CHAPTER 3

REGULATORY REQUIREMENTS

Chapter Outline

REGULATORY REQUIREMENTS

3.1 INTRODUCTION

Water use regulations evaluated in this master plan include the provisions of the Safe Drinking Water Act and amendments as administered by the State of Oregon Department of Human Services, Drinking Water Program. This chapter provides a summary of the key regulations that govern the operation of Junction City's water system. This regulatory summary is complete as of April 2009.

The Oregon Department of Human Services, Drinking Water Program publishes a biennial overview of drinking water standards. The most current version of this overview has been included in Appendix X and may be consulted for a complete listing of contaminant MCLs and treatment techniques as well as a more detailed regulatory and historical compliance review.

3.2 REGULATING AGENCIES

Congress passed the original Title XIV of the Public Health Service Act, commonly known as the Safe Drinking Water Act (SDWA), in 1974. The SDWA and subsequent amendments are federal water quality regulations affecting all public water purveyors. Regulations under the SDWA at the federal level are promulgated by the US Environmental Protection Agency (USEPA).

The requirements of the SDWA and amendments are implemented by the State of Oregon under the Oregon Drinking Water Quality Act of 1981 (ORS 448 as amended). This legislation gave the State primacy for enforcing the federal rule requirements and the responsibility of maintaining and enforcing a drinking water program. The State of Oregon Department of Human Services, Drinking Water Program (ODWP) is the primary regulating agency for public drinking water systems. Water rights and water use regulations are administered by the Oregon Water Resources Department (OWRD).

3.3 EXISTING WATER QUALITY REGULATIONS

The USEPA and ODWP currently enforce drinking water standards for 91 primary contaminants and 15 secondary contaminants. Primary standards regulate contaminants that pose a serious risk to public health whereas secondary standards cover aesthetic considerations. Public water systems must sample for primary contaminants routinely to ensure that standards are met, and report results of that sampling to the regulating agency.

Primary contaminants can be grouped into the following general groups. A discussion of each will be presented in this section.

- Microbial contaminants
- Disinfectants and disinfection byproducts
- Inorganic chemicals
- Organic chemicals
- Radiologic contaminants

Control of each contaminant is administered through a proscribed list of standards or limits that take several forms.

- Maximum Contaminant Level Goal (MCLG) — The level of a contaminant in drinking water below which there is no known or expected risk to health, allowing for a margin of safety. All regulated contaminants have an MCLG, although the MCLG is not enforceable.
- Maximum Contaminant Level (MCL) — The highest level of a contaminant allowed in drinking water, set as close to the MCLG as feasible using the best available treatment technologies.
- Treatment Technique (TT) — A required treatment process intended to reduce the level of a contaminant in drinking water. Contaminants for which testing or monitoring is not economically or technically feasible are regulated by the establishment of a treatment technique. Treatment techniques represent a requirement to install and operate a treatment process that has a proven efficacy for contaminant reduction. Performance standards (PS) are used to determine whether or not a water system is meeting a specific treatment technique requirement and consist of measurements of water quality parameters such as turbidity, disinfectant residual, pH or alkalinity.
- Action Level (AL) — The concentration of a contaminant, which when exceeded, triggers treatment or other requirements that a water supplier must follow.

Water systems that use groundwater sources are governed by a different set of water quality regulations than those that use surface water sources. A third category of source water, regulated under the same standards as surface water is groundwater under the direct influence of surface water (GWUDI). The ODWP defines GWUDI as "any water beneath the surface of the ground with significant occurrences of insects or other macro-organisms, algae or other large-diameter pathogens such as *Giardia lamblia* or *Cryptosporidium*, or significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity or pH which closely correlate to climatological or surface water conditions". An evaluation of surface water influence can involve geological assessments or water quality analysis, depending on the determination of the ODWP. Such investigations or re-evaluations can be made at any time based on changing conditions.

Junction City currently owns six operable wells. Four of these wells are currently utilized for water production and are classified as groundwater sources. In 2005, the ODWP notified the City that their 11th & Elm Street well was potentially GWUDI. In 2006 the ODWP notified the City that the 8th & Front Street well was also potentially GWUDI. Both of these wells were off-line at the time and have remained off-line. As of this writing the City is in receipt of the ODWP's letters however no investigative efforts have been undertaken to determine whether the identified sources are in fact GWUDI. It should be noted that the City currently operates at capacity with the four remaining active wells. Future municipal growth will provide a strong impetus to investigate and utilize these fully developed, off-line wells to satisfy growing demands. Should one or both of these sources be confirmed as GWUDI, the City will be regulated by existing groundwater and GWUDI water quality standards. To this end, the discussions in this section are inclusive of existing regulatory requirements for GWUDI.

3.3.1 Microbial Contaminants

Pathogenic microorganisms in drinking water can be divided into three groups: bacteria, protozoa, and viruses. Pathogenic microorganisms have a number of specific properties which distinguish them from chemical contaminants. They are living organisms and they are not dissolved in water although they will coagulate or attach to colloids and solids in water.

Regulatory inactivation or removal of these three groups of microorganisms is predominantly determined by the nature of the water source. Unlike groundwater systems, municipalities using surface water or GWUDI are required to inactivate or remove parasitic protozoa and viruses.

Bacteria

Coliforms are a broad class of bacteria which live in the digestive tracts of humans and many animals. Although many types of coliform bacteria are harmless, some cause gastroenteritis, a general category of health problems that includes diarrhea, cramps, nausea and vomiting. Gastroenteritis is not usually serious for a healthy person, but can cause serious problems for people with weakened immune systems such as the very young, elderly, or immunocompromised. Outside the colon, coliforms only survive for approximately 48 hours. Common bacteriological pathogens responsible for waterborne disease include *Escherichia coli (E. coli), Legionella*, *Salmonella typhi*, *Shigella* and *Vibro cholerae*.

Protozoa

Protozoa are single-cell organisms. They have a complex metabolism and feed on solid nutrients, algae and bacteria present in multiple-cell organisms, such as humans and animals. To survive harsh environmental conditions, some species can secrete a protective covering and form a resting stage called a cyst, a condition that can protect some protozoa from conventional chlorine disinfection. Common examples of parasitic protozoa are *Giardia lamblia* and *Cryptosporidium.*

Viruses

Unlike bacteria and parasitic protozoa, viruses can only replicate in living host cells and are inactive for periods outside of the host organism. Due to their small size, viruses can pass through conventional filtration processes and are accordingly typically inactivated with chlorine. Common examples of waterborne viruses include hepatitis A, rotavirus and Norwalk virus.

3.3.1.1 Regulatory Monitoring

Bacterial Coliforms

Initially published in 1989 the Total Coliform Rule (TCR) applies to all public water systems and establishes health goals—in the form of maximum contaminant level goals (MCLGs), and legal limits—in the form of maximum contaminant levels (MCLs) for total coliform levels in drinking water. It requires systems to sample for coliform bacteria which are used as an indicator of whether a water system is vulnerable to pathogens. Coliforms were also selected because they are easily detected in water.

In promulgating the TCR, the EPA set the maximum contaminant health goal (MCLG) for total coliforms at zero. The MCL stipulates the total number of water samples a PWS must test each month and limits the number of "coliform-present" samples within this routine collection set. Under this regulation the City is currently required to collect six monthly samples from an

approved set of locations throughout the distribution grid and limits a "coliform-present" result to a single sample.

If a sample tests positive for coliforms, the system must collect a set of repeat samples within 24 hours. A "coliform-present" test result on either a routine or repeat sample constitutes a non-acute violation and requires additional testing for fecal coliforms and *E. coli*. A positive result for either fecal coliform or *E. coli* constitutes an acute MCL violation. Public notification is conducted in accordance with OAR 333-061-0042 which outlines a tiered approach commensurate with the proscribed risk level of a given violation.

Protozoa and Viruses

Regulatory monitoring for protozoa and viruses is accomplished with a set of treatment techniques that include the provision of continuous chlorination at each well, maintaining a disinfectant residual in the distribution system, protecting the source water area, proper well construction, maintaining distribution system pressure and controlling or eliminating cross-connections within the distribution system.

3.3.1.2 Municipal Compliance

Bacterial Coliforms

Compliance for the TCR is based on a monthly cycle measured on two levels: submitting the proscribed number of samples, as well as successful test results for the absence of total coliforms in a given test cycle. The only violation of the coliform MCL on record with ODWP was in November 2002 when one of ten repeat samples tested positive for total coliform. The public notification process was successfully completed for this violation. In three separate instances the City was issued a violation for not reporting enough information. No other violations have been reported.

Protozoa and Viruses

Public water systems utilizing GWUDI are required to install and properly operate a water treatment process that reliably achieves 3-log (99.9%) removal and/or inactivation of *Giardia lamblia*, 4-log (99.99%) removal of viruses, and 2-log (99%) removal of *Cryptosporidium*. The control of protozoa and viruses is accomplished with treatment techniques (ie. turbidity reduction and disinfection) in lieu of MCLs.

Since the City has historically operated as a groundwater system it is currently exempt from these regulations. Three potential developments could require the City to construct treatment facilities in order to comply with surface water treatment standards for the removal and/or inactivation of *Giardia* and *Cryptosporidium*. First, should the City begin to use an existing off-line well that is determined to be a GWUDI source, second, should any of the existing groundwater sources be reclassified as GWUDI, and third, if the City is unable to meet the turbidity standard of 5.0 nephelometric turbidity units (NTU) for any of their groundwater sources. The City has not historically monitored for turbidity in the raw or finished water. Recent raw water sampling has demonstrated turbidity levels in the 3.0 to 4.5 NTU range. Due to elevated levels of iron in the City's sources, it is anticipated that this turbidity source is largely due to iron in the source water that readily oxidizes to its insoluble form. Additional raw water turbidity sampling is needed to

determine the source of turbidity, to establish a turbidity baseline and to determine the potential need for treatment.

3.3.2 Disinfectants and Disinfection Byproducts Rule

Disinfection of drinking water can readily be identified as one of the major public health advances of the 20th century. While disinfectants are effective in controlling many microorganisms, they react with natural organic and inorganic matter in water to form disinfection byproducts (DBPs) which have been shown to be carcinogenic in laboratory animals. While it is important to strengthen protection against microbial contaminants, it is also important to reduce the potential health risks of DBPs.

The Federal Total Trihalomethane Rule was published in the Federal Register in November 1979 and established a MCL for total trihalomethanes (TTHMs) for community water systems serving 10,000 people or more. The Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DBPR) promulgated in December of 1998 built on the TTHM Rule by lowering the existing MCL and widening the range of affected systems to include all public water systems that add a disinfectant to their drinking water. The rule specifically established:

- a maximum residual disinfectant level goal (MRDLG) for chlorine at 4.0 mg/L
- a maximum residual disinfectant level (MRDL) of 4.0 mg/L for chlorine
- a total trihalomethane MCL of 80 µg/L, regulating the sum of four trihalomethanes
- a haloacetic acid (HAA5) MCL of 40 µg/L, regulating the sum of five haloacetic acids

The rule also established removal limits of total organic carbon (TOC) as a DBP precursor. Other portions of the rule that do not apply to the Junction City water system have been omitted from this discussion.

The Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR) was finalized on January 4, 2006 and applies to water systems that use groundwater, GWUDI, and surface water. As of this writing, Oregon has not received primacy for the Stage 2 DBPR however it is anticipated this will occur in May of 2009. The rule retains the MCLs for TTHMs and HAA5s established in the Stage 1 DBPR and augments the rule by providing more consistent protection from DBPs across the entire distribution system and by focusing on the reduction of DBP peaks. The Stage 2 DBPR requires community water systems to conduct initial distribution system evaluations (IDSEs) to identify and select new compliance monitoring sites that more accurately reflect sites representing high TTHM and HAA5 levels. These new 'worst-case' monitoring sites are selected based on the results of the Stage 1 DBPR compliance monitoring. The rule also redefines the method of calculating MCLs. Compliance with each MCL will be based on a locational running annual average (LRAA) instead of the running annual average (RAA) method used under the Stage 1 DBPR.

3.3.2.1 Regulatory Monitoring

Community water systems can fulfill the IDSE requirements by applying for 40/30 Certification, a process whereby a community water system certifies that all individual TTHM and HAA5 monitoring results for compliance with the Stage 1 DBPR are less than or equal to 40 µg/L for TTHM and 30 µg/L for HAA5 during a prescribed 2-year period. In addition the system must not

have had any Stage 1 DBPR monitoring violations for TTHM and HAA5 during the same period. At the state's discretion, a system meeting all of the requirements for 40/30 certification may still be required to conduct standard monitoring. Systems that qualify for reduced monitoring may remain on reduced monitoring as long as their quarterly LRAAs for TTHMS and HAA5 remain no more than 40 µg/L for TTHM and 30 µg/L for HAA5, respectively (for systems with quarterly reduced monitoring) or their TTHM and HAA5 samples are no higher than 60 µg/L and 45µg/L, respectively (for systems with annual or less frequent monitoring).

ODWP has granted the City a common aquifer designation for the four active wells thereby limiting the DBPR sampling to a single sample. The City has applied for and received 40/30 Certification under the Initial Distribution System Evaluation (IDSE) provision of the Stage 2 DBPR. This will likely qualify the City for an extension of the reduced 3-year monitoring currently granted under Stage 1.

Table 3-1 summarizes the anticipated sampling requirements under the Stage 2 DBPR based on population and source water type. Since Oregon has not yet received primacy for the Stage 2 DBPR, it is unclear how the State will administer the sampling cycle once the City moves into the next population bracket in 2015.

Table 3-1 | Stage 2 DBPR Compliance Monitoring Requirements

Source Water Type	CWS Population	Monitoring Frequency [1]	Total Distribution System Monitoring Locations
Groundwater	500 – 9,999	per year [2]	2
	10,000 – 99,999	per quarter [3]	4
GWUDI	3,301 – 9,999	per quarter [3]	2
	10,000 – 49,999	per quarter [3]	4

[1] Standard monitoring frequencies. All systems must monitor during the month of highest DBP concentration.

[2] Systems on annual monitoring are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations respectively. Only one location with a dual sample set is required if the highest TTHM and HAA5 concentrations occur at the same location and month.

[3] Systems on quarterly monitoring must take a dual sample set (a TTHM and an HAA5 sample) at each monitoring location during each monitoring period.

3.3.2.2 Municipal Compliance

TTHM and HAA5 data reported to ODWP for 2005 through 2008 have been below the detectable limit of the laboratory test. There is no indication that the City will have problems complying with current or future anticipated MCLs and should continue to qualify for reduced monitoring.

3.3.3 Lead and Copper Rule

Lead or copper in Oregon tap water is primarily due to corrosion of plumbing system components within buildings. Consumers commonly describe the presence of copper as metallic, bitter or rusty. The ability to detect copper in tap water is though to be controlled by individual sensitivity

however water chemistry also plays a part since the flavor of copper is more noticeable at lower pH levels.

The control of lead and copper concentrations in drinking water began with the Oregon lead solder ban of 1985 which prohibited the use of lead pipe and set lead content limits for plumbing solder and brass fixtures. In 1991 the EPA promulgated the Lead and Copper Rule (LCR) to further regulate lead and copper concentrations in drinking water. The LCR was uniformly adopted by Oregon on December 7, 1992 and applies to community and non-transient, non-community public water systems. The rule is unique in that compliance is measured by water sampled from the consumer's tap instead of from sampling points at the water treatment plant or within the public distribution system. Failure to meet the regulatory limits requires the water utility to implement a corrosion control treatment process designed to reduce the corrosivity of the water.

3.3.3.1 Regulatory Monitoring

The LCR establishes action levels of 15 µg/L for lead and 1.3 mg/L for copper. It also sets a secondary maximum contaminate level (SMCL) for copper at 1 mg/L. The LCR stipulates that sampling be conducted at "high-risk" homes, further defined as homes constructed prior to 1985 that utilize copper piping and lead-based solder. One-liter samples of standing water (first draw after a minimum 6-hours of non-use) are collected from homes identified in the water system sampling plan. In each round of sampling 90% of the samples must have lead levels less than or equal to the action level. The number of samples is determined by the municipal population and equates to 40 samples for the Junction City system. Two rounds of initial sampling are required and are collected at six-month intervals. Subsequently, three annual samples are required and are conducted with a reduced sample set (20 samples) if the initial sampling confirms compliance. Demonstration of compliance after this stage decreases the sampling frequency to once every three years.

Water systems that cannot meet the action levels must install corrosion control treatment, and submit water sampling data to ODWP at proscribed frequencies. In the event the lead action level cannot be met with these measures in place a public education program, adjustments to the corrosion control program and follow-up sampling is required.

3.3.3.2 Municipal Compliance

As shown in Table 3.2, the initial monitoring results of 1993 showed the system to be in compliance, however testing conducted in 1994 identified a violation of the action level for copper. The City corrected this violation by installing an orthophosphate chemical feed system at two of the wells—13th & Elm and 8th & Deal. Orthophosphates minimize the corrosion of piping and materials by creating a passivating film inside the distribution system piping that inhibits the electrochemical corrosion process.

Table 3-2 | Lead and Copper Monitoring Results

Year	Lead (AL=15 µg/L)	Copper (AL=1.3 mg/L)
1993	8.4	1.22
1994 (interval 1)	9.0	2.10
1994 (interval 2)	9.0	0.97
1995	13.0	1.20
1996	7.0	1.20
2000	10.0	1.00
2001	ND [1]	0.74
2004	ND [1]	0.35
2007	ND [1]	0.29

[1] ND = Non-detect (levels are below test method detection limits)

Although the City's raw water pH ranges from 6.X to 7.X, Junction City has met the action levels for copper since 1994 with only periodic short-term excursions above the lower SMCL. Lead levels in the City's finished water have consistently been below the action level. pH in the distribution system typically ranges from 7.0 to 8.25. Based on the City's successful compliance with corrosion control, the sampling frequency required by ODWP is every three years with results from the next test set due in 2010.

3.3.4 Inorganic Contaminants

The USEPA regulates most chemical contaminants (inorganic and organic contaminants) through the rules known as Phase I, II, IIb, and V. The agency has issued the four rules over a five-year period after gathering, updating, and analyzing information on each contaminant's presence in drinking water supplies and its health effects. Oregon received primacy for the Phase II and V rules on January 14, 1994.

Inorganic contaminants (IOCs) most commonly originate in the source of water supply, but can also enter the water from contact with materials used for pipes, plumbing fixtures and storage tanks. For most IOCs adverse health effects result after long-term (lifetime) exposure to the compounds. Water systems in Oregon rarely violate maximum levels for inorganic contaminants from source waters, but these contaminants are routinely detected in drinking water systems at levels more than one-half the maximum level. The most commonly detected inorganics in Oregon drinking water systems are nitrate, arsenic, nitrite, cadmium, and mercury[5].

The Oregon Drinking Water Act currently regulates 16 inorganic compounds two of which (nitrate and asbestos) merit attention for this water study. Oregon law recognizes the acute health effects of nitrate, particularly for young children and accordingly requires more stringent testing for nitrate. Monitoring for IOCs is conventionally required once every three years however the

[5] DHS, 2004

City has qualified for a 9-year reduced monitoring cycle for all IOC's with the exception of nitrate which is required annually. As previously noted a full listing of the inorganic contaminants and their MCL's appear in Appendix X.

The City has been in compliance for IOC testing with the single exception of a late/non-reporting violation for test results from the 8th & Deal Street well in 2002. This violation was subsequently corrected and the system was returned to compliance. Results for the City's next IOC test set will be due in 2013.

3.3.4.1 Nitrate

Studies beginning in the late 1980s have shown that nitrate levels for groundwater in the Southern Willamette Valley have been increasing. Two studies commissioned by DEQ in 1993[6] demonstrated the susceptibility of groundwater in the Harrisburg/Junction City/Coburg corridor to nitrate contamination. The current MCL for nitrate is 10 mg/L. Nitrate levels exceeding this threshold pose a risk of methemoglobinemia or "blue baby" syndrome to infants and developing fetuses.

Annual source sampling conducted by the City has established nitrate levels ranging from 1.1 mg/L to 6.9 mg/L at 8th & Front Street well and levels exceeding 10 mg/L in the 11th & Elm Street well. Both of these sources have been taken off-line in recent years due to the City's inability to treat the water. The City currently operates three other wells that have very low to non-detectable levels of nitrate.

Removal of nitrate from groundwater is one of the key goals of the proposed water treatment plant. Specific technology used to accomplish this is presented in Chapter 7.

3.3.4.2 Asbestos

Roughly one quarter of Junction City's distribution network (roughly 9 miles) is comprised of asbestos concrete (AC) pipe. For a three-year period beginning in 1993, OAR 333-061-0036 required all public water systems to perform a test to quantify asbestos in the distribution system. Samples were to be taken at locations served by AC pipe and in locations where corrosion of the AC pipe was most likely. This initial sample began a 9-year compliance cycle for follow up testing. The MCL for asbestos fibers is 7 million fibers per liter (MFL).

Despite historically low pH values in the distribution system, results of the 1993 test and a follow up test in 2005, showed that asbestos fibers were below the detectable limit. Due to the history of successful compliance, the City is required to continue testing on a 9-year cycle. As recommended in the water treatment discussion of Chapter 7, the City is also encouraged to re-evaluate their corrosion control process and raise the pH of their treated water to a level that will pose less of a corrosion threat to the AC pipe.

3.3.5 Organic Contaminants

Current drinking water standards regulate a total of 56 organic contaminants frequently classified into two sub-groups, Volatile Organic Chemicals (VOCs) and Synthetic Organic Chemicals (SOCs). Organic contaminants are man-made chemicals and commonly include industrial and

[6] DEQ, 1993 and DEQ, 2004

commercial solvents and chemicals as well as herbicides and pesticides used in agriculture and landscaping. A full list of the contaminants appear in Appendix X.

3.3.5.1 Regulatory Monitoring

Public water systems are required to test for each contaminant from each water source during every 3-year compliance period. Public water systems with a population greater than 3,300 must test twice during each three-year compliance period for SOCs. Public water systems using surface water or GWUDI must test for VOCs at the entry point annually. Quarterly follow up testing is required for any contaminants that are detected. The exceptions are dioxin and acrylamide/epichlorohydrin. Only those systems determined by ODHS to be at risk of contamination must monitor for dioxin. Sampling may be reduced to a 6-year cycle if the system has a certified Drinking Water Protection Plan. Systems that cannot meet the MCLs must install or modify treatment systems or develop alternate sources.

3.3.5.2 Municipal Compliance

All SOC and VOC test results have been in compliance with the exception of a SOC violation for Phthalate at the 8th & Front Street well in 2004. This result has been reviewed with ODWP and the City plans to take follow-up samples in the first and second quarters of 2009. The City has qualified for reduced testing on a 6-year cycle with the most recent test results conducted in 2005.

3.3.6 Radiologic Contaminants

The purpose of this rule is to limit exposure to radioactive contaminants in drinking water. Most drinking water sources have very low levels of radioactive contaminants, most of which are naturally occurring as trace elements in rocks and soils. Most radioactive contaminants are at levels that are low enough to not be considered a public health concern. At higher levels, long-term exposure to radionuclides in drinking water may cause cancer. Radon, another decay product of radioactive material, is regulated independently under the Radon Rule in Section 3.4.5 of this chapter.

3.3.6.1 Regulatory Monitoring

Initial testing required by this rule began in 2005 and required all public water systems to test each source quarterly for one year. Test results were required for gross alpha, radium-226/228 and uranium. Testing is required to resume on a quarterly basis if the MCL is exceeded.

3.3.6.2 Municipal Compliance

Laboratory results for the array of radionuclides were below the test method detection limits for the 2005 test period. These results have established Junction City's current testing frequency as once every nine years with the exception of radium tests that will be required at 5th & Maple every 6 years. The next test set for radionuclides is due in 2012 with radium results due in 2009. Historic results predict that the City will be able to comply with this rule in the future.

3.3.7 Arsenic Rule

On January 22, 2001 EPA adopted a new standard for arsenic in drinking water at 10 micrograms per liter (µg/L or ppb), replacing the old standard of 50 µg/L. Oregon adopted the rule and the new limit went into effect on October 21, 2004.

Arsenic is a naturally occurring chemical found in the earth's crust, but can be dangerous to humans when released into drinking water supplies as rocks, minerals, and soils erode. Studies have linked long-term exposure to arsenic contamination with cancer and cardiovascular, pulmonary, immunological, neurological and endocrine effects.

3.3.7.1 Regulatory Monitoring

Systems with groundwater sources must sample every three years whereas systems with surface water sources must sample annually. Water systems that exceed the MCL must monitor quarterly and meet the MCL as a running annual average. Public water systems that cannot meet the MCL must either install water treatment systems or develop alternate sources of water.

3.3.7.2 Municipal Compliance

Arsenic sampling in the finished water has been performed at or exceeding the City's current 9-year reduced monitoring cycle. Arsenic levels have consistently been below the MCL. Accordingly, it appears that the City will be able to comply with this rule in the future. The next round of test results for arsenic are due in 2016.

3.3.8 Unregulated Contaminant Monitoring Rule

The Unregulated Contaminant Monitoring Rule (UCMR) is used to collect data for contaminants suspected to be present in drinking water, but that do not have health-based standards set under the Safe Drinking Water Act. The UCMR is closely coordinated with EPA's Contaminant Candidate List. The EPA uses both of these programs to identify drinking water contaminants that are not currently regulated in order to identify future health risks and problems with drinking water.

To date, the program has been implemented in three stages, UCM Rounds 1 & 2, UCMR1 and UCMR2 on a 5-year cycle. The first stage was managed by the state primacy agencies and consisted screening and assessment monitoring tests. The UCMR1 promulgated on September 17, 1999 utilized a tiered monitoring approach that required all large public water systems and a nationally representative sample of small public water systems serving less than 10,000 people to monitor for selected sets of contaminants. The UCMR2 promulgated on January 4, 2007, is being managed by the EPA and requires monitoring for a new set of unregulated contaminants.

3.3.8.1 Regulatory Monitoring

UCMR 2 requires monitoring for several pesticides and pesticide degradates, five flame retardants, a group of nitrosamines and two munitions (TNT and RDX).

All public water systems serving more than 10,000 people, and a representative sample of 800 public water systems serving 10,000 or fewer people, are required to conduct assessment monitoring for 10 chemicals (List 1) during a 12-month period between January 2008 and

December 2010. All public water systems serving more than 100,000 people, as well as a group of public water systems selected by the EPA are required to conduct the Screening Survey (List 2) for 15 contaminants during the same 2008-2010 testing period.

3.3.8.2 Municipal Compliance

Junction City is currently exempt from the program based on population, however with a population projection of over 10,000 by 2015, the City will undoubtedly be required to participate in UCMR3.

3.3.9 Secondary Contaminants

The EPA has established National Secondary Drinking Water Regulations that set non-mandatory secondary maximum contaminant level (SMCL) water quality standards for 15 contaminants. The EPA does not enforce these SMCLs as they are not considered to present a risk to human health at the listed levels. They are established only as guidelines to assist public water systems in managing their drinking water for aesthetic considerations. Table 3-3 presents these contaminants.

Table 3-3 | Secondary Maximum Contaminant Levels

Contaminant	Secondary MCL	Noticeable Effects above the Secondary SMCL
Aluminum	0.05 – 2.0 mg/L	Colored water
Chloride	250 mg/L	Salty taste
Color	15 color units	Visible tint
Copper	1.0 mg/L	Metallic taste, blue-green staining
Corrosivity	Non-corrosive	Metallic taste, corroded pipes/fixture staining
Fluoride	2.0 mg/L	Tooth discoloration
Foaming Agents	0.5 mg/L	Frothy, cloudy, bitter taste, odor
Iron	0.3 mg/L	Rusty color; sediment, metallic taste, reddish or orange staining
Manganese	0.05 mg/L	Black to brown color, black staining, bitter metallic taste
Odor	3 TON [1]	Musty, "rotten-egg" or chemical smell
pH	6.5 – 8.5	Low pH: bitter metallic taste, corrosion High pH: slippery feel, soda taste, deposits
Silver	0.1 mg/L	Skin discoloration, graying of the white part of the eye
Sulfate	250 mg/L	Salty taste
Total Dissolved Solids	500 mg/L	Hardness, deposits, colored water, staining, salty taste
Zinc	5 mg/L	Metallic taste

[1] Threshold Odor Number

3.3.9.1 Regulatory Monitoring

Secondary maximum contaminant levels are non-mandatory regulations and therefore do not have a monitoring requirement.

3.3.9.2 Municipal Compliance

Information provided by the City is available for 6 of these contaminants; iron, manganese, corrosivity, pH, silver and sulfate. Silver has not been detected in any of the test samples.

Iron

The City routinely collects iron samples from each operating well and from several points in the distribution system. A summary of these data are presented in Appendix X. Iron levels are high in the 8th & Deal and 3rd and Cedar wells with maximum recorded values averaging 3.0 mg/L. Probability plots show that roughly 45% of the iron values for these two wells are above the SMCL. Iron levels measured at the 5th & Maple and 13th & Elm wells and from within the distribution system share a common range and show maximum values averaging 0.6 mg/L. For these three sites 15% of the values lie above the SMCL. No data were available for the well at 11th & Elm.

Chapter 7 presents a full evaluation of the proposed treatment process for the new WTP. In the event that an ion exchange process is selected for the removal of nitrate, iron levels of this magnitude will require pretreatment to avoid fouling the ion exchange resin. Removal of iron as a necessary pretreatment step for this process will also benefit the consumer by providing a more desirable drinking water product.

Manganese

The City has not historically monitored for manganese in the raw or finished water. Recent sampling indicates that the four active wells have manganese concentrations slightly below the 0.05 mg/L secondary standard.

Corrosivity and pH

Corrosivity is measured according to the parameters defined in the Lead and Copper Rule as previously discussed. The City has been in compliance with this rule and does not appear to have corrosive water. The City routinely measures pH at each of the operating wells and at several points in the distribution system. A summary of raw data for this parameter as provided by the City, is presented in Appendix X. A review of pH data for the 13th & Elm Street well shows a wide range from 7.0 to 8.75. Data for the 8th & Deal Street well exhibits a similarly wide range with values from 7.0 to 8.30. Data for the remaining two wells at 3rd & Cedar and 5th & Maple exhibit a much narrower range with a representative average of 7.30. While these values fall within the SMCL, it should be noted that this is an unusually wide range of values and warrants a closer examination of test methods and the collection of additional data particularly from the raw water at each well.

Sulfate

Sulfate data have historically been collected for water at each of the wells. Results show minimal levels of sulfate, on the order of 2 mg/L with a slightly higher range of 15 mg/L from the 8th & Deal and 11th & Elm wells. It is very unlikely that excess sulfate is a concern for the City.

From a strictly taste and odor standpoint the well at 5th & Maple is has perhaps the lowest water quality due in part to the presence of hydrogen sulfide. This constituent is frequently associated with a rotten egg smell. The well at 13th & Elm by comparison has been reported to have the lowest levels of hydrogen sulfide.

3.4 FUTURE WATER QUALITY REGULATIONS

The EPA is required to review existing national primary drinking water regulations every six years in order to identify current health risk assessments, changes in technology, and other factors that provide a health or technological basis to support regulatory revisions to maintain or improve public health protection.

3.4.1 Ground Water Rule

On November 8, 2006 the USEPA promulgated the final Ground Water Rule (GWR) to reduce the risk of exposure to fecal contamination that may be present in public water systems that use groundwater sources. The GWR builds upon the Total Coliform Rule (TCR) and addresses bacterial and viral contamination at the source, as a complimentary approach to the distribution monitoring currently required by the TCR.

The GWR establishes a risk-targeted approach to identify groundwater systems that are susceptible to fecal contamination. Indications of risk may come from total coliform monitoring, hydrogeologic sensitivity analyses, or other system-specific data and information. The GWR specifically targets viral pathogens as a category of fecal contaminants.

The rule applies to all public water supplies served by groundwater sources that are not treated to Surface Water Treatment Rule (SWTR) standards. Although federal guidance on key aspects of the rule is still in development it is clear that GWR implementation will be state-specific. As of this writing, Oregon does not have primacy for the GWR.

3.4.1.1 Regulatory Monitoring

Compliance monitoring is required for systems that elect to achieve the 4-log treatment by disinfection to ensure the reliability of the treatment process.

The following requirements of the GWR apply to systems that do not provide 4-log virus treatment for all sources:

- Triggered source water monitoring (effective December 31, 2009)
- Hydrogeologic sensitivity assessments for aquifers
- Assessment monitoring for all sources
- System Sanitary surveys conducted by the State

The triggered source water monitoring provisions of the GWR are more detailed than any other provision of the final rule and can only be avoided by providing the required 4-log inactivation and/or removal prior the first customer.

For a groundwater system without 4-log virus treatment, a single positive routine Total Coliform Rule (TCR) compliance sample will initiate triggered monitoring. A single source water sample must be taken within 24 hours from each well in production at the time of the positive TCR sample. Testing is performed to detect the presence of *Escherichia coli* (*E.coli*). Systems with an initial positive source water sample must take five more source water samples. The rule anticipates the use of 100-mL samples from wells and guidance describing the sampling process at the wellhead is in development. The switch from the current requirement of fecal coliform

testing after identifying a total coliform sample to *E.coli* testing has been made because *E.coli* is currently understood to be a better indicator of the presence of pathogens.

A hydrogeologic sensitivity assessment (HSA) may be required for all groundwater systems that do not provide 4-log virus inactivation/removal, however, the rule does not require that the HSA provision be used on any system's supply, nor does it specify what approach states should use to identify systems that should be targeted for HSAs. The GWR is not explicit on the consequences of an HAS that finds a source to be sensitive, but draft guidance reads, "Source water assessment monitoring is recommended as necessary and wells located in sensitive aquifers should be targeted for assessment monitoring using a hydrogeologic sensitivity assessment"[7].

Assessment monitoring occurs at the state's discretion. The GWR suggests that assessment monitoring should include 12 groundwater source samples that represent each month the system provides groundwater to the public. The consequences of a positive sample from assessment monitoring are not specified in the GWR. There appears to be latitude for the state to determine that any positive sample obtained during assessment monitoring triggers the treatment technique provisions.

Under the existing Total Coliform Rule (TCR) sanitary surveys are to be performed on a 5-year interval. The GWR sanitary survey requirement has been structured to provide more frequent and complete sanitary surveys with more stringent penalties for non-compliance. Surveys are to be performed every 3-years with some discretion granted for water systems that have consistently demonstrated outstanding performance. Failure to correct deficiencies and comply with the required corrective action plan or schedule will result in a treatment technique violation for the water system. States are required to conduct these surveys and identify significant deficiencies requiring corrective action by December 31, 2012 for community water systems with less than 4-log inactivation/removal and by December 31, 2014 for community water systems with 4-log inactivation/removal.

3.4.1.2 Municipal Compliance

The City currently lacks the ability to provide 4-log virus inactivation at any of the sources. Compliance with this forthcoming rule is therefore contingent in the short term on the ability of the current groundwater sources to meet the existing microbial contaminant levels. Long-term compliance will be addressed with the construction of a centralized water treatment plant, scheduled to be in operation by the fall of 2011.

Of the 974 most current TCR routine samples, the City has tested total coliform positive (TC+) on 10 occasions. Of the 28 follow up tests only one was TC+ and none of the routines or follow up tests were fecal coliform positive (FC+). Given this history and the absence of FC+ test results, it appears likely that the City will remain compliant under the GWR with periodic triggered source water monitoring in the case of occasional routine samples that are TC+.

The commissioning of the new plant will provide a strong treatment platform to provide 4-log treatment and a basis to reduce the amount of sampling required by the rule in the absence of

[7] USEPA, 2007

4-log virus treatment. Specifics of the treatment process to achieve compliance with this rule are discussed in detail in Chapter 7.

3.4.2 Long Term 2 Enhanced Surface Water Treatment Rule

The Enhanced Surface Water Treatment Rule (ESWTR) was promulgated by the USEPA to improve control of microbial pathogens in all public water systems that use surface waters or GWUDI. Two subsequent phases of the rule are the Long Term 1 ESWTR (LT1) and Long Term 2 ESWTR (LT2). The latter rule, published in the Federal Register on 1/5/06 has been established to provide increased consumer protection against the protozoan *Cryptosporidium*.

Cryptosporidium is a significant concern in drinking water because it contaminates most drinking water sources, it is resistant to chlorine and other disinfectants, and it has caused waterborne disease outbreaks. Consuming water with *Cryptosporidium* can cause gastrointestinal illness, which may be severe and sometimes fatal for people with weakened immune systems (which may include infants, the elderly, and people who have AIDS). *Cryptosporidium* oocysts present specific challenges to water treatment since they are highly resistant to disinfectants such as chlorine. Current regulations require filtered water systems to reduce source water *Cryptosporidium* levels by 99 percent (2-log). Recent studies of *Cryptosporidium* in drinking water indicate that this treatment is sufficient for most systems, but additional treatment is necessary for systems with high levels of *Cryptosporidium* in their water sources and all unfiltered water systems, which do not treat for *Cryptosporidium*.

Oregon will not have primacy for the LT2 until it is formally adopted in May of 2009.

3.4.2.1 Regulatory Monitoring

The LT2 requires all surface water and GWUDI systems to monitor for *Cryptosporidium* at the source. Public water systems serving less than 10,000 people are given the option of performing source water testing for *E.coli* and are only triggered into *Cryptosporidium* monitoring if the counts for *E.coli* are high. A public water system is assigned a "Bin" based on the demonstrated level of *Cryptosporidium* in the source water. Treatment requirements for each system depend in part on a system's existing treatment equipment and removal capabilities with consideration given to the concentration of protozoa present in the source. Additional treatment processes for the inactivation or removal of *Cryptosporidium* are selected from a regulatory list of options.

3.4.2.2 Municipal Compliance

None of the wells in the Junction City system have been classified as GWUDI so the City is exempt from regulation under this rule as long as all the sources remain classified as groundwater sources. If re-classification occurs, the City will come under full regulation of the ESWTR including the provisions of the LT2. As previously stated, this will require 2.0 log removal/inactivation under the requirements of the ESWTR, as well as source water testing required by the LT2 to establish *Cryptosporidium* levels in a system's source water. LT2 requires additional removal/inactivation measures based on the demonstrated level of *Cryptosporidium* in the source water.

In accordance with the requirements of the LT2, the draft OAR language proposed for adoption in May 2009 includes new requirements for *Cryptosporidium* inactivation/removal in all public

water systems utilizing GWUDI. Three primary disinfectants, ozone, chlorine dioxide and ultraviolet light (UV) have been listed for effective inactivation of this protozoa. Several filtration methods are eligible for removal credit. Removal and/or inactivation treatment processes will be evaluated in Chapter 7 of this report.

3.4.3 Filter Backwash Recycling Rule

The Filter Backwash Recycling Rule (FBRR) was published in the Federal Register on April 10, 2000 and was adopted by the State of Oregon in June of 2004. Although this is an existing rule it has been included in this section because the City has not previously been regulated by it. Regulation would commence in the event the City elects to construct a filtration process as part of the new WTP and seeks to reduce the total volume of the waste stream from the filters.

The FBRR complements existing surface water and GWUDI treatment rules by reducing the potential for microbial pathogens, particularly *Cryptosporidium* oocysts, to pass through the filters into the finished water. The FBRR requires all recycled waste streams (e.g., spent filter backwash, thickener supernatant, or liquids from dewatering processes) to be returned to the head of the plant and passed through the entire treatment process.

3.4.4 Distribution System Rule

The Total Coliform Rule was last revised in 1989 and as previously discussed, established health goals and legal limits for the presence of total coliforms, fecal coliforms and E. coli in drinking water. Under the 1996 Safe Drinking Water Act Amendments, the USEPA is required to review, and revise as appropriate, each Primary Drinking Water Regulation. In September 2008, the USEPA Total Coliform Rule/Distribution Systems Advisory Committee signed an Agreement in Principle, making recommendations for revisions to the Total Coliform Rule. Significant improvements were made during the revision process, including the creation of new treatment techniques, assessment triggers, response actions and violations, as well as revisions to the type and frequency of testing that water systems must undertake.

The revised TCR will apply to all public water systems. It is estimated that the USEPA will propose the revised rule in 2010 for finalization in 2012. Compliance will be required in 2015.

3.4.5 Radon

Radon is a naturally occurring gas formed from the decay of uranium-238. Radon in drinking water can contribute to indoor air radon levels from washing and showering. Inhalation or ingestion of radon can result in lung or stomach cancer. The USEPA has proposed preliminary guidelines for the regulation of radon however the final form of the rule has yet to be promulgated.

The City has not performed any source water testing for radon to date.

3.5 CONSUMER CONFIDENCE REPORT RULE

The EPA published the Consumer Confidence Report Rule in the Federal Register on August 19, 1998. The CCR Rule requires community water systems to provide an annual report to their

customers detailing information on water quality delivered by the system and documenting water quality monitoring results.

The report must be distributed by July 1 of each year, must contain an explanation of data collected during or prior to the previous calendar year, and must provide the telephone number of the owner, operator or designee of the community water system as a source of additional information concerning the report. This information is typically sent out with water bills, however systems must make a good faith effort to reach consumers who do not get water bills—typically renters. Water systems must certify to the ODWP that the CCR was sent to customers and that the information it contained was correct and consistent with the compliance monitoring data previously submitted to the ODWP. Complete details of the rule requirements can be found in OAR 333-061-0043.

The City has been in compliance with this rule and has issued reports for every year since 1998. The 2007 and 2008 reports are provided in Appendix X.

3.6 VULNERABILITY ASSESSMENT

The events of Sept. 11, 2001, reinforced the need to enhance the security of the United States. Congress responded by passing the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (the Bioterrorism Act), which was signed into law June 12, 2002. The Act amends the Safe Drinking Water Act, requires every community water system that serves a population greater than 3,300 persons to conduct a vulnerability assessment, and specifies actions that community water systems and the USEPA must take to improve the security of the nation's drinking water infrastructure.

Complete details of the requirements for Oregon water systems can be found in OAR 333-061-0064. Water systems should review their vulnerability assessments periodically to account for changing threats or additions to the system to ensure that security objectives are being met.

3.7 CROSS-CONNECTION CONTROL PROGRAM

Plumbing cross-connections, defined as actual or potential connections between a potable and non-potable water supply, constitute a serious health hazard. There are numerous well documented cases where cross-connections have been responsible for the contamination of drinking water and have resulted in poisonings or the spread of disease.

Oregon Administrative Rules 333-061-0070 through 0074 detail the requirements for a cross-connection control program. The City is required to establish a cross-connection ordinance and must submit an annual report to ODWP. Systems with more than 300 service connections are required to provide a certified tester.

The City's cross-connection control Ordinance 1014 was established on December 19, 1995. The City currently employs two certified inspectors and is responsible for inspecting new devices and installations, monitoring annual inspections, terminating water service in cases of non-compliance and compiling submitting the annual inspection report to ODWP.

3.8 SUMMARY AND RECOMMENDATIONS

- The City should consider monitoring for radon at each source water entry point to the distribution system.