APPENDIX 7: CHAPTER 7 APPENDICES

7A: Standard Operating Procedures

7B: Cross Connection Control Program

7A: Standard Operating Procedures

YELM WATER RECLAMATION FACILITY (WRF)
STANDARD OPERATING PROCEDURES (SOPS)
PREPARED FOR

City of Yelm
Yelm, Washington
March 2012

Brown AND Caldwell
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Olympia, Washington 98501
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1.0 SOP for CORRECTING NITROGEN REMOVAL

EFFICIENCY in WRF EFFLUENT

OVERVIEW

The total nitrogen permit limit for WRF effluent to be used as Reclaimed Water (RW) relies on proper nitrification/denitrification in the WRF. Several factors can affect the process, but the most vulnerable part of the process are the nitrifying bacteria (nitrifiers). Nitrifier growth is affected by toxicity, pH, alkalinity, DO concentration, and SBR temperature. During the cooler winter months it may not be effective to reestablish the needed nitrifiers without supplementing them from a secondary source.

One supply of nitrifiers has existed in the plant in the waste sludge storage tanks. Under the conditions that have been experienced in the past, this sludge can provide a seed stock for replenishing the microorganisms in the SBRs.

A second external source of nitrifying bacteria may be obtainable from other treatment plants that employ similar nutrient removal processes. It should be noted that importing sludge from outside facilities should be done after researching for other negative sludge characteristics, such as plants that have high levels of filamentous bacteria, or other deterrents.

The following SOP addresses possible recovery steps for rebuilding nitrifier inventory:

SOP

1. Is the MLSS concentration appropriate for the seasonal conditions? MLSS should be approximately 3,000 mg/l for cooler, winter months.

    a. If MLSS concentrations are low, increase the MLSS to 3,000 mg/l.
    b. Related to MLSS concentration, the solids retention time (SRT) in the SBRs is typically longer in the winter in order to maintain nitrification. An initial target SRT of 40 days should be established for winter operating procedures.

2. If MLSS concentrations are either increased to 3,000 mg/l, or if problems with nitrification removal continue, consider supplementing the nitrifying bacteria with other stock. Some sludge should be removed from the SBR before supplementing with new sludge so that the total mass of solids in the SBRs does not change dramatically.

    a. If the waste sludge storage tank sludge exhibits nitrification activity, introduce a portion of this sludge to the plant (to each SBR) on a periodic basis.
    b. If internal seed stock is unavailable, import MLSS from an outside wastewater treatment facility This may require more than one load of MLSS be obtained and introduced to the plant.

3. Check SBR DO during aerobic cycles. If DO is below 2.0 mg/L for much of the aerated portion of the cycle, increase DO setpoints. If DO is adequate, check total time of the aerobic portion of the cycle. This can be increased in 10% increments to see if additional air time improves nitrification.

4. In cases where an outside toxicity has inhibited the nitrifiers, replenishing the microorganisms by step 2a or 2b above will be necessary.

5. If alkalinity is too low, it may be inhibiting growth of nitrifiers, and adjustments in influent alkalinity must be made.

    a. The plant is equipped with an alkalinity delivery system to deliver caustic soda to control alkalinity. However, this alkalinity system is not in service as of March 2012and requires refurbishment before being returned to use.
    b. As an alternative to the use of the alkalinity delivery system, the plant operators have manually dosed with bags of lime introduced directly into each SBR during the aeration cycle.

6. Nitrification and nitrogen removal can also be affected by Nitrite Lock. The nitrification process is carried out by two classes of bacteria, where one group convert ammonia to nitrite and the second group convert nitrite to nitrate. Nitrite lock occurs when the class of nitrifying bacteria that oxidize nitrite to nitrate are inhibited. Nitrite lock can be indicated when chlorine residuals remain low despite increases in chlorine feed rate. Nitrite lock is typically diagnosed by measuring nitrite concentrations in excess of 2 mg/L-N. The causes of nitrite lock can include toxic inhibition, SRT inhibition, low oxygen concentration, and pH inhibition. To recover from nitrite lock, both steps of nitrification must be stopped completely and the process re-seeded with nitrifying bacteria. Re-seeding is accomplished as described above. However, it is important to determine the cause of nitrite lock and eliminate this cause before re-seeding. A paper describing nitrite lock in detail is appended to these SOPs.

7. Denitrification is the biological process that converts nitrate (or nitrite) to nitrogen gas. This is the process that accomplishes nitrogen removal from the system. Denitrification can also be inhibited within the activated sludge process. If nitrate levels are too high, it may indicate problems with denitrification. In this case, consider adjustment of the SBR Anoxic time interval.

    a. Previous experience has shown that a 10% increase in Anoxic time is often effective.
    b. Make sure that <u>no</u> aeration is taking place during the Anoxic time. Mechanical mixing is OK (and desired).
    c. Monitor the DO level of the SBR following the Aeration cycle. It is possible that very high DO levels might allow DO to be carried into the Anoxic Zone time, diminishing the effectiveness of the Anoxic Zone period in the SBR. If the DO is excessive, consider steps to slow the blowers or otherwise reduce the volume of air introduced to the SBR.

d. If oxgen levels are low during the anoxic cycle time and increasing the anoxic cycle time does not have an affect on improving nitrogen removal, then there could be a carbon limitation that is preventing additional denitrification from occurring. Adding supplemental readily degradable carbon to the influent during the anoxic cycle time could help improve denitrification performance. Note: As of March, 2012 the City was evaluating options to introduce supplemental carbon to the treatment process.

2. SOP for PREPARING THE WRF FOR

WINTER (Cold Weather) OPERATION

OVERVIEW

Past operating experience has shown that steps to prepare the WRF facility for the cooler winter months is helpful in assuring that a sufficient inventory of nitrifying microorganisms (nitrifiers) are available in the mixed liquor. The nitrifiers are critical for nitrogen removal, and when the wastewater cools during the winter months, new growth is inhibited because of the temperature. Thus, a healthy population should be established before the cool weather season.

A gradual increase in mixed liquor concentration (MLSS) should provide the necessary inventory. This increase should be made BEFORE the influent cools with the seasonal change, and the increase in MLSS must be done gradually. A good rule of thumb is that this increase should take approximately two weeks.

This SOP will recommend a mixed liquor concentration of 3,000 mg/l for the winter months, however, the operations of the plant and plant process control may allow some flexibility in this target.

> ***NOTE:*** *This SOP is SPECIFIC to process control preparation necessary for maximizing Nitrification/Denitrification. Other tasks necessary to winterize the WRF for cold weather operations should be implemented based on the experience of the operations staff.*

The following SOP outlines the steps required to prepare the plant for winter operation:

SOP

1. Program a reminder to employ this SOP:

    a. Currently, OUTLOOK TASKS is used as a reminder for programmed tasks in the Plant. Include a reminder in this tool to signal a start date of September 15, every year, for this SOP to be initiated.
    b. On the Daily Planner, or Monthly Calendar, make an entry for September 15, to initiate this SOP.

2. Adjust the SBR program to decrease the Sludge Wasting time interval by 50% of normal. The following must also be considered:

    a. Any time the SBR program is changed; time shortened or borrowed from one cycle must be taken or given to another phase of the cycle. In this case the wasting interval is being shortened, so one of the other cycles must be increased in order to maintain the overall timing of the SBR cycles.

3. Each day that the wasting is reduced, careful monitoring of the Settleability and SVI must be made in order to ensure that adequate decanting of the SBR is occurring. The following must be considered:

    a. Try to maintain a minimum of 2-feet of clear water in the SBR when Decanting begins to prevent solids loss.
    b. Microthrix control should be in operation to prevent interference from filamentous bacteria from negatively affecting settling.

4. As the MLSS increases, it may be necessary to increase the SBR Settling Time duration to provide adequate settling before the Decanting Cycle.

5. When the MLSS reaches the target of 3,000 mg/l, readjust the SBR Sludge Wasting time interval as necessary to maintain the MLSS at 3,000 mg/l.

3.0 SOP for PREPARING THE WRF FOR

SUMMER (Warm Weather) OPERATION

OVERVIEW

The WRF may be operated at a higher mixed liquor concentration (MLSS) during the winter months than is necessary during summer weather. Typically, a MLSS of 1,800 to 2,200 mg/l is sufficient for warm weather operations.

The SBR Wasting Time interval will need to be increased in order to increase wasting to reduce the MLSS to the summer weather range and it should be done slowly, over a period of several weeks. Remember that increasing the wasting will impact the other plant systems, including waste sludge storage capacity and GBT dewatering operating time as well as the volume of solids that must be trucked off-site.

The following SOP outlines the steps required to prepare the plant for summer operation:

SOP

1. Readjust the SBR Waste Sludge time interval by 1 minute.

2. Monitor the MLSS concentration as it should drop slowly over the next couple of weeks.

3. If after two weeks, the decrease in MLSS is lagging, increase the SBR Wasting Time interval one additional minute.

4. As the MLSS decreases, the SBR Settle time interval may be reduced and that time donated to another phase of the SBR cycle.

4. SOP for SECURING RECLAIMED

WATER during a PERMIT PARAMETER EXCURSION

OVERVIEW

The reclaimed water (RW) produced by the WRF must comply with Department of Ecology permit requirements. The permit governs the following water quality parameters:

- Chlorine Residual: >0.1 mg/l
- Total coliform: 2.2 monthly average (7-day geometric mean)
  (Sample Maximum: 23 counts per 100 mg/l)
- Turbidity: 2.0 NTUs monthly average
  (Sample Maximum 5.0 NTUs)
- pH: 6.5 to 9.0
- BOD: 30 mg/l
- Suspended Solids: 30 mg/l
- Dissolved Oxygen: > 0.0 mg/l
- Total Nitrogen: 10 mg/l
  (15 mg/l maximum daily)

In the event of a permit parameter excursion, distribution of RW must be suspended and corrective measures taken to return the parameter to compliance. Several of the parameters (pH, Turbidity) are monitored and measured by field mounted instrumentation. In the event that these instruments measure an excursion, steps to assure their proper operation and calibration should be taken before RW distribution is suspended.

The following SOP should be followed when a permit parameter is exceeded.

SOP

1. If parameter is measured by field mounted instrument, verify that the instrument is operating properly and is in proper calibration.

2. When parameter excursion is confirmed, STOP RW Pumps.

3. ISOLATE the RW distribution system:

    a. CLOSE the manual Distribution Header Main Valve (a manually operated yard valve located in front of Public Works on Rhoton Road).
    b. CLOSE the manual “flow meter inlet valves” at each RW users tap of the RW distribution header. (NOTE: A GIS map has been developed showing users and locations.)

4. Once the RW Distribution header is secured, the RW Pumps can be restarted in order to provide utility water needed for operations in the treatment plant.

5. Notify RW customers, including any City of Yelm customers, that the RW supply has been interrupted and any pertinent information regarding the interruption using the prepared form (see attached).

6. Empty the contents of the RW Storage Tank, recycling the non-compliant RW back into the treatment plant for re-treatment.

7. Employ corrective measures in the treatment plant necessary for returning the RW to compliance.

City of Yelm

Sewer Department
931 N.P. Road
Mail:
105 Yelm Ave. W
Yelm, WA 98597

DATE:

(Name of contact)

(Name of entity)

Contact Address

City, State, zip

Re: RW Production Shutdown

Dear:

The City of Yelm Water Reclamation Facility has been forced to shut down production of Reclaimed Water for the following
reason:_____
_____
_____
_____

Please know that we are doing everything we can to rectify the situation as quickly as possible. In the meantime, State and Federal laws prevent us from distributing and allowing use of reclaimed water. We have shut down production and stopped distribution. Please do not use or allow use of reclaimed water during this period. We will inform you in writing as soon as we are able to distribute Reclaimed Water again.

If you have any questions, Please do not hesitate to call the Reclamation Facility at (360) 458-8411 option 4.

Thank You,

James R. Doty

Facility Manager

City of Yelm Water Reclamation Facility

5. SOP for RESTARTING RW DISTRIBUTION SYSTEM

OVERVIEW

There are several reasons that the RW Distribution system may require to be restarted. Regardless of the reason, the restart is the same.

Because customers may not be immediately prepared for the RW supply to resume, a procedure to contact each customer by mail (written notification) requesting resumption of RW is required.

The following SOP is used when returning the RW Distribution system to service:

SOP

1. OPEN the main distribution header manual valve. (a manually operated yard valve located in front of Public Works on Rhoton Road).

2. Issue notifications (using the existing form letter for "Reclaimed Water Production Being Restarted", see attached) to RW customers asking them to request resumption of RW supply.

3. Send a representative of the City to OPEN the flow meter isolation valve at the customer location.

City of Yelm

Sewer Department

931 N.P. Road
Mail:
105 Yelm Ave. W
Yelm, WA 98597

March 26, 2012

To: All Reclaimed Water Customers

Re: Reclaimed Water Production Being Restarted

Dear Customers,

The City of Yelm Reclaimed Water Process has been brought back to within the parameters/limits required by our NPDES Permit and is ready to restart distribution of the Reclaimed Water.

If you desire to have your Reclaimed Water Service reinstated, please contact Yelm City Hall at (360) 458-3244, or in person to have your service reinstated.

Thank you for your patience.

James R. Doty

Plant Manager

City of Yelm Sewer Dept.

6. SOP for SLUDGE WASTING ADJUSTMENTS

OVERVIEW

Wasting at the Yelm WRF is accomplished as a feature of the SBR program. The wasting interval is at the end of the SBR decant cycle. The program calls for the Wasting Motor Operated Valve (MOV) to open and remain open for a programmable number of minutes. The waste sludge is then pumped by the WAS pumps to the sludge storage tanks.

When the MLSS concentration is below or above the target level, adjustments to the SBR program must be made to either shorten the wasting interval if the MLSS is too low or increase the wasting interval if the wasting interval is too high.

The rule of thumb should be to make small changes to the wasting interval in the SBR program.

SOP

1. Refer to the SBR program instructions to adjust the wasting Interval time.

2. Follow the SBR manufacturer recommendations for adjusting the wasting time.

3. Refer to the SOP for preparing the WRF for summer operation by adjusting the sludge wasting rate for additional details.

7. SOP for WASTE SLUDGE STORAGE

OVERVIEW

Sludge that is wasted from the SBR goes to the Waste Sludge Storage tank(s). These tanks are aerated and provide storage of the waste sludge until the thickening equipment is operated.

The thickening equipment (Gravity Belt Thickener) typically operates several days per week. However, there are periods when the sludge might be in storage for a week or more.

Excessive aeration and storage time while the sludge is in the storage tanks can cause nitrification and consequently, drive the alkalinity and pH to very low levels. Currently, the City of Tacoma requires sludge pH above 6.0. The pH is adjusted by adding lime to the sludge storage tanks while the aeration is taking place. The nitrification that takes place in the storage tanks consequently results in high levels of nitrate to be returned to the SBR in the GBT underflow during thickening operations. If nitrification in the storage tanks exists, consider operating the dewatering equipment so that part of the underflow goes into one SBR and part goes into the other. This may not be an exact 50/50 split, but by timing the GBT operation with the SBR fill cycles, it can, at minimum, be distributed to both basins.

Nitrification will deplete alkalinity in the sludge storage tanks. If lack of alkalinity is inhibiting the growth of nitrifying bacteria in the SBR, return of alkalinity depleted GBT underflow could worsen the problem.

Controlling the amount of air that the sludge in storage receives will minimize the generation of nitrate and will help mitigate pH and alkalinity problems. Turning the blower on and off at 30 minute intervals will induce alternating nitrification and denitrification thereby recovering a portion of the alkalinity consumed during nitrification.

Lastly, if it is possible to operate only one of the two storage tanks, the amount of detention time in the tanks will be reduced, also helping mitigate the impacts of nitrification and alkalinity reduction.

SOP

1. Adjust the Sludge Storage Tank blower to reduce volume of air used for mixing and freshening the stored sludge. Turn the blower on and off at 30 minute intervals. (NOTE: The blower provides air for mixing and for keeping the sludge in the storage tank fresh. Adjustments must take into consideration Nitrification, mixing and septic conditions.)

2. If possible, operate only one storage tank, reserving the second tank for emergency or periods when sludge must be stored or wasting is high.

8. SOP for CORRECTING HIGH TURBIDITY

in WRF EFFLUENT

OVERVIEW

The turbidity limit for the RW is 2.0 or less. High turbidity in the WRF effluent is typically related to problems with the sand filter operation, however, it can be indicative of a problem with the SBR decant cycle. Because turbidity is monitored and measured by a field mounted instrument, the first step to take during a turbidity excursion is to verify that the meter is functioning properly and to verify that it is properly calibrated. (Refer to the filter manufacturer's O&M Manual for the instrument for calibration procedure.)

The following SOP should be followed in the event of a turbidity issue:

SOP

1. Check turbidity meter function (Refer to the filter manufacturer's O&M Manual for calibration and maintenance procedures):

    a. Is meter turned on and functioning properly?
    b. Is there biofilm growth in meter feed lines?
    c. Is the meter properly calibrated?

2. Check the Sand Filter chemical feed operation:

    a. Is the chemical feed system properly adjusted and is it delivering polyaluminum chloride (PAX) to the sand filter?
    b. Is the PAX pump pumping?
    c. Is the PAX feed rate at the proper setting?
    d. Is the supply of PAX (the bulk tote) empty?

3. Is the Sand Filter overloaded?

    a. Make sure that the SBR is not decanting solids during the Decant Cycle.
    b. Are there enough Sand Filters on line to handle the hydraulic load? Refer to the manufacturer's O&M Manual for the filters to determine if the loading rate exceeds the number of filters in operation.

4. Check the Sand Filter for proper operation:

    a. Make sure the air compressor is operating.
    b. Make sure the air pressure is in the proper range: between 80 and 120-PSI.
    c. Make sure that the Air Lift Pump tube in the sand filter is operating properly. Holes can develop in the tube from abrasion. Pull the tube and inspect.

9. SOP for SAND FILTER PAX ADDITION

and EFFLUENT TURBIDITY CONTROL

OVERVIEW

The WRF is equipped with continuously back-flushing sand filters for turbidity control of the effluent. A coagulant, Poly Aluminum Chloride (PAX), is used as a filtering aid for the Sand Filters. Flow decanted from the SBRs flows to the polishing pond, and from the polishing pond flows to the Sand Filters. Labeled as Sumalchlor 50, provided by Summit Research, the Poly Aluminum Chloride coagulant is 12% elemental aluminum and 24% aluminum hydroxide. The efficiency of the filters is dependent on the addition of the PAX.

The following SOP pertains to the Sand Filter PAX addition:

SOP

1. Set PAX to control Sand Filter effluent turbidity, as read by the Turbidimeter in the chemical room, to 0.3 NTU.

2. Typical dosage is 0.3 gallons per hour (GPH).

3. If the turbidity reaches 0.8 on the Turbidimeter, increase the PAX metering pump in 0.05 GPH increments. Response to the increased dosage may take up to 2-hours to take effect.

4. Re-check the turbidity, and when it reaches 0.2 NTUs, decrease the PAX dosage.

5. Check the Tote level daily and record.

    a. Replace the Tote when it reaches 6-inches remaining.

10. SOP for PAX ADDITION for FILAMENTOUS BACTERIA (Microthrix) CONTROL

OVERVIEW

Poly Aluminum Chloride (PAX-14 by Kemira Chemical) is used to control Microthrix filamentous bacteria in the SBRs. Filamentous bacteria negatively affect the performance of the treatment plant by preventing good sludge settling and by the creation of a very thick, unmanageable foam that forms on the surface of the SBRs.

PAX is metered into the SBR during the Aeration cycle. In a feed system interconnected to the SBR program, the PAX metering pump starts at the beginning of the aeration cycle and stops 60-minutes later.

Typically, PAX is fed to the SBRs in three segments; segments one and two last 14 days each, segment three can last up to 77 days. Refer to the PAX Excel spreadsheet for the proper settings.

The following SOP is used for Microthrix control:

SOP

1. Set up the PAX pumping system:

    a. Determine the MLSS concentration in mg/l for the SBRs.
    b. Refer to the Excel Spreadsheet provided by Kemira to obtain recommended metering pump settings.

2. Set the PAX Metering Pump for 1st Segment (first stage PAX application).

    a. The first segment lasts for 14 days. Mark the calendar accordingly to trigger the change to 2nd Segment settings.
    b. Check the daily PAX usage and record (throughout the entire application cycle).

3. Energize the PAX metering pumps.

    a. The pump is automatically called to operate when the SBR Blower is called. The PAX pump runs for 60-minuts per aeration cycle.

4. At the end of the first 14 days, set the metering pump for 2nd Segment (second stage PAX application).

    a. The second segment lasts for 14 days. Mark the calendar accordingly to trigger the change to 3rd Segment settings.

5. At the end of the second 14 Days, set the metering pump for 3rd Segment (third stage PAX application).

    a. The third segment can last for 77 days. Observe the SBRs for presence of Microthrix foam to determine if the pump needs to remain on for the entire 77 days.

11. SOP for CORRECTING HIGH TOTAL COLIFORM COUNTS in WRF EFFLUENT

OVERVIEW

High total coliform counts in the effluent are usually chlorine residual related. If the residual is low or non-existent, most likely there will be problems with the Total Coliform counts. The permit requires that the coliform count 7-day average be 2.2 or less (based on a geometric mean) with a single sample maximum of 23 counts per 100 ml.

The RW permit requires a minimum of 0.5 mg/l chlorine residual at the end of the distribution header. Typically, the RW chlorine residual is 1.5 mg/l.

In the event of a permit excursion, the chlorination equipment should be checked for proper operation, the chlorine feed-rate should be adjusted, and in the case of an empty chlorine supply container, the container switched out.

The following SOP pertains to correcting high coliform counts in the effluent:

SOP

1. Is the chlorination equipment operating properly?

    a. Verify that the chlorinator is operating properly. Make sure that the rotameter is smooth and not jumping.
    b. Verify that the chlorine feed rate on the rotameter is set properly.
    c. Verify that the bulk Chlorine supply tank is not empty.

2. Verify that the Chlorine Analyzer is operating properly.

    a. Verify that the Analyzer is operating.
    b. Calibrate if necessary.

NOTE: The plant has experienced “nitrite lock” in the past. Nitrite lock is caused by an upset in the plant of the nitrification/denitrification process and cause very high chlorine dosages. For a detailed discussion of Nitrite Lock, refer to the WEF White Paper: Operational Keys to Nitrite Lock that is appended to these SOPs.

12. YELM WRF Lab Testing Inventory

OVERVIEW:

The Yelm WRF conducts or contracts for laboratory testing for purposes of reporting to the Department of Ecology (DOE) and for internal process control. The lab is accredited for the tests reported to DOE per the DOE lab accreditation program.

Results of tests required by the WRF's NPDES permit are reported via the Reclaimed Water Treatment Plant Monitory Report, or discharge monitoring report (DMR). A typical DMR is attached to this SOP for reference. Additional process monitoring and control data that is collected is recorded on bench sheets and operating logs. An inspection of the WRF by Ecology in 2011 recommended that these records be kept in bound notebooks for permanent storage and retrieval.

Accredited Lab Testing for DOE:

Analyte	Method	Standard Method
Ammonia as N	Nesslerization	SM 18 4500-NH3 C
BOD		SM 5210 B
Oxygen, Dissolved	D.O. Meter	SM 4500-OG
pH	Electrometric	SM 4500-H
TSS	Filtration	SM 2540 D
Total Res. Chlorine	DPD-Spectrophotometer	SM 4500-CI G
Fecal Coliforms	Membrane Filtration	SM 9222 D
Total Coli/E Coli	Colilert	SM 9223 B Colilert Q

The results from the above tests are reportable to the Dept. of Ecology.

Process Control Testing:

In addition to the tests that we are accredited for, the following tests are performed for process control monitoring:

Analyte	Method
Nitrate	Hach Nitraver-5 powder pillows (Cadmium Reduction)
Nitrite	Hach Nitrover-3 powder pillows (Diazotization Method)
Settleability	
Microscopic Examination	
Alkalinity	Hach Digital Titration (Hach Method #8203) I use Bromcreosol Green pH4
%VSS	SM 2540 E
%TS on Thickened WAS	SM 2540 B

The following tests are done daily on the influent to the Water Reclamation Facility:

pH-Std. Units
Temperature-°C

The following tests are done daily on the Reclaimed Water/Effluent from the Water Reclamation Facility:

pH-Std. Units
Temperature-°C
Total Res. Chlorine-(mg/L)
Total Coliform-(cfu/100mL)
Dissolved Oxygen-(mg/L)

The following tests are done daily on the Outfall to the Canal/River from the Water Reclamation Facility:

pH-Std. Units
Temperature-°C
Total Res. Chlorine-(mg/L)
Total Coliform-(cfu/100mL)
Dissolved Oxygen-(mg/L)

The following tests are done two times per week on the influent to the Water Reclamation Facility:

Analyte:
BOD5 –mg/L-lbs/day
TSS –mg/L-lbs/day

Outside Lab (contracted) Testing:

The following Tests are done **Monthly** on the **Reclaimed Water** By Edge Analytical Laboratories in Burlington, WA

Analyte:
Nitrite-mg/L
Nitrate-mg/L
TKN-mg/L
Alkalinity-mg/L
Conductivity-umhos/cm
Chloride-mg/L
Fluoride-mg/L
Total Dissolved Solids-mg/L
Sulfate-mg/L
Hardness-mg/L

The following Tests are done **Quarterly (March, June, Sept., Dec.)** on the **Reclaimed Water** By Edge Analytical Laboratories in Burlington, WA

Iron (Fe)-ug/L
Arsenic (Ar)-ug/L
Cadmium (CD)-ug/L
Chromium (Cr)-ug/L
Copper (Cu)-ug/L
Lead (Pb)-ug/L
Manganese (Mn)-ug/L
Mercury (Hg)-ug/L
Silver (AG)-ug/L
Nickel (Ni)-ug/L

Zinc (Zn)-ug/L
Total Trihalomethane (TTHM)-ug/L

The following Test is done **yearly (March)** on the **Reclaimed Water** By Edge Analytical Laboratories in Burlington, WA

Priority Pollutant Scan (PPS)-ug/L

The following Tests are done **Quarterly (March, June, Sept., Dec.)** on the **Six Ground Water Monitoring Wells in Cochrane Park** By Edge Analytical Laboratories in Burlington, WA

Nitrate (as N)-mg/l
Nitrite (as N)-mg/l
TKN (as N)-mg/l
Ammonia (as N)-mg/l
Total Dissolved Solids-mg/L
Fecal Coliform Bacteria –cfu/100mL
Chloride-mg/L
Fluoride-mg/L
Dissolved Organic Carbon-mg/L
Total Trihalomethanes-ug/L

The following Tests are done **yearly (March)** on the **Six Ground Water Monitoring Wells in Cochrane Park** By Edge Analytical Laboratories in Burlington, WA

Bicarbonate(HCO3)-mg/L
Carbonate(CO3)-mg/L
Calcium(Ca)-mg/L
Magnesium(Mg)-mg/L
Potassium(K)-mg/L
Sodium(Na)-mg/L
Sulfate(SO4)-mg/L
Total Metals:
Arsenic (Ar)-ug/L
Cadmium (CD)-ug/L
Chromium (Cr)-ug/L
Copper (Cu)-ug/L
Lead (Pb)-ug/L
Manganese (Mn)-ug/L
Mercury (Hg)-ug/L
Silver (AG)-ug/L
Nickel (Ni)-ug/L
Zinc (Zn)-ug/L

The following Tests are done **Quarterly (March, June, Sept., Dec.)** on the **Influent to the Cochrane Park Rapid Infiltration Basins** By Edge Analytical Laboratories in Burlington, WA

Ammonia (as N)-mg/l
Chloride-mg/L
Fecal Coliform Bacteria –cfu/100mL
Nitrate (as N)-mg/l

Nitrite (as N)-mg/l
TKN (as N)-mg/l
Total Dissolved Solids-mg/L

ATTACHMENT A

SAMPLE RECLAIMED WATER TREATMENT PLANT MONITORING REPORT

RECLAIMED WATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0040762 | Month August | Year 2011

Facility Name City of Yelm | County Thurston

Receiving Water Nisqually River | Plant Operator Jim Doty

Plant Type SBR with Chlorine Disinfection | Population 6848

	INFLUENT					001-RECLAIMED WATER DISCHARGE									
Frequency	CONT	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK	2/WEEK	2/WEEK	2/WEEK	DAILY	7DMV	DAILY	DAILY	DAILY
Date	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	TOTAL COLIFORM CFU/100 ML	TOTAL COLIFORM CFU/100 ML	CHLORINE MG/L	DISSOLVED OXYGEN MG/L	pH STANDARD UNITS
1	0.335					0.000									
2	0.348	174	505	52	150.92	0.000									
3	0.337					0.000									
4	0.337	187	525.6	55	154.58	0.000									
5	0.327					0.000									
6	0.345					0.000									
7	0.369					0.000									
8	0.347	160	463	51	147.59	0.031	9.5	2.5	0.7	0.2	1	1	1.9	5.1	6.9
9	0.324					0.049					<1	1	1.3	5.0	7.0
10	0.338					0.275					<1	1	2.3	6.5	6.8
11	0.330	153	421.1	52	143.11	0.412	8.2	28.2	1	3.4	<1	1	1.6	6.6	7.1
12	0.322					0.289					<1	1	1.9	6.5	7.1
13	0.336					0.307					<1	1	2.4	6.7	7.0
14	0.369					0.284					<1	1	1.6	6.2	6.7
15	0.345	128	368.3	57	164.01	0.338	8.6	24.2	1	2.8	<1	1	1.8	5.2	6.8
16	0.341					0.342					<1	1	1.7	6.1	6.9
17	0.334					0.377					<1	1	1.6	6.2	7.0
18	0.318	212	562.2	120	318.25	0.267	10.1	22.5	1.1	2.4	<1	1	2.0	6.3	7.0
19	0.327					0.364					<1	1	1.7	5.0	6.9
20	0.329					0.267					<1	1	1.9	5.4	6.8
21	0.364					0.306					<1	1	1.5	6.6	7.0
22	0.341	180	511.9	56	159.26	0.399	9.7	32.3	0.8	2.7	<1	1	2.0	5.8	7.0
23	0.351					0.360					<1	1	1.8	6.5	6.9
24	0.342					0.363					<1	1	1.9	7.2	7.2
25	0.335	169	472.2	55	153.66	0.343	6.6	18.9	0.8	2.3	<1	1	2.1	7.2	7.1
26	0.330					0.288					<1	1	2.2	7.2	7.1
27	0.326					0.289					<1	1	1.9	7.1	7.1
28	0.371					0.304					<1	1	1.7	7.4	7.1
29	0.352	179	525.5	55	161.46	0.400	8.9	29.7	0.7	2.3	<1	1	1.8	7.3	7.0
30	0.349					0.351					<1	1	2.1	7.6	7.1
31	0.355					0.280					<1	1	2.1	7.5	7.0
Total															
	AVG 0.341	AVG 171	AVG 483.9	AVG 61.4	AVG 172.5	AVG 0.235	AVG 8.8	AVG 22.6	AVG 0.9	AVG 2.3			AVG 1.9	AVG 6.4	MIN 6.7
Permit	**1**		**2000**		**430**		**30**		**30**						**6**
	MAX 0.371	MAX 212	MAX 562.2	MAX 120.0	MAX 318.3	MAX 0.412					MAX 2	MAX 1			MAX 7.2
Limits											**23**	**2.2**			**9**

No Reclaimed Water produced until Aug 8, 2011 James R. Doty

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GM7=highest 7-day Geometric Mean

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James Doty Mgr.
Name and Title

James R Doty
Signature

RECLAIMED WATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0040762 **Month** August **Year** 2011

Facility Name City of Yelm **County** Thurston

Receiving Water Nisqually River **Plant Operator** Jim Doty

Plant Type SBR with Chlorine Disinfection **Population** 6848

	001 - RECLAIMED WATER DISCHARGE (continued)														FILTERS	
Frequency	1/DA	0400 hr	0800 hr	1200 hr	1600 hr	2000 hr	2400 hr	1/DA	1/DA	1/DA	1/DA	1/DA	1/DA	1/DA	1/DA
	Avg Raw	Finished Turbidity Sample Every Four Hours, NTU										Raw	Finish		
Date	TURBIDITY NTU	TURBIDITY NTU	TURBIDITY NTU	TURBIDITY NTU	TURBIDITY NTU	TURBIDITY NTU	TURBIDITY NTU	Turbidity Finished Daily Average	Turbidity Maximum Finished NTU	No. of Turbidity Samples > 2.0 NTUs	% Turbidity Reduction See Note 1	TEMPERATURE °C	TEMPERATURE °C	Water Treated by Filters 1,000 gallons	Total Hours of Filter Operation
1	4.865	0.84	0.78	0.79	0.83	0.83	0.85	0.84	0.96		83%	20	20	350	24
2	4.789	0.73	0.72	0.66	0.73	0.76	0.79	0.75	0.90		84%	21	21	347	24
3	4.635	0.73	0.68	0.64	0.61	0.76	0.83	0.71	0.83		85%	21	21	347	24
4	4.761	0.76	0.76	0.71	0.7	0.76	0.94	0.76	0.95		84%	21	21	346	24
5	4.422	0.87	0.84	0.76	0.76	0.79	0.77	0.80	0.96		82%	21	21	349	24
6	4.107	0.92	0.84	0.73	0.74	0.79	0.76	0.80	0.92		81%	21	21	348	24
7	3.713	0.82	0.82	0.73	0.74	0.84	0.82	0.78	0.90		79%	21	21	345	24
8	2.801	0.85	0.87	0.8	0.73	0.75	0.85	0.80	0.91		71%	21	21	345	24
9	3.226	0.77	0.72	0.69	0.65	0.67	0.77	0.71	0.85		78%	21	21	346	24
10	4.05	0.7	0.7	0.63	0.61	0.6	0.66	0.67	0.78		84%	20	20	343	24
11	3.857	0.62	0.64	0.62	0.6	0.59	0.66	0.67	0.72		83%	21	21	340	24
12	3.893	0.61	0.61	0.52	0.52	0.55	0.6	0.57	0.66		85%	21	21	343	24
13	3.543	0.57	0.56	0.58	0.5	0.55	0.58	0.55	0.60		84%	21	21	342	24
14	3.503	0.54	0.54	0.55	0.48	0.51	0.56	0.54	1.56		85%	21	21	339	24
15	3.43	0.54	0.53	0.52	0.51	0.53	0.53	0.53	0.59		85%	20	20	339	24
16	3.509	0.56	0.54	0.5	0.5	0.51	0.52	0.52	0.61		85%	20	20	341	24
17	3.558	0.51	0.52	0.5	0.5	0.52	0.53	0.51	0.56		86%	20	20	342	24
18	3.56	0.5	0.5	0.5	0.45	0.52	0.5	0.54	1.14		85%	20	20	339	24
19	3.663	0.47	0.46	0.46	0.44	0.45	0.51	0.46	0.51		87%	20	20	338	24
20	3.619	0.49	0.47	0.46	0.44	0.45	0.48	0.47	0.53		87%	20	20	339	24
21	3.513	0.45	0.45	0.41	0.41	0.41	0.43	0.43	0.48		88%	22	22	338	24
22	3.337	0.42	0.45	0.42	0.42	0.44	0.43	0.43	0.46		87%	21	21	342	24
23	3.317	0.42	0.42	0.4	0.37	0.4	0.42	0.41	0.45		88%	21	21	343	24
24	3.392	0.4	0.4	0.4	0.37	0.4	0.41	0.40	0.42		88%	21	21	345	24
25	3.569	0.41	0.38	0.37	0.37	0.37	0.37	0.38	0.42		89%	22	22	342	24
26	3.639	0.4	0.38	0.36	0.36	0.37	0.38	0.37	0.41		90%	21	21	343	24
27	3.624	0.38	0.38	0.36	0.36	0.37	0.4	0.37	0.44		90%	21	21	343	24
28	3.545	0.4	0.38	0.37	0.35	0.37	0.41	0.38	0.41		89%	21	21	342	24
29	3.332	0.38	0.37	0.36	0.36	0.36	0.36	0.37	0.41		89%	21	21	350	24
30	3.298	0.38	0.38	0.36	0.37	0.35	0.37	0.37	0.41		89%	21	21	354	24
31	3.275	0.4	0.4	0.42	0.38	0.37	0.4	0.39	0.45		88%	20	20	349	24
Total															
								AVG 0.56	MAX 1.56	100.00%	AVG 85%	AVG 20.8	AVG 20.8	AVG 344	24
Permit								**2**	**5**						
Limits															

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum

GM7=highest 7-day Geometric Mean **7DMV**= 7-day Median Value **Note 1** P.T.R. = [(Ave Raw NTU)-(Ave Finished NTU)/(Ave Raw NTU)]x100%

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James Doty Mgr.
Name and Title

James R. Doty
Signature

RECLAIMED WATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0040762 **Month** August **Year** 2011

Facility Name City of Yelm **County** Thurston

Receiving Water Nisqually River **Plant Operator** Jim Doty

Plant Type SBR with Chlorine Disinfection **Population** 6848

	001 - RECLAIMED WATER DISCHARGE (continued)												CHEMICALS USED		
Frequency	1/30	1/30	1/30	1/30	1/30	1/30	1/30	1/30	1/30	1/30	1/30	DAILY	DAILY	DAILY	DAILY
Date	HARDNESS MG/L AS CaCO	TOTAL NITROGEN MG/L	TKN (as N) MG/L	NITRATE NO3 MG/L	NITRITE NO2 MG/L	TDS MG/L	ALKALINITY MG/L	CONDUCTIVITY UMHOS/CM	CHLORIDE MG/L	FLOURIDE MG/L	SULFATE MG/L	TEMPERATURE DEG C	PACL LBS/DAY	NaOH LBS/DAY	CHLORINE LBS/DAY
1												20	108.9	0	19
2												21	94.1	0	20
3												21	92.5	0	16
4												21	92.5	0	24
5		5.12	1.76	3.36	<0.1							21	92.2	0	38
6												21	91.9	0	41
7												21	91.7	0	26
8												21	91.9	0	39
9	96.3	9.17	1.95	7.22	<0.1	327	92	546	70	<0.1	24	21	92.2	0	40
10												20	91.9	0	42
11												21	92.2	0	25
12												21	92.5	0	32
13												21	91.9	0	35
14												21	92.5	0	37
15												20	92.5	0	23
16												20	93.3	0	37
17												20	93.0	0	41
18												20	93.5	0	41
19												20	93.0	0	31
20												20	93.3	0	15
21												22	92.2	0	35
22												21	91.9	0	33
23	93.3	8	1.22	6.78	<0.1							21	91.4	0	37
24												21	90.9	0	23
25												22	91.4	0	27
26												21	90.9	0	37
27												21	91.1	0	38
28												21	91.4	0	41
29												21	91.4	0	17
30												21	92.2	0	30
31												20	92.7	0	32
Total															
	AVG 94.8	AVG 7.43	AVG 1.58	AVG 5.79	AVG <0.1	AVG 327	AVG 92	AVG 546	AVG 70	AVG <0.1	AVG 24	AVG 20.8	AVG 92.7	AVG 0	AVG 31
Permit		**10**													
Limits															

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James Doty Mgr.
Name and Title

Signature

RECLAIMED WATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0040762 | Month August | Year 2011

Facility Name City of Yelm | County Thurston

Receiving Water Nisqually River | Plant Operator Jim Doty

Plant Type SBR with Chlorine Disinfection | Population 6848

002 - CENTRALIA POWER CANAL

Frequency	CONT	2/WEEK	2/WEEK	2/WEEK	2/WEEK	DAILY	2/WEEK	DAILY	DAILY	DAILY	1/30	1/30			
Date	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM CFU/100 ML	DISSOLVED OXYGEN MG/L	CHLORINE MG/L	TEMPERATURE DEG C	HARDNESS MG/L AS CaCO	TOTAL AMMONIA MGL (as NH3-N)			
1	0.326					7.1	<1	4.7	0.1	20		1.52			
2	0.323	7.88	21.23	1.5	4.04	7.1	<1	4.9	0.02	21					
3	0.321					7.1	<1	4.6	0.04	21		1.18			
4	0.000	11.1	0	1.6	0.00	7.0	2	4.3	0.03	21		0.22			
5	0.127					7.0	<1	4.9	0.01	21		0.03			
6	0.250					7.0	<1	5.8	0.02	21		0.01			
7	0.244					7.0	<1	5.4	0.02	21		0.03			
8	0.208	9.5	16.48	0.7	1.21	6.9	1	5.1	0.03	21		0.02			
9	0.211					7.0	<1	5.0	0.01	21		0.05			
10	0.028					6.8	<1	6.5	0.03	20		0.01			
11	0.000	8.2	0	1	0.00	7.1	<1	6.6	0.01	21		0.01			
12	0.000					7.1	<1	6.5	0.03	21		0.03			
13	0.001					7.0	<1	6.7	0.02	21		0.01			
14	0.014					6.7	<1	6.2	0.01	21		0.03			
15	0.019	8.6	1.363	1	0.16	6.8	<1	5.2	0.02	20		0.01			
16	0.000					6.9	<1	6.1	0.01	20		0.04			
17	0.000					7.0	<1	6.2	0.03	20		0.01			
18	0.001	10.1	0.084	1.1	0.01	7.0	<1	6.3	0.03	20		0.03			
19	0.000					6.9	<1	5.0	0.01	20		0.04			
20	0.008					6.8	<1	5.4	0.03	20		0.04			
21	0.011					7.0	<1	6.6	0.02	22		0.01			
22	0.000														
23	0.000														
24	0.000		Centralia Power Canal Shut down												
25	0.000		on August 22nd, 2011												
26	0.000														
27	0.000								James R Doty						
28	0.000														
29	0.000														
30	0.000														
31	0.000														
Total															
	AVG 0.067	AVG 9.23	AVG 6.53	AVG 1.15	AVG 0.90	MIN 6.7	GEM 1	AVG 5.6	AVG 0.03	AVG 20.7	AVG 70.9	AVG <0.01			
Permit		**30**	**250**	**30**	**250**	**6**	**100**		**0.5**			**3**			
		AVW 9.5	AVW 10.6	AVW 1.6	AVW 2.0	MAX 7.1	GM7 1.19		AVW 0.04			AVW 0.59			
Limits		**45**	**375**	**45**	**375**	**9**	**200**		**0.75**			**4.5**			

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RECLAIMED WATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0040762 | Month August | Year 2011

Facility Name City of Yelm | County Thurston

Receiving Water Nisqually River | Plant Operator Jim Doty

Plant Type SBR with Chlorine Disinfection | Population 6848

003-NISQUALLY RIVER

Frequency	CONT	2/WEEK	2/WEEK	2/WEEK	2/WEEK	DAILY	2/WEEK	DAILY	DAILY	DAILY	1/30	1/30	1/30		
Date	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM CFU/100 ML	DISSOLVED OXYGEN MG/L	CHLORINE MG/L	TEMPERATURE DEG C	HARDNESS MG/L as CaCO3	AMMONIA MG/L (as NH3-N)	TOTAL LEAD UG/L		
1	0.000														
2	0.000														
3	0.000														
4	0.000					No discharge to Nisqually River									
5	0.000					until Aug 22nd, 2011									
6	0.000														
7	0.000														
8	0.000														
9	0.000														
10	0.000														
11	0.000														
12	0.000														
13	0.000														
14	0.000														
15	0.000														
16	0.000														
17	0.000														
18	0.000														
19	0.000														
20	0.000														
21	0.000														
22	0.000	9.7	0.00	0.8	0.00					21					
23	0.009					6.9	<1	6.5	0.04	21	93.3	0.03	<0.5		
24	0.031					7.2	<1	7.2	0.02	21		0.02			
25	0.000	6.6	0.00	0.8	0.00										
26	0.000														
27	0.000														
28	0.000														
29	0.000	8.9	0.00	0.7	0.00										
30	0.000														
31	0.010					7	<1	7.5	0.02	20		0.04			
Total															
	AVG 0.002	AVG 8.4	AVG 0.00	AVG 0.77	AVG 0.00	MIN 6.9	GEM 1	AVG 7.1	AVG 0.03	AVG 20.8	AVG 93.3	AVG 0.03	AVG <0.05		
Permit		**30**	**250**	**30**	**250**	**6.5**	**100**		**0.047**			**3**			
		AVW 8.4	AVW 0.0	AVW 0.8	AVW 0.0	MAX 7.2	GM7 1		MXD 0.04			AVW 0.03			
Limits		**45**	**375**	**45**	**375**	**8.5**	**200**		**0.124**			**4.5**			

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James Doty Mgr.
Name and Title

Signature

ATTACHMENT B

OPERATIONAL KEYS TO NITRITE LOCK

Operational Keys to Nitrite Lock

Woodie Mark Muirhead*, Brown and Caldwell

Ron Appleton, Brown and Caldwell

*Ali'i Place, Suite 2400, 1099 Alakea Street, Honolulu, Hawaii 96813

Abstract

Nitrite-nitrogen seldom exceeds 1.0 milligram per liter (mg/L) in a properly controlled nitrification process. As soon as ammonia is oxidized to nitrite by ammonia oxidizing bacteria (AOB), the nitrite is oxidized to nitrate by nitrite oxidizing bacteria (NOB). Under certain environmental conditions, such as a poorly established or inhibited NOB population, the nitrite concentration will increase. High nitrite concentrations can interfere with disinfection and cause violations of effluent bacteria limits, result potentially in whole effluent toxicity (WET) failures, and cause effluent pH violations. An abnormal increase in secondary effluent nitrite is referred commonly as "nitrite lock". It is discussed frequently in the Water Environment Federations' Technical Discussion Forum and is not understood fully. This paper will explain nitrite lock, present case studies from four treatment plants, and outline operational strategies for preventing and controlling nitrite lock.

Keywords

Nitrification, Nitrite Lock, Inhibition, Disinfection

Introduction

Nitrite-nitrogen seldom exceeds 1.0 milligram per liter (mg/L) in a properly controlled nitrification process. As soon as ammonia is oxidized to nitrite by ammonia oxidizing bacteria (AOB), the nitrite is oxidized to nitrate by nitrite oxidizing bacteria (NOB). Under certain environmental conditions, such as a poorly established or inhibited NOB population, nitrite will increase. A poorly established NOB population can occur during start-up of nitrification processes. Inhibition of NOB can occur as the result of many environmental conditions, some of which are controllable by operations personnel. Operational problems associated with nitrite lock vary, but the most significant impact is loss of disinfection effectiveness due to nitrite and chlorine reactions. Troubleshooting is sometimes difficult because appropriate analytical data are lacking and a poor understanding of the underlying causes of nitrite lock exists.

Impacts of Nitrite Lock

Nitrite lock can result in poor disinfection, effluent violations, and toxicity. These potential impacts are discussed below.

Nitrite-Chlorine Reactions. The most frequent concern about nitrite lock is the chemical reaction between chlorine and nitrite, and the subsequent impact on disinfection. Nitrite reactions with elemental chlorine are shown in equations (1) and (2):

$$Cl_2 + H_2O \rightarrow HOCl + HCl \qquad (1)$$

$$HOCl + NO_2^- \rightarrow NO_3^- + HCl \qquad (2)$$

Nitrite reactions with sodium hypochlorite are shown in equations (3) and (4):

$$NaOCl + H_2O \rightarrow HOCl + NaOH \qquad (3)$$

$$HOCl + NO_2^- \rightarrow NO_3^- + HCl \qquad (4)$$

One mg/L of nitrite-nitrogen will react with (consume) 5 mg/L free chlorine (White, 1999). The reaction between chlorine and nitrite can result in poor disinfection, increased chlorine costs, and possible pH violations.

Equations (2) and (4) show the reaction of nitrite with free chlorine. Chloramines do not react readily with nitrite (White, 1999). Some facilities have incorporated this knowledge of chemistry into seasonal start-up strategies to prevent nitrite lock, or have added other sources of ammonia (e.g., ammonium hydroxide or anaerobic digester centrate) to control nitrite lock.

Nitrite Toxicity. The Environmental Protection Agency (EPA) determined maximum concentrations of pollutants in receiving waters that should be protective of aquatic life (U.S. Environmental Protection Agency, 1976). For nitrite-N, the concentrations were less than 5.0 milligrams per liter (mg/L) for warm water fish, and less than 0.06 mg/L for salmonid species. However, EPA did not establish these concentrations as water quality criteria because it was believed that concentrations of nitrite-N "that would exhibit toxic effects on warm- or coldwater fish could rarely exist in nature…"

Though these concentrations might rarely occur in nature, they could exist in a wastewater treatment plant effluent during nitrite lock. If these concentrations are present during sample collection for whole effluent toxicity (WET) testing, they could cause potentially a WET test failure.

Denitrification. Denitrifying organisms use nitrate as a terminal electron acceptor during respiration of organic compounds, reducing nitrate to nitrogen gas. Nitrite is an intermediary ion during this process. If nitrite is present, denitrifying organisms can use it as a terminal electron acceptor. Denitrification can occur more quickly when the organism uses nitrite instead of nitrate. The most significant impact of nitrite lock on denitrification would be floating sludge in secondary clarifiers, and subsequent solids loss.

Key Nitrification Relationships

Understanding the causes and potential impacts of nitrite lock requires fundamental knowledge of relationships between AOB and NOB. These important relationships are discussed below.

- The stoichiometric equations for oxidation of ammonia to nitrite (5) and for oxidation of nitrite to nitrate (6) are shown below (U.S. Environmental Protection Agency, 1993).

$$NH_4^+ + 1.5\ O_2 \rightarrow 2H^+ + H_2O + NO_2^- \qquad (5)$$

$$NO^-_2 + 0.5\ O_2 \rightarrow NO_3^- \qquad (6)$$

  These equations show that 7.1 mg/L of alkalinity is consumed during nitrification. All the alkalinity is consumed by AOB. In low alkalinity wastewaters, AOB can consume enough alkalinity to depress potentially the pH to inhibitory levels for NOB.

- Equations (5) and (6) also show that AOB and NOB are obligate aerobes. AOB consume approximately 3.43 mg/L of oxygen for each mg/L of ammonia-N oxidized to nitrite-N. NOB consume approximately 1.14 mg/L of oxygen for each mg/L of nitrite-N oxidized to nitrate-N.
- The occurrence of nitrite lock during periods when NOB populations are established fully suggests NOB are more sensitive to environmental factors. Barnard suggests *Nitrobacter* species are more vulnerable "to toxic or other influences and would be the first to suffer as a result to any disturbance to the environment … a dissolved oxygen (DO) level which is too low, a pH value which is too high or too low, or the influence of toxic inhibitors" (Barnard, 1994).
- NOB have a faster growth rate than AOB (U.S. Environmental Protection Agency, 1993). As soon as AOB produce nitrite, a well-establish NOB population will assimilate it and convert it to nitrate. At temperatures above approximately 27 degrees Celsius, the growth rate of AOB has been shown to exceed the growth rate of NOB, which could result potentially in an increase in the nitrite concentration (Knowles, 1964).
- Despite the faster growth rate of NOB at temperatures below approximately 27 degrees Celsius, the population of NOB will lag behind the population of AOB, since NOB need nitrite as an energy source.

These relationships show that a range of environmental conditions are potential causes of nitrite lock. For typical wastewater treatment plants these include low dissolved oxygen, low alkalinity or low pH, high temperature, and the presence of toxic or inhibitory substances. In addition, start-up or seasonal start-up of nitrification facilities can result in nitrite lock due NOB growth lagging behind AOB growth. High pH could also be inhibitory for facilities with this influent characteristic.

Common Troubleshooting Mistakes

Nitrite lock is often prolonged by limited data and a poor understanding of process relationships. There are four common practices that limit troubleshooting and timely corrective actions. These practices are discussed below.

Combined nitrite-N and nitrate-N analyses. Many discharge permits express oxidized nitrogen analytical requirements as nitrite-N + nitrate-N concentrations. As a result, it is not uncommon for treatment plant staff to use an analytical procedure that combines the measurements and fail to differentiate nitrite-N from nitrate-N. When nitrite lock occurs, the presence of nitrite is masked by the combined analysis.

Evaluating on the basis of final effluent parameters. Many of the analytical parameters used to evaluate nitrite lock are affected by chlorine disinfection, including nitrite concentration, alkalinity, and pH. Final effluent data, particularly at facilities that use chlorine for disinfection, cannot be used effectively for evaluating the causes of nitrite lock. Secondary effluent data should be used.

Attributing NOB inhibition solely to external sources. Inhibition of NOB can come from external sources (e.g., toxic or inhibitory discharges) and from raw wastewater characteristics beyond an operator's control (e.g., low temperature). Despite this potential, internal causes of inhibition of NOB should not be ignored. Examples of internal sources of inhibition include:

- Use of chlorine for filamentous control, secondary clarifier chlorination rings, and filter backwashing can introduce toxic concentrations that can inhibit NOB.

- Low pH due to nitrification in low alkalinity wastewaters. All the alkalinity consumed during nitrification occurs during the oxidation of ammonia to nitrite. For low alkalinity wastewaters (< 150 mg/L as $CaCO_3$), AOB can consume sufficient alkalinity to depress the pH to a level that can inhibit NOB.

- Low dissolved oxygen in the biological process can inhibit AOB and/or NOB.

Failing to act quickly. Nitrifying organisms are a small percentage of the mass in a biological treatment system. If the cause of nitrite lock is not determined quickly, NOB can be wasted from the secondary process, requiring a longer recovery period for the NOB population to become re-established.

Case Studies

The case studies presented in this section illustrate various causes and impacts of nitrite lock. The first two case studies are based on forensic analyses of historical data. During the events in these two case studies, only limited attempts were made to troubleshoot the events analytically. Fortunately, sufficient data are available to reasonably determine the cause. The last two case studies were analyzed during the nitrite lock events. All the case studies represent a progression of experience dealing with nitrite lock, describing events that span eleven years.

City of Salem, Oregon. In 1988, Salem Oregon's Willow Lake Wastewater Treatment Plant (WWTP) switched from a parallel, trickling filter-pure oxygen activated sludge to a coupled trickling filter-air activated sludge (TF/AS) process. Though the facility was not required to nitrify, nitrite lock occurred for approximately two weeks during the initial operation of the TF/AS process.

Figure 1 shows the high chlorine demand associated with elevated nitrite-N concentrations. It also shows the significant impact even low concentrations of nitrite-nitrogen can have on chlorine use. Chlorine use increased as much as 10 times above normal as a result of 4 to 5 mg/L secondary effluent nitrite-nitrogen concentrations. This increase in chlorine demand not only affected disinfection, it also increased chlorine costs substantially.

Figure 1 shows another important relationship. As the secondary effluent ammonia-N concentration increased, the chlorine use decreased. Chloramines do not readily react with nitrites.

Figure 2 compares MLSS concentration and MLSS pH. The vertical red, dashed line shows the first full day of TF/AS operation. The pure oxygen system was converted to air activated sludge 2 days earlier, but continued to operate in parallel with the trickling filter until full operation of the TF/AS process began. Covered pure oxygen basins typically have low pH due to the high partial pressure of carbon dioxide in the headspace. The MLSS pH increased from approximately 6.2 to 6.5 when the basin was converted from pure oxygen to fine pore air diffusion.

Figure 3 compares MLSS and dissolved oxygen concentrations, and secondary effluent ammonia-N. After the TF/AS process was brought on-line, nitrification increased in the secondary process even though the MLSS and dissolved oxygen concentrations steadily declined. Around February 12th, nitrification began to decrease. Prior to the switchover to the TF/AS process, the trickling filter received half the load it did after the switchover. When the switchover was made, the trickling filter seeded the air activated sludge process with nitrifying organisms. The high MLSS and dissolved oxygen concentrations promoted higher levels of nitrification, until the MLSS and dissolved oxygen concentrations decreased. The data suggest that dissolved oxygen was the key limiting factor since the MLSS concentration increased dramatically on February 17th, yet no significant increase in nitrification occurred in the period that followed.

Figure 4 compares MLSS pH with secondary effluent nitrite-N concentrations. As the MLSS pH increased during the two-month period, the nitrite-N concentration decreased. The increase in pH over the period is related to the decrease in nitrification discussed above and shown in Figure 3. These data suggest the nitrite lock was caused by low pH, particularly below pH 6.7. Raw wastewater alkalinity for the Willow Lake WWTP is low (130 to 150 mg/L). When the process was completely nitrifying, AOB consumed sufficient alkalinity to depress the MLSS pH to inhibitory levels for NOB. Since the facility was not required, nor designed to nitrify, a means of supplemental alkalinity addition was not available. Plant staff brought the process out of nitrite lock through control measures that reduced the amount of nitrification.
This case study demonstrates two important aspects of nitrite lock: (1) low pH can have an inhibitory effect on NOB, and (2) chloramines do not readily react with nitrite.

Figure 1. Chlorine Consumption During Nitrite Lock

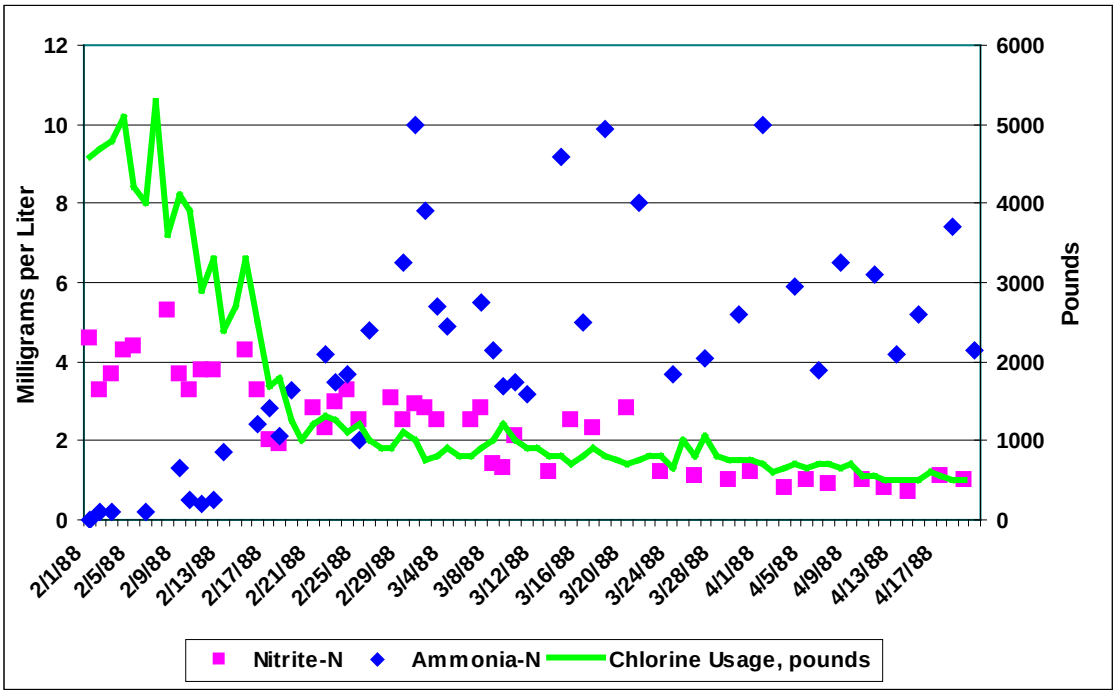


Figure 2. Comparison of MLSS Concentration and pH

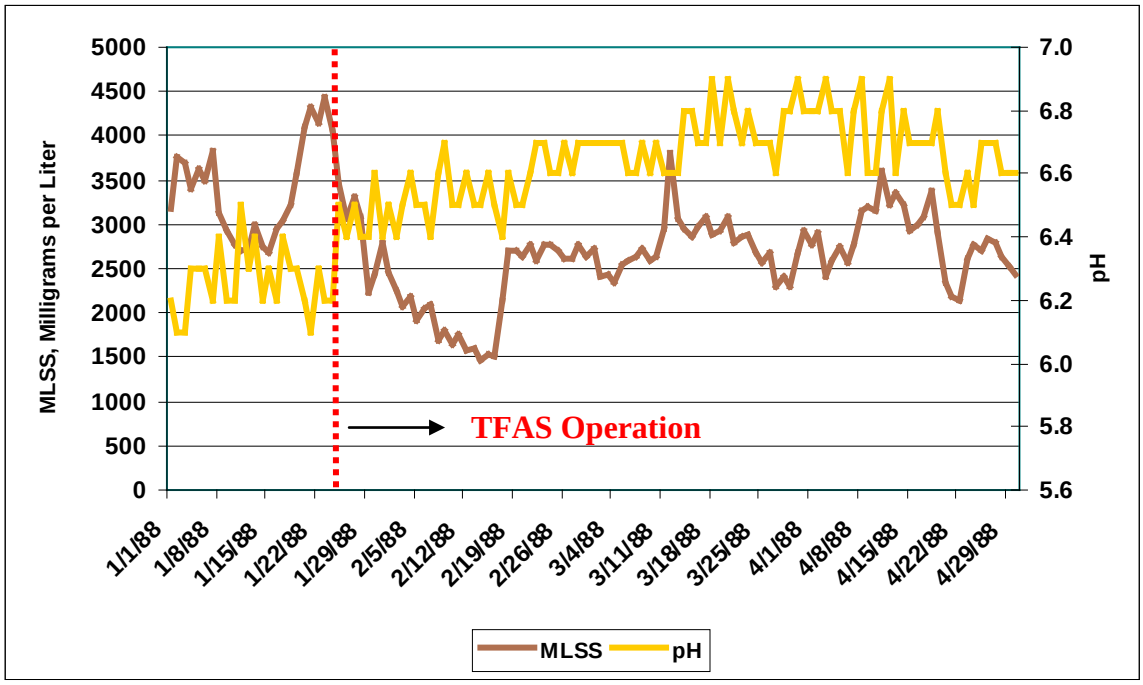


Figure 3. Nitrification Compared with MLSS Concentration and Dissolved Oxygen

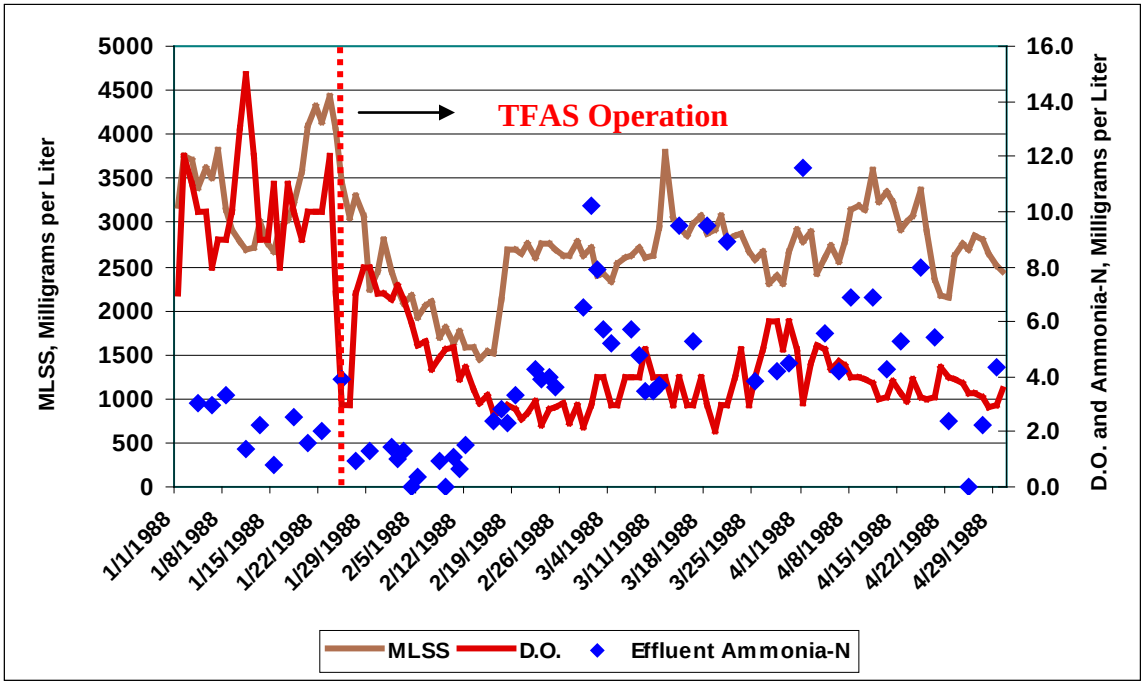
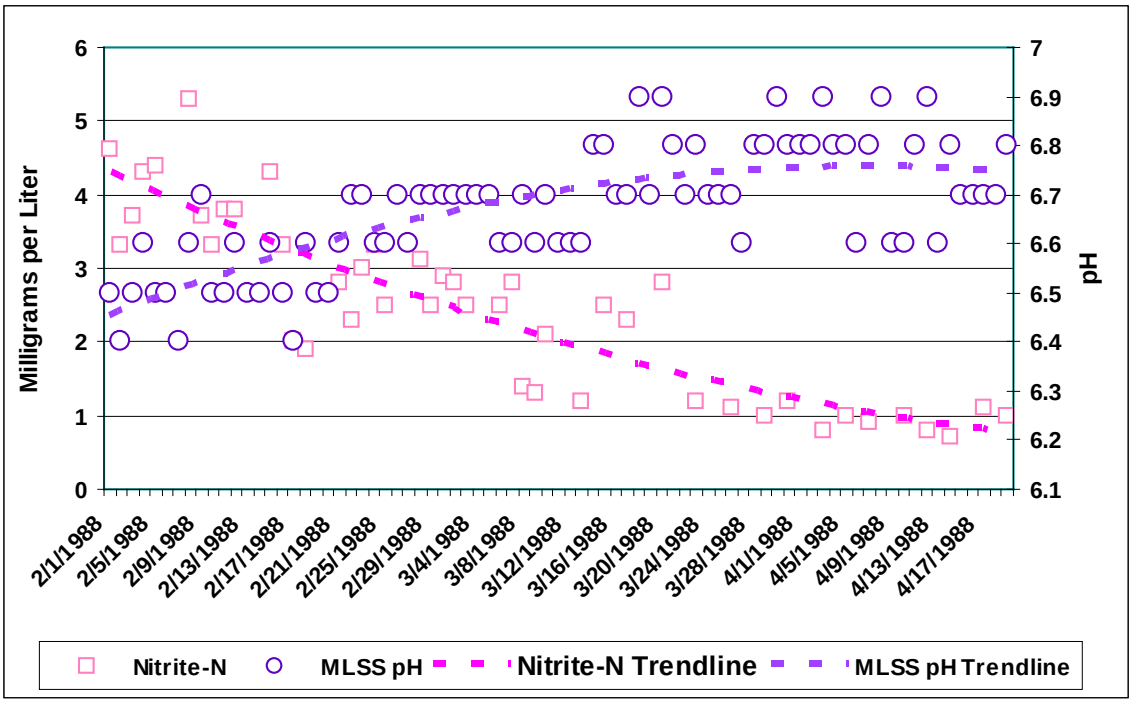


Figure 4. Secondary Effluent Nitrite-Nitrogen and pH Comparison



Clean Water Services, Oregon. During October 1990, Clean Water Services' (formerly Unified Sewerage Agency) Durham Facility experienced intermittent nitrite lock in one of its secondary treatment trains. The facility operated two parallel, but independent trains during this period. Figure 5 compares the secondary effluent ammonia-N for each train. Side 1 was carrying approximately 15% more biological mass than Side 2 during the first half of the month, which resulted in a higher, yet inconsistent level of nitrification. About mid-month, the mass on Side 2 began to increase, resulting in a higher level of nitrification on Side 2.

Figure 6 compares the secondary effluent nitrite-N for each train. It shows the nitrite-N on Side 1 fluctuated significantly during the month, whereas Side 2 was fairly stable, even when the level of nitrification on Side 2 increased to levels comparable to Side 1. This discrepancy between the two trains suggests that nitrite lock on Side 1 was caused by something internal to the secondary process.

Figure 7 compares the alkalinity of each train. The impact of low alkalinity on pH was suspected initially as the cause. However, toward the end of the month when nitrification on Side 2 achieved the same level of nitrification as Side 1, the alkalinity of both trains was comparable. Side 2 secondary effluent nitrite was stable (except the last day of the month) and Side 1 continued to fluctuate. As further indication that the cause was not likely due to pH, the MLSS pH on Side 1 ranged from 6.7 to 7.2 (only one data point was below 6.8), which should not

inhibit NOB sufficiently. This suggests the cause of the nitrite lock was not low pH, but was something specific to Side 1.

A monthly process summary memorandum (Unified Sewerage Agency, 1990) provided the most likely cause of this incidence of nitrite lock – low dissolved oxygen. The following is an excerpt from the memorandum.

> *The aeration basin dissolved oxygen problems gradually were fixed during the month. The system is now back to normal. ……Early in the month, microscopic examination revealed that Side 2 looked very healthy, but Side 1 was lousy. As the aeration system problems, which mainly affected Side 1, were fixed, Side 1 bugs gradually improved during the month.*

This case study illustrates that nitrite lock can be induced by process control variations internal to the treatment process. Nitrifying organisms are obligate aerobes and sufficient oxygen must be present for AOB and NOB.

Based on the secondary effluent pH during these events, and the pH at which nitrite lock occurred in the Salem, Oregon case study, a secondary effluent pH of 6.7 or lower might serve as an indicator of conditions conducive for nitrite lock.

Figure 5. Secondary Effluent Ammonia-Nitrogen

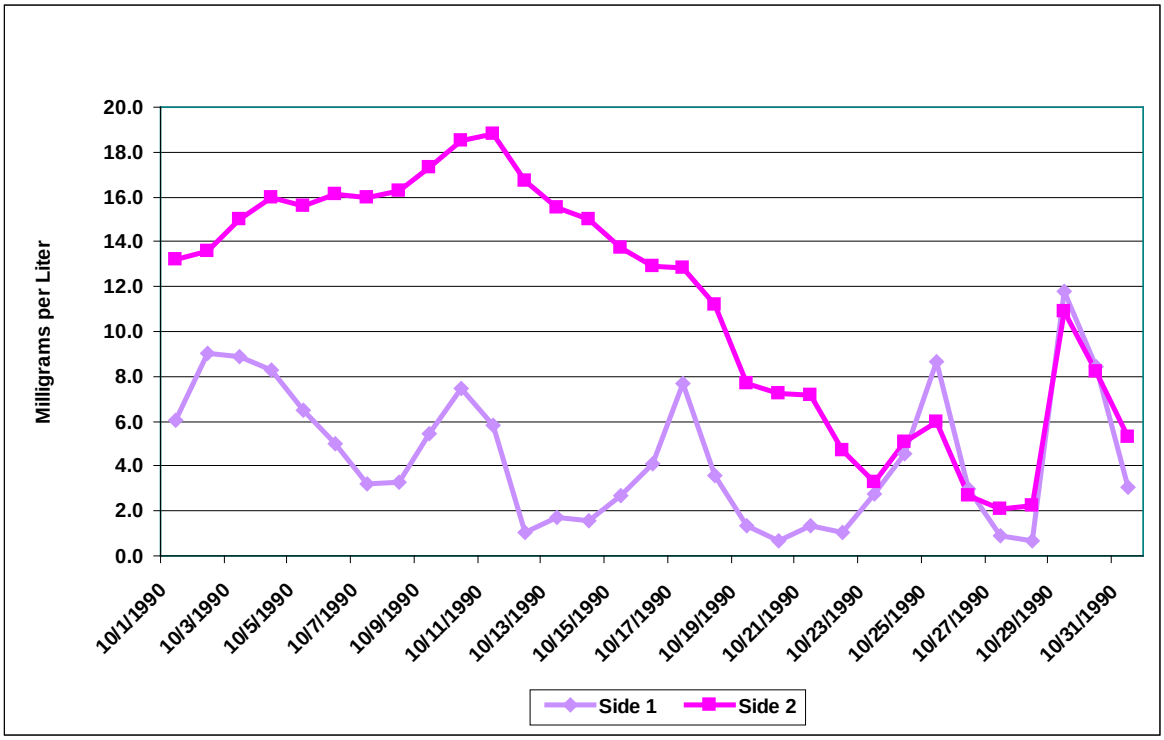


Figure 6. Secondary Effluent Nitrite-Nitrogen

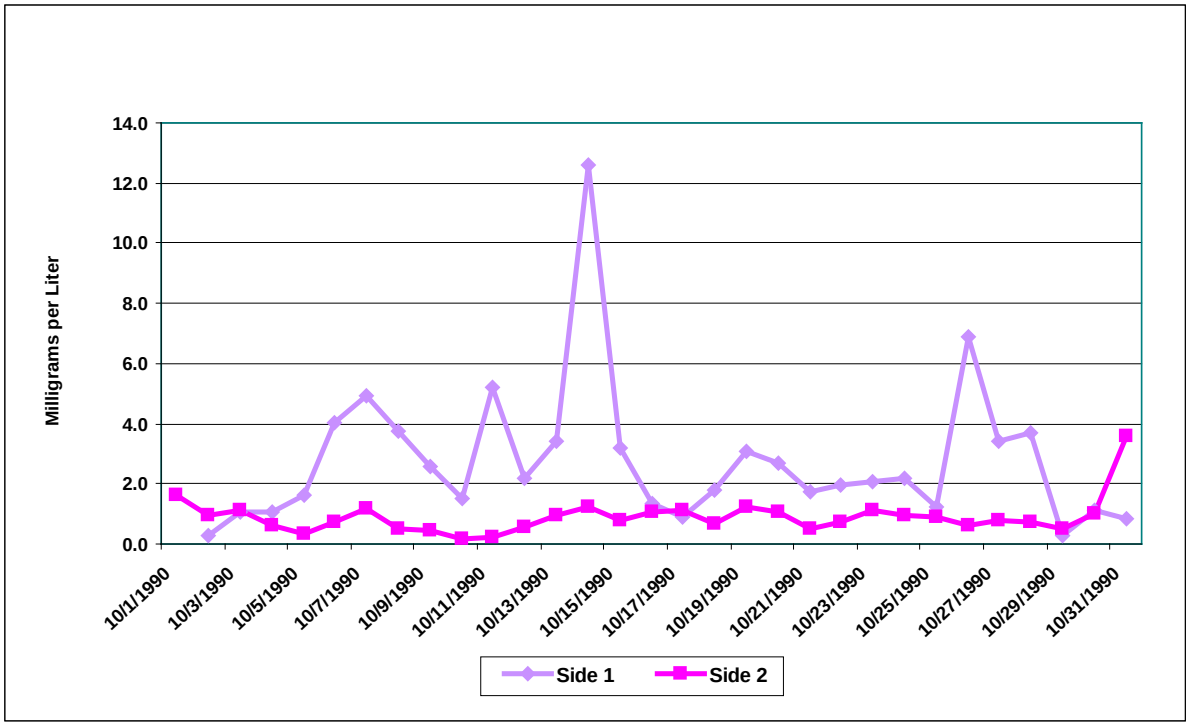
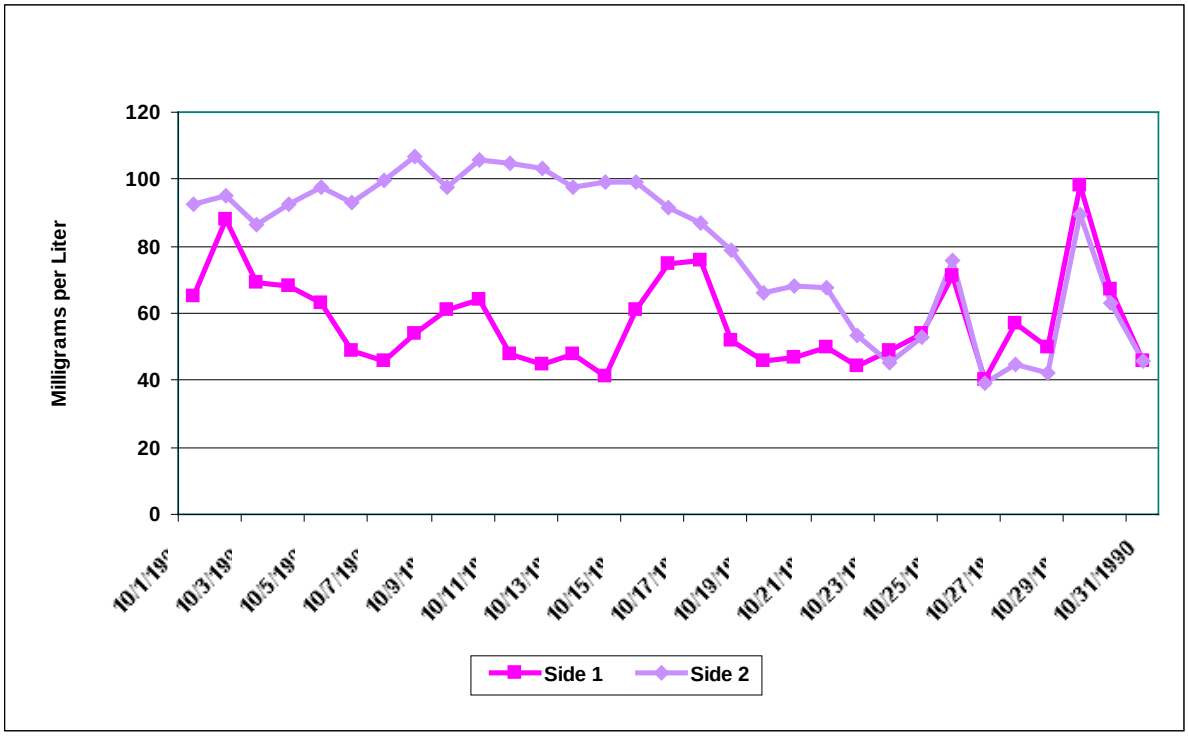


Figure 7. Secondary Effluent Alkalinity



City of Las Vegas, Nevada. (Brown and Caldwell, 1996). In December 1994, the City of Las Vegas Water Pollution Control Facility experienced nitrite lock during the start-up of a nitrification facility. Figure 8 compares influent ammonia-N with effluent ammonia-N and effluent nitrate+nitrite-N. As nitrification progressed during the month, the effluent ammonia-N concentration decreased, and the effluent nitrite+nitrate-N concentration increased. As nitrification progressed, however, disinfection effectiveness was lost. Beginning on December 14th, effluent fecal coliform concentrations began to increase significantly.

On December 16th, analytical tests confirmed the facility was in nitrite lock. Figure 9 compares pre-chlorination nitrite concentrations with post-chlorination chlorine residual. The chlorine was reacting with the nitrite.

Since chloramines do not react readily with nitrite, corrective action was taken to stop the reaction of chlorine with nitrite by mixing a non-nitrified effluent with the nitrified effluent containing nitrites. Figure 10 shows that a measurable chlorine residual was achieved quickly when the ammonia concentration exceeded the nitrite concentration. Though successful, mixing the two effluents together could not be sustained due to hydraulic constraints. By December 24th, a sufficient NOB population was established in the secondary process to oxidize the nitrite to nitrate and to achieve disinfection effectiveness.

This case study demonstrates three important aspects of nitrite lock: (1) nitrite lock can occur during the start-up of a nitrification process; (2) it is important to perform separate nitrite-N and nitrate-N testing to evaluate the occurrence of nitrite lock; and (3) chlorine demand associated with nitrite lock can be reduced significantly by forming chloramines.

Figure 8. Progression of Nitrification During Start-up

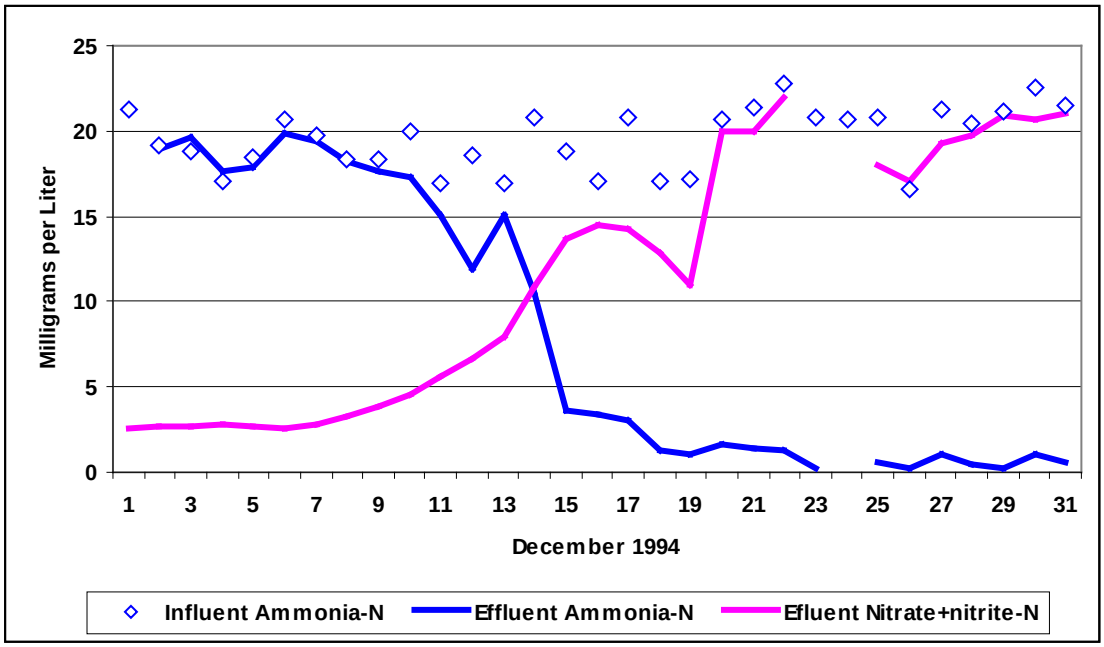


Figure 9. Impact of Nitrite on Chlorine Residual

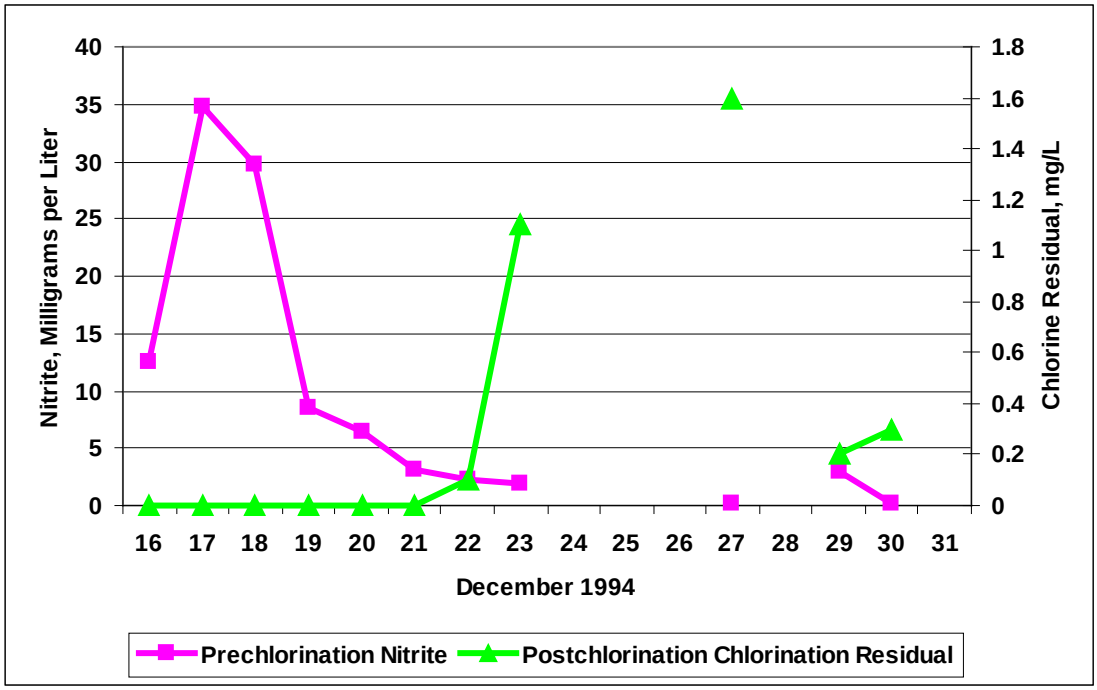
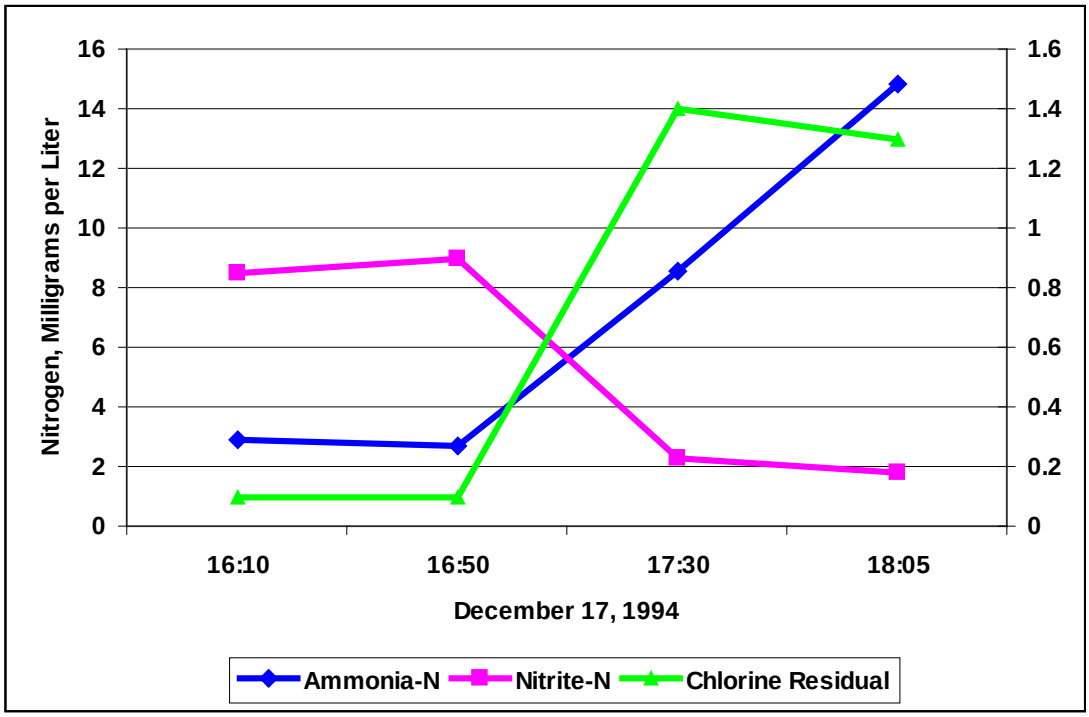


Figure 10. Effect of Increasing Ammonia Concentration to Regain Chlorine Residual



El Paso Public Utilities, Texas. In 1999, the Haskell R. Street Wastewater Treatment Plant began operating a new air activated sludge process with the capability of full nitrification. Nitrite lock was expected during start-up, and a start-up strategy was developed to minimize its impact. Part of this strategy was to slowly increase the MLSS for partial nitrification, as a means of ensuring the secondary effluent ammonia-N concentration always exceeded the secondary effluent nitrite-N concentration.

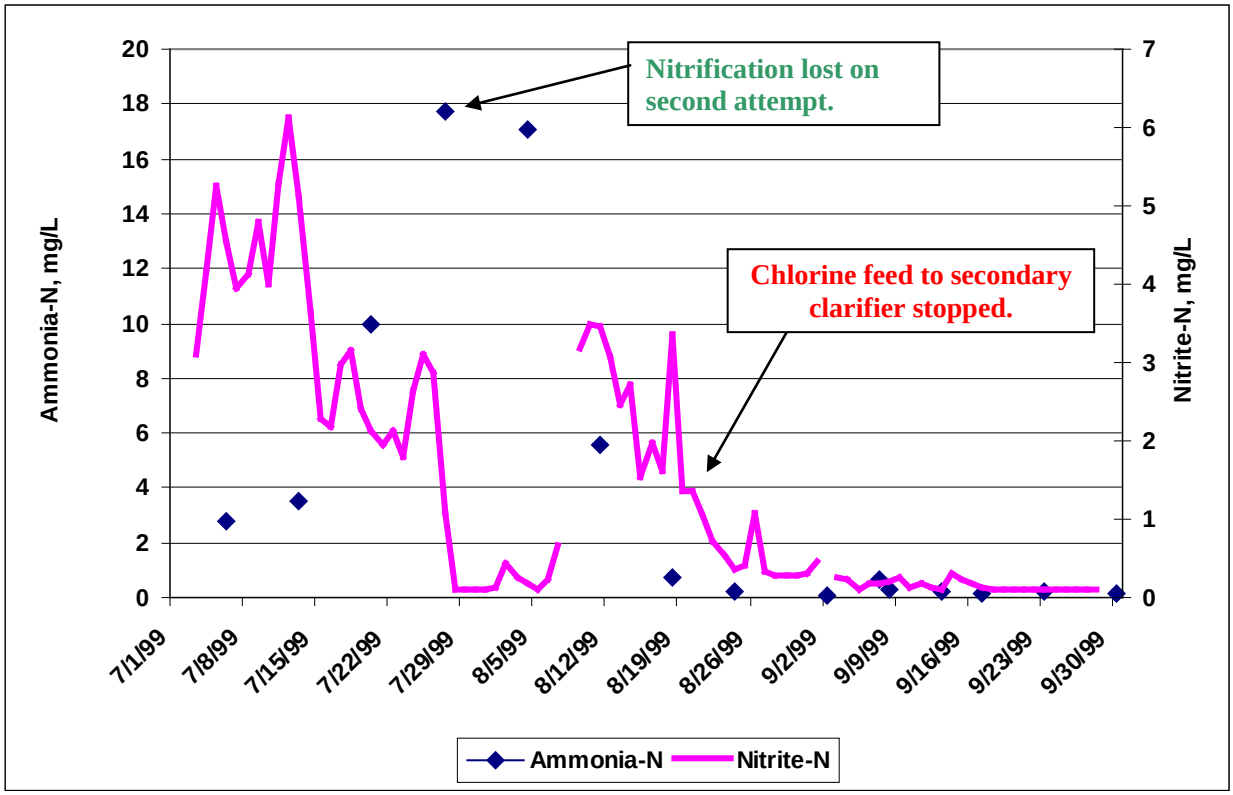
Despite this strategy, the first two attempts to achieve full nitrification were unsuccessful. On each attempt nitrite lock occurred. Toxic inhibition was suspected since the activated sludge process variables were within ranges to support nitrification. The third attempt to achieve nitrification was successful. Figure 11 shows the secondary effluent ammonia-N and nitrite-N concentrations during the last two nitrification start-up efforts.

Unlike most facilities, the Haskell R. Street WWTP's discharge permit required a *minimum* chlorine residual of 1.0 mg/L. Maintaining this residual resulted in higher chlorine usage than would be expected at a comparable treatment plant. Nitrite lock further increased the chlorine demand to a point that the chlorination system could not supply enough chlorine solution to the chlorine contact tank to meet demand and maintain the required residual. Supplemental calcium hypochlorite addition was only partially successful. In an attempt to meet the demand and the chlorine residual requirements, chlorine solution was introduced intermittently to one of the secondary clarifier weir chlorination rings during this period.

On August 20th, a green coloration was observed in the secondary clarifier where supplemental chlorine was being fed. The clarifier was profiled for chlorine residual measurements. Concentrations as high as 3.5 mg/L were measured. The chlorine solution to the secondary clarifier weir chlorination ring was immediately stopped. Within a week, full nitrification was achieved. The chlorine was suspected of inhibiting NOB in the sludge blanket (hence the return activated sludge) of the clarifier to which the supplemental chlorine was fed.

This case study illustrates how in-plant sources of toxicity can cause nitrite lock. The experience suggests that toxic concentrations of chlorine were being introduced into the return activated sludge, and inhibiting NOB.

Figure 11. Secondary Effluent Ammonia-N and Nitrite-N



Other Indicators

The green coloration associated with nitrite-chlorine reactions in the Haskell R. Street WWTP case study became useful less than two weeks later at a Hawaii wastewater treatment facility. Figure 12 shows two secondary clarifiers that operate in parallel. They are both fed mixed liquor from a single aeration basin. The green coloration of Clarifier 1 contrasts dramatically with the color of Clarifier 2. Despite the visual discrepancy, both clarifiers were producing excellent effluent quality with low turbidity.

The presence of nitrites was determined analytically in the MLSS, though the concentrations were not quantified. Both clarifiers have chlorination rings around the weirs, and these are the main point of chlorine addition for disinfection. The chlorine ring for Clarifier 1 is above the water surface (shown in Figure 12) and the chlorine is injected downward below the clarifier surface at multiple points from the ring. The chlorine ring for Clarifier 2 is located just below the water surface and the chlorine is injected laterally against the clarifier wall.

Discussions with plant staff indicated that the color of Clarifier 1 began shortly after scale build-up was removed from the nozzles of the chlorine ring of that clarifier. The scale removal from

the nozzles of this ring was suspected of allowing most, if not all of the chlorine feed to be directed to Clarifier 1. It was suspected that the chlorine was inhibiting NOB in the sludge blanket of Clarifier 1, in a manner similar to the experience at the Haskell R. Street WWTP.

When the chlorine was shifted from the clarifier chlorine rings to an effluent junction box, the green coloration appeared immediately at the junction box and disappeared from Clarifier 1 within 24 hours. Within a week, full nitrification was achieved.

Figure 12. Coloration associated chlorine-nitrite reactions

Clarifier 1

Clarifier 2

Conclusions

Nitrite lock can occur during start-up of nitrification facilities, and under environmental conditions that are inhibitory to NOB. These inhibitory environmental conditions can include low dissolved oxygen, extreme pH, high temperature, and presence of toxic compounds. Though some environmental conditions are beyond an operator's control, ensuring adequate pH, MLSS concentration, and dissolved oxygen are manageable process control variables. Preventing the impact of internal toxic compounds, such as chlorine, is also manageable by the operator.

Troubleshooting nitrite lock requires analytical data that measures the performance of the secondary treatment process. In particular, secondary effluent data are needed for nitrite-N, ammonia-N, alkalinity, and pH.

Chlorine-nitrite reactions can be minimized by chloramine formation. This can be accomplished by ensuring the secondary effluent ammonia-N nitrogen concentration is maintained above the nitrite-N concentration either through process control measures or supplemental ammonia-N addition.

Acknowledgements

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7B: Cross Connection Control Program

CITY of YELM

Cross Connection Control Program

SKILLINGS CONNOLLY

October, 2001

CITY OF YELM

CROSS CONNECTION CONTROL PROGRAM

OCTOBER, 2001

Revised October, 2010

To reduce the risk of contamination of the City's water system, the City of Yelm has developed the following Cross Connection Control Program. The intent of the program is to reduce and eliminate the potential for contaminants to enter the water system via customer service connections. This is accomplished through the installation of backflow prevention devices at service connections that have the potential to introduce contaminants to the water system. Backflow prevention devices, if installed properly, prevent water and contaminants from leaving the water customer's premises and flowing back into the water system.

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Cross Connection Control Program
Section 1: Background

WHY CROSS CONNECTION CONTROL?

The City of Yelm is dedicated to providing the best quality of water possible to its consumers. For years the City has been able to supply their customers with safe, high quality water. To ensure the longevity of this longstanding tradition, the City has implemented a Cross Connection Control Program.

As defined by the American Water Works Association, a cross connection is any actual or potential connection between a potable water line and any pipe, vessel, or machine containing a non-potable fluid or has the possibility of containing a non-potable fluid, such that it is possible for the non-potable fluid to enter the water system by backflow. A cross connection could be any physical arrangement whereby a potable water supply is connected, directly or indirectly, with any non-potable or unapproved water supply system, sewer, drain, conduit, pool, storage reservoir, plumbing fixture, or any other device which contains or may contain, contaminated water, liquid gases, sewage, or other waste of unknown or unsafe quality which may be capable of imparting contamination to the potable water supply as a result of back flow.

The purpose of the City's cross connection control plan is to reduce the risk of contamination of the water system through cross connections. The Washington Administrative Code (WAC) requires that the City take measures to ensure that contamination does not occur as a result of a cross contamination. The City is happy to do this in order to protect the health of its customers and the longstanding quality of the City's water, but it can only be done thoroughly and effectively through the cooperation of water system customers.

How do Backflow Incidents Occur?

Pressure is the driving force behind any water system. Typically the a system has a stable water pressure that provides reliable water service to customers, however local reductions of pressure can cause contaminants to be siphoned back into the water system, much like sucking a beverage through a drinking straw. These local reductions in pressure can be caused by a break in the water system or the emergency water demands of a fire hydrant. A simple example of this principle could be as simple as a washtub being filled by placing the hose in the tub. If the filling hose is left submerged in the tub and a fire hydrant is opened to combat a fire next door, than fluids within the tub could be sucked into the City's water system.

Backflow of contaminants can also occur as a result of the City's water system pressure being less than the pressure of a connected contaminant source. A simple example of this backflow occurrence could be a home that is service by both a private well and City water. If the well pump is providing 100 psi of pressure to the house and the City is supplying 50 psi of pressure then it is possible that a cross connection would allow water to be pumped from the unknown well into the water system and result in a contamination.

How are Backflow Incidents Prevented?

The prevention of backflow incidents is accomplished in two ways. Air gaps prevent backflow incidents from occurring as a result of siphoning. In the above example providing an air gap could be as simple as filling the wash tub without submerging the hose in the fill water. In addition to providing an air gap, contamination resulting from either siphonage or excessive customer pressure can be controlled through the installation of backflow prevention devices. These devices use a series of valves to close off the connection to the City's water system if pressures at the customer's end become greater than the pressures of the City's system or if siphoning conditions exist.

Why Would I be Asked to Install Backflow Prevention Device?

Several circumstances may require that your premises be isolated from the rest of the system via a backflow prevention device. These can include but are not limited to:

- Being connected to both a private well and City water.
- Having a reuse water service connection to your premises.
- If you premises contains or uses materials considered to be hazardous.

If your premises have cross connection potential, not installing a backflow prevention device can result in a serious health risk to all of the water systems customers.

The City of Yelm is committed to the safety of its customers and to providing water of the highest quality. Backflow prevention is a critical task to ensure the quality of the City's water system and the safety of all its customers. The City of Yelm and its customers would like to thank you for your cooperation and support in implementing our Cross Connection Control Program. Only through the continued cooperation and diligence of the customers can the City continue to provide water of the highest quality, so that we all can continue to enjoy safe and healthy drinking water.

Cross Connection Control Program
Section 2: Program Background

CITYOFYELM
CROSS CONNECTION CONTROL PROGRAM
Summary of Program Decisions

TYPE OF PROGRAM

The City of Yelm's cross connection control program will consist only of premises isolation.

EXTENT OF COORDINATION WITH LOCAL ADMINISTRATIVE AUTHORITY

An informal working relationship with the local administrative authority will be established to promote thorough communication and strive to meet the intentions of the program.

ENFORCEMENT OF CORRECTIVE ACTION

In the event of noncompliance with the cross connection control program, the city will rely on service shut-off as a corrective measure.

RELATIONSHIP WITH CUSTOMER

Service agreements with customers will include compliance with the Cross-Connection Control Ordinance and Program.

LOCATION AND OWNERSHIP OF PREMISIS ISOLATION ASSEMBLY

Immediately downstream of meter on customers property

CROSS CONNECTION SPECIALIST AND PROGRAM MANAGEMENT

The water superintendent and/or a certified cross connection specialist employed at the City will manage the CCC program.

HAZZARD ASSESSMENTS

Water department employees will perform assessments and re-assessments of hazards.

COST RECOVERY

CCC program management cost will be included in the water department budget and thus all customers will bear the costs of program implementation.

Cross Connection Control Program
Section 3: Cross Connection Control Program

CITY OF YELM
CROSS CONNECTION CONTROL PROGRAM

Authority

In accordance with Washington Administrative Code (WAC) 246.290.490, water system purveyors must protect public water systems from cross connection contamination. Cross connection contamination's can occur if pressure from a customers connection exceed the pressures within the public water system or if water used by the customer is return to the public water system in any manner. Cross connections with a public system can possibly introduce contaminants to the system and result in a serious public health risk. The City of Yelm has implemented this Cross Connection Control Program in order to protect the City's water system and public health. The City of Yelm's Cross-Connection Control Program is authorized by the Yelm Municipal Code Chapter 13.04.220 (A copy of Chapter 13.04.220 is included in the Appendix.). The City of Yelm herein referred to as the purveyor and is responsible for preventing occurrence of cross connections within the system facilities under its control, this includes water system facilities up to the customer's service meter. The Purveyor does not accept responsibility for cross connection prevention beyond the limits of the customer service meter. This area is the jurisdiction of the local administrative authority (LAA) and responsibilities of cross connection control are those of the customer and/or the LAA. Yelm Municipal Code Chapter 15.16 adopts the uniform Plumbing Code for construction within the City and thus the UPC cross connection control measures therein. Rule, regulations and practices as set forth in the following publications have been adopted by the City to address water system cross connections:

State Board of Health's "Cross Connection Control Regulations in Washington State"

American Water Works Association, Pacific Northwest Section's current edition of "Cross Connection Control Manual, Accepted Procedures and Practices"

WAC 246.290.490

The above mentioned AWWA Cross Connection Control Manual is a valuable resource for definitions of terms pertaining to cross connection control and types of backflow prevention devices available.

Program Basis
The city of Yelm will rely on premises isolation to control cross connections with the water system. The program will strive to minimize contamination risks from table 9 high hazard customers and selected customers with irrigation and commercial applications.

Responsibility
The Water Department's Cross-Connection Control Specialist is responsible for the enforcement of the Yelm Municipal Code, Section 13.04.220, including:

- Review and determination of any potential cross-connections.
- Surveillance and inspection of all cross-connection control devices in service.
- Maintenance of cross-connection control device records, including a record of each device in service and yearly testing records.
- Discontinuing service to any premises impacted by cross-connection until it is eliminated or controlled.

The Cross-Connection Control Specialist will also be responsible for coordination with the local administrative authority. This should be an informal working relationship and may include but will not be limited to notification of changes to the CCC program and enforcement actions of the program. Requesting notification when plumbing permits and enforcement actions occur within the water system service area. Sharing of assembly test data and joint surveys of assemblies by the LAA and water superintendent.

Testing of cross connection control devices *is not* the responsibility of the purveyor. The customer will be responsible for obtaining and maintaining the cross connection control device and will retain ownership of said device. Scheduled testing of cross connection control devices will be the responsibility of the water system customer.

Customer Relationship and Corrective Action
The purveyor shall require customer compliance with the cross connection control program as a condition of providing service to the customer. Upon accepting service from the purveyor, the customer agrees to comply with the cross connection control program and acknowledges that water service may be shut-off in the occurrence of an emergency situation, serious public health risk and noncompliance with the cross connection control program. If a backflow incident should occur, the Department of Health and the Local Administrative Authority are to be notified. If corrective action must be taken as a result of non compliance than the Local Administrative Authority shall be notified as part of the working relationship between the purveyor and the LAA.

Program Management

Kevin Ray is the City's Cross Connection Control Specialist. Mr. Ray will manage the City's cross connection control program on a daily basis. Mr. Ray and staff will perform the functions of the cross connection control program including the review of BAT reports, surveys, inspection, notification, record keeping, etc.

City Staff Cross Connection Control Specialist Contact Information:

Kevin Ray
901 Rhoton Rd
PO Box 479
Yelm, W A 98597
Phone number: (360) 458-8406
CCS Cert. No.:

Procedures

Classification and Procedures for Existing Cross-Connection Control Devices

The Water Department will conduct regular hazard surveys throughout the city and identify existing and potential cross-connections.

If the cross-connection identified cannot be eliminated, installation of a backflow prevention device is required. Depending on the type of hazard identified one of the following two measures will be taken by the City.

Inspection Procedure

1. **Acceptable Atmospheric (Non-Pressure) Type Vacuum Breaker**

   The device must be on the current Washington State DOH approved listing. (See Appendix) If a device is on the list and installed properly, a City of Yelm Water Department Inspection Report will be completed and filed in the Water Department's records under the service address. A letter confirming compliance with the City's Municipal Code will be sent to the customer. No further action will be required.

2. **Backflow Prevention Assemblies Approved for Installation in Washington State. (See Appendix)**

   If the backflow device is on the list and installed properly, a City of Yelm Water Department Cross-Connection Inspection Report will be completed and filed in the Water Department's records under the service address. These backflow prevention devices must be tested annually by a certified Washington State Inspector. This information will be explained to the customer. A letter will be mailed to the customer requesting an inspection of his backflow prevention device. Attached to the letter will be a City of Yelm Backflow Assembly Test, Maintenance and Inspection report form along with a list of Washington State Certified Testers available for testing on a commercial basis. Failure to respond to this letter with a completed Test/Inspection report will result in a second and third letter being sent with the same attachments. Failure to comply after within thirty days after the third letter could result in discontinuance of water service by the City.

Once the customer has complied and the City has received the completed Backflow Assembly Test, Maintenance and Inspection report, a letter will be issued to the customer thanking him for compliance and advising him that he will receive a letter along with an Inspection report to be completed annually. The Inspection report will be filed and a letter with attachments will be mailed out each year on the anniversary date of the first inspection.

All backflow prevention devices to be installed must be inspected and approved by the City Water Department.

All backflow prevention devices must be tested annually by an independent testing laboratory certified by the Department of Health. A list of DOH certified BATs is included in the appendices. Test results are to be submitted to the Superintendent and recorded with the Water Department.

Installation, inspection, and testing of all backflow prevention devices are conducted according to the current edition of *The Accepted Procedure and Practice in Cross-Connection Control Manual,* Pacific Northwest Section of A WW A.

Classification and Procedures for Cross-Connection Control Devices that need to be installed

If a need for cross connection control is discovered during one of the hazard surveys, the City will take one of the following measures depending on the type of hazard discovered.

1. **Acceptable Atmospheric (Non-Pressure) Type Vacuum Breaker**

   The device must be on the current Washington State DOH approved listing of Backflow Prevention Assemblies. (See Appendix). These devices must be installed according to the *PNWSI* A WW A Manual, Section II. (A copy of which will be provided to the customer on request.) Once the device is installed properly and visually inspected, a City of Yelm Water Department Inspection Report will be completed and filed in the Water Department's records under the service address. A letter confirming compliance with the City's Municipal Code will be sent to the customer. No further action will be required.

2. **Backflow Prevention Assemblies Approved for Installation in Washington State. (See Appendix)**

   These devices must be installed according to the PNWS/ AWWA Manual, Section II, (A copy of which will be provided to the customer on request.) Once the device is installed properly and visually inspected, a City of Yelm Water Department Inspection Report will be completed and filed in the Water Department's records under the service address. These backflow prevention devices must be tested annually by a certified Washington State Inspector. This information will be explained to the customer. A letter will be mailed to the customer requesting an inspection of his backflow prevention device. Attached to the letter will be a City of Yelm Backflow Assembly Test, Maintenance and Inspection report form along with a list of Washington State Certified Testers available for testing on a commercial basis. Failure to respond to this letter with a completed Test/Inspection report will result in a second and third letter being sent with the same attachments. Failure to comply after within thirty days after the receipt of the third letter could result in discontinuance of water service by the City.

   Once the customer has complied and the City has received the completed Backflow Assembly Test, Maintenance and Inspection report, a letter will be issued to the customer thanking him for compliance and advising him that he will receive a letter along with an Inspection report to be completed annually. The Inspection report will be filed and a letter with attachments will be mailed out each year on the anniversary date of the first inspection.

All backflow prevention devices to be installed must be inspected and approved by the City Water Department.

All backflow prevention devices must be tested annually by an independent testing laboratory certified by the Department of Health. A list of DOH certified BATs is included in the appendices. Test results are to be submitted to the Superintendent and recorded with the Water Department.

Installation, inspection, and testing of all backflow prevention devices are conducted according to the current edition of *The Accepted Procedure and Practice in Cross-Connection Control Manual,* Pacific Northwest Section of AWWA.

Cross-Connection Control for New Connections

As part of the approval process for new building permits or other land use permits, the staff Cross Connection Specialist will evaluate the associated hazard if any and the need for cross connection control. If cross connection control is deemed necessary, the measure for cross connection control devices that need to be installed, as stated above, will be followed.

Public Education

The City may implement a public education program that consists of pamphlet inserts to be included with the monthly billing statements. The information contained in these pamphlets may serve to educate consumers regarding cross connection risks from irrigation and fire systems and the health hazards that can be associated with everyday uses of hose connections, utility sinks etc. The annual consumer confidence report may be utilized to educate the public on cross connection principles, associated health concerns and program efforts of the City. Exhibits for public display at community events may also be an effective way for the City to further the cross connection education of customers.

Backflow Incidence Response

If a backflow incident is thought to have occurred, the contaminating cross connection shall be eliminated immediately and the City shall be notified at once. The contamination source shall be isolated from the rest of the system and the department of health should be notified. Local testing will take place to determine the extent of contamination. Once further contamination has been curbed, flushing and disinfection of the affected system will proceed as necessary. Both the general public and department of health will be notified of the incident as soon as possible.

Cross Connection Control Program
Section 4: Program Documentation

CITY OF YELM WASHINGTON

CROSS CONNECTION INSPECTION REPORT

CUSTOMER NAME: _____

ADDRESS: _____ ZIP: _____

PHONE: _____ DATE _____

ADDRESS OF DEVICE: _____

LETTER TO:

OWNER'S NAME: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

INSPECTION NOTES:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

INSPECTION PERFORMED BY: _____

DATE: _____

Dear Customer:

We recently made a cross-connection inspection at your premises. We found areas that are in violation of the state cross-connection control regulations. Washington State Law (WAC 246.290.490) states that if potential (indirect) or actual (direct) cross-connections exist, the water system must be protected with a state approved backflow prevention assembly.

The following problems should be corrected within the next _____ days.

Immediately after successful installation of the State approved backflow prevention device, it must be tested by a Washington certified backflow tester. This test is required on a yearly basis. The test report for is to be returned to: City of Yelm, Attention: Kevin Ray, P.O. Box 479, Yelm WA, 98597.

If you have any questions please feel free to call me at (360) 458-8406.

Very truly yours,

Kevin Ray
Cross Connection Control Specialist
City of Yelm Water Department

KR/mow

Dear Customer:

Washington State Law (WAC 246.290.490) states that any time an auxiliary water supply is hooked directly or indirectly to the City's potable water system, it is considered to be a cross-connection.

Your well needs to be properly abandoned per Washington State Law (WAC 173.160), or an approved reduced pressure principle backflow assembly needs to be installed near the water meter per City and State requirements.

The meter at the above address will be removed unless you comply with these requirements. A cross-connection inspection is required before the meter can be reset.

If you have any questions please feel free to call me at (360) 458-8406.

Very truly yours,

Kevin Ray
Cross Connection Control Specialist
City of Yelm Water Department

KR/mow

Dear Customer:

The backflow prevention assembly(s) and installation(s) at the above address are hereby approved at this time. We want to thank you for your kind and expedient cooperation in complying with the State backflow Prevention Regulations. The City is required by law to monitor and enforce these regulations, which include indirect (possible) and direct (actual) cross connections with the public potable drinking water supply.

If you have any questions or feel that there is a situation that could be a cross connection hazard, please feel free to call me at (360) 458-8406.

Very truly yours,

Kevin Ray
Cross Connection Control Specialist
City of Yelm Water Department

KR/mow

Dear Customer:

The backflow prevention assembly(s) and installation(s) at the above address are hereby approved at this time. We want to thank you for your kind and expedient cooperation in complying with the State backflow Prevention Regulations. The City is required by law to monitor and enforce these regulations, which include indirect (possible) and direct (actual) cross connections with the public potable drinking water supply.

You will be sent a notice to have your backflow assembly(s) tested in approximately 12 months. The person performing the backflow test(s) must be certified in the State of Washington to perform these tests. Included in the reminder will be a list of certified backflow testers and test report form(s) which must be filled out and returned to: City of Yelm, Attention Kevin Ray, P.O. Box 479, Yelm, WA 98597.

Your cooperation in this matter has brought you into compliance with the Cross-Connection Control Requirements of the State of Washington.

If you have any questions, please to call me at (360) 458-8406.

Very truly yours,

Kevin Ray
Cross Connection Control Specialist
City of Yelm Water Department

KR/mow

Thurston County Certified Backflow Assemby Testers

BAT #	Name	Contact Number
B2748	Champion, William	(360) 956 - 9234
B5051	Choate, Jason	(360) 480 - 0447
B1807	Coke, Steve	(360) 701 - 9963
B3454	Daniels, Curtis	(360) 432 - 3788
B5146	Edwards, John	(360) 451 - 0593
B5048	Fagergren, Jon	(360) 333 - 3761
B4523	Galang, Chris	(360) 480 - 8908
B5406	Gruver, David	(360) 556 - 0027
B2869	Kimball, Scott	(360) 736 - 2683
B4475	Mayfield, William	(360) 951 - 6130
B3253	McNamara, Dan	(360) 561 - 3045
B4526	Osorio, Jose	(360) 456 - 6669
B2354	Ottoboni, Robert	(360) 459 - 0197
B2203	Sheridan, Edward	(360) 427 - 1025
B4736	Smith, Sr., Richard	(360) 866 - 1872
B5082	Smithson, Ralph	(360) 786 - 8606
B4759	Tayne, Tim	(253) 212 - 5433
B4929	Turner, Jr., LeRoy	(360) 249 - 0515
B5151	Vessey, Mike	(360) 264 - 7009
B4643	Woollett, Danny	(360) 491 - 2510

Dear Customer:

Please find enclosed a backflow assembly test report form(s) for_____ backflow assembly device(s) located on your water service line(s). Also enclosed is a list of Washington Certified testers in your area. The assembly(s) must be tested by a Washington certified tester and the report form(s) filled out and returned to: City of Yelm, Attention: Kevin Ray, P.O. Box 479, Yelm, WA 98597, by _____

Washington State Law, WAC 246.290.490, requires the above testing

Thank you for your cooperation in this matter. If there are any questions, please feel free to call me at (360) 458-8406.

Very Truly Yours,

Kevin Ray
Cross Connection Control Specialist
City of Yelm Water Department

KR/mow

Enclosure

Dear Customer:

We sent you a letter in, _____ requiring you to test your backflow prevention assembly(s).

Washington State Law (WAC 246.290.490) requires that backflow assemblies shall be tested yearly (every 12 months) by a certified tester. Therefore, we are requesting that you have your backflow assembly(s) tested by a certified tester (see enclosure) and reports mailed to City of Yelm, Attention: Kevin Ray, P.O. Box 479, Yelm, WA 98597.

This must be completed within 15 working days from the date of this letter, otherwise we have no other alternative but to start proceedings to terminate your water service.

Washington State Law, WAC 246.290.490, requires the above testing

Thank you for your cooperation in this matter. If there are any questions, please feel free to call me at (360) 458-8406.

Very Truly Yours,

Kevin Ray
Cross Connection Control Specialist
City of Yelm Water Department

KR/mow

Enclosure

Final Notice

Dear Customer:

In _____ and _____ you were sent a letter advising you to test your backflow prevention assembly(s).

You are in violation of Washington State Law (WAC 246.290.490). The backflow assemblies must be tested by a certified tester. Therefore, we are requesting that you have your backflow assembly(s) tested by a certified tester (see enclosure) and copies of test reports mailed to City of Yelm, Attention: Kevin Ray, P.O. Box 479, Yelm, WA 98597.

If this matter is not resolved within ten (10) working days from the date of this letter, the City will be forced to terminate your water service.

Thank you for your cooperation in this matter. If there are any questions, please feel free to call me at (360) 458-8406.

Very Truly Yours,

Kevin Ray
Cross Connection Control Specialist
City of Yelm Water Department

KR/mow

Enclosure

City of Yelm, Washington

Backflow Assembly Test Maintenance, and Inspection Report

CUSTOMER NAME: _____

ADDRESS: _____ ZIP: _____

PHONE: _____ DATE INSTALLED_____

( )R.P.B.A. ( ) D.C.V.A. ( ) P.V.B.A. ( ) A.G.

MAKE OF ASSEMBLY: _____ MODEL NO.: _____

SERIEL NO.: _____SIZE: _____LINE PRESSURE: _____PSI

PRESSURE DROP ACROSS CHECK VALVE #1 _____PSI

TEST	CHECK VALVE #1	CHECK VALVE #2	*RELIEF VALVE/ POPPET
BEFORE REPAIRS	LEAKED ( ) CLOSED TIGHT ( )	LEAKED ( ) CLOSED TIGHT ( )	OPENED AT: _____PSI
PARTS REPAIRS REMARKS			
TEST AFTER REPAIRS	CLOSED TIGHT ( )	CLOSED TIGHT ( )	OPENED AT: _____PSI

*REQUIRED ONLY ON THE R.B.P.A. AND THE P.V.B.A.

TESTED BY: _____ DATE: _____

REPAIRED BY: _____DATE: _____

FINAL TEST BY: _____ DATE: _____

WASH. STATE B.A.T. CERT. NO. _____

I CERTIFY THE ABOVE TEST WAS PERFORMED: _____

DATE: _____

Cross Connection Control Program
Section 5: City of Yelm Ordinance

13.04.220 Cross-connection and backflow control program.

The purpose of this section is to protect the health of the user and the potability of the water in the water system, by requiring the inspection and regulation of all actual or potential cross-connections between potable and nonpotable water systems in order to minimize the danger of contamination or pollution of the public water supply. Controlling and preventing cross-connection is accomplished by either installing an approved backflow prevention assembly or removing the cross-connection.

A. Authority.

1. The Federal Safe Drinking Water Act of 1974 and the statutes of the State of Washington RCW Title 43 and Chapter 248-54 WAC require purveyors to "protect public water systems from contamination due to cross-connections."

2. This section prohibits the presence of cross-connections.

3. The city of Yelm's water comprehensive plan includes cross-connection requirements.

B. Definition of Responsibilities. The city shall require the installation of backflow prevention devices on any premises being served by the water system when in the judgment of the public works director or designated cross-connection control specialist the nature and extent of activities on the premises would present an immediate and/or dangerous hazard to health should a cross-connection occur.

C. Definitions. The following terms are defined for purposes of this chapter:

1. "Air gap separation" means the physical vertical separation between the free flowing discharge end of a potable water supply pipe line and the open or nonpressure receiving vessel. The air gap is to be twice the diameter of the supply piping measured vertically from the overflow rim of the receiving vessel.

2. "Approved backflow prevention assembly" means an assembly which has been approved by the state of Washington and the city of Yelm for preventing backflow.

3. "Atmospheric vacuum breaker" (also known as an "anti-siphon valve") means a device consisting of a single check valve in the supply line that opens to the atmosphere when the pressure in the line drops to atmospheric.

4. "Auxiliary water supply" means any supply of water used to augment the supply obtained through the purveyor's water system which serves the premises in question.

5. "Backflow" means the flow of water or other fluids in the direction opposite to the normal flow.

6. "Backflow prevention assembly tester" means an individual who is certified by the state of Washington and approved by the city of Yelm to test backflow prevention assemblies.

7. "Check valve" means a valve that permits flow in only one direction.

8. "Contaminant" mean any physical, chemical, biological, or radiological substance or matter in water which may render the water nonpotable, according to Washington State regulations.

9. "Cross-connection" means any link or channel between piping which carries potable drinking water and the piping fixtures which carry nonpotable water or other substances.

10. "Cross-connection control program" means a program included in the overall water comprehensive plan which fulfills the requirements of the state of Washington cross-connection regulations and is approved by the city of Yelm.

11. "Cross-connection specialist" means an individual certified by the state of Washington and approved by the city of Yelm to inspect for cross-connections.

12. "Customer system" means all plumbing, piping, and appurtenances on the customer's side of the point of metering or connection.

13. "Public works director" means the public works director, or his/her designated representative.

14. "Double check valve assembly" means an assembly of two independently acting check valves with a shut-off valve on each side of the two check valves. The assembly also has test ports for checking the water tightness of each check valve. Backflow prevention assemblies must be approved for installation in Washington State.

15. "Double detector check valve assembly" means the same as a double check valve assembly with the addition of a water meter and an additional double check valve assembly bypassing the main line assembly for the purpose of measuring low or proportional flow. Backflow prevention assemblies must be approved for installation in Washington State.

16. "Facility survey" means an on-site review of the water source, facilities, equipment, operation, and maintenance for the purpose of evaluating the hazards to the drinking water supply.

17. "Owner" means any person who has legal title to or license to operate or occupy a property upon which a cross-connection inspection will be made or upon which a cross-connection is present.

18. "Pressure vacuum breaker assembly" means a mechanical assembly consisting of one spring loaded check valve in the supply line and a spring loaded air inlet on the downstream side of the check valve which will open to

atmosphere when the pressure in the assembly drops below one pound per square inch. The complete assembly consists of two shut-off valves and two test ports for checking water tightness of the check valve. Backflow prevention assemblies must be approved for installation in Washington State.

19. "Reduced pressure backflow prevention assembly (RP)" means an assembly for preventing backflow incorporating two check valves, a differential relief valve located between the two check valves, two shut-off valves, one on each end of the assembly, test ports for checking water tightness of the check valves and the operation of the relief valve. Backflow prevention assemblies must be approved for installation in Washington State.

20. "Reduced pressure detector assembly (RPD)" means the same as RP assembly with the addition of a water meter and an additional RP assembly bypassing the main line assembly for the purpose of measuring low or proportional flow. Backflow prevention assemblies must be approved for installation in Washington State.

21. "Safe drinking water (potable water)" means water which has sufficiently low concentrations of microbiological, inorganic chemical, organic chemical, radiological or physical substances so that individuals drinking water at normal levels of consumption will not be exposed to disease organisms or other substances which may produce harmful physical effects.

22. "Secondary contaminant" means a contaminant which at levels generally found in drinking water does not present unreasonable risks to health, but does adversely affect taste, odor, and color.

23. "Service connection" means the point of delivery of water at or near the property line, generally at the water meter.

D. Cross-Connection Program Requirements. The city will operate a cross-connection control program which fulfills the requirements of the state of Washington cross-connection regulations and is approved by the city of Yelm.

1. The owners shall allow their property to be inspected for possible cross-connections and shall follow the provisions of the city's program if a cross-connection is permitted.

2. If the city requires that the public supply be protected by containment, the owner shall be responsible for water quality and for thermal expansion protection beyond the outlet end of the containment device and should utilize fixture outlet protection for that purpose. Fixture outlet devices shall be installed in accordance with the Uniform Plumbing Code. A plumbing permit and inspections may be required.

3. On new installations the city will provide on-site evaluation and/or inspection of plans in order to determine the type of backflow preventor, if any, that will be required. In any case, a minimum of a meter setter check valve will be required on any new construction.

4. For premises existing prior to the start of this program, the city will perform evaluations and inspections of plans or premises and inform the owner by letter of any corrective action deemed necessary, the method of achieving the correction, and the time allowed for the correction to be made.

Premises will be inspected on or after the expiration date of required action to correct a cross-connection. Premises failing to comply with the city's request shall receive written notice that water service to the premises will be terminated within a period not to exceed 30 calendar days. In the event the owner informs the city of extenuating circumstances as to why the correction has not been completed, the city may grant a time extension up to 30 days.

5. The city will not allow any cross-connection to remain unless it is protected by an approved backflow preventor for which a permit has been issued and which will be regularly tested to ensure satisfactory operation.

6. If the city determines at any time that a threat to the public health exists, the water service will be terminated immediately.

7. The city shall perform inspection of all backflow devices. Inspection shall include the on-site reviews of existing installations, after any repairs or maintenance, and after any relocation. The owner is required to submit to the city a copy of the initial test report, as well as annual testing reports completed by a certified backflow assembly tester.

8. When the initial installation or annual test identifies an improperly operating backflow device, the owner shall correct the malfunction as directed by the city. The owner shall contact the city after correcting the malfunction for inspection.

E. Owner. The owner shall be responsible for the elimination or protection of all cross-connections on their premises.

1. The owner, following the receipt of a letter from the city, shall, at their own expense, install any and all backflow preventors requested.

2. The owner shall correct any malfunction of the backflow preventor which is revealed by periodic city testing.

3. The owner shall inform the city of any proposed or modified cross-connections and also any existing cross-connections of which owner is aware.

4. The owner shall install only city-approved backflow preventors

5. Any owner having a private well or other private water source shall not cross-connect to the city's system.

6. The owner shall provide access to premises to the city at the city's request. Failure to provide access to inspect facilities shall be grounds for termination of water service.

7. The owner shall be responsible for the payment of all fees for permits, annual or semi-annual device testing, retesting in the case that the device fails to operate correctly, and any reinspections for noncompliance with city requirements.

F. Failure to Comply. Any person, firm or corporation who willfully violates any provisions and requirements of the cross-connection control manual shall be guilty of a misdemeanor and further shall be subject to discontinuance of supply of water to the premises. Discontinuance of the city potable water supply to the premises shall remain in effect until corrective action as required by the public works director is completed, tested, and approved.

G. Installation and Testing. Installation and testing of all backflow protection devices shall be in accordance with the American Water Works Association Cross-Connection Control Manual accepted procedures and practices. The latest edition shall be used.

1. In addition, all backflow protection shall be installed at a location that is easily accessible for inspection and testing. Devices located in vaults shall have adequate clearances and depths to allow the city to inspect and test. Devices that cannot be easily and readily inspected shall be required to be relocated and replumbed as required by the city. The owner shall contact the city for applicable installation requirements and standards.

H. Applicability. The city recognizes there are varying degrees of risks associated with different types of uses and will consider this when determining if a cross-connection exists and applicable backflow prevention devices.

I. Existing Backflow Prevention Devices. Any existing backflow protection device in use can continue to be used providing:

1. The devices are functioning properly based on inspection and approved test reports received by the city.

2. The degree of protection is satisfactory for protection of the city's potable water system as determined by the public works director or designated cross-connection control specialist.

3. Backflow devices that do not meet the above conditions shall be replaced with new approved devices. (Ord. 778 § 9, 2003).

13.04.230 Unauthorized turn-on.

Should the owner or occupant of any premises turn on the water or suffer or cause the same to be turned on after it has been shut off at the curb cock by the water department, water service may again be turned off by the water department and a penalty of $60.00 shall be accessed. Thereafter, a reconnect fee of $50.00 shall be assessed before restoration of service can be made. (Ord. 897 § 1, 2008; Ord. 748 § 9, 2001; Ord. 337, 1987).

13.04.240 Turn-off fees.

When a verbal or written request is made which may be responded to during regular working hours for any discontinuance of water service to a premises for the convenience of the occupant or owner, the response thereto shall be classified as special service, and no charge shall be made. Such service outside regular working hours shall be at the rate of $50.00 per call. (Ord. 778 § 10, 2003; Ord. 337, 1987).

13.04.250 Water consumption rates.

A. Monthly Base Rate Charges. The monthly base rate charges based upon meter size for all consumers will be:

2010 Rate Table	
Meter Size	**Meter Charge**
5/8 inch (Typical Residential)	$20.42
1 inch	$51.04
2 inch	$102.08
3 inch	$163.33
4 inch	$326.66
5 inch	$510.40
6 inch	$510.40

5/8 inch (Outside City Limits)	$33.41
Senior Citizen	$0.00

Monthly base rate charges shall be increased by 16 percent January 1, 2011, and eight and one-quarter percent January 1st of 2012, 2013, 2014, and 2015.

B. Monthly Consumption Charges. The monthly consumption charges for all commercial, residential and irrigation meters will be:

2010 Rate Table					
	Water Usage (Cubic Feet)				
	0 – 400	**400 – 1,000**	**1,000 – 2,000**	**2,000 – 3,000**	**3,000+**
Residential	$1.91/ccf	$2.96/ccf	$6.68/ccf	$7.25/ccf	$8.31/ccf
Commercial	$5.13/ccf				
Irrigation	$8.31/ccf				

Monthly consumption charges shall be increased by 16 percent January 1, 2011, and eight and one-quarter percent January 1st of 2012, 2013, 2014, and 2015.

C. Automatic Fire Sprinkler Systems. All buildings with an automatic fire sprinkler system connected to the city water distribution system shall pay the ready-to-serve charge based on the pipe size as substituted for equal meter size in the rate schedule. No water shall be used through such connections or sprinkler system except for actual fire control. If the consumer is found using water through an unmetered special fire or sprinkler service connection for other than fire protection, then each such connection shall be equipped with a conventional-type meter at the expense of the property owner.

D. Outside City Corporate Limits. Charges for the use of water outside the corporate limits of the city shall be the meter rate identified in the "outside" schedule.

E. Temporary Water Service. Temporary water service for construction of any building, street, utility or similar project shall be provided at the rate identified in the rate schedule in subsection A or B of this section dependent upon location of project. A construction meter shall be required and application shall be made at the office of the public works director identifying location and reason for use of water. A deposit of $800.00 for each construction meter shall be collected. Upon completion of the project, return of construction meter and charges for consumed water paid for, return of deposit shall be made to consumer. (Ord. 920 § 2, 2010; Ord. 918 § 1, 2010; Ord. 905 §§ 1, 2, 2009; Ord. 891 § 1, 2008; Ord. 778 §§ 11 – 15, 2003; Ord. 748 § 1, 2001; Ord. 593 § 1, 1997; Ord. 337, 1987).

13.04.255 Adjustment of utility bills.

A. The city administrator, or his designee, is empowered to resolve billing disputes upon receipt of request to do so from a city utility customer. Upon receipt of such notice from the customer, the city administrator, or his designee, shall review the bill with the customer to see if the amount is justly owed. The customer shall have the right to have a meeting to bring forth reasons and evidence why such bill should not be due and owing.

B. When any customer in any given billing period has used, according to the water meter, a quantity of water which is more than double the average amount of water used on such premises in similar billing periods in prior years, and the water consumption is solely caused by a broken water pipe on the user's premises, the customer may make an application to the treasurer in writing for a reduction of the billing.

1. If the application states a broken pipe on the customer's premises caused a large consumption of water, the existence of a broken pipe shall be verified by inspection by the public works employees. If it is established by presenting acceptable documentation demonstrating to the city that such broken pipe has been repaired, a reduction of the water bill to an amount that is the average of the prior four months plus one-half of the difference between the average and the existing disputed bill.

2. The reduction provided for in this section shall not be allowed if such excess water consumption is due to a customer's neglect or failure to repair the broken pipe. A reduction in billing shall not be permitted if such excess consumption is due simply to leaky faucets or other plumbing fixtures.

C. Irrigation systems are specifically excluded from any adjustments due to leakage.

D. In newly developed property which does not have a prior service record, the appropriate water service charge will be

based upon the charges for a similar type of water service and occupancy for the preceding year.

E. The application by the customer shall be on the forms provided by the city. (Ord. 809 § 1, 2004).

13.04.260 Fire hydrants.

Repealed by Ord. 778. (Ord. 337, 1987).

13.04.265 Sprinkling during fires prohibited.

It is unlawful for any person to knowingly use water for a lawn or garden sprinkling or irrigating purposes on any premises during the progress of a fire or disaster within the city water system. (Ord. 337, 1987).

13.04.270 Service.

Water consumers shall be required to complete an application for utility service and provide photo identification with the city clerk/treasurer's office to start service for water at the address listed on their application. (Ord. 897 § 1, 2008).

13.04.280 Billing and payments.

Monthly statements of charges for water service shall be due and payable at the office of the city clerk/treasurer or at such other place or places designated by him/her on or before the fifteenth of the month and are deemed delinquent thereafter. Statements shall cover service charges for the period shown thereon and the water consumption charges from the meter reading for the period from last meter read. Statements shall be forwarded to the customer as soon as practicable after each service period. (Ord. 897 § 1, 2008; Ord. 566 § 1, 1995; Ord. 384 § 1, 1990).

13.04.290 Nonpayment of charges.

A. Water service terminated for nonpayment shall not be restored to the nonpaying occupant until all delinquent charges, together with a service fee of $50.00 for restoring services, are paid. The city will not refuse to turn on a discontinued service to a new tenant in any building due to the nonpayment of a prior tenant. Upon completion of a utility service application and proof of identification, the new service shall be restored. Restoration of service shall in no way comprise the existing debt or the responsibility of the owner for payment.

B. Water service to commercial and non-owner-occupied units shall be contracted for by the owner (landlord) of the premises served. The city will agree to divide services among a number of units and to bill the owner for each of the designated units separately. Liability for all bills to rental units shall be joint and several between the tenant, the owner of the premises, and any other party identified on the original service request.

C. The city treasurer or authorized representative shall have the authority to refer delinquent accounts of the city water utility and refuse collection system to an agency for collection and to write off accounts that are over one year old in an amount not to exceed $500.00 per account. This write-off option shall be utilized only after it has been determined by the treasurer that the account is uncollectible and is not referable to a collection agency. The city may also elect to refer the matter to counsel for collection through an appropriate civil action. In either event, all costs of collection shall be paid by the defaulting party. (Ord. 897 § 1, 2008; Ord. 778 § 17, 2003; Ord. 566 § 2, 1995).

13.04.300 Rate reduction – Established.

From and after July 1, 1987, the water-consumption charges to any water subscriber of the city, meeting the eligibility and qualification requirements set forth in YMC 13.04.310 and 13.04.320, shall be reduced by the sum of the ready-to-serve charge each month. (Ord. 337, 1987).

13.04.310 Rate reduction – Eligibility.

A. To be eligible for the water service charge reduction set forth in YMC 13.04.300, a subscriber shall:

1. Be a single person, 65 years of age or older, who is retired and whose income from all sources whatsoever does not exceed the median income as established or amended by resolution of the city council;

2. Be a couple where one partner is 65 years of age or older, whose income from all sources whatsoever combined with the income of the partners does not exceed the median income as established and set forth by resolution of the city council; or

3. Be a permanently disabled head of household whose income from all sources whatsoever does not exceed the median income as established or amended by resolution of the city council.

B. For the purposes of this chapter, the term "income from all sources whatsoever" includes all earnings, investment income such as dividends and interest, capital gains, benefits, social security benefits, pensions, disability payments, retirement pay and annuities, but does not include reimbursement for losses. (Ord. 868 § 2, 2007; Ord. 512 § 2, 1994; Ord. 337, 1987).

13.04.320 Rate reduction – Application procedure.

To qualify for the reduction in water-service charges set forth in this chapter, every eligible subscriber (or if married, then either spouse) shall file with the city clerk/treasurer his or her statement, under oath, on such form as may be prescribed by the city clerk/treasurer, that he, she or they meet the eligibility requirements set forth in YMC 13.04.310 and that such applicant or applicants promise to forthwith notify the city of any circumstances or change in conditions which would make the applicant or applicants ineligible to receive the reduction. (Ord. 337, 1987).

13.04.330 Annexation requirements.

Any consumer requesting water service outside of the city limits shall be required, as a condition of receiving the water service and in addition to other requirements set forth in this chapter, to execute a waiver of protest to any future annexation which shall become an encumbrance upon the premises. (Ord. 512 § 2, 1994; Ord. 337, 1987).

13.04.340 Violations – Penalties.

A. Civil Penalties.

1. Any person who shall violate any provision of this chapter shall be liable to the city for any expense, loss, damage, cost of inspection or cost of correction incurred by the city by reason of such violation including any cost to the city incurred in collection from such person such loss, damage, expense, cost of inspection or cost of correction, including necessary reasonable attorney's fees and court costs.

2. Any person who shall make an unauthorized connection to the city's water system shall be charged a minimum fine of $250.00, or such other fines and penalties as may be adopted from time to time by city ordinance, for each unauthorized connection.

B. Criminal Penalties.

1. Any person, firm or corporation who willfully violates any of the provisions of this chapter shall be subject to discontinuance of supply of city water to the premises. Discontinuance of the city potable water supply shall remain in effect until corrective action as required by the public works director is completed. Furthermore, any willful violation by a person, firm, or corporation shall be guilty of a misdemeanor. (Ord. 778 § 18, 2003).

Cross Connection Control Program
Section 6: Inventory of Existing Devices

INVENTORY OF EXISTING COMMERCIAL BACKFLOW ASSEMBLIES 2010		
CUSTOMER	***ASSEMBLY TYPE***	***USE***
AUTO ZONE	DCVA	DOMESTIC
	DCVA	IRR
BROWNS AUTO MALL	DCVA	DOMESTIC
	DCVA	IRR
	DCVA	IRR
BURGER KING	DCVA	DOMESTIC
	DCVA	IRR
BURNETT CENTER	DCVA	DOMESTIC
	DCVA	IRR
	DCVA	DOMESTIC
	DCVA	DOMESTIC
	DCVA	IRR
CASA MIA	DCVA	DOMESTIC
CHS	DCVA	FIRE SPRINKLER
	DCVA	FIRE SPRINKLER
	DCVA	DOMESTIC
DELLS FARM SUPPLY	DCVA	IRR
	DCDA	FIRE SPRINKLER
	DCVA	FIRE SPRINKLER
	DCVA	
	DCVA	DOMESTIC
DISCOVER COUNSELING	DCVA	DOMESTIC
EASTHAVEN VILLA	DCVA	IRR
	RPBA	DOMESTIC
ELLEDGE MEDICAL	DCVA	IRR
	RPBA	DOMESTIC
EMANUAL LUTHER CHURCH	DCVA	DOMESTIC
FAIRPOINT	DCVA	FIRE SPRINKLER
	DCVA	FIRE SPRINKLER
	DCVA	IRR
	DCVA	IRR
	DCVA	IRR
FIRST CITIZENS BANK	DCVA	DOMESTIC
	DCVA	IRR
FIT STOP	DCVA	DOMESTIC
FORT STEVENS SCHOOL	RPBA	DOMESTIC
GOLDEN DRAGON REST.	DCVA	DOMESTIC
	DCVA	IRR
GRAND STAR INC	DCVA	IRR
	RPBA	POINT OF USE
	RPBA	POINT OF USE
	RPBA	POINT OF USE
	RPBA	POINT OF USE
	RPBA	POINT OF USE
	RPBA	CAR WASH
	RPBA	CAR WASH
J&I POWER EQUIPMENT	DCVA	DOMESTIC
	DCVA	IRR

INVENTORY OF EXISTING COMMERCIAL BACKFLOW ASSEMBLIES 2010		
CUSTOMER	***ASSEMBLY TYPE***	***USE***
JACK IN THE BOX	DCVA	IRR
	RPBA	POINT OF USE
	RPBA	POINT OF USE
K-9 CLIPS	DCVA	DOMESTIC
KEY BANK	DCVA	DOMESTIC
LATTERDAY SAINTS CHURCH	DCVA	FIRE SPRINKLER
LES SCHWAB	DCDA	FIRE SPRINKLER
	DCVA	FIRE SPRINKLER
	DCVA	IRR
	RPBA	DOMESTIC
LIVINGSTONE BOATS	DCVA	FIRE SPRINKLER
	RPBA	DOMESTIC
MCDONALDS	DCVA	IRR
MIND AND BODY CARE	RPBA	DOMESTIC
NORTHWEST RESTURANT INC	DCVA	DOMESTIC
	DCVA	POINT OF USE
	RPBA	POINT OF USE
PAWS AND CLAWS	RPBA	DOMESTIC
PKG REAL PROPERTY	DCVA	DOMESTIC
PLAZA PARK	RPBA	DOMESTIC
	RPBA	DOMESTIC
	DCVA	IRR
PRAIRIE PARK HOLDING		
MOTEL EXPANSION	DCDA	FIRE SPRINKLER
	DCVA	FIRE SPRINKLER
	RPBA	DOMESTIC
	DCVA	IRR
MOTEL EXPANSION	DCVA	DOMESTIC
	DCVA	IRR
THEATER	DCVA	FIRE SPRINKLER
	DCVA	IRR
	RPBA	POINT OF USE
	RPBA	POINT OF USE
	RPBA	POINT OF USE
	RPBA	POINT OF USE
COMMERCIAL BUILDING	DCVA	IRR
	DCVA	DOMESTIC
	DCDA	FIRE SPRINKLER
	DCVA	FIRE SPRINKLER
RAINIER APTS	DCVA	DOMESTIC
REMAX	DCVA	IRR
RHONDAS COFFE HOUSE	DCVA	DOMESTIC
	DCVA	IRR
RICK CHRISTENSEN	DCVA	DOMESTIC
	DCVA	IRR
RITE AID CORP	RPBA	DOMESTIC
	DCVA	IRR
	DCVA	FIRE SPRINKLER
	DCVA	POINT OF USE
	RPBA	POINT OF USE

INVENTORY OF EXISTING COMMERCIAL BACKFLOW ASSEMBLIES 2010		
CUSTOMER	***ASSEMBLY TYPE***	***USE***
ROSEMOUNT RETIREMENT	DCVA	IRR
	RPBA	POINT OF USE
	DCDA	FIRE SPRINKLER
	DCVA	FIRE SPRINKLER
	RPDA	DOMESTIC
	RPBA	DOMESTIC
SAFEWAY	DCVA	FIRE SPRINKLER
	RPBA	POINT OF USE
	RPBA	POINT OF USE
	RPBA	POINT OF USE
	RPBA	POINT OF USE
	RPBA	POINT OF USE
	DCVA	IRR
	RPBA	POINT OF USE
	RPBA	POINT OF USE
STANDARD AUTO PARTS	DCVA	IRR
	DCVA	DOMESTIC
STATE FARM	RPBA	DOMESTIC
SUNBIRDS	DCVA	FIRE SPRINKLER
TAHOMA TERRA GOLF	DCVA	IRR
	RPBA	DOMESTIC
TAHOMA TERRA MULTIFAMILY	DCVA	DOMESTIC
	DCVA	DOMESTIC
	DCVA	DOMESTIC
	DCVA	IRR
	DCVA	FIRE SPRINKLER
	DCVA	FIRE SPRINKLER
	DCVA	FIRE SPRINKLER
TIMBER TECH	RPBA	DOMESTIC
TIMBERLINE BANK	DCVA	DOMESTIC
TOM, DICK & HARRYS MEATS	RPBA	DOMESTIC
TWIN STAR CREDIT UNION	RPBA	DOMESTIC
WAL-MART SUPERSTORES	RPBA	DOMESTIC
	RPBA	IRR
	DCDA	FIRE SPRINKLER
	DCVA	FIRE SPRINKLER
	PBVA	POINT OF USE
	RPBA	POINT OF USE
	RPBA	POINT OF USE
	RPBA	POINT OF USE
WINDEMERE REALESTATE	DCVA	DOMESTIC
	DCVA	IRR
YELM ADULT COMM. CTR	DCVA	DOMESTIC
	DCVA	FIRE SPRINKLER
YELM ARCO	DCVA	IRR
	RPBA	POINT OF USE
	RPBA	POINT OF USE
YELM BATTING CAGES	RPBA	DOMESTIC
YELM COMMUNITY CTR	DCVA	DOMESTIC
	DCVA	DOMESTIC

INVENTORY OF EXISTING COMMERCIAL BACKFLOW ASSEMBLIES 2010		
CUSTOMER	***ASSEMBLY TYPE***	***USE***
	DCVA	IRR
	RPBA	FIRE SPRINKLER
YELM FAMILY DENTISTRY	RPBA	DOMESTIC
YELM GLASS	DCVA	DOMESTIC
YELM PRAIRIE CHRISTAN	RPBA	FIRE SPRINKLER
YELM PRAIRIE DENTAL	DCVA	IRR
	RPBA	DOMESTIC
YELM SCHOOL ALTERNATIVE	DCVA	FIRE SPRINKLER
	DCVA	IRR
	DCVA	IRR
	RPBA	
YELM VISION CLINIC	RPBA	DOMESTIC
CITY OF YELM		
SEWER TREATMENT PLANT	AG	MAKE UP WATER
	AG	MAKE UP WATER
	RPBA	DOMESTIC
PUBLIC WORKS	RPBA	DOMESTIC
	RPBA	DOMESTIC
	DCVA	IRR
CITY HALL	RPBA	DOMESTIC
	RPBA	DOMESTIC
PUBLIC SAFETY	DCVA	DOMESTIC
	DCVA	IRR
RIDGELINE SCHOOL	RPDA	DOMESTIC
	RPBA	DOMESTIC
YELM HIGH SCHOOL	RPBA	DOMESTIC
YELM MIDDLE SCHOOL	RPBA	DOMESTIC
	RPBA	DOMESTIC
YELM SCHOOL BUS BARN	RPBA	DOMESTIC
FIVE CORNERS	DCVA	IRR
YELM AVE E	DCVA	IRR
CREEK ST ALGIERS	DCVA	IRR
YELM AVE E	DCVA	IRR
EDWARDS ST NW	DCVA	IRR
103RD & PLAZA	DCVA	IRR
206 MCKENZIE CT	RPBA	DOMESTIC
COCHRANE PARK	RPBA	DOMESTIC
	DCVA	IRR
508 FIRST ST S	RPBA	DOMESTIC
504 FIRST ST S	RPBA	DOMESTIC
208 FIRST ST S	RPBA	DOMESTIC
106 EDWARDS ST SW	RPBA	DOMESTIC
408 SECOND ST S	RPBA	DOMESTIC
MILL POND SCHOOL	RPBA	DOMESTIC
505 YELM AVE E	DCVA	IRR
PLAZA DR AND ALGIERS	DCVA	IRR
SARS	RPBA	DOMESTIC
	DCVA	FIRE SPRINKLER

Cross Connection Control Program
Section 7: Approved Devices

A list of approved backflow prevention assemblies can be ordered from the Washington State Department of Health website:

http://www.doh.wa.gov/ehp/dw/Programs/backflow_prevention.htm

Cross Connection Control Program
Other supporting documents

March 7, 2003

Mayor Adam Rivas
PO Box 1527
Yelm WA, 9859

The Honorable Mayor Rivas,

The City of Yelm is dedicated to providing the best quality of water to its customers. To ensure the longevity of this longstanding tradition, the City has implemented a cross connection control program. This is a federally mandated requirement that all cities, to the best of their ability, must comply with. This is in accordance with Washington Administrative Code (WAC) 246-290-490, and Yelm Municipal Code 13.04.220.

Protecting the City's water system can only be done thoroughly and effectively through cooperation between the City and its water system customers. If you currently have an irrigation system, well or fire protection system, they may require a backflow assembly. The backflow assembly must be tested annually, by an independent tester who is certified by the Department of Health. This is to ensure they are working properly. The results are to be submitted to the City of Yelm water department.

The City's responsibility ends at the water meter, with the installation and cost of the backflow assembly being the responsibility of the property owner. However, the City will provide a reasonable time line to meet the requirement and to assist with any questions. All backflow assemblies must be approved by the Department of Health and inspected by the City's Cross Connection Specialist. I have included a handout on cross connection which provides additional information on cross connection and helps to explain the requirements. I will be contacting you within the next couple of days to set an appointment to meet with you regarding your irrigation system.

In the meantime, if you have any questions regarding backflow prevention assemblies; feel free to call me at (360) 458 – 8406.

Sincerely,

City of Yelm

Kevin Ray
Cross Connection Specialist

March 13, 2003

Dear Customer:

The City of Yelm is dedicated to providing the best quality of water possible to its customers. To maintain the longevity of this longstanding tradition, the City has implemented a Cross Connection Control Program to protect the City water system and public health, in accordance with Washington State Code (WAC) 246-290-490, and Yelm Municipal Code 13.04.220. The Cross-Connection Control Program is a state mandated program regulated by the Department of Health Division of Drinking Water.

It is the City's responsibility to prevent cross connection from happening within our system. To ensure this, the City must insect your premise for potential cross connection hazards. After the initial inspection, you will receive a copy of the inspection report, and if needed, the appropriate backflow assembly will be recommended. Because the installation and cost of the backflow assembly is required and is the owner's responsibility, the City will provide a reasonable timeline to meet this requirement. Installations of backflow assemblies must be inspected and approved by the City Water Department. They also must be tested at time of installation, as well as annually, by an independent tester who is certified by the Department of Health. The test results are to be submitted to the City of Yelm water department. Backflow assemblies can be purchased from most plumbing outlets.

I have included a hand out "Why Cross Connection Control", to help better explain this program and its importance. City staff will also be holding an informational meeting on April 30, 2003 at the public works facility located at 901 Rhoton Road. The meeting will start at 6:00 pm and will provide educational material regarding cross connection. If you are unable to attend this meeting, I will be contacting you in the near future to schedule an individual site visit to help you determine what requirements will need to be met.

In the meantime, if you have any question in this regard, please contact me at (360) 458-8406.

Sincerely,

City of Yelm

Kevin Ray, Cross Connection Specialist

Washington State Department of Health

Division of Environmental Health
Office of Drinking Water

Site Directory:

- Drinking Water Home

- CCC Navigation Screen
- Enter PWS Contact Info
- Start a New Form
- Edit/Print Form
- Access/Submit Evaluation
- Scholarship Request
- Help
- FAQs
- Contact DOH
- Downloads
- Exit

Enter PWS Contact Information Screen:

Water System ID: **99350J** Water System Name: **YELM, CITY OF**

Please enter your CCC contact information below:

This information will be used to populate the contact information on all the forms. Fields marked with a "+" are required.

CCC Program Manager:

The CCC Program Manager is in responsible charge of the CCC program, as required in WAC 246-290-490(3)(e). This is the person who manages the CCC program for the PWS and is responsible for the day-to-day implementation of the CCC program.

Title:	Public Work Field Supervisor/(
+ First Name and Middle Initial:	Kevin
+ Last Name:	Ray

Provide CCC Program Manager mailing address at the water system. This address will be used when DOH sends out next year's report forms.

Street Number:	PO Box 479
City:	Yelm
State:	Washington
Zip Code:	98597
Telephone Number:	(360) 458 - 8406 Extension Number
CCS Cert. No.:	

Please enter your e-mail address twice for verification purposes.

+ CCC Program Manager E-mail:	kevinr@ci.yelm.wa.us * (Please use the standard e-mail format, e.g. you@somewhere.com)

CCC

Program Manager E-mail:	kevinr@ci.yelm.wa.us
+	* (Please use the standard e-mail format, e.g. you@somewhere.com)

PWS Manager:

The PWS Manager is the person that the CCC Program Manager reports to, or other manager having oversight of the CCC program. In large systems, the person doesn't need to be in charge of the entire PWS.

Title:	Water Operator
+ First Name:	Edward
+ Last Name:	Smith

Please enter your e-mail address twice for verification purposes.

PWS Manager E-mail:	edwards@ci.yelm.wa.us
PWS Manager E-mail:	edwards@ci.yelm.wa.us
Operator Certification Number:	4221

Update Contact Information | Cancel

Washington State Department of Health
Office of Drinking Water
243 Israel Rd SE
Box 47890
Olympia, Washington, 98504-7890

Last Update: 11/07/2007 5:43 AM
Send inquiries about DOH and its programs to the Health Consumer Assistance Office.
Comments or questions regarding this web site? Send mail to the CCC Program.

Washington State Department of Health

Division of Environmental Health
Office of Drinking Water

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Caution!
For security reasons, your data entry session will be terminated after 30 minutes of inactivity. Data entered but not saved as draft or updated during the session will be lost.

Cross-Connection Control Program Summary At End of 2008

Describe the characteristics of the PWS's CCC Program at the end of 2008.

Part 1: Public Water System (PWS) Identification

PWS ID: **99350**	PWS Name: **YELM, CITY OF**	County: **THURSTON**

Part 2: Cross-Connection Control (CCC) Program Characteristics

A. Type of Program Currently Implemented

Type of Program	Check One
Premises isolation only.	◉
Combination program: reliance on both premises isolation and in-premises protection.	○
In transition from a combination program to a premises isolation only program.	○

B. Coordination with Local Administrative Authority (LAA) on Cross-Connection Issues

Indicate the status of coordination with LAAs in your service area. The LAA is the entity that enforces the Uniform Plumbing Code. Check one box in each of last columns for each LAA in you service area.

LAA No.	Name of LAA (e.g., the City or County Building Department)	PWS Currently: Coordinates with LAA	PWS Currently: Has Written Agreement with LAA	If not coordinating, did LAA decline to coordinate?
1	CITY OF YELM BUILDING DEPARTMENT ADD ROW	Y ◉ N ○	Y ◉ N ○	Y ◉ N ○

C. Corrective or Enforcement Actions Available to the Purveyor

Type of Corrective Action	Indicate Whether Available	Most Often Used (Check One)
Denial or discontinuance of water service.	Y ◉ N ○	○
Purveyor installs backflow preventer and bills customer.	Y ○ N ◉	○
Assessment of fines (in addition to elimination or control of cross-connection).	Y ◉ N ○	○
Other corrective actions (describe): ADD ROW	Y ○ N ◉	○

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SAVE SUBMIT TO DOH

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Washington State Department of Health
Office of Drinking Water
243 Israel Rd SE
Box 47890
Olympia, Washington, 98504-7890

Last Update: 10/24/2007

Send inquiries about DOH and its programs to the Health Consumer Assistance Office
Comments or questions regarding this web site? Send mail to the CCC Program.

	DCVA ◉ RPBA ○
PWS currently inspects AVBs upon ***initial*** installation.	Y ○ N ○ N/A ◉ ?
PWS currently inspects AVBs upon repair, reinstallation or relocation.	Y ○ N ○ N/A ◉ ?

G. Used Water

PWS prohibits, by ordinance, rules, policy or agreement, the intentional return of used water (e.g. for heating or cooling) into the distribution system.	Y ◉ N ○
If not prohibited at present, date plan to prohibit use. Please use MM/DD/YYYY format.	N/A ☑
Current number of service connections returning used water to distribution system.	0

H. Backflow Protection for Unapproved Auxiliary Water Supplies[1] NOT Interconnected with PWS

Indicate the **minimum** backflow preventer and type of protection required for service connections having unapproved auxiliary water supplies *when they are NOT interconnected to the PWS*. Check only one per row.

Existing service connections. ?	None ○ DCVA ○ RPBA ◉ AG ○
Type of protection required. ?	None ○ In-premises protection ○ Premises isolation ◉
New service connections. ?	None ○ DCVA ○ RPBA ○ AG ◉
Type of protection required. ?	None ○ In-premises protection ○ Premises isolation ◉

[1]An auxiliary water supply is any water supply on or available to the customer's premises in addition to the purveyor's potable water supply.

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Washington State Department of Health
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Olympia, Washington, 98504-7890

Washington State Department of Health

Division of Environmental Health
Office of Drinking Water

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D. CCC Program Responsibilities

Do *not* include enforcement action related procedures or circumstances.

CCC Program Activity	Responsible Party (Check one per row)	
	Customer	Purveyor
Hazard Evaluation by DOH-certified CCS	○	◉
Backflow preventer (BP) ownership	◉	○
BP installation	◉	○
BP ***initial*** inspection (for proper installation - all BPs)	○	◉
BP ***initial*** test (for testable assemblies)	◉	○
BP ***annual*** inspection (Air Gaps and AVBs)	○	◉
BP ***annual*** test (for testable assemblies)	◉	○
BP maintenance and repair	◉	○

E. Backflow Protection for Fire Protection Systems.

Please remember to enter number of days allowed if you require retrofitting.

PWS coordinates with ***LAA*** on CCC issues for fire protection systems(FPS).	Y ◉ N ○ N/A ○
PWS coordinates with ***local Fire Marshal*** on CCC issues for FPS.	Y ◉ N ○ N/A ○
PWS ensures backflow prevention is installed before serving ***new*** connections with FPS.	Y ◉ N ○
PWS requires retrofits to ***high***-hazard FPS.	Y ◉ No. of days allowed: 30 (?) N ○ N/A ○
PWS requires retrofits to ***low***-hazard FPS.	Y ◉ No. of days allowed: 30 (?) N ○ N/A ○

F. Backflow Protection for Irrigation Systems

Minimum level of backflow prevention required on irrigation systems ***without*** chemical addition.	Not Addressed ○ AVB ○ PV/SVBA ○

Last Update: 10/24/2007

Send inquiries about DOH and its programs to the Health Consumer Assistance Office
Comments or questions regarding this web site? Send mail to the CCC Program.

Washington State Department of Health

Division of Environmental Health
Office of Drinking Water

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I. Backflow Protection for Tanker Trucks and Temporary Water Connections

Minimum level of backflow protection (installed on or associated with the truck) required for tanker trucks taking water from PWS.	AG ◉ DCVA ○ RPBA ○ Not Specified ○ Tanker trucks not allowed ○
PWS requires tanker trucks to obtain water at designated filling sites each equipped with permanently installed backflow preventer(s).	Y ○ (Min. protection: DCVA ○ RPBA ○) ? N ○ N/A ○ No sites provided ◉
PWS currently accepts tanker trucks approved by other PWSs without further inspection or testing.	Y ○ N ◉ N/A ○
Minimum level of backflow protection required for temporary water connections (e.g. for construction sites).	AG ○ DCVA ◉ RPBA ○ Not specified ○ Temp. connections not allowed ○
PWS requires testing each time the temporary connection backflow preventer is relocated.	Y ◉ N ○ N/A ○ (Temp. connections not allowed)
PWS provides approved backflow preventer for temporary connections.	Y ◉ N ○ N/A ○ (Temp. connections not allowed)

J. Backflow Protection for Non-Residential Connections

For each category shown, indicate whether PWS has non-residential connections of that type and the **minimum** level of ***premises isolation*** backflow protection required (whether or not PWS currently has that type of customer).

Type of Connection	PWS has Customers of this Type	Minimum Premises Isolation Backflow Protection Required
Commercial ?	Y ◉ N ○	Not Required ○ DCVA ◉ RPBA ○
Industrial ?	Y ◉ N ○	Not Required ○ DCVA ○ RPBA ◉
Institutional ?	Y ◉ N ○	Not Required ○ DCVA ○ RPBA ◉

Other (specify): ADD ROW	Y ○ N ○	Not Required ○ DCVA ○ RPBA ○

K. Backflow Protection for Wholesale Customers

Indicate whether the PWS requires backflow protection at interties with wholesale customers (other PWSs).

Type of Intertie	PWS has (plans to have) Customers of this Type	Backflow Protection Required (if protection is required, indicate minimum level).
Existing	Y ○ N ◉	Not specified / Not required ○ Always required ○ Required only if purchaser's CCC program is inadequate ○ Minimum required (if applicable): DCVA ○ RPBA ○ ?
New	Y ○ N ◉	Not specified / Not required ○ Always Required ○ Required only if purchaser's CCC program is inadequate ○ Minimum required (if applicable): DCVA ○ RPBA ○ ?

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Part 3: CCC Program Record-Keeping and Inventory

Indicate the type or name of computer software used by the PWS to track CCC records.

Cross-Track (BMI) ◉	BPMS ○	XC2 (Engsoft) ○	Tokay ○	Other commercial CCC software (specify) ○
Custom developed for or by PWS[1] ○ ?	Other commercial software (e.g. Excel) ○ ?			None Used ○

[1] Do not include commercial CCC software customized for PWS. Indicate these on line above.

Part 4: Comments and Clarifications

Enter comments or clarifications to any of the information provided in this report.

Part No. ?	Comment
Pt 4	The numbers of DVCA in part 4 have changed , in the past we had hand counted the test forms, this year we found we where counting copies of the same assemblies twice. with the new soft

ADD ROW

Part 5: CCC Program Summary Completion Information

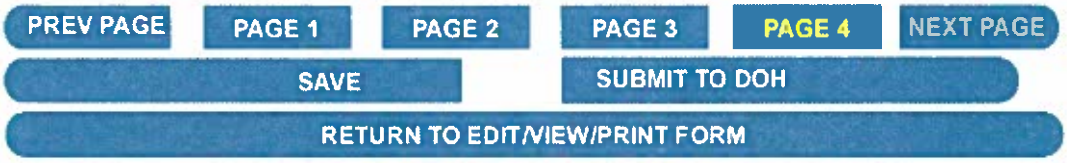
Enter dates in MM/DD/YYYY format.

I certify that the information provided in this CCC Program Summary is complete and accurate to the best of my knowledge.		
CCC Program Mgr. Name[2]: Kevin Ray		Title: Public Work Field Superv
Signature:		Date: 05/07/2009
Phone: (360) 458 - 8406	E-mail*: kevinr@ci.yelm.wa.us	
I certify that the information provided in this report accurately represents the status and description of this water system's CCC Program.		
PWS Mgr/Owner Name[3]: Edward Smith		Title: Water Operator
Signature:	Op. Cert. No.: 4221	Date: 05/07/2009

* Required Field. For security reasons, an e-mail address must be provided. DOH will e-mail you to confirm any changes made to your data

2 The CCC Program Manager is generally the CCS responsible for developing and implementing the PWS's CCC program.

3 The person that the CCC Program Manager reports to or other manager having direct responsibility and/or oversight of the CCC program. This person doesn't need to be in charge of the entire water system.



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Caution!

For security reasons, your data entry session will be terminated after 30 minutes of inactivity. Data entered but not saved as draft or updated during the session will be lost.

Public Water System Cross-Connection Control Activities Annual Summary Report for Year 2008

Part 1: Public Water System (PWS) and Cross-Connection Control Specialist (CCS) Information

PWS ID: **99350**	PWS Name: **YELM, CITY OF**	County: **THURSTON**
Provide name and certification number of CCS who develops and implements your CCC program.		
CCS Name (Last, First & MI): Ray, Kevin		CCS Phone: (360) 458 - 8406
CCS Cert No.:	BAT Cert. No. (if applicable):	
CCS is (check one):	PWS owner or employee ○	On contract to PWS ○ Volunteer or other ○

Part 2: Status of Cross-Connection Control Program at End of 2008

PWS has: (Check one box in each column below)	
A written CCC program Y ◉ N ○	CCC implementation activities Y ◉ N ○

(Written program may be a separate document, or part of water system plan or small water system management program.)

Provide information about PWS's specific CCC Program Elements. ***Check one box in each column for each row.***

Program Element Number	Description of Element [See WAC 246-290-490(3)]	This Program Element is: Included in Written Program	This Program Element is: Being Implemented or Is Completed
1	Legal Authority Established	Y ◉ N ○	Y ◉ N ○
2	Hazard Evaluation Procedures and Schedules	Y ◉ N ○	Y ◉ N ○
3	CCC Procedures and Schedules	Y ◉ N ○	Y ◉ N ○

4	Certified CCS Provided	Y ◉ N ○	Y ◉ N ○
5	Backflow Preventer Inspection and Testing	Y ◉ N ○	Y ◉ N ○
6	Testing Quality Control Assurance Program	Y ◉ N ○	Y ◉ N ○
7	Backflow Incident Response Procedures	Y ◉ N ○	Y ◉ N ○
8	Public Education Program	Y ◉ N ○	Y ◉ N ○
9	CCC Records	Y ◉ N ○	Y ◉ N ○
10	Reclaimed Water Permit	Y ◉ N ○ N/A ○	Y ◉ N ○ N/A ○

Did you check one box in EACH of the above columns for EACH row?

Part 3A: System Characteristics at End of 2008

Indicate the number of connections of each type that the PWS serves (whether or not they are protected by backflow preventers). **Estimate if necessary.**

Type of Service Connection	Number
Residential (as defined by PWS)	2196
All Other (include dedicated fire sprinkler and irrigation lines and PWS-owned facilities such as water and wastewater treatment plants and pumping stations, parks, piers and docks.)	314
Total Number of Connections	2510

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Part 3B: Cross-Connection Control for High-Hazard Premises or Systems Served by the PWS

If PWS does not serve any high-hazard premises or systems, check here ☐ and go to Part 4.

- **Complete all cells.** Count only premises PWS serves water to. Enter zero (0) if PWS does not serve such premises.
- Estimate connections served if needed (OK to use phone book). Hazard evaluations do not need to be done to complete this table.

Type of High-Hazard Premises or Systems [WAC 246-290-490(4)(b)]	Number of Connections as of 12/31/2008			
	A Being Served Water by PWS[1]	B With Premises Isolation by AG/RP[2]	C With Column B AG Inspected or RP Tested[3]	D Granted Exception from Mandatory Premises Isolation
Agricultural (farms and dairies)	0	0	0	0
Beverage bottling plants (including breweries)	0	0	0	0
Car washes	2	1	1	0
Chemical plants	2	2	2	0
Commercial laundries and dry cleaners	0	0	0	0
Both reclaimed water and potable water provided	30	30	30	0
Film processing facilities	0	0	0	0
Dedicated fire protection systems with chemical addition or using unapproved auxiliary supplies	0	0	0	0
Food processing plants (including canneries, slaughter houses, rendering plants)	2	2	2	0

Hospitals, medical centers, medical, dental and veterinary clinics, nursing homes, mortuaries, etc. reported on Part 3C	16	14	14	0
Dedicated irrigation systems using purveyor's water supply and chemical addition[4]	0	0	0	0
Type of High-Hazard Premises or Systems [WAC 246-290-490(4)(b)]	**Number of Connections as of 12/31/2008**			
	A Being Served Water by PWS[1]	**B With Premises Isolation by AG/RP[2]**	**C With Column B AG Inspected or RP Tested [3]**	**D Granted Exception from Mandatory Premises Isolation**
Laboratories	2	2	2	0
Metal plating industries	0	0	0	0
Petroleum processing or storage plants	0	0	0	0
Piers and docks	0	0	0	0
Radioactive material processing plants or nuclear reactors	0	0	0	0
Survey access denied or restricted	0	0	0	0
Wastewater lift/pump stations (non-residential only)	0	0	0	0
Wastewater treatment plants	1	1	1	0
Unapproved auxiliary water supply interconnected with potable water supply	8	8	8	0
Other: ADD ROW	0	0	0	0
Totals	63	60	60	0

[1] Count multiple connections or parallel installations to the same premises as separate connections.

[2] Count only those connections with AG or RP installed for premises isolation. Do not include connections with only in-premises protection or those with DCVA/DCDAs installed for premises isolation.

[3] Count only those connections ***whose premises isolation preventers*** were tested or inspected during year 2008.

[4] For example, irrigation systems in parks, playgrounds, golf courses, cemeteries, estates, etc.
[5] Premises with hazardous materials or processes (requiring isolation by AG or RP), such as: aircraft and automotive manufacturers, pulp and paper mills, metal manufacturers, military bases, and wholesale customers that pose a high hazard to the PWS. May be grouped together in categories, e.g.: "Other manufacturing", or "Other commercial.

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Part 3C: Cross-Connection Control for Medical Category High-Hazard Premises Served by the PWS

If PWS does not serve any medical type premises, check here ☐ and go to Part 4.

- **Complete all cells.** Count only premises PWS serves water to. Enter zero (0) if PWS does not serve such premises.
- Estimate connections served if needed (OK to use phone book). Hazard evaluations do not need to be done to complete this table.

Type of High-Hazard Premises or Systems [WAC 246-290-490(4)(b)]	Number of Connections as of 12/31/2008			
	A Being Served Water by PWS[1]	B With Premises Isolation by AG/RP[2]	C With Column B AG Inspected or RP Tested[3]	D Granted Exception from Mandatory Premises Isolation
Hospitals				
Hospitals (include psychiatric hospitals and alcohol and drug treatment centers)	0	0	0	0
Facilities for Treatment and Care of Patients Not Located in Hospitals Counted Above				
Same day surgery centers	0	0	0	0
Out-patient clinics and offices	2	2	2	0
Alternative health out-patient clinics and offices	0	0	0	0
Psychiatric out-patient clinics and offices	0	0	0	0
Chiropractors	3	3	3	0
Hospice care centers	0	0	0	0
Childbirth centers	0	0	0	0

Kidney dialysis centers	0	0	0	0
Blood centers	0	0	0	0
Dental clinics and offices	8	7	7	0
Facilities for Housing Patients				
Nursing homes	2	2	2	0
Boarding homes	0	0	0	0
Residential treatment centers	0	0	0	0
Other Medical-Related Facilities				
Mortuaries	0	0	0	0
Morgues and autopsy facilities (not in hospitals)	0	0	0	0
Veterinarian offices, clinics and hospitals	1	0	0	0
All other (describe in Part 6: Comments on page 6)	0	0	0	0
Totals	16	14	14	0

[1] Count multiple connections or parallel installations to the same premises as separate connections.

[2] Count only connections with premises isolation AGs or RPs (RPBA or RPDA). Don't include connections with in-premises protection only or connections with DCVAs or DCDAs installed for premises isolation.

[3] Count only connections whose premises isolation preventers were inspected (AG) or tested (RP's) within the last 12 months. The number in Column C can't be larger than the number in Column B in the same row.

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Part 4A: Backflow Preventer Inventory and Testing Data During Year 2008

- Complete all cells. Count only backflow preventers relied on to protect the public water system. Enter zero (0) if no backflow preventers in the category. Count only backflow preventers relied on to protect the public water system.
- **If PWS records don't distinguish between premises isolation and in-premises protection preventers, *enter all data in Premises Isolation Section (rows 1-7) and check the box in the Premises Isolation heading row (above row 1).***
- Count AVBs on irrigation systems only. **If you don't track AVBs, check box above the "AVB" column.**
- Count multiple tests (or failures) for any particular backflow preventer as one test (or failure) for that backflow preventer.
- Count each assembly separately for multiple service connections or parallel installations. Count DCDAs and RPDAs as single assemblies, not parallel installations.
- Count assemblies installed on dedicated fire or irrigation lines as Premises Isolation Assemblies.

If PWS does not track AVBs check here: ☐

	Backflow Preventer Category and Testing / Inspection Information	Air Gap	RPBA	RPDA	DCVA	DCDA	PVBA	SVBA
Premises Isolation, including preventers isolating PWS-owned facilities. *If In-Premises Protection preventers are also included, check here* ☐								
Rows 1-3 pertain ONLY to Premises Isolation preventers in service at beginning of 2008								
1	In service at beginning of 2008	2	47	2	175	0	0	0
2	Inspected and/or Tested in 2008[1]	2	47	2	143	0	0	0
3	Failed Inspection or Test in 2008	0	5	0	12	0	0	0
Rows 4 - 6 pertain ONLY to NEW Premises Isolation preventers installed during 2008								
4	New preventers installed in 2008[2]	0	27	0	13	0	0	0

5	Inspected and/or Tested in 2008[1]	0	27	0	13	0	0	0	
6	Failed inspection or test in 2008	0	0	0	0	0	0	0	
7	Preventers taken out of service in 2008[3]	0	0	0	0	0	0	0	
Premises Isolation Total at end of 2008		2	74	2	188	0	0	0	
Backflow Preventer Category and Testing/Inspection Information		**Air Gap**	**RPBA**	**RPDA**	**DCVA**	**DCDA**	**PVBA**	**SVBA**	
In-Premises Protection (Fixture Protection or Area Isolation), including preventers withi owned facilities.									
Rows 8 - 10 pertain ONLY to In-Premises Protection preventers in service at beginning									
8	In service at the beginning of 2008	0	0	0	0	0	0	0	
9	Inspected and/or Tested in 2008[1]	0	0	0	0	0	0	0	
10	Failed Inspection or Test in 2008	0	0	0	0	0	0	0	
Rows 11 - 13 pertain ONLY to NEW In-Premises Protection presenters installed during 2									
11	New preventers installed in 2008[2]	0	0	0	0	0	0	0	
12	Inspected and/or Tested in 2008[1]	0	0	0	0	0	0	0	
13	Failed inspection or test in 2008	0	0	0	0	0	0	0	
14	Preventers taken out of service in 2008[3]	0	0	0	0	0	0	0	

In-Premises Protection Total at end of 2008	0	0	0	0	0	0	0
Grand Total at end of 2008	2	74	2	188	0	0	0

[1]Initial and/or routine annual inspection (for proper installation and approval status) and/or test (for testable assemblies only using DOH/USC test procedures).

[2]Includes preventers installed on connections where backflow prevention was not previously required and any preventers that replaced those in service at the beginning of 2008. Replacement preventers may be of a different type than the original.

[3]New or existing preventers taken out of service, whether or not they were replaced by the same or different type of preventer.

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Part 4B: Other Implementation Activities in 2008

Complete all cells. Enter zero (0) if not applicable.

Activity or Condition	Number
New service connections evaluated in 2008 for cross-connection hazards to PWS.	152
New service connections requiring backflow protection to protect PWS.[1]	38
Existing service connections evaluated in 2008 for cross-connection hazards to PWS.	3
Existing service connections requiring backflow protection to protect PWS.[1,2]	3
Exceptions granted in 2008 to high-hazard premises per WAC 246-290-490(4)(b).[3]	0
CCC enforcement actions taken by PWS during 2008.[4]	1

[1]Include services where either premises isolation or in-premises preventers were required to protect the PWS.

[2]Include existing services that need new, additional or higher level backflow prevention.

[3]A DOH Exceptions to High Health Hazard Premises Isolation Requirements Form (green) *must* be attached for each exception granted during the year.

[4]"Enforcement actions" mean actions taken by the PWS (such as water shut-off, PWS installation of backflow preventer) when the customer fails to comply with PWS's CCC requirements.

Part 5: Backflow Incidents, Risk Factors and IndicaIndicators during 2008

	Backflow Incidents, Risk Factors and Indicators during 2008	Number (Enter 0 if none)	Check if Data Not Available
Backflow Incidents during 2008			
1	Backflow incidents that contaminated the PWS.[5]	0	☐
2	Backflow incidents that contaminated the customer's drinking water system ***only***.[5]	0	☐

		?	
Risk Factors for Backflow during 2008			
3	Distribution main breaks per 100 miles of pipe.	2.00	☐
4	Low pressure events (<20 psi in PWS distribution system).	0	☐
5	Water outage events.	0	☐
Indicators of Possible Backflow during 2008			
6	Total health-related complaints received by PWS.[6]	0	☐
7	Received during BWA or PN events.[7]	0	☐
8	Received during low pressure or water outage events.	0	☐
9	Total aesthetic complaints (color, taste, odor, air in lines, etc.).	11	☐
10	Received during BWA or PN events.[7]	0	☐
11	Received during low pressure or water outages events.	0	☐

[5]Complete and submit a Backflow Incident Report form for each known backflow incident.
[6]Such as stomach ache, headache, vomiting, diarrhea, skin rashes, etc.
[7]**"BWA"** means ***Boil Water Advisory*** and **"PN"** means ***Public Notification*** for water quality reasons.

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Part 6: Comments and Clarifications

Enter comments or clarifications to any of the information included in this report.

- Please delete comments that are no longer valid.

Part No.	Date Added	Comment
General	5/7/09	ADD ROW

Part 7: Report Completion Information

Enter dates in MM/DD/YYYY format.

I certify that the information provided in this CCC Activities Report is complete and accurate to the best of my knowledge.		
CCC Program Mgr. Name[1]: Kevin Ray		Title: Public Work Field Superv
Signature:		Date: 05/07/2009
Phone: (360) 458 - 8406	E-mail: kevinr@ci.yelm.wa.us This field is required.	
I have reviewed this report and certify that the information provided is complete and accurate to the best of my knowledge.		
PWS Mgr./Owner Name[2]: Edward Smith		Title: Water Operator
Signature:	Op. Cert. No.: 4221	Date: 05/07/2009

[1] The CCC Program Manager is generally the CCS responsible for developing and implementing the PWS's CCC program.

[2] The person that the CCC Program Manager reports to or other manager having direct responsibility for and/or oversight of the CCC program. This person doesn't need to be in charge of the entire water system.

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- Please delete comments that are no longer valid.

Part No.	Date Added	Comment
General	5/7/09	ADD ROW

Part 7: Report Completion Information

Enter dates in MM/DD/YYYY format.

I certify that the information provided in this CCC Activities Report is complete and accurate to the best of my knowledge.		
CCC Program Mgr. Name[1]: Kevin Ray		Title: Public Work Field Superv
Signature:		Date: 05/07/2009
Phone: (360) 458 - 8406	E-mail: kevinr@ci.yelm.wa.us This field is required.	
I have reviewed this report and certify that the information provided is complete and accurate to the best of my knowledge.		
PWS Mgr./Owner Name[2]: Edward Smith		Title: Water Operator
Signature:	Op. Cert. No.: 4221	Date: 05/07/2009

[1] The CCC Program Manager is generally the CCS responsible for developing and implementing the PWS's CCC program.

[2] The person that the CCC Program Manager reports to or other manager having direct responsibility for and/or oversight of the CCC program. This person doesn't need to be in charge of the entire water system.

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