SECTION 7

CRITERIA

7-1 General

Performance criteria are established to evaluate the adequacy of various water system components through a systematic analysis. Necessary improvements are identified and recommended for inclusion in a Capital Improvement Program (CIP). Some criteria are based upon experience and their application is at the discretion of the water purveyor. This includes service pressures, storage capacity, and sources of supply. Other criteria, such as water quality and fire protection, are based on federal, state and local jurisdictional requirements. This section details the criteria which will serve as the benchmark for evaluating the City's water system. A summary of the service criteria is listed in Table 7-1.

Table 7-1
Service Criteria

Description	Criteria	Existing Requirement	Ultimate Requirement
1. Source of Supply			
a. Total	Maximum Day Demand (except for closed zones which shall be Maximum Day Demand plus Fire Flow Demand or Peak Hour, whichever is greater)	37,409 gpm	72,315 gpm
b. Local Supply	Average Day Demand	23,380 gpm	46,339 gpm
2. Reservoir Capacity			
a. Operational Storage	30% of Maximum Day Demand for NMC 25% of Maximum Day Demand for OMC	13.5 mg	27.4 mg
b. Emergency Storage	100% of Average Day Demand	33.7 mg	66.7 mg
c. Fire Suppression	Highest Fire Flow Requirement		
Residential			
Rural	1,500 gpm for 2 hours	0.18 mg	0.18 mg
Low Density	1,500 gpm for 2 hours	0.18 mg	0.18 mg
Low-Medium Density	1,500 gpm for 2 hours	0.18 mg	0.18 mg
Medium Density	2,000 gpm for 2 hours	0.24 mg	0.24 mg
High Density	3,500 gpm for 4 hours	0.84 mg	0.84 mg
Retail / Service			
Neighborhood Commercial	2,500 gpm for 3 hours	0.45 mg	0.45 mg
General Commercial	3,000 gpm for 3 hours	0.54 mg	0.54 mg
Office Commercial	3,000 gpm for 3 hours	0.54 mg	0.54 mg
Hospitality	4,000 gpm for 4 hours	0.96 mg	0.96 mg
Employment			
Business Park	3,000 gpm for 3 hours	0.54 mg	0.54 mg
Industrial	3,500 gpm for 4 hours	0.84 mg	0.84 mg
Other			
Airport	4,000 gpm for 4 hours	0.96 mg	0.96 mg

Table 7-1
Service Criteria (continued)

Description	Criteria	Existing Requirement	Ultimate Requirement
Mixed Use	3,500 gpm for 4 hours	0.84 mg	0.84 mg
Open Space	1,500 gpm for 2 hours	0.18 mg	0.18 mg
Public Facility	3,000 gpm for 3 hours	0.54 mg	0.54 mg
Public School	2,500 gpm for 3 hours	0.45 mg	0.45 mg
3. Booster Pump Stations	➢ Capable of delivering Maximum Day Demand plus Fire Flow or Peak Hour Demand of service area, whichever is greater ➢ Stand-by pump equal in size to the largest duty pump ➢ Flow meters, suction and discharge pressure gauges, and telemetry equipment for alarm and status notification at each station ➢ Provisions for emergency power at all stations		
4. Minimum Pipe Size	12-inch in commercial and industrial areas 8-inch in all other areas		
5. Maximum Velocities	➢ 5 ft/s at Average Day Demand ➢ 7 ft/s at Maximum Day Demand (5 ft/s for PVC pipe) ➢ 7 ft/s at Fire Flow Demand (5 ft/s for PVC pipe)		
6. Static Pressures	➢ Minimum 40 psi ➢ Desired 60 - 80 psi ➢ With pressure regulation over 80 psi		
7. Dynamic Pressures	Minimum 40 psi during Peak Hour Demand		
8. Fire Flows and Pressures			
Residential			
Rural	1,500 gpm for 2 hours with 20 psi residual pressure at fire hydrant		
Low Density	1,500 gpm for 2 hours with 20 psi residual pressure at fire hydrant		
Low-Medium Density	1,500 gpm for 2 hours with 20 psi residual pressure at fire hydrant		
Medium Density	2,000 gpm for 2 hours with 20 psi residual pressure at fire hydrant		
High Density	3,500 gpm for 4 hours with 20 psi residual pressure at fire hydrant		
Retail / Service			
Neighborhood Commercial	2,500 gpm for 3 hours with 20 psi residual pressure at fire hydrant		
General Commercial	3,000 gpm for 3 hours with 20 psi residual pressure at fire hydrant		
Office Commercial	3,000 gpm for 3 hours with 20 psi residual pressure at fire hydrant		
Hospitality	4,000 gpm for 4 hours with 20 psi residual pressure at fire hydrant		
Employment			
Business Park	3,000 gpm for 3 hours with 20 psi residual pressure at fire hydrant		
Industrial	3,500 gpm for 4 hours with 20 psi residual pressure at fire hydrant		
Other			
Airport	4,000 gpm for 4 hours with 20 psi residual pressure at fire hydrant		
Mixed Use	3,500 gpm for 4 hours with 20 psi residual pressure at fire hydrant		
Open Space	1,500 gpm for 2 hours with 20 psi residual pressure at fire hydrant		
Public Facility	3,000 gpm for 3 hours with 20 psi residual pressure at fire hydrant		
Public School	2,500 gpm for 3 hours with 20 psi residual pressure at fire hydrant		

7-2 Service and Operational Criteria

7-2.1 Source of Supply

Any water system must be capable of meeting all demands imposed upon the system. This can be achieved through multiple supply sources, storage, or a combination of both. Generally, the determination is based upon water availability, existing storage capacity, and economics. It is prudent to secure water supplies from multiple sources so that demands can be met at reasonable levels when one or more water sources are not available.

California Code of Regulations Related to Drinking Water require a minimum source of supply of one maximum day demand of the service area. Under this criterion, reservoirs are typically needed to regulate hourly fluctuations in demand, provide fire flow and supplement supply during an outage of a source for an extended duration.

As much of the average day demand shall be supplied by local sources as feasible.

7-2.2 Storage

Typically for a water system, three categories of storage are of importance: operational, emergency, and fire suppression. The entire system as well as each individual pressure zone is evaluated to determine the system's ability to meet storage criteria.

Operational Storage

Operational storage serves to equalize variations in sources of supply and demand over short periods of time (daily or weekly) and to fight fires. Utilizing the daily demand hydrograph, the component of operational storage needs to account for the difference in supply and demand, which can be determined with an extended period simulation of the system over a day or a week, etc.

The operational storage might typically be based on one maximum day demand if groundwater storage is not available. For the City of Ontario's system, operational storage criterion is based on 30 percent of the maximum day demand for New Model Colony and 25 percent of the maximum day demand for Old Model Colony. Greater daily demand fluctuations are anticipated in New Model Colony due to its residential character compared to the mixed residential and industrial character of Old Model Colony.

Emergency Storage

Emergency storage is used in the event of an interruption in the primary water supply source. It is assumed that most outages can be mitigated within 7 days. Accordingly, many agencies that depend solely on imported water utilize 7 average days of storage as their emergency storage criterion. It is reasonable to expect that groundwater sources will be available during an outage of the imported water supply. Therefore, the required emergency storage volumes may typically be reduced by an agency's groundwater supply capacity. The City of Ontario's emergency storage volume can be reduced by the actual production capacity of its wells. The only requirement would be that the facilities be capable of pumping the water needed during an emergency from the wells

to the higher zones. Since the City's well capacity of 51,100 gpm exceeds the existing average day demand (23,380 gpm) and the ultimate average day demand (46,339 gpm), the emergency storage criteria is set to one average day demand.

Unlike operational and fire storage, which shall be available for all individual zones, emergency storage can be available at one or a few storage sites. Again, the only requirement would be that the facilities be capable of moving the water needed during an emergency from the location of the storage to other zones.

Fire Suppression Storage

Fire suppression storage, shown in Table 7-1, is the volume required to supply the service area with the required fire flows, which range from 1,500 to 4,000 gpm for a duration of two (2) to four (4) hours.

The required storage determined as described above shall be increased 15 percent of the reservoir volume so that this portion of the volume is available for variations in elevation, and to provide submergence over the reservoir outlet pipe.

7-2.3 Booster Pump Stations

Booster pump stations are typically sized to deliver the maximum day demand plus fire flow or the peak hour demand of the service areas, whichever is greater. The exception is closed service zones supplied by either a hydropneumatic pumping system or a variable speed pumping system. Under these circumstances, the booster pumps must meet maximum day demand plus fire flow requirements or there must be a separate fire pump installed to meet the fire flow requirements.

All booster pump stations shall incorporate a standby pump of the same size as the largest duty pump. This ensures that there is a replacement for the largest duty pump during maximum day demand conditions, while one of the pumps at the station is being repaired or replaced. It typically takes pump manufacturers 12 to 16 weeks for delivery of a new pump and motor unit once the order is placed and shop drawings are approved.

7-2.4 System Pressures

Most water utilities set 60 to 80 pounds per square inch (psi) as the average static pressure throughout the system. The water system shall also be capable of maintaining a minimum residual pressure of 40 psi during the peak hour demand. A residual pressure of 20 psi must be maintained at the fire hydrant outlet in developed areas during fire flow.

In areas where pressures exceed 80 psi, the Uniform Plumbing Code requires customers to install "an approved type pressure regulator preceded by an adequate strainer" on their service connections to protect domestic plumbing and water heaters.

7-2.5 Transmission and Distribution Pipelines

The distribution system shall be sized and designed to provide redundant service at adequate pressures for normal use as well as at fire flow conditions. In most cases, this can be accomplished by looping the system. Looping through easements or other areas which are not easily accessible shall be avoided. Provisions shall be made for supplying each service zone from at least two sources where feasible.

In order to maintain adequate system pressures and prolong the life of the pipe, flow velocities shall be limited. The system shall operate at velocities of 1 to 3 feet per second (fps) normally, with a maximum velocity of 5 to 7 fps at intermittent peak flows. The pipe velocity at fire flows shall not exceed 7 fps. Velocity in PVC pipes shall not exceed 5 fps.

The pressure in the system at any given point for a particular flow is dependent on a number of variables including pipe size, roughness and length. These components all contribute to the magnitude of pressure losses in the system. The system shall be designed and operated to maintain system losses to less than 10 feet for each 1000 feet of pipe length under any condition, subject to satisfying all other criteria.

All pipes shall be sized to provide adequate fire flows. To achieve this, when a single, unlooped pipe provides fire service to an area, a minimum diameter of 8-inch shall be maintained to the last hydrant. All mains shall be constructed with a minimum diameter of 8-inches. In commercial and industrial areas, the minimum diameter required is 12-inches. These pipe size recommendations shall be adhered to for all new design and construction projects, as well as any waterline replacement/upgrade projects.

7-2.6 Fire Suppression

The fire flow requirements used for this study are based upon the City's 2005 Water Master Plan, the Uniform Fire Code, and the City's Design Guidelines and Specifications Water System Design Criteria dated August 2009. Fire flows shown in Table 7-1 are required to be delivered at a minimum residual pressure of 20 psi at the fire hydrant outlet.

All fire hydrants shall be installed at 300-foot intervals with the exception of fire hydrants located on arterial roads, which will be spaced at 500-foot intervals on alternate sides of the roadway (1000 feet separation same side).

7-2.7 Service Life of Facilities

All facilities have useful lives for which relatively trouble-free service can be expected. Once exceeded, these facilities become less reliable, expensive to maintain and are subject to failure. Therefore, facility age is considered in the assessment of all water systems and in formulating future replacement projects.

The determination of the useful life is dependent upon multiple considerations. Table 7-2 shows the useful lives that are generally accepted as prudent planning criteria. They shall be one of the considerations in determining the phasing of facility replacement.

Table 7-2
Planning Criteria for Facility Useful Life

Facility	Useful Life (Years)
Steel Reservoirs	40
Concrete Reservoirs	50
Lined and Coated Ductile Iron/Steel Pipe	50
PVC Pipe	50
Asbestos Cement Pipe	50
Cast Iron and Steel Pipe (Lining or coating of non-current practice)	35
Pump Stations/Wells/Treatment Facilities	
Structure	50
Piping	40
Valves	20
Mechanical	15
Electrical	15
Well Casing	20 - 60

7-2.8 Operational Flexibility

Operational Flexibility is achieved by providing multiple sources of supply, back-up or stand-by facilities, and looped distribution system piping. Criteria to be applied include:

- Provide multiple sources of supply
- Provide looped system whenever possible
- For wells, provide standby generators and automatic transfer switches to deliver at least the average day demand into the system. For other wells, provide portable generator connection and manual transfer switches.
- Provide standby generators and automatic transfer switches at all booster pump stations
- Provide emergency interconnections with neighboring agencies

7-2.9 Distribution System Maintenance Program

Regular maintenance of a distribution system is an essential part of a properly operated water distribution system. Maintenance shall include periodic flushing and cleaning of the system, servicing of valves and hydrants, conducting leak surveys, replacement and repairs, and disinfection of repaired sections. Each maintenance and repair activity shall be documented. This work shall be performed in accordance with the Title 22, Chapter 16 (California Waterworks Standards) and AWWA G200 Standards.

Flushing and Cleaning

Flushing shall be performed to remove any accumulated sediments or other impurities which have been deposited in the system pipes. It will also help to restore system capacity. It is important that system flushing be performed systematically to remove the debris. The minimum flushing velocity shall be 2.5 fps.

Cleaning, will require proper access to the pipelines, shall be conducted on the sections that require it based upon the information collected and documented during regular maintenance activities.

Servicing of Valves and Hydrants

Valves are often found inaccessible, inoperable, or closed and shall therefore be tested and exercised regularly. In the event of a line break, it is important that valves operate properly so that the break can be isolated for repair. Records of repair shall require a notation of the time at which valves are closed and reopened so that valves do not remain closed inadvertently. In 2007, the City hired a contractor to systematically exercise all the valves in the City's system. The work was completed in 2009. The valve exercising program will continue with each valve being exercised every five years.

Hydrants shall be periodically inspected for leaks at the hose outlets. Leaking hydrants shall be removed and/or reconditioned and then replaced.

Valve exercising and hydrant maintenance program can be implemented in conjunction with the flushing program.

Leak Surveys

Comparison of pumping and purchase records, and customer meter readings and other uses such as system flushing can indicate if excessive leakage is occurring in the system. Leak surveys shall be conducted when excessive leakage is suspected.

Water Main Replacement and Repair

Water mains shall be repaired and/or replaced when pipes are found to be broken, corroded, or leaking. The method of repair shall consider if the line is scheduled for replacement, its location in the system, and the conditions which led to the failure. Following the repair or replacement of any pipe, the line shall be flushed and disinfected in accordance with the applicable requirements.

7-2.10 Storage Tank and Reservoir Maintenance

The storage tanks shall be inspected periodically by a qualified diver at no more than 5 year intervals. The reports from diving inspections shall be utilized in scheduling the subsequent inspection program, as well as the maintenance/repair projects.

7-2.11 Water Quality

The quality of water served by the City has to be in accordance with the Federal standards as well as the State of California Department of Public Health (CDPH) standards as set forth in Title 22 of the California Code of Regulations.

The basic water quality standards are established by the Safe Drinking Water Act (SDWA), which was passed by the Congress in 1974. Amendments to the SDWA were enacted in 1986 and 1996. The SDWA mandated the U.S. Environmental Protection Agency (EPA) to develop primary drinking water standards or maximum contaminant levels (MCL'S) in public water supplies.

The CDPH has responsibility for the State's drinking water program. It is accountable to the EPA for enforcement of the SDWA and for adoption of standards that are at least as stringent as that of the EPA. Since California conducts independent risk assessments, some of its standards are more stringent than the standards of the Federal Government.

The maximum contaminant levels are the maximum permissible levels of contaminants in water, which enter the distribution system of a public water system. MCL'S for bacteriological quality, haloacetic acids, and trihalomethanes are measured within the distribution system. The Federal and State MCL'S are enforceable and must be met by appropriate public drinking water systems.

The Federal maximum contaminant level goals (MCLG's) establish the maximum level of contaminant with an adequate margin of safety that would cause no known or anticipated adverse effect on the health of consumers. MCLG's are non-enforceable health goals based on health considerations only. In California, the Office of Environmental Health Hazard Assessment sets Public Health Goals (PHGs), which are similar to MCLGs in that they are non-enforceable health goals based on health considerations. In California, the exceedance of a PHG triggers a requirement to notify the governing body, and to hold a public meeting during which the cost of treating the water to remove the contaminant is discussed.

The secondary MCL's are established to protect public welfare and to provide pure, wholesome and potable water. They are measured at the point of delivery to the consumer. They involve protection of the taste, odor and appearance of the water. Federal secondary MCL's are not enforceable. The State secondary MCL's are enforceable for all new systems and new sources developed by existing systems.

Notification Levels (NLs) and Response Levels (RLs), (formerly known as "action levels") are set by CDPH based on actual contamination of drinking water supplies, or in anticipation of possible contamination. If an NL is exceeded, notification of the governing body is required. If an RL is exceeded, removal of the source from service is recommended by CDPH. Public notification is not required for NL or RL exceedances, but is recommended by the Department of Public Health.

Since the 1986 Amendments, several rules have been promulgated by the EPA. These include:

- Lead and Copper Rule - (June 7, 1991 and revised October 10, 2007 which requires monitoring) requires treatment techniques consisting of optimal corrosion control treatment, source water treatment, public education and lead service line replacement.
- Consumer Confidence Report Rule - (August 19, 1998) requires community water systems to prepare and provide to their customers annual consumer confidence reports on the quality of the water delivered by the systems. This rule allows customers to make health-based decisions regarding their drinking water consumption.
- Radionuclides - (December 7, 2000) This rule finalized the MCLG's, MCL's, and monitoring, reporting and public notification requirements for uranium, combined radium-226 and radium-228, gross alpha particle radioactivity, and beta particle and photon radioactivity.
- Public Notification Rule - (June 5, 2000) requires owners and operators of public water systems to notify customers when they fail to comply with the requirements of the National

Primary Drinking Water Regulations; have a variance or exemption from the drinking water regulations; or are facing other situations posing a risk to public health. The rule sets the requirements that the public water systems must follow regarding the form, manner, frequency, and content of a public notice.

- Unregulated Contaminant Monitoring Rule - (January 11, 2001) requires EPA to establish a program to monitor unregulated contaminants, and to publish a list of contaminants to be monitored. The first two rounds of monitoring (UCMR1 and UCMR2) have been completed, and development of the contaminant list for the third round of monitoring (UCMR3) is in progress.

- Surface Water Treatment Rule - (June 29, 1989) requires all public water systems using surface water supplies and groundwater under the influence of surface water to filter and disinfect for protection against Giardia lamblia, Legionella, enteric viruses and heterotrophic bacteria.

  The State surface water treatment regulations resulted from a series of amendments to the National Primary Drinking Water Regulations. The State regulations became effective on June 5, 1991. In California, all public water systems must filter all their surface water and part of their groundwater under the influence of surface water.

- Interim Enhanced Surface Water Treatment Rule - (February 16, 1999) The purposes of this rule are to improve control of microbial pathogens including specifically the protozoan Cryptosporidium in drinking water; and address risk tradeoffs with disinfection by-products. The rule establishes a MCLG of zero for Cryptosporidium; 2-log Cryptosporidium removal requirements for systems that filter; strengthened combined filter effluent turbidity performance standards and individual filter turbidity provisions; disinfection benchmark provisions to assure continued levels of microbial protection while facilities take the necessary steps to comply with the new disinfection byproduct standards; inclusion of Cryptosporidium in the definition of groundwater under the direct influence of surface water and in the watershed control requirements for unfiltered public water systems; requirements for covers on new finished water reservoirs; and sanitary surveys for all surface water systems regardless of size. This rule builds upon the treatment technique requirements of the Surface Water Treatment Rule.

- Total Coliform Rule - (June 29, 1990) Establishes microbiological standards and monitoring requirements for all public water systems. Compliance is based upon the presence or absence of total coliforms in a sample rather than on an estimate of coliform density. The State regulations are identical to the Federal regulations.

- Arsenic Rule - (January 2001) This rule established a MCL of 0.01 mg/L for arsenic.

- Filter Backwash Rule – This rule applies to conventional or direct filtration treatment systems and recycled spent filter backwash water for protection from Cryptosporidium. It requires that all recycled flows be conveyed to the head of the treatment system for complete treatment.

- Disinfectants and Disinfection by Products Rule -This rule is required by the 1986 Amendments. It must balance the need for protection from cancer causing chemicals that

result from disinfection of drinking water (the by-products) with the need to eliminate the microbes through disinfection.

The first stage of this rule was the Draft Disinfectants/Disinfection By-Products Rule (D/DBPR), proposed on July 29, 1994. The compounds affected by the first stage were as follows:

Chlorine
Chloramines
Chlorine Dioxide

Total Trihalomethanes (TTHMS)
Total Haloacetic Acids (THAAS)
Total Organic Carbon (TOC)
Bromate
Chlorite

The Stage 1 rule proposed MCLS of 0.080 mg/l for trihalomethanes, 0.060 mg/l for total haloacetic acids, 0.010 mg for bromate, 1.0 mg/l for chlorite, determined as the annual average of quarterly measurements. The proposed maximum residual disinfection level for chlorines and chloramines was 4.0 mg/l and for chlorine dioxide was 0.08 mg/l.

The Stage 2 rule requires an evaluation of water distribution systems, known as an Initial Distribution System Evaluation (IDSE), to identify the locations with high disinfection byproduct concentrations. These locations are then used by the systems as the sampling sites for Stage 2 DBPR compliance monitoring. The MCL for two groups of disinfection byproducts are calculated for each monitoring location in the distribution system. The rule also requires each system to determine if they have exceeded an operational evaluation level, which is identified using their compliance monitoring results.

- Groundwater Rule – (October 11, 2006) This rule addresses the risk of bacteriological contamination of groundwater sources through an approach that relies on four major components: periodic sanitary surveys, source water monitoring, corrective actions, and compliance monitoring.

In addition to the SDWA requirements, Assembly Bill 733 (passed in 1996), required water purveyors with 10,000 or more customers to submit an estimate of the total cost of providing fluoridation facilities at each source of supply.

The CDPH California Waterworks Standards, revised and adopted March 9, 2008, describes disinfection requirements (Article 5) and additive regulations (Article 7) for public water systems. New or repaired water mains, reservoirs, and wells must be disinfected and sampled for bacteriological quality in accordance with American Water Works Association Standards. Direct and indirect additives cannot be in contact with the drinking water unless certified as meeting the specifications of the NSF International/American National Standard Institute (NSF/ANSI).

A summary of the federal and state water quality standards are presented in Tables 7-3 and 7-4.

Table 7-3
Primary Drinking Water Standards

Contaminant	USEPA		CDPH	
	MCL (mg/l)	Date	MCL (mg/l)	Effective Date
Inorganics				
Aluminum	-	-	1	2/25/1989
Antimony	0.006	07/92	0.006	9/8/1994
Arsenic	0.01	2001	0.01	2004
Asbestos (fibers>10 micrometers)	7 MFL[a]	01/91	7 MFL[a]	9/8/1994
Barium	2	01/91	1	1977
Beryllium	0.004	07/92	0.004	9/8/1994
Cadmium	0.005	01/91	0.005	9/8/1994
Chromium (total)	0.1	01/91	0.05	5/30/1905
Copper (AL)			1.3	
Cyanide (as free cyanide)	0.2	07/92	0.15	6/12/2003
Fluoride	4	04/86	2	04/98
Lead (AL)	0.015[b]	06/91	0.015[b]	12/11/1995
Mercury	0.002	6/24/1977	0.002	1977
Nickel	Remanded		0.1	9/8/1994
Nitrate	(as N) 10	6/24/1977	(as NO3) 45	1977
Nitrite (as N)	1	01/91	1	9/8/1994
Total Nitrate/Nitrite (as N)	10	01/91	10	9/8/1994
Perchlorate			0.006	2004
Selenium	0.05	01/91	0.05	9/8/1994
Thallium	0.002	07/92	0.002	9/8/1994
Radionuclides				
Uranium	30 µg/L	12/7/2000	20 pCi/L	1/1/1989
Combined radium-226 & 228	5 pCi/L	6/24/1977	5 pCi/L	1977
Cross Alpha particle activity	15 pCi/L	6/24/1977	15 pCi/L	6/24/1977
Gross Beta particle activity	4 millirem/yr	6/24/1977	4 millirem/yr	2003
Strontium-90	8 pCi/L	6/24/1977	8 pCi/L[c]	1977
Tritium	20,000 pCi/L	6/24/1977	20,000 Pci/L[c]	1977

Table 7-3 (cont)
Primary Drinking Water Standards

Contaminant	USEPA		CDPH	
	MCL (mg/l)	Date	MCL (mg/l)	Effective Date
Volatile Organic Chemicals (VOCS)				
Benzene	0.005	06/87	0.001	2/25/1989
Carbon tetrachloride	0.005	06/87	0.0005	4/4/1989
Chlorobenzene	0.1		0.1	
1,2-Dichlorobenzene	0.6	01/91	0.6	9/8/1994
1,4-Dichlorobenzene	0.075	06/87	0.005	4/4/1989
1,1-Dichloroethane	-	-	0.005	6/24/1990
1,2-Dichloroethane	0.005	06/87	0.0005	4/4/1989
1,1-Dichloroethylene	0.007	06/87	0.006	2/25/1989
cis-1,2-Dichloroethylene	0.07	01/91	0.006	9/8/1994
trans-1,2-Dichloroethylene	0.1	01/91	0.01	9/8/1994
Dichloromethane	0.005	07/92	0.005	9/8/1994
1,2-Dichloropropene	-	-	0.005	2/25/1989
1,3-Dichloropropane	0.005	01/91	0.0005	6/24/1990
Ethylbenzene	0.7	01/91	0.3	6/12/2003
Monochlorobenzene	0.1	01/91	0.07	9/8/1994
Styrene	0.1	01/91	0.1	9/8/1994
1,1,2,2-Tetrachloroethane	-	-	0.001	2/25/1989
Volatile Organic Chemicals (VOCS)				
Tetrachloroethylene (PCE)	0.005	01/91	0.005	5/1/89
Toluene	1	01/91	0.15	9/8/1994
1,2,4 Trichorobenzene	0.07	07/92	0.005	9/8/1994
1,1,1-Trichloroethane	0.2	06/87	0.2	2/25/1989
1,1,2-Trichloroethane	0.005	07/92	0.005	9/8/1994
Trichloroethylene (TCE)	0.005	06/87	0.005	2/25/1989
Trichlorofluoromethane (Freon)	-	-	0.15	6/24/1990
1,1,2-Trichloro-1,2,2-Trifuoroethane	-	-	1.2	6/24/1990
Vinyl Chloride	0.002	06/87	0.0005	4/4/1989
Xylenes	10	01/91	1.75	2/25/1989

Table 7-3 (cont)
Primary Drinking Water Standards

Contaminant	USEPA		CDPH	
	MCL (mg/l)	Date	MCL (mg/l)	Effective Date
Non-Volatile Synthetic Organic Chemicals (SOCS)				
Acrylamide	TT[e]	01/91	TT[e]	9/8/1994
Alachlor	0.002	01/91	0.002	9/8/1994
Atrazine	0.003	01/91	0.001	6/12/2003
Bentazon	-	-	0.018	4/4/1989
Benzo(a)pyrene (PAHs)	0.0002	07/92	0.0002	9/8/1994
Carbofuran	0.04	01/91	0.018	6/24/1990
Chlordane	0.002	01/91	0.0001	6/24/1990
Dalapon	0.2	07/92	0.2	9/8/1994
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	01/91	0.0002	5/3/1991
Di(2-ethylhexyl)adipate	0.4	07/92	0.4	9/8/1994
Di(2-ethylhexyl)phthalate	0.006	07/92	0.004	6/24/1990
2,4-D	0.07	01/91	0.07	9/8/1994
Dinoseb	0.007	07/92	0.007	9/8/94
Dioxin (2,3,7,8-TCDD)	0.00000003	07/92	0.00000003	9/8/1994
Diquat	0.02	07-92	0.02	9/8/1994
Endothall	0.1	07/92	0.1	9/8/1994
Endrin	0.002	07/92	0.002	9/8/1994
Epichlorahydrin	TT[e]	01/91	TT[e]	9/8/1994
Ethylene dibromide	0.00005	01/91	0.00005	9/8/1994
Glyphosate	0.7	07/92	0.7	6/24/1990
Heptachlor	0.0004	01/91	0.00001	6/24/1990
Heptachlor epoxide	0.0002	01/91	0.00001	6/24/1990
Hexachlorobenzene	0.001	07/92	0.001	9/8/1994
Hexachlorocyclopentadiene	0.05	07/92	0.05	9/8/1994
Lindane	0.0002	01/91	0.0002	9/8/1994
Methoxychlor	0.04	01/91	0.03	6/12/2003
Molinate	-	-	0.02	4/4/1989
Oxamyl (Vydate)	0.2	07/92	0.05	6/12/2003
Pentachlorophenol	0.001	01/91	0.001	9/8/1994
Picloram	0.5	07/92	0.5	9/8/1994
Polychlorinated biphenyls (PCBs)	0.0005	01/91	0.0005	9/8/1994
Simazine	0.004	07/92	0.004	9/8/1994
Thiobencarb	-	-	0.07	4/4/1989
Toxaphene	0.003	01/91	0.003	9/8/1994
2,4,5-TP (Silvex)	0.05	01/91	0.05	9/8/1994

Table 7-3 (cont)
Primary Drinking Water Standards

Contaminant	USEPA		CDPH	
	MCL (mg/l)	Date	MCL (mg/l)	Effective Date
Disinfectants				
Chloramines (as Cl2)	MRDL=4.0		MRDL=4.0	
Chlorine (as Cl2)	MRDL=4.0		MRDL=4.0	
Chlorine dioxide (as ClO2)	MRDL=0.8		MRDL=0.8	
Disinfection Byproducts				
Total trihalomethanes (TTHMs)	0.08	1/1/2002[d]	0.1	3/14/1983
Total haloacteic acids (HAA5)	0.06	1/1/2002[d]	0.06	
Bromate	0.01	1/1/2002[d]	0.01	
Chlorite	1.0	1/1/2002[d]	1.0	
Microorganisms				
Cryptosporidium	TT		TT	
Giardia Lamblia	TT		TT	
Heterotrophic plate count (HPC)	TT		TT	
Legionella	TT		TT	
Total Coliforms (incl. fecal coli & E.coli)	5%		5%	
Turbidity	TT		TT	
Viruses (enteric)	TT		TT	

a. MFL = Million fibers per liter, with fiber length > 10 microns

b. Regulatory Action Level; if system exceeds, it must take certain actions such as additional monitoring, corrosion control studies and treatment, and for lead, a public educaiton program; replaces MCL.

c. MCLs are intended to ensure that exposure above 4 millirem/yr does not occur.

d. Effective for surface water systems serving more than 10,000 people; effective for all others 1/1/04

e. TT = treatment technique, because an MCL is not feasible

Table 7-4
Secondary Drinking Water Standards

Contaminant	USEPA MCL (mg/l)	CDPH MCL (mg/l)
Aluminum	0.05 to 0.2	0.2
Chloride	250	250 (Recommended)
Color	15 color units	15
Copper	1.0	1.0
Corrosivity	non-corrosive	
Fluoride	2	
Foaming agents	0.5	0.5
Iron	0.3	0.3
manganese	0.05	0.05
Methyl-*tert*-butyl either (MTBE)		0.005
Odor	3 threshold odor numbers	3 threshold odor numbers
pH	6.5 - 8.5	
Silver	0.1	0.1
Sulfate	250	250 (Recommended)
Thiobencarb		0.001
Total dissoved solids (TDS)	500	500 (Recommended)
Turbidity		5 units
Zinc	5	5

7-2.12 Future Regulations

Future regulations proposed by the USEPA and CDPH that may affect the City of Ontario's future water quality, supply, and treatment standards are presented in Table 7-5.

As the supplier of the imported water, WFA and CDA are responsible for meeting the primary and secondary standards for imported water. The City is responsible for maintaining quality, including disinfectant residuals, in its system; and to meet the primary and secondary standards for well water.

Table 7-5
Future Regulations Proposed by the USEPA and CDPH

Regulation	Potential Contaminants	Comments	Anticipated Review Date
Revisions to Total Coliform Rule (TCR)	Total Coliforms Fecal Cloriform / *E. coli*	The TCR, promulgated in 1989, may be revised by EPA. Revisions are anticipated to include addressing or monitoring finished water quality in the distribution system.	Uncertain
Distribution System Rule	Microbiological Contaminates	Possible changes may include intrusion of facilities, pressure transient monitoring, finished water storage monitoring; and provisions for monitoring nitrification, corrosion, permeation and leaching.	Uncertain
Perchlorate	Perchlorate	A Drinking Water Equivalent Level (DWEL) of 24.5 ppb was established as part of the Integration Risk Information System (IRIS) assuming 100% exposure of drinking water. Contribution of perchlorate exposure from food is under review. Uncertain as to if EPA will regulate perchlorate in drinking water. Note: CDPH's MCL Perchlorate is 0.006 mg/l.	Uncertain
Radon Rule	Radon	At each entry point to the water system, initial monitoring of 4 consecutive quarters may be required. Final EPA rule with Alternative MCL (AMCL) limits was originally scheduled for 2009.	Uncertain

7-3 Design Criteria

Water system improvements shall be designed in accordance with the criteria set forth in the City's latest version of "Design Guidelines and Specifications – Water System Design Criteria", unless otherwise approved in writing by the City. Subsection 7-3.1 and 7-3.2 describe design criteria that is not included in the City's current design document.

7-3.1 Wells

The wells shall be designed in accordance with the Water Well Standards: State of California Bulletin 74-81 and Bulletin 74-90 (supplement to Bulletin 74-81), the most recent AWWA Standard A-100, Department of Public Health requirements, and sound engineering judgment.

The pumps shall be placed low enough in the casing so that subsequent lowering shall not be necessary. All well screens shall be below the pump intake to preclude cascading of water into the well casing even with the lowest expected pumping water level. The casing diameter shall be at least 4 inches larger than the largest pump/column pipe dimension, and maximum velocity shall not exceed 5 fps. Total screen area shall be sized to maintain a velocity of less than 0.1 foot per second at the maximum anticipated flow. Additionally, the casings diameters shall be selected to allow lining the wells in the future without losing significant capacity. The use of higher grade materials, such as stainless steel shall be considered to increase the useful life of the wells.

The well design shall include a 4-inch diameter camera tube extending to below the pump intake elevation, and a sounding tube. A separate air line with a depth gauge and an air connection shall be provided at every well. Flow meters, pressure gauges, and telemetry equipment shall be included to continuously monitor the wells. Either permanent emergency generators with automatic transfer switches or portable generator connections with manual transfer switches shall be provided at each well site. Sufficient standby power generation capacity shall be provided to pump at least the average day demand into the system.

7-3.2 Booster Pump Stations

The pump stations shall be equipped with modern pump controllers, flow meters, suction and discharge pressure gauges, proper isolation valves, and telemetry equipment. Facilities that will minimize pressure transients at start-up, shut-down, and power failure shall be provided. Flow meters and pressure gauges are essential tools for monitoring pump performance and demand conditions in the service area. Telemetry equipment is used to remotely monitor the status of the facility, and notify personnel in the event of a failure.

Pump stations shall be constructed of fireproof materials and be provided with peripheral sprinkler systems to prevent fire damage. Furthermore, power to the pump stations shall be provided through underground service to minimize possibility of damage during fires.

Standby generators and automatic transfer switches shall be provided to operate the pump stations during commercial power outages.

7-3.3 Pressure Reducing Stations

Pressure reducing stations supplying service zones shall be constructed with sufficient valves to deliver the entire range of demands and the fire flows within their proper operating range. Wherever possible, a minimum of two pressure reducing stations shall serve these zones. Pressure reducing stations shall be constructed with a pressure relief valve at the downstream end to preclude excessive pressures in the service area in case of malfunctioning of the pressure reducing valves. Each pressure reducing station shall be equipped with flow meters and telemetry equipment so that their operation can be remotely monitored through the SCADA system, and alarm conditions, such as open pressure relief valve can be addressed in a timely manner.