

Appendix H
Water Quality Monitoring Program

City of Tumwater

Water Quality Monitoring Program

December 2009 Update

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OVERVIEW

Maintaining excellent water quality, both at the source and in the water system, has always been an important goal for the City of Tumwater water utility. Groundwater, which originates as rainwater, is Tumwater's sole source of drinking water.

As water travels through the ground, it can pick up substances that occur naturally in the rocks and soils that have been deposited as a result of human activity, or the presence of animals. For example, in 1993, City staff discovered tetrachloroethylene (PCE) and trichloroethylene (TCE) in a well at the Palermo Wellfield under the routine monitoring program. This presence led to the loss of approximately fifty percent of the City's supply until the water treatment systems were in place in 1999. This highlights how important Tumwater's water quality monitoring, maintenance, and treatment programs are for providing a safe, reliable drinking water supply to the City's customers.

WATER QUALITY STANDARDS

The 1974 federal Safe Drinking Water Act (SDWA) and its 1986 and 1996 amendments established specific legislation for regulation of public water systems by federal and state governments. The US Environmental Protection Agency (EPA) is authorized to develop national drinking water regulations and oversee the implementation of the SDWA. Once federal regulations become effective or promulgated, the states may adopt the federal law as state law and accept the primary responsibility for implementation and enforcement of the law.

The State of Washington has been delegated the authority to oversee drinking water regulations by the federal government; this oversight is exercised for Group "A" water systems by the State Department of Health (DOH). State drinking water regulations are published in Washington Administrative Code (WAC) 246-290 which establishes the water quality standards that must be followed for Group A Public Water Systems (PWS). Group A Community PWS are defined as all systems that regularly serve 15 or more year-round residential connections, or 25 or more year-round residents (for 180 or more days per year).

Minimum standards for water quality are usually specified in terms of maximum contaminant levels (MCLs). Primary MCLs are based on chronic and/or acute human health effects. Secondary MCLs are based on factors other than health effects, such as the aesthetic quality of water and are not enforceable. Public water purveyors have the responsibility of meeting the requirements of the regulations on a day-to-day basis. Monitoring requirements are established for regulated contaminants to ensure that water systems demonstrate compliance with MCLs or treatment technique requirements. Public water suppliers are also required to retain certain records and submit reports to the DOH.

TOTAL COLIFORM

Historically, the City has experienced occasional total coliform detections in the distribution system, primarily in the Bush Mountain area. However, in 2004, detections of total coliform became more widespread and frequent. Since August 2004, there have been three months (within a cumulative eight-month period where temporary chlorine disinfection was not applied) where coliform detections have triggered a non-acute MCL violation. In August 2004, three of the 25 routine samples and two of the nine repeat samples tested positive for total coliform (all samples tested negative for fecal indicators). The positive samples were concentrated near Antsen Street in the 454 Zone. In October 2004, five of the 17 routine samples and two of the 18 repeat samples tested positive for total coliform (all samples tested negative for fecal indicators). The positive samples were scattered throughout the system. Following this second, non-acute MCL violation, the City implemented temporary chlorine disinfection of its system while Tideflex mixing systems were installed in the active storage reservoirs. In April 2006, the City completed the reservoir improvements and discontinued temporary disinfection. In August 2006, five of the 51 routine samples tested positive for total coliform (all samples tested negative for fecal indicators). The detections were concentrated in the northern part of the system around the Barnes Lake area.

Further investigation of the coliform occurrences found the following:

- Coliform occurrence within the water system is attributable to microbial re-growth. DOH does not consider this to be a source deficiency issue. There have been no coliform detections at any of the well sources since the City began investigative source monitoring in 2004.
- The coliform detections have been widespread. However, they tend to occur during the warmer summer months.
- The maintenance of a low disinfectant residual (i.e., 0.05 to 0.25 mg/L as Cl₂) appears adequate to control bacterial re-growth within the system. There have been no coliform detections when the free chlorine residual was measured above 0.05 mg/L as Cl₂.

In response to the total coliform violations, Tumwater initiated temporary chlorination. The temporary chlorine disinfection program involved application of 12.5% strength hypochlorite solution at the Palermo and Bush sources and the two booster pump stations. At each of these locations, the chlorine feed rates have been set to provide an immediate residual of about 0.25 mg/L as Cl₂. This operation has allowed the City to maintain a residual between 0.05 and 0.25 mg/L as Cl₂ throughout the system. During the initial disinfection period (November 2004 to April 2006), there have been no samples were positive for total coliform. Since then, one sample, collected in July 2007, has been positive for presence of total coliform. Three follow-up samples were negative for coliform presence. No cause was determined.

BCA AND PERMANENT DISINFECTION

On October 31, 2006, Tumwater entered into a Bilateral Compliance Agreement (BCA) with DOH. The purpose of the BCA is to outline conditions and action items for the City to follow to address recent non-acute violations of the Total Coliform Rule (TCR). One of these conditions involves the implementation of permanent, system-wide disinfection. The City has initiated this Water Disinfection Project (WDP) to satisfy the requirements of the BCA, ensure continued regulatory compliance, and maintain its high standard of customer service.

The WDP program is intended to provide and maintain a chlorine residual in the range 0.05 to 0.30 mg/L as Cl₂ throughout Tumwater's entire distribution system. This program includes the installation of sodium hypochlorite chemical feed systems at each system entry-point, as well as at its co-located "C" Street Booster Pump Station and Booster Station No. 4. As part of this project, water from Well 10 will be piped directly to the individual systems at Wells 9, 11, and 15 for combined chlorination prior to distribution.

The objectives of the disinfection-related aspects of the WDP are as follows:

- Continue to maintain compliance with the conditions of the BCA.
- Allow for the reliable use of all existing and anticipated future sources of supply.
- Develop a structured approach for the implementation of permanent, system-wide disinfection, including process selection, regulatory approval, and the design and installation of disinfection systems.
- Maintain the City's high standard of customer service relating to the safety and aesthetic quality of its finished water supply.

Final design of the new disinfection facilities is scheduled for completion in September 2009.

Construction is scheduled to begin in December 2009, with substantial completion and facility startup in September 2010.

NEW SOURCES OF SUPPLY

In 2010, the City of Tumwater will be developing a new well or wells in the immediate vicinity of the Palermo Wellfield to address the capacity and interference issues. These new wells are expected to provide an additional total yield of approximately 1,000 gpm and would be plumbed through the existing treatment systems. Under normal operating conditions, the new wells would be used in lieu of current Wells 3, 6, and 8, which would remain as supplementary wells. Complete water quality tests will be conducted on these potential new sources once test wells, scheduled for March/April 2010, are installed.

In July of 2009 the Thurston County Water Conservancy Board recommended approval of the transfer of the Olympia Brewery water rights to the Cities of Lacey, Olympia, and Tumwater. The Brewery Wells have known iron and manganese issues, and will likely require treatment to remove these constituents prior to potable use.

WATER QUALITY MANAGEMENT

Since the general oversight and management of issues surrounding water quality falls under the Public Works domain of both Engineering and Operations, clarification on the roles and functions of each is defined below.

The Operations Department is responsible for sample procurement, facility maintenance, and any issue surrounding the proper daily operation of the water system. The Operations Department also maintains the hard copy results and digitization of sampling result data.

The Water Resources Division of the Engineering Department maintains overall water quality program management, including the development of water quality monitoring plans, wellhead protection oversight, ordinance development and reviews compliance with local codes and policies. It is the also responsibility of the Engineering Department to review compliance with federal and state guidelines.

MONITORING REQUIREMENTS AND COMPLIANCE

Existing state and federal law contains regulations for bacteriological contaminants, inorganic chemicals and inorganic physical parameters (IOCs), volatile organic chemicals (VOCs), synthetic organic chemicals (SOCs), radionuclides, disinfectants, and disinfection by-products. Current drinking water standards and an overview of Tumwater's compliance status are described below.

BACTERIOLOGICAL

Many serious diseases are caused by bacteria, a class of single-celled organisms. Tumwater currently monitors 16 locations around the City on a rotating basis, collecting 50 samples per month. The required number of monthly coliform samples is based on an estimate of the number of customers served by Tumwater each month. DOH has recently required that this estimate include not only residential customers but also regular, non-residential users, such as business employees or daycare centers. The demographic data provided in Chapter 2 of the Water System Plan indicates that Tumwater serves approximately 21,000 residential customers and 22,000 non-residential customers each month. As a system serving approximately 43,000, Tumwater must collect 50 monthly coliform samples. Prior to this change in method for estimating population, Tumwater was required to collect 20 monthly coliform samples. Tumwater began collecting 50 samples per month in March 2009.

As recommended by DOH, the TCR monitoring locations are spread throughout the system, with a special emphasis on dead-end lines, where bacteria might thrive due to limited circulation and other circumstances. These samples are analyzed for coliforms, which are used as bacteriological "indicator" organisms. Indicator organisms are not considered a health risk when found in the drinking water, but suggest that conditions are suitable to support more potentially harmful bacteria, such as fecal coliform or *E. Coli*. When bacterial indicator organisms exceed EPA standards, the City takes appropriate actions to ensure that the public water supply is safe, and that the causes of contamination are investigated and addressed.

For a more detailed overview of the Coliform Monitoring Program, please refer to the Coliform Monitoring Plan, most recently updated in 2009 (refer to Appendix K). A non-acute MCL violation for a system collecting 50 coliform samples per month is detection of coliform presence in more than 5.0% of monthly samples (more than 2 samples). According to WAC 246-290-310, acute violations of bacteriological MCLs are as follows:

- Fecal coliform present in a repeat sample, which is a sample collected to confirm the presence of coliform detected in a previous analysis.
- *E. coli* present in a repeat sample.

- Coliform present in a set of repeat samples collected as a follow-up to a sample with fecal coliform or *E. coli* present.

Occurrence of an acute MCL violation requires follow-up sampling and contact with DOH to determine necessary future action.

As discussed above, Tumwater has had 3 non-acute MCL violations of the coliform monitoring requirements. In response to this issue, Tumwater has signed a BCA with DOH, implemented temporary chlorine disinfection, and will bring permanent disinfection online in 2010. One sample has been positive for total coliform presence while temporary chlorination has been online. Tumwater anticipates that the implementation of permanent disinfection will adequately address the occurrence of additional positive coliform samples.

INORGANIC CHEMICAL ANALYSIS

Tumwater conducts inorganic chemical and physical analyses on parameters regulated by primary and secondary chemical and physical standards. These parameters and their MCLs are presented in Table 1. Table 1 also reflects the updated MCL for Arsenic, which was reduced from 0.05 mg/L to 0.010 mg/L in 2006, when the Arsenic Rule came into effect. Since Tumwater uses groundwater sources, the frequency of analysis from each groundwater source or wellfield is once every 36 months, except for asbestos, which has been waived from source water monitoring. Tumwater must monitor for asbestos in the distribution system once every nine years. Inorganic samples are obtained from a point representative of the source, after treatment, and prior to entry to the distribution system.

Tumwater collected samples at each source for inorganic and physical parameter analysis most recently in July 2009. Monitoring was also conducted in 2003 and 2007. Monitoring results demonstrate that Tumwater’s water quality meets primary and secondary MCLs. Tumwater’s next round of monitoring for inorganic and physical parameters for all sources will be conducted between January 2011 and December 2013.

Table 1: Inorganic chemical & physical parameters.

Substance	Primary MCLs (mg/L)	Substance	Secondary MCLs (mg/L)
Antimony (Sb)	0.006	Chloride (Cl)	250.0
Arsenic (As)	0.010	Fluoride (F)	2.0
Asbestos	7 million fibers/L (longer than 10 microns)	Iron (Fe)	0.3
Barium (Ba)	2.0	Manganese (Mn)	0.05
Beryllium (Be)	0.004	Silver (Ag)	0.1
Cadmium (Cd)	0.005	Sulfate (SO4)	250.0
Chromium (Cr)	0.1	Zinc (Zn)	5.0
Copper (Cu)	*	Color	15 Color Units

Substance	Primary MCLs (mg/L)	Substance	Secondary MCLs (mg/L)
Cyanide (HCN)	0.2	Specific Conductivity	700 umhos/cm
Fluoride (F)	4.0	Total Dissolved Solids	500 mg/L
Lead (Pb)	*		
Mercury (Hg)	0.002		
Nickel (Ni)	0.1		
Nitrate (as N)	10.0		
Nitrite (as N)	1.0		
Selenium (Se)	0.05		
Sodium (Na)	*		
Thallium (Tl)	0.002		

**Although the state board of health has not established MCLs for copper, lead, and sodium, there is sufficient public health significance to require inclusion in inorganic chemical and physical source monitoring. Lead and copper requirements are covered under the heading Lead and Copper Analysis. The EPA has established a recommended level of 20 mg/L as a level of concern for those consumers that may be restricted for daily sodium intake in their diets.*

RADIONUCLIDES ANALYSIS

The Radionuclides Rule, which updated EPA's standards for radionuclides in drinking water, became effective on December 8, 2003. Under these requirements, the first round of monitoring for combined radium 226/228, gross alpha particle activity, and uranium was to be completed by December 31, 2007. The results of this initial round of monitoring, based on the average of four quarterly samples, were used to determine the frequency of radionuclides monitoring in the future. Alternately, DOH could allow systems to use grandfathered radionuclides data collected between June 2000 and December 8, 2003 to determine future radionuclides monitoring requirements.

Tumwater most recently conducted monitoring for combined radium 226/228 and gross alpha particle activity in July 2009. Monitoring results were below the MCLs presented in Table 2. Based on Tumwater's initial round of monitoring, Tumwater will be required to sample for combined radium 226/228 and gross alpha particle activity once every three years, except for the Airport Wellfield (sources 21, 22, and 23), which must be sampled twice every three years for radium 226/228. Tumwater's next round of radionuclides monitoring will be conducted in May 2012.

Only community water systems designated as vulnerable by the State must sample for beta particle and photon activity.

Table 2: The MCLs for Radionuclides

Substance	MCL
Radium-226	3 pCi/L
Combined Radium-226 and Radium-228	5 pCi/L
Gross alpha particle activity (excluding radon and uranium)	15 pCi/L
Uranium	30 µg/L

LEAD AND COPPER RULE

The EPA published the final regulations for the Lead and Copper Rule (LCR) in 1991 as part of the 1986 SDWA amendments, intended to reduce tap water concentrations of lead and copper. Lead and copper samples collected according to 40 CFR must have concentrations below the “Action Level” of 0.015 mg/L for lead, and 1.3 mg/L for copper at the 90th percentile. This rule has been revised multiple times, with the most recent revisions becoming effective in December 2007. This revision primarily clarifies sample collection requirements. Tumwater has developed a Lead and Copper Monitoring Program, last revised in 2009.

Tumwater completed the last compliance round of tap sampling in 2007, an engineering evaluation in 2009 to monitor the impacts of introducing disinfection, and will collect the next set of compliance samples in 2010. Tumwater is in compliance with Lead and Copper Rule monitoring and action level requirements and is currently on reduced monitoring (collecting 30 tap samples every three years).

Table 3: 90th Percentile Levels for the Last 4 Monitoring Events

Year	Monitoring Type	Lead 90 th Percentile	Copper 90 th Percentile
2009	Engineering	0.006	0.156
2007	Compliance	0.012	0.450
2004	Compliance	0.009	0.250
2001	Compliance	0.004	0.140

Additional information regarding the City’s Lead & Copper monitoring program can be found in the 2010 Comprehensive Water System Plan Update.

DISINFECTANT/DISINFECTION BY-PRODUCTS (DBPS)

As part of the 1996 Safe Drinking Water Act Amendments, the EPA was required to develop regulations balancing risks due to microbial contaminants and disinfection byproducts (DBPs). With respect to DBPs, the EPA developed the Stage 1 Disinfectants/DBPs Rule (Stage 1 DBPR, effective 2002) and the Stage 2 DBPR. These regulations established Maximum Residual Disinfectant Levels (MRDLs) for chlorine, chloramine, and chlorine dioxide and MCLs for total trihalomethanes (TTHMs) and five haloacetic acids (HAA5). An MRDL is similar to an MCL, except it has been established for a disinfectant. Compliance with these MCLs is calculated using a running annual average of quarterly sample results. The Stage 2 DBPR tightened compliance requirements by introducing new criteria for selecting DBP monitoring locations, and requiring MCL compliance calculations based on a running annual average of samples collected at each monitoring location, instead of an average of all samples from all locations collected during a quarter. Applicable MCLs and MRDLs are presented in Table 4.

As a system that provides secondary disinfection, these regulations apply to Tumwater. In 2007, Tumwater completed a Stage 1 D/DBP Monitoring Plan and began monitoring per this plan in November 2007. To comply with the Stage 1 DBPR, Tumwater samples for TTHMs and HAA5s at six distribution system locations each quarter. During the 2008/2009 monitoring cycle, the City's running annual averages for TTHMs and HAA5s were 0.005 mg/L and 0.000 mg/L, respectively. Since the City's results are less than 50% of the MCLs, they can qualify for reduced monitoring. The City should consult with the State for reduced monitoring approval. Additionally, each of the coliform samples was analyzed for chlorine residual, resulting in at least 50 monthly chlorine samples, all well below the chlorine MRDL.

In addition to compliance with the Stage 1 DBPR, Tumwater has completed the Initial Distribution System Evaluation (IDSE) required by the Stage 2 DBPR for selection of Stage 2 monitoring locations. The objective of this evaluation is to identify distribution system locations that may be exposed to relatively high DBP levels. The IDSE process included developing and submitting an IDSE Plan to the EPA and obtaining approval. To complete the IDSE, Tumwater collected TTHM and HAA5 samples for one year as set out in the IDSE Plan. These samples were in addition to those collected for Stage 1 D/DBP compliance. Based on the IDSE results, Tumwater will submit their IDSE report by January 1, 2010, which will establish four long-term DBP monitoring locations in Tumwater's system. Tumwater will also need to prepare a Stage 2 DBP Monitoring Plan, and will begin long-term monitoring in 2013. This monitoring will replace Tumwater's DBP monitoring under the Stage 1 DBPR.

Table 4: Disinfectant/DBPs MRDLs and MCLs Applicable to Tumwater

Disinfectant	MRDL (mg/L)
Chlorine	4.0
DBP	MCL (mg/L)
Total Trihalomethanes (TTHM)	0.080
Haloacetic Acids (HAA5)	0.060

ORGANIC CHEMICALS

EPA has established requirements for monitoring volatile organic chemicals (VOCs), regulating MCLs for 21 VOCs as shown in Table 4. In areas where treatment is installed, sampling must occur at points after treatment and before entry into the distribution system. VOC monitoring frequency is established based on whether VOCs have been detected in the source of supply. Drinking water systems are able to obtain monitoring waivers from the State. Currently, Tumwater samples for VOCs at each source once every three years. Tumwater last sampled for VOCs in August 2007. Monitoring results indicate that Tumwater is in compliance with MCLs for VOCs. Tumwater's next round of VOC monitoring will be required by December, 2010.

Tumwater monitors Synthetic Organic Compounds (SOCs) at each source once every three years. Table 5 presents SOCs and the associated MCLs. DOH has issued Tumwater monitoring waivers at all sources for dioxin, endoathall, ethylene dibromide and other soil fumigants, glyphosphate, insecticides, and diquat. Tumwater does not need to conduct sample analysis for these contaminants through 2010. Additionally, DOH has issued monitoring waivers for all sources except the Airport Wellfield (S09) for herbicides and general pesticides. Tumwater last sampled for SOCs in April 2009. Tumwater's monitoring results indicate that they are in compliance with MCLs for SOCs. Tumwater's next SOC monitoring will occur between 2011 and 2013.

Table 5: MCL Requirements for VOC Parameters

Contaminant	MCL (mg/L)	Contaminant	MCL (mg/L)
Benzene	0.005	Ethylbenzene	0.7
Carbon Tetrachloride	0.005	Styrene	0.1
Monochlorobenzene	0.1	Tetrachloroethylene	0.005
o-Dichlorobenzene	0.6	Toluene	1
p-Dichlorobenzene	0.075	1,2,4-Trichlorobenzene	0.07
1,2-Dichloroethane	0.005	1,1,1-Trichloroethane	0.2
1,1-Dichloroethylene	0.007	1,1,2-Trichloroethane	0.005
cis-1,2-Dichloroethylene	0.07	Trichloroethylene	0.005
trans-1,2-Dichloroethylene	0.1	Vinyl Chloride	0.002
Dichloromethane	0.005	Xylenes (total)	10
1,2-Dichloropropane	0.005		

Table 6: MCL Requirements for SOC Parameters

Contaminant	MCL (mg/L)	Contaminant	MCL (mg/L)
2,4-D	0.07	Endrin	0.002
2,4,5-TP	0.05	Ethylene dibromide (EDB)	0.00005
Alachlor	0.002	Glyphosate	0.7
Atrazine	0.003	Heptachlor	0.0004
Benzo[a]pyrene(PAHs)	0.0002	Heptachlor epoxide	0.0002
Carbofuran	0.04	Hexachlorobenzene	0.001
Chlordane	0.002	Hexachlorocyclopentadiene	0.05
Dalapon	0.2	Lindane	0.0002
Di(2-ethylhexyl)adipate	0.4	Methoxychlor	0.04
Di(2-ethylhexyl)phthalate	0.006	Oxamyl	0.2
Dibromochloropropane (DBCP)	0.0002	Pentachlorophenol	0.001
Dinoseb	0.007	Picloram	0.5
2,3,7,8-TCDD (Dioxin)	3 x 10 ⁻⁸	Polychlorinated biphenyls	0.0005
Diquat	0.02	Simazine	0.004

NITRATE/NITRITE

Tumwater monitors for nitrate and nitrite, taking one sample annually from each active source. During years when complete inorganic monitoring is required, nitrate and nitrite samples are included as part of that analysis. Monitoring results indicate that Tumwater is in compliance with nitrate and nitrite MCLs.

UNREGULATED CONTAMINANT MONITORING REGULATION (UCMR)

The 1996 SDWA amendments required EPA to establish criteria for a program to monitor unregulated contaminants and to identify no more than 30 contaminants to be monitored every five years. The purpose of this monitoring is to collect data to support the US EPA Administrator’s decisions regarding

whether or not to regulate contaminants such as those on the Drinking Water Contaminant Candidate List (CCL) to protect public health. The UCMR 1 required community water systems (CWSs) that serve more than 10,000 persons to monitor their water for the presence of listed unregulated contaminants between 2001 and 2003.

EPA has since issued the UCMR 2, which requires select public water systems to monitor for 25 chemicals. All public water systems serving more than 10,000 people are required to conduct Assessment Monitoring from the UCMR 2's List 1 during a 12-month period between January 2008 and December 2010. All public water systems serving more than 100,000 people, 320 selected systems serving more than 10,000 people, and 480 systems serving fewer than 10,000 people must conduct a Screening Survey for parameters included on the UCMR 2's List 2 for 15 contaminants during the same period.

Tumwater is required to monitor only for those contaminants found on UCMR 2's List 1, Assessment Monitoring (see Table 7), consisting of 10 chemical contaminants for which standard analytical methods are available. Tumwater conducted Assessment Monitoring during June, 2008. None of the chemicals were detected.

Table 7: UCMR 2 List 1, Assessment Monitoring

Contaminant	CASRN	Use or Environmental Source
Dimethoate	60-51-5	Used in the production of isocyanate and explosives
Terbufos sulfone	56070-16-7	Used as a mixture with 2,4-dinitrotoluene (similar uses)
2,2',4,4'-tetrabromodiphenyl ether (BDE-47)	5436-43-1	Flame retardant
2,2',4,4',5-pentabromodiphenyl ether (BDE-99)	60348-60-9	Flame retardant
2,2',4,4',5,5'-hexabromobiphenyl (HBB)	59080-40-9	Flame retardant
2,2',4,4',5,5'-hexabromodiphenyl ether (BDE-153)	68631-49-2	Flame retardant
2,2',4,4',6-pentabromodiphenyl ether (BDE-100)	189084-64-8	Flame retardant
1,3-dinitrobenzene	99-65-0	Explosive
2,4,6-trinitrotoluene (TNT)	118-96-7	Explosive
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	Explosive

Table 8 presents the laboratories located in Washington State which are approved to conduct analysis of samples collected for the UCMR 2's Assessment Monitoring List.

Table 8: UCMR 2 Analysis - Washington State Laboratories

Laboratory	Street Address	City	Zip	Phone Number
Edge Analytical	1620 S. Walnut St.	Burlington	98233	(360) 757-1400
Columbia Analytical Services, Inc.	PO Box 479	Kelso	98626	(360) 577-7222
Water Management Laboratories	1515 80 th Street E.	Tacoma	98404	(253) 531-3121

CONSUMER CONFIDENCE REPORTING

Consumer Confidence Reports (CCRs) are the centerpiece of the right-to-know provisions in the 1996 Amendments to the Safe Drinking Water Act. CCRs must contain information on the quality of the water delivered by the systems and characterize the risks (if any) from exposure to contaminants detected in the drinking water in an accurate and understandable manner. Each report must provide consumers with the following fundamental information about their drinking water:

- The source of the drinking water,
- A brief summary of the susceptibility to contamination of the local drinking water source,
- How to get a copy of Tumwater's complete source water assessment,
- The level (or range of levels) of any contaminant found in local drinking water, as well as EPA's health-based standard (maximum contaminant level) for comparison,
- The likely source of that contaminant in the drinking water supply,
- The potential health effects of any contaminant detected in violation of an EPA health standard, and an accounting of the system's actions to restore safe drinking water;
- Tumwater's compliance with other drinking water-related rules,
- An educational statement for vulnerable populations about avoiding *Cryptosporidium*,
- Educational information on nitrate, arsenic, or lead in areas where these contaminants are detected above 50% of EPA's standard, and
- Phone numbers of additional sources of information, including EPA's Safe Drinking Water Hotline (800-426-4791).

This information will supplement public notification that Tumwater must provide to their customers upon discovering any violation of a contaminant standard. This annual report is not meant to be the primary notification of potential health risks posed by drinking water, but provides customers with a snapshot of their drinking water supply. The reports must be available by July 1 each year.

MONITORING SCHEDULE

Each year, DOH provides the City of Tumwater with a Water Quality Monitoring Report (WQMR). This report is designed to assist the City to keep track of monitoring requirements for that year and is tailored specifically to Tumwater’s system and sources. The WQMR outlines the core sampling requirements under the terms of the SDWA, summarizing both microbial and chemical sampling requirements. Waivers that have been granted from sampling are factored into the schedule. The source numbers identified in Table 8 are numbers associated with the City’s Water Facilities Inventory (WFI). The WFI is included in Chapter 1 of the Water System Plan. Tables 8, 9, and 10 are based on the WQMR issued to Tumwater in 2009.

Table 9: Active Sources with Water Quality Monitoring Requirements

DOH Source #	Source Name	Source Use	Susceptibility Rating
S02	Palermo WF 1-6,8 (S01,8,16,17,18,19,20)	Permanent	High
S09	Airport WF 9,10,15 (S21,22,23)	Permanent	High
S14	BMS WF (S12,13)	Permanent	Moderate
S15	Well 11-93 ABA869	Permanent	Moderate

Table 10: 2009 Water Chemical Sampling Requirements

Month	Monitoring Group	Test Method
January	No source water chemical sampling required this month.	
February	No source water chemical sampling required this month.	
March	No source water chemical sampling required this month.	
April	Herbicides – Airport Wellfield General Pesticides – Airport Wellfield	SOC 515.2 SOC 525.2
May	Gross Alpha – Airport Wellfield Radium 228 – Airport Wellfield	GROSS ALPHA RAD
June	No source water chemical sampling required this month.	
July	Inorganic Compounds – Airport Wellfield	IOC
August	No source water chemical sampling required this month.	
September	Nitrate – All sources	NITRATE
	Radium 228 – Airport Wellfield	RAD
October	No source water chemical sampling required this month.	
November	No source water chemical sampling required this month.	
December	No source water chemical sampling required this month.	

Table 11: Future Water Quality Monitoring Requirements

Monitoring Group	Test Method	Sample Location	Schedule/Status
Bacteriological	Coli	Distribution	Monthly
Lead & Copper	LCR	Distribution	Sampling every 3 years Next sample to be collected during July – September 2010
Asbestos	ASB	Distribution	1 sample every 9 years Next sample to be collected in 2010
Volatile Organic Compounds	VOC 524.2	All sources	1 sample every 3 years Next sample to be collected by December, 2010
General Pesticides	SOC 525.1	S 02	Waived through 12/2010
		S 09	Next sample to be collected between 2011 and 2013
		S 14	Waived through 12/2010
		S 15	Waived through 12/2010
Insecticides	SOC 531.1	All sources	Waived through 12/2010
EDB and other soil fumigants	SOC 504	All sources	Waived through 12/2010
Dioxin, Endothall, Diquat, Glyphosphate	SOCs 1613, 547.1, 548.1, and 549.1	All sources	Waived through 12/2010
Inorganic Contaminants	IOC	All sources	1 sample every 3 years Next sample to be collected between 2011 and 2013
Nitrate	NIT	All sources	1 sample collected annually Next sample to be collected in 2010
Radionuclides	RAD	S 02	1 sample every 3 years Next sample to be collected in 2012
		S 09	2 samples every 3 years Next sample to be collected in 2012
		S 14	1 sample every 3 years Next sample to be collected in 2012
		S 15	1 sample every 3 years Next sample to be collected in 2012

DATA ASSESSMENT AND TRACKING

The Tumwater Water Utility continues to monitor contaminants regularly for compliance with federal and state regulations. Over time, this information accumulates into volumes of data and requires an accurate and “user-friendly” data management system. This system allows the utility to better track compliance and trends in water quality.

Operations staff primarily handles all sample results. Once results are received, the lab data sheet is reviewed, scanned into the computer, and placed on the network creating a digital copy. Original documents are reviewed and stored at the office of the Water Quality Technician in the Operations Department. The Water Resources Program staff reviews results monthly on the in-house network to confirm proper sample collection and that the results show compliance with water quality regulations. To date, this process has been informal. No further action is taken unless an issue arises that needs research into back-files or a MCL exceedence is determined.

CONTAMINANT PRESENCE RESPONSE

In the event a contaminant presence has been identified, Tumwater has historically taken the position that it will remove the source well from service until a full investigation can take place. Adjacent wells should be monitored, possibly reducing pumping or removing from service if appropriate to reduce the risk of contaminating the second well. Monitoring should continue to determine if the well could be returned to service. In addition, the City should consult with its hydrogeologic or engineering experts and/or with the Thurston County groundwater program staff.

Tumwater is responsible for complying with the standards of water quality identified in WAC 246-290-310, *Maximum Contaminant Levels (MCLs)*. If water quality exceeds any primary MCL as regulated in WAC 246-290, Tumwater shall take the appropriate follow-up actions based on which MCL is exceeded:

- Notify DOH or the appropriate primacy agency within 24 or 48 hours (depending if Tier 1 or Tier 2 violation is incurred).
- Notify the public according to the procedures outlined under WAC 246-290-330.
- Determine the cause of the contamination.
- Take the proper corrective action as identified by DOH/primacy agency.

The City is required under WAC 246-290-71001 – 246-290-71005 to notify the water system users when a primary MCL violation has occurred for any of the required water samples taken by Tumwater. The DOH has specific guidelines and requirements for public notification such as the content and language of

the notice, distribution, and procedure. The language of public notices can be customized to fit the individual situation upon approval from DOH, but language provided by the EPA must be included verbatim for the appropriate response.

ANTICIPATED MONITORING REQUIREMENTS

TOTAL COLIFORM RULE REVISIONS/DISTRIBUTION SYSTEM RULE

As part of its six year review of existing regulations, USEPA has determined the need to revise the TCR. A Total Coliform Rule/Distribution System Federal Advisory Committee (TCRDS FAC) was convened, and an Agreement in Principle (AIP) was signed on September 18th, 2008. The charge to the FAC was to develop recommendations to EPA on revisions to the Total Coliform Rule (RTCR) and on what information about distribution systems is needed to better understand and address possible public health impacts from potential degradation of drinking water quality in distribution systems.

The issues that the TCRDS Advisory Committee addressed include: TCR monitoring framework, sanitary survey provisions, definition of MCL violations and potential follow-up corrective actions, and communication of public health significance of violations. Some specific recommendations in the AIP that will likely impact Tumwater include:

- Replacing the current total coliform non-acute and acute MCLs with “trigger levels” that will result in specific types of system assessments (Level 1 for non-acute, Level 2 for acute). The maximum contaminant level goal (MCLG) and MCL for *E. coli* would remain unchanged.
- Assessments would be intended to identify factors that would contribute to water quality changes indicated by observed possible routine TCR samples such as:
 - Inadequacies in sampling
 - Atypical events
 - O&M practices
 - Inadequacies associated with water source or treatment
 - Sanitary defects
- The AIP does not make recommendations for modifying the number of samples collected, or for modifying updated and approved TCR Monitoring Plans.
- Certain systems may qualify for reduced monitoring, based on coliform history and documentation/implementation of best operating and maintenance practices.
- The AIP recommends allowing systems more flexibility in selecting “upstream” and “downstream” follow-up sampling location.

With regard to a potential Distribution System Rule, the TCRDS Advisory Committee considered the following: (1) evaluation of available data and research on aspects of distribution systems that may

create risks to public health, (2) identification of priority data gaps, and (3) identification of data collection approaches (such as a data collection rule and/or additional research). A Steering Committee has been developed to help draft a Research and Information Collection Agenda, so as to fill knowledge gaps in the areas mentioned above.

The date for a proposed revised TCR and/or Distribution System Rule is uncertain at this time, but is not likely to occur prior to 2010. A final rule is not expected until 2012, with an effective date not likely prior to 2015.

Any developments with either rule will likely have impacts on Tumwater. Revisions to the TCR will hopefully reduce monitoring and reporting burdens for water systems and states, while maintaining or improving current levels of public health protection. It is quite possible these rules will require the use and documentation of best management practices within the distribution system.

GROUNDWATER RULE

The Groundwater Rule (GWR) was promulgated in November 2006 and becomes effective on December 1, 2009. The purpose of the GWR is to reduce the risk of exposure to waterborne pathogens, specifically bacteria and viruses, from fecal contamination. This type of contamination may reach groundwater supplies through various sources, such as septic systems or stormwater runoff.

For compliance purposes, sources that are treated continuously for 4-log inactivation of viruses are considered “disinfected.” Sources that are untreated or are treated but do not meet the 4-log inactivation criterion are considered to be “undisinfected” sources.

The GWR contains these primary elements:

- Sanitary surveys
- Source water monitoring,
- Corrective action treatment requirements, and
- Public notification requirements.

Systems such as Tumwater, which do not provide 4-log treatment of viruses at groundwater sources, may be required to conduct source water monitoring for fecal indicators. The GWR specifies two types of source monitoring for undisinfected systems: triggered monitoring and assessment monitoring. Groundwater systems will be required to conduct triggered source water monitoring within 24 hours of receiving notification of a positive total coliform sample within the distribution system to determine whether the coliform presence is due to fecal contamination of the source.

Triggered monitoring requires systems to collect a source water sample from each groundwater source in use serving the area where the positive sample occurred. These samples will be analyzed for fecal indicators. If a triggered source water sample is positive for a fecal indicator, the State will require the

system to take corrective action or to collect five additional samples from the same source within 24 hours of notification of a triggered monitoring sample positive for fecal indicators. If any one of these samples is positive for fecal indicators, the system must take corrective action. Under the Groundwater Rule, a fecal indicator is *E. coli*, enterococci, or coliphage.

With DOH's approval, systems with more than one groundwater source may meet triggered source water monitoring requirements by taking a groundwater sample at a representative source. In order to take advantage of this reduction in monitoring, the system would likely have to develop and submit a monitoring plan which identifies sources that are contributing to individual TCR monitoring locations.

The Groundwater Rule includes source water monitoring and hydrogeologic sensitivity assessments as tools States can use at their discretion to evaluate groundwater sources that may be at risk for fecal contamination. As part of monitoring and evaluation activities associated with the BCA described previously in this document, DOH confirmed that source water fecal contamination was not an issue for Tumwater, and primary disinfection of Tumwater's groundwater supplies (i.e., 4-log inactivation of viruses) was not required.

According to the DOH Fact Sheet *Preparing for the Groundwater Rule* (February, 2009), systems should prepare for compliance by:

- Correcting any deficiencies noted on last sanitary survey (no major deficiencies were identified, according to Tumwater staff),
- Installing a sample tap at each wellhead if one does not already exist,
- Know specifically where each well goes in the distribution system,
- Update the Emergency Response Plan
- Contact the Regional Engineer to discuss plan for "triggered" monitoring

CONTAMINANTS WHICH MAY BE REGULATED IN THE NEAR FUTURE

RADON

There is currently no federally enforced drinking water standard for radon (Radon in Drinking Water: Questions and Answers, EPA815-F-99-007, October 1999). EPA proposed regulations to reduce the public health risks associated with radon in air and water on November 2, 1999. According to the December 2007 Regulatory Agenda, the current timeframe for final action on the Radon Proposed Rule is May 2009 (72 FR 70118; December 10, 2007). However, as of this writing, no final action has occurred.

EPA's radon proposal includes a 300 pCi/L maximum contaminant level for community water systems that use ground water, or an alternative, less-stringent MCL of 4,000 pCi/L water systems can comply with if they or their state implements an EPA-approved program to reduce radon risks in household indoor-air as well as tap water.

ALDICARB

Final MCLs for the pesticides aldicarb, aldicarb sulfone, and aldicarb sulfoxide have been established under the Phase II Rule for SOCs and IOCs. However, the effective date for these MCLs was postponed when the EPA agreed to reexamine the health effects for the aldicarb compounds. No new effective date has been established.

PERCHLORATE

Perchlorate is a contaminant that exists in the environment as a part of other compounds such as ammonium, potassium, or sodium perchlorate. Ammonium perchlorate is manufactured as an oxygen-adding component in solid fuel propellant for rockets, missiles, and fireworks.

The 1996 amendments to the SDWA require EPA to publish a list of contaminants that are not currently subject to a National Primary Drinking Water Regulations (NPDWR) and are known or anticipated to occur in public water systems. Perchlorate was placed on the EPA's Contaminant Candidate List (CCL). In October 2008, EPA made a preliminary determination not to regulate perchlorate. However, in August 2009, EPA published a request for comments on additional approaches for analyzing perchlorate data. After this comment period, EPA plans to make a final determination on whether to regulate perchlorate.

METHYL-T-BUTYL-ETHER (MTBE)

MTBE is a member of a group of chemicals commonly known as fuel oxygenates. Oxygenates are added to fuel to increase its oxygen content. MTBE is used in gasoline throughout the United States to reduce carbon monoxide and ozone levels caused by auto emissions. MTBE replaced the use of lead as an octane enhancer in 1979.

The City tested several sources throughout the city in early 2000 to identify the presence or absence of MTBE. No MTBE was identified in any sources. In addition, the lab which processes VOC samples for the City has agreed to include reports of MTBE as a "tentatively identified compound" (TIC) if it detects any possible presence of MTBE in future samples.

MTBE has been placed on the EPA's CCL and the EPA has not made a regulatory determination at this time.

RECOMMENDATIONS

Tumwater should continue to promote provision of the highest quality water possible. Recent regulatory changes within the distribution system, such as the IDSE process under the Stage 2 DBPR and the proposed revisions to the TCR, demonstrate an industry paradigm shift away from simple use of MCLs, and towards more risk-based regulations. This shift will require Tumwater Operations and Water Resources staff to work closely together to ensure the highest quality water from source to tap. Staff should continue to evaluate current regulatory requirements on an annual basis and incorporate the requirements into the budget and CFP planning as needed.

Specific recommendations related to the materials reviewed and presented in this Water Quality Plan include:

- Seek approval from DOH for reduced monitoring under the Stage 1 DBPR.
- Continue to conduct compliance monitoring in accordance with the DOH WQMR.
- Continue to assess water quality and potential treatment needs associated with new sources of supply.
- Continue to evaluate the effectiveness of secondary disinfection at controlling coliform presence.
- Finalize and submit Stage 2 DBPR Monitoring Plan, and conduct compliance monitoring in 2013.
- Continue to follow developments associated with the Revised TCR/DS process.
- Continue to prepare updates to existing Monitoring Plans, and develop Monitoring Plans associated with new regulations, as needed. Specific recommendations to several of Tumwater's Monitoring Plans were provided as part of a separate review.

EMERGENCY CONTACTS

CITY OF TUMWATER

- After Hours Emergency: (360) 754-4150
- Steve Craig, Operations Manager: (360) 754-4150
- Dan Smith, Water Resources Program Manager: (360) 754-4140

WASHINGTON STATE DEPARTMENT OF HEALTH

- Main Line: 1-800-521-0323
- After-Hours Emergency: (877) 481-4901
- Clark Halvorson, Southwest Region Manager - Division of Drinking Water
(360) 236-3025 FAX (360) 664-8058
Email: clark.halvorson@doh.wa.gov
- Belle Fuchs, Source Monitoring and Water Quality
(360) 236-3046 FAX (360) 664-8058
- Sandy Brentlinger, Coliform Monitoring and Water Quality
(360) 236-3044 FAX (360) 664-8058
- Regina Grimm, Regional Engineer
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