ORGANIC, & INORGANIC CHEMICAL DETECTION PROCEDURE

Gray & Osborne, Inc.

CONSULTING ENGINEERS

conservation will be requested through radio, television, newspaper and/or police loudspeaker as required.

The City has auxiliary power at Well Nos. 10 and 12, the treatment plant, the 2.0-MG Reservoir Booster Station, and the 15th Avenue Booster Station. The auxiliary power is in the form of diesel generators.

In the event of cold weather, back up power at the treatment plant will allow heaters to run in the building.

Severe Earthquake

A severe earthquake can result in transmission line breaks, distribution system breaks and structural damage to the pump station, treatment facility, wells, reservoirs and vaults which house critical valving and meters.

Table 7-10 provides procedures to follow in the event of a severe earthquake.

TABLE 7-10

Severe Earthquake Response

System Component	Proposed Actions
Reservoirs	• Observe structures for visual signs of structural damage. • If structural damage is apparent, drain reservoir and inspect the interior of the tank • Check storm drainage system for significant flows • If leakage is suspected, isolate one reservoir at a time and monitor water level for at least 24 hours
Distribution Lines	• Close valves to isolate breaks • Check reservoir level • Notify water customers of emergency and request water conservation
Transmission Lines	• Shut down source pumps • Isolate break and check the base water system section maps for valve locations • Repair break • Disinfect isolated section
Booster Stations, Wells, Treatment Facilities & Meters	• Inspect for joint leakage and leaking storage tanks • Inspect wells for operation • Inspect well seals to prevent contamination from entering the wellhead • Inspect for alignment of pump column and casing • Inspect screen integrity
Supply Facilities	• Inspect for leakage or other structural damage

Major Fire

In the event of a major fire within the service area, low-pressure conditions could result in the extremities of the distribution system due to fire suppression demand. Proper functioning of booster pump and PRV stations should offset this effect. In the event of fire or drastically low static pressures, valves should be checked, followed by the system setpoints of pumps, reservoirs and PRV stations.

Cold Weather Conditions

Extended cold weather conditions could cause freezing problems at shallow service connections, valve vaults without an insulating earth cover, reservoirs, and water supply and treatment facilities. Frozen lines can be wrapped with heat tape or space heaters can be used.

Distribution System Low/High Pressure

The water surface elevation in the storage reservoirs and booster station settings control distribution system pressures. Under normal conditions, the reservoir overflow levels set the maximum pressure within the 330 and 434 pressure zones. However, excess pressure may accumulate in these pressure zones if the distribution and transmission system is isolated from a reservoir. Pressure within the 520 pressure zone is contingent upon the settings of the two booster stations that service it, namely the 2.0-MG and 1.0-MG Reservoir booster stations. The following table proposes investigative and corrective actions for both low and high pressure conditions.

TABLE 7-11

Distribution System High/Low Pressure Response

System Component	Proposed Actions	
	High Pressure	**Low Pressure**
Reservoirs	• Check reservoir levels • Manually discharge valves on pump • Ensure the recirculation pipeline is clean and free of any obstructions	• Check reservoir levels • Check drain line • Check for leakage
Distribution and Transmission Lines	• Excess pressure may cause damage to some older pipes. Open hydrants at various locations to reduce system pressure	• Contact City Hall, Fire and Police Departments • Demands due to fires, open hydrant or peak demands may be the cause. • Check roads, storm drainage facilities and sewer manholes along distribution system for excessive flows that would indicate a broken main.
Booster & PRV Stations and Well Pumps	• Increase the percent valve closure at PRVs to create additional headloss	• Check pressure upstream and downstream at each facility • Check for leakage

CROSS-CONNECTION CONTROL PROGRAM

The City's Cross-Connection Control Program was enacted through Ordinance 391 in 1974. The specifics of this ordinance are set forth in the Milton Municipal Code Chapter 13.32. A copy of the municipal code and the City's Cross-Connection Control manual is at City Hall. A copy of the cross connection chapter from the municipal code can be found in Appendix P.

PRIORITY SERVICE LIST

There are three categories of business establishments which may pose a hazard to the water system. Category one services pose the highest degree of hazard and include the following facilities:

- Printers
- Medical laboratories

- Chemical companies
- Radiator shops
- Battery, fertilizer, and paint manufacturers
- Pest control businesses
- Janitorial companies

Category two services are considered less hazardous and include the following:

- Doctor, dentist, and veterinarians' offices
- Blood banks
- Drug rehabilitation centers
- Car washes
- Photo labs
- Commercial laundries
- Nursing homes and hospitals

The least hazardous service category includes the following types of businesses:

- Food processing facilities
- Dairy establishments
- Beverage and candy manufactures
- Massage and health spas
- Motels and schools with pool, spa, or sauna facilities

NEW AND EXISTING CROSS-CONNECTION DEVICES

New and existing cross-connection devices will be catalogued and checked initially by City staff. It is the responsibility of the customer to ensure proper testing of the devices on an annual basis thereafter. Backflow prevention devices are required on all new potential cross-connections. A condition for new services is an evaluation by the cross-connection control certified City staff to determine what type of backflow device is needed.

CROSS-CONNECTION CONTROL PROGRAM RECORD KEEPING

A critical program element of a cross-connection control program is the maintenance of accurate records. The City uses a computer program to maintain a list of customers with cross connection devices. Annual testing results and inspection records are included in the list, plus notes on any violations and subsequent action in this. A copy of this list is included in Appendix P.

CHAPTER 8

CAPITAL IMPROVEMENT PLAN

INTRODUCTION

This chapter presents the proposed schedule for the City's 6-year Capital Improvement Plan (CIP) in accordance with the requirements of WAC 246-290. Water system capital improvements are scheduled and prioritized on the basis of water quality concerns, growth, regulatory requirements, component reliability, system benefit, and financial priority. For the proposed projects identified in this chapter, individual project descriptions and preliminary project cost estimates for the 6-year CIP are provided in Appendix Q. Additional projects for the 20-year planning period have also been identified. When the Water System Plan is updated after 6 years, the projects presented for the 20-year planning period should be reevaluated and scheduled for the subsequent 6-year planning period, if necessary. A water system basemap indicating proposed improvement projects is included as Figure 8-1.

In the future, other projects may arise that are not identified as part of the City's CIP. Such projects may be deemed necessary for ensuring water quality, preserving emergency water supply, accommodating transportation improvements proposed by other agencies, or addressing unforeseen problems within the City's water system. Due to budgetary constraints, the completion of these projects may require that the proposed completion date for projects in the CIP be rescheduled. The City retains the authority to reschedule proposed projects and to expand or reduce the scope of proposed projects, as best determined by the City Council. As the proposed completion date for the project approaches, each capital improvement project should be reevaluated to consider the most recent planning efforts

The CIP is categorized into six categories:

- Water Supply Projects (WS)
- Storage Projects (ST)
- Booster Station Projects (BS)
- Pressure Zone Modification Projects (PZ)
- Distribution System Projects (D), and
- Miscellaneous Projects (M)

Each category is further divided into a detailed list of projects presented chronologically over the 6-year and 20-year planning periods. Projects after the 6-year planning period are described along with a cost estimate, but are not scheduled for a specific year. Figure 8-1 identifies the locations of all capital improvement projects.