

## **Appendix A**

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### Department of Health Documents

- SEPA Environmental Checklist and Determination of Non-Significance (DNS)
- Consistency Review Letters and Signed Forms (City of Kelso, City of Longview, Cowlitz County, Beacon Hill Water & Sewer District)
- City of Kelso Water Facilities Inventory (WFI) Form
- Sanitary Survey 2012
- Water Use Efficiency Reports – 2009, 2010, 2011

Note: Waiting for Determination of Non-Significance and Signed Consistency Review Forms as of 3/6/2013.

**WAC 197-11-960 Environmental checklist.**

ENVIRONMENTAL CHECKLIST

A. BACKGROUND

1. Name of proposed project, if applicable:

City of Kelso, Water System Plan Update

2. Name of applicant: City of Kelso

3. Address and phone number of applicant and contact person:

Michael Kardas, Senior Civil Engineer  
203 S. Pacific Ave, Suite 205  
Kelso, WA 98626  
360-577-3376

4. Date checklist prepared: June 15, 2012

5. Agency requesting checklist: Washington State Department of Health

6. Proposed timing or schedule (including phasing, if applicable):

The water system plan evaluates the existing water system and projects future needs to the year 2032. The water system plan will be adopted by the City of Kelso's City Council following approval of the draft plan by DOH. This action is expected to be taken winter 2013. The City of Longview and Beacon Hill Water & Sewer District will have the opportunity to review Kelso's water system plan.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

The Water System Plan Update identifies several capital improvement projects needed to ensure safe and reliable delivery of drinking water to the residents connected to the City of Kelso's water system over the 6- and 20-year planning period. Implementation of the Water System Plan will lead to the construction and reconstruction of water mains, reservoirs, pumping stations, and other components of the City's water system. Also, the City's water plan may be amended at any time.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

Environmental checklist will be prepared for specific projects recommended in the plan if they are determined to not be categorically exempt under SEPA.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

None known.

10. List any government approvals or permits that will be needed for your proposal, if known.

The Water System Plan must be approved by DOH and Kelso's City Council.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

The Water System Plan Update examines the City of Kelso’s current water system to evaluate any needed improvements in the next 6- and 20-year planning periods based on predicted population growth, changing regulations, and aging infrastructure. The plan also contains recommendations for conservation activities, budgeting for needed improvements and documenting of current operating procedures. An Implementation Schedule for system improvements along with an analysis of possible funding sources is included in the Water System Plan.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The area covered by this Water System Plan includes the City of Kelso and the unincorporated areas as identified in the Water System Plan service area. The Water System Plan contains several maps showing the geographical extent of the area covered by the plan.

B. ENVIRONMENTAL ELEMENTS

1. **Earth**

a. General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other . . . . .

b. What is the steepest slope on the site (approximate percent slope)?

Approximately 30 percent.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

The soils in and around Kelso are mostly silt loam and silty clay loams. Soils made up partly or entirely of sand can be found adjacent to the Cowlitz and Columbia rivers. .

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

Certain isolated locales within the urban area are known to have unstable soils. These areas are too small and numerous to list in this SEPA checklist. The Cowlitz-Wahkiakum Council of Governments maintains maps showing many of these unstable soil areas. There are certain areas in the service area that contain active or ancient landslide topography. Projects identified in the plan that are proposed in or near these landslide areas will be required to have site specific geotechnical evaluations prior to implementation.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

Not applicable.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

Not applicable.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

Not applicable.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

Not applicable.

## 2. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

Dust could be blown into the air during construction of the recommended improvements.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

Not applicable.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

Not applicable.

## 3. Water

a. Surface:

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

Portions of the Columbia, Coweeman, and Cowlitz rivers are located within the study area. There are not any lakes of importance in the water service area defined in the water system plan.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

The plan identifies installation of a test well on Mill Street adjacent to the Cowlitz River. Additionally, other minor improvements proposed by the plan may be located within 200 feet of the waters described above. Specific plans for these improvements are not currently available.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

Not applicable.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

Implementation of the water plan will result in the continued withdrawal of water from the Cowlitz River. The amount of water withdrawn from the Cowlitz River in the year 2032 will be 4.3 MGD by the Kelso WTP.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

The City's current Ranney collector and proposed Mill Street test well are in the 100-year flood plan. The rest of the study area is either above the level of the 100-year flood or protected behind a system of dikes.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No.

b. Ground:

1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.

The City plans to install a Test well at Mill Street along the Cowlitz River. It is anticipated that the Mill Street test will be considered Groundwater Under the Influence of Surface Water.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

Not applicable.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

Not applicable.

2) Could waste materials enter ground or surface waters? If so, generally describe.

Not applicable.

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

Not applicable.

**4. Plants**

a. Check or circle types of vegetation found on the site:

- X\_\_\_\_\_ deciduous tree: alder, maple, aspen, other
- X\_\_\_\_\_ evergreen tree: fir, cedar, pine, other
- X\_\_\_\_\_ shrubs
- X\_\_\_\_\_ grass
- X\_\_\_\_\_ pasture
- X\_\_\_\_\_ crop or grain
- X\_\_\_\_\_ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
- X\_\_\_\_\_ water plants: water lily, eelgrass, milfoil, other
- \_\_\_\_\_ other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

Minor amounts of vegetation listed in 4a may be removed, altered or disturbed as a result of future capital improvement projects identified in the plan.

c. List threatened or endangered species known to be on or near the site.

Not known.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Not applicable.

**5. Animals**

a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

- birds: hawk, heron, eagle, songbirds, other: All
- mammals: deer, bear, elk, beaver, other: All
- fish: bass, salmon, trout, herring, shellfish, other: All

b. List any threatened or endangered species known to be on or near the site.

Bald eagles occasionally fly over the City of Kelso. Some may nest in the study area. Salmon and smelt are present in the rivers mentioned above in 3.(a)1. The study area has representation on the WRIA committees and collaborates with the Lower Columbia Fish Recovery Board (LCFRB) in efforts to preserve and restore habitat for the threatened salmonoid and smelt populations.

c. Is the site part of a migration route? If so, explain.

The study area is located in a portion of the Pacific flyway migration route that is used by waterfowl and other species of birds. The rivers in the study area are part of the annual salmonoid migration route to upstream spawning grounds.

d. Proposed measures to preserve or enhance wildlife, if any:

The City of Kelso collaborates with the LCFRB to preserve and restore habitat for the threatened salmonoid and smelt populations. No other impacts to wildlife are expected as a result of approval of the water plan, therefore no wildlife enhancement measures are proposed.

**6. Energy and natural resources**

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Electricity is used to operate the well pumps, treatment equipment, and distribution system pump stations.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No.

- c. What kinds of energy conservation features are included in the plans of this proposal?  
List other proposed measures to reduce or control energy impacts, if any:

Not applicable.

**7. Environmental health**

- a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

None known.

- 1) Describe special emergency services that might be required.

The plan describes emergency operational procedures that might be required in the event of equipment failure and contamination of the water supply. Approval of the Water System Plan is not expected to result in the need for any other emergency services.

- 2) Proposed measures to reduce or control environmental health hazards, if any:

Not applicable.

**b. Noise**

- 1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

Not applicable.

- 2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Construction noises may be created in the daytime during construction of the recommended projects.

- 3) Proposed measures to reduce or control noise impacts, if any:

Not applicable.

**8. Land and shoreline use**

- a. What is the current use of the site and adjacent properties?

A wide range of urban and rural land exists within the study area, including residential, commercial, industrial, agricultural, and open space.

- b. Has the site been used for agriculture? If so, describe.

Not applicable.

- c. Describe any structures on the site.

Numerous residential, commercial, industrial, agricultural, and public use structures exist within the study area.

- d. Will any structures be demolished? If so, what?

No occupied structures will be demolished as a result of the adoption or approval of the Water System Plan. Demolition of existing utility reservoirs and pump stations may take place within the future capital improvement projects identified.

e. What is the current zoning classification of the site?

The zoning districts in the City of Kelso vary from residential to commercial and industrial. .

f. What is the current comprehensive plan designation of the site?

The City of Kelso completed the latest comprehensive plan in 2006. The comprehensive plan contains classifications for specific uses including residential, commercial, industrial and agricultural.

g. If applicable, what is the current shoreline master program designation of the site?

Most of the study area has an urban shoreline designation. .

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

No.

i. Approximately how many people would reside or work in the completed project?

The population of the City of Kelso was 11,925 in 2010 according to the US Census.

j. Approximately how many people would the completed project displace?

None.

k. Proposed measures to avoid or reduce displacement impacts, if any:

Not applicable.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

The Water System Plan is based upon planned land used recommended in the City of Kelso's comprehensive plan and zoning ordinances.

## 9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

Not applicable.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

Not applicable.

c. Proposed measures to reduce or control housing impacts, if any:

Not applicable.



**10. Aesthetics**

- a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

Water reservoirs may be built to a height of 40 feet.

- b. What views in the immediate vicinity would be altered or obstructed?

None known.

- c. Proposed measures to reduce or control aesthetic impacts, if any:

When necessary, water storage and pumping facilities will be screened from view.

**11. Light and glare**

- a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

Not applicable.

- b. Could light or glare from the finished project be a safety hazard or interfere with views?

No.

- c. What existing off-site sources of light or glare may affect your proposal?

None.

- d. Proposed measures to reduce or control light and glare impacts, if any:

Not applicable.

**12. Recreation**

- a. What designated and informal recreational opportunities are in the immediate vicinity?

Numerous recreational opportunities and facilities are located in and around the study area.

- b. Would the proposed project displace any existing recreational uses? If so, describe.

No.

- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

Not applicable.

**13. Historic and cultural preservation**

- a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

There are a number of historically significant structures and other objects in the study area. None are expected to be affected by adoption of the plan or implementation of its recommendations.

- b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

Not applicable.

- c. Proposed measures to reduce or control impacts, if any:

If objects or structures of potential historic or cultural importance are discovered during excavation, they will be handled in accordance with the requirements of the Antiquities Act, Section 106.

#### 14. Transportation

- a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

The City of Kelso has too many streets, roads, and highways to list in this checklist. Refer to the figures contained in the plan for information regarding their location.

- b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

Not applicable.

- c. How many parking spaces would the completed project have? How many would the project eliminate?

Not applicable.

- d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

No.

- e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

Not applicable.

- f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

Not applicable.

- g. Proposed measures to reduce or control transportation impacts, if any:

Not applicable.

**15. Public services**

- a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

Natural growth during the time covered by the Water System Plan will require an increased need for all types of public services in study area. Approval and adoption of the plan will neither add nor subtract from the need for those services.

- b. Proposed measures to reduce or control direct impacts on public services, if any.

Not applicable.

**16. Utilities**

- a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.

All of the above.

- b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

Not applicable.

**C. SIGNATURE**

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature:

Date Submitted:

## D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS

(do not use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

The approval of adoption of the Water System Plan will not increase discharge to water, emissions to air, noise production, or production, storage, or release of hazardous substances. Construction activities associated with the capital improvement projects identified in the plan may cause minor, temporary impacts to the environment as the result of dust, noise, and run-off associated with normal construction procedures.

Proposed measures to avoid or reduce such increases are:

Specific projects, such as those identified above, will be subject to individual environmental reviews as part of the project report requirement identified by WAC 246-290-110 (4)(a)(i).

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

The approval of adoption of the Water System Plan will not impact plants, animals, fish, or marine life. Construction activities associated with the capital improvement projects identified in the plan may cause minor, temporary impacts to plant life as the result of dust, noise, and run-off associated with normal construction procedures.

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

Specific projects, such as those identified above, will be subject to individual environmental reviews as part of the project report requirement identified by WAC 246-290-110 (4)(a)(i).

3. How would the proposal be likely to deplete energy or natural resources?

No capital improvement projects identified in the plan will significantly increase the energy usage by the City of Kelso's water system.

Proposed measures to protect or conserve energy and natural resources are:

Not applicable.

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

No capital improvement projects identified in the plan are expected to affect sensitive areas or areas designated for governmental protection.

Proposed measures to protect such resources or to avoid or reduce impacts are:

Not applicable.

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

No capital improvement projects identified in the plan will allow or encourage land or shoreline uses that are incompatible with the existing comprehensive plan.

Proposed measures to avoid or reduce shoreline and land use impacts are:

Not applicable.

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Implementation of the Water System Plan will not increase demands on transportation or public services. The Water System Plan relied upon existing growth projections to develop the water infrastructure requirements to support the projected growth.

Proposed measures to reduce or respond to such demand(s) are:

None.

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

No conflicts are known.

# Kennedy/Jenks Consultants

## Engineers & Scientists

32001 32nd Avenue South, Suite 100  
Federal Way, Washington 98001  
253-835-6400  
FAX: 253-952-3435

19 October 2012

Mr. Steve Langdon  
City Planning Manager  
City of Longview  
1525 Broadway  
Longview, Washington 98632

Subject: City of Kelso 2012 Water System Plan  
Department of Health Planning Consistency Review Form  
K/J 1197012.00

Dear Mr. Langdon:

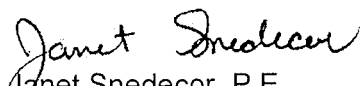
The City of Kelso is in the process of updating their 2012 Water System Comprehensive Plan. As part of the planning process, the State of Washington requires that a review be completed to determine consistency with other local plans and regulations.

On behalf of the City of Kelso, Kennedy/Jenks Consultants is providing you with the information necessary for the completion of the Planning Consistency Review. Enclosed you will find a Consistency Review Checklist and a CD containing the City of Kelso's draft 2012 Water System Plan. Please review the applicable sections then complete and return the Consistency Review Checklist to the City of Kelso, attention Mr. Michael Kardas at the following address:

Michael Kardas, Senior Civil Engineer  
City of Kelso  
203 South Pacific Avenue, Suite 205  
Kelso, Washington 98626

Your assistance is appreciated.

Very truly yours,

  
Janet Snedecor, P.E.  
Project Manager

cc: Michael Kardas, Senior Civil Engineer, City of Kelso

Enclosures:

Consistency Review Checklist  
City of Kelso, Draft 2012 Water System Plan (on CD)

# Kennedy/Jenks Consultants

## Engineers & Scientists

32001 32nd Avenue South, Suite 100  
Federal Way, Washington 98001  
253-835-6400  
FAX: 253-952-3435

19 October 2012

Ms. Nancy Malone  
Community Development Manager  
City of Kelso, Community Development  
203 South Pacific Avenue, Suite 205  
Kelso, Washington 98626

Subject: City of Kelso 2012 Water System Plan  
Department of Health Planning Consistency Review Form  
K/J 11970012.00

Dear Ms. Malone:

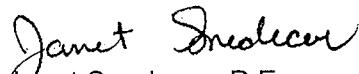
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Michael Kardas, Senior Civil Engineer  
City of Kelso  
203 South Pacific Avenue, Suite 205  
Kelso, Washington 98626

Your assistance is appreciated.

Very truly yours,

  
Janet Snedecor, P.E.  
Project Manager

cc: Michael Kardas, Senior Civil Engineer, City of Kelso

Enclosures:

Consistency Review Checklist  
City of Kelso, Draft 2012 Water System Plan (on CD)

# Kennedy/Jenks Consultants

## Engineers & Scientists

32001 32nd Avenue South, Suite 100  
Federal Way, Washington 98001  
253-835-6400  
FAX: 253-952-3435

19 October 2012

Mr. Phillip Rupp  
Planning Manager  
Cowlitz Department of Building and County Planning  
207 4<sup>th</sup> Avenue North  
Kelso, Washington 98626

Subject: City of Kelso 2012 Water System Plan  
Department of Health Planning Consistency Review Form  
K/J 1197012.00

Dear Mr. Rupp:

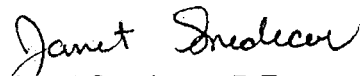
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Michael Kardas, Senior Civil Engineer  
City of Kelso  
203 South Pacific Avenue, Suite 205  
Kelso, Washington 98626

Your assistance is appreciated.

Very truly yours,

  
Janet Snedecor, P.E.  
Project Manager

cc: Michael Kardas, Senior Civil Engineer, City of Kelso

Enclosures:

Consistency Review Checklist  
City of Kelso, Draft 2012 Water System Plan (on CD)



# Kennedy/Jenks Consultants

## Engineers & Scientists

32001 32nd Avenue South, Suite 100  
Federal Way, Washington 98001  
253-835-6400  
FAX: 253-952-3435

19 October 2012

Ms. Kim Adamson  
General Manager  
Beacon Hill Water and Sewer District  
1121 West Side Hwy  
Kelso, Washington 98626

Subject: City of Kelso 2012 Water System Plan  
Department of Health Planning Consistency Review Form  
K/J 1197012.00

Dear Ms. Adamson:


The City of Kelso is in the process of updating their 2012 Water System Comprehensive Plan. As part of the planning process, the State of Washington requires a review be completed to determine consistency with other local plans and regulations.

On behalf of the City of Kelso, Kennedy/Jenks Consultants is providing you with the information necessary for the completion of the Planning Consistency Review. Enclosed you will find a Consistency Review Checklist and a CD containing the City of Kelso's draft 2012 Water System Plan. Please review the applicable sections, then complete and return the Consistency Review Checklist to the City of Kelso, attention Mr. Michael Kardas at the following address:

Michael Kardas, Senior Civil Engineer  
City of Kelso  
203 South Pacific Avenue, Suite 205  
Kelso, Washington 98626

Your assistance is appreciated.

Very truly yours,

  
Janet Snedecor, P.E.

Project Manager

cc: Michael Kardas, Senior Civil Engineer, City of Kelso

Enclosures:

Consistency Review Checklist  
City of Kelso, Draft 2012 Water System Plan (on CD)



# WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 1  
 Updated: 02/12/2013  
 Printed: 2/17/2013

WFI Printed For: On-Demand  
 Submission Reason: Pop/Connect

RETURN TO: Southwest Regional Office, PO Box 47823, Olympia, WA, 98504

| 1. SYSTEM ID NO. | 2. SYSTEM NAME | 3. COUNTY | 4. GROUP | 5. TYPE |
|------------------|----------------|-----------|----------|---------|
| 38000 L          | KELSO, CITY OF | COWLITZ   | A        | Comm    |

| 6. PRIMARY CONTACT NAME & MAILING ADDRESS                  | 7. OWNER NAME & MAILING ADDRESS                                  | 8. Owner Number 002935 |
|--|--|------------------------|
| PAUL L. REEBS [WTP SUPV]<br>PO BOX 819<br>KELSO, WA 98626  | KELSO, CITY OF<br>PAUL L. REEBS<br>PO BOX 819<br>KELSO, WA 98626 | TITLE: WTP SUPV        |
| STREET ADDRESS IF DIFFERENT FROM ABOVE                     | STREET ADDRESS IF DIFFERENT FROM                                 |                        |
| ATTN<br>ADDRESS 710 S 1ST<br>CITY KELSO STATE WA ZIP 98626 | ATTN<br>ADDRESS<br>CITY STATE ZIP                                |                        |

| 9. 24 HOUR PRIMARY CONTACT INFORMATION            | 10. OWNER CONTACT INFORMATION           |
|---|---|
| Primary Contact Daytime Phone: (360) 577-1085     | Owner Daytime Phone: (360) 577-1085     |
| Primary Contact Mobile/Cell Phone: (360) 957-3850 | Owner Mobile/Cell Phone: (360) 957-3850 |
| Primary Contact Evening Phone: (xxx) xxx-xxxx     | Owner Evening Phone: (xxx) xxx-xxxx     |
| Fax:(360) 423-8196   E-mail: XXXXXX               | Owner Fax Phone:   E-mail: XXXXXX       |

**WAC 246-290-420(9) requires that water systems provide 24-hour contact information for emergencies.**

| 11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)           |                                   |
|--|-----------------------------------|
| <input checked="" type="checkbox"/> Not applicable (Skip to #12) |                                   |
| <input type="checkbox"/> Owned and Managed                       | SMA NAME: _____ SMA Number: _____ |
| <input type="checkbox"/> Managed Only                            |                                   |
| <input type="checkbox"/> Owned Only                              |                                   |

| 12. WATER SYSTEM CHARACTERISTICS (mark all that apply)                                     |   |   |
|--|---|---|
| <input type="checkbox"/> Agricultural  | <input type="checkbox"/> Hospital/Clinic                          | <input checked="" type="checkbox"/> Residential                               |
| <input checked="" type="checkbox"/> Commercial / Business                                  | <input checked="" type="checkbox"/> Industrial                    | <input checked="" type="checkbox"/> School                                    |
| <input checked="" type="checkbox"/> Day Care   | <input checked="" type="checkbox"/> Licensed Residential Facility | <input type="checkbox"/> Temporary Farm Worker                                |
| <input checked="" type="checkbox"/> Food Service/Food Permit                               | <input checked="" type="checkbox"/> Lodging                       | <input checked="" type="checkbox"/> Other (church, fire station, etc.): _____ |
| <input checked="" type="checkbox"/> 1,000 or more person event for 2 or more days per year | <input checked="" type="checkbox"/> Recreational / RV Park        |   |

| 13. WATER SYSTEM OWNERSHIP (mark only one)   | 14. STORAGE CAPACITY (gallons) |
|--|--------------------------------|
| <input type="checkbox"/> Association<br><input checked="" type="checkbox"/> City / Town<br><input type="checkbox"/> County<br><input type="checkbox"/> Federal<br><input type="checkbox"/> Investor<br><input type="checkbox"/> Private<br><input type="checkbox"/> Special District<br><input type="checkbox"/> State | 5,150,000                      |

| 15<br>Source Number | 16<br>SOURCE NAME<br><br>LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER.<br><br>Example: WELL #1 XYZ456<br><br>IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME<br>Example: SFATTI E | 17<br>INTERTIE<br>SYSTEM ID NUMBER | 18<br>SOURCE CATEGORY |            |                |        |                        |           |               |               |       |           | 19<br>USE | 20 | 21<br>TREATMENT |           |                |      |              | 22<br>DEPTH | 23 | 24<br>SOURCE LOCATION |              |                  |       |                                      |                               |
|---------------------|--|------------------------------------|-----------------------|------------|----------------|--------|------------------------|-----------|---------------|---------------|-------|-----------|-----------|----|-----------------|-----------|----------------|------|--------------|-------------|----|-----------------------|--------------|------------------|-------|--------------------------------------|-------------------------------|
|                     |  |                                    | WELL                  | WELL FIELD | WELL IN A WELL | SPRING | SPRING IN SPRING FIELD | SEA WATER | SURFACE WATER | RANNEY / INF. | OTHER | PERMANENT |           |    | SEASONAL        | EMERGENCY | SOURCE METERED | NONE | CHLORINATION |             |    | FILTRATION            | FLUORIDATION | IRRADIATION (UV) | OTHER | DEPTH TO FIRST OPEN INTERVAL IN FEET | CAPACITY (GALLONS PER MINUTE) |
| S02                 | RANNEY   |                                    |                       |            |                |        |                        |           |               |               |       |           | X         | X  |                 | Y         | X              | X    | X            | X           |    |                       | 2500         | SE SE            | 27    | 08N                                  | 02                            |
| S03                 | 48100/Longview Water Dept  | 48100 R                            |                       |            |                |        |                        |           |               |               |       |           |           | X  |                 | Y         | X              |      |              |             |    |                       | 1000         |                  | 02    | 08N                                  | 02                            |

# WATER FACILITIES INVENTORY (WFI) FORM - Continued

|                                |   |                             |                      |                        |
|--------------------------------|---|-----------------------------|----------------------|------------------------|
| <b>1. SYSTEM ID</b><br>38000 L | <b>2. SYSTEM NAME</b><br>KELSO, CITY OF | <b>3. COUNTY</b><br>COWLITZ | <b>4. GROUP</b><br>A | <b>5. TYPE</b><br>Comm |
|--------------------------------|---|-----------------------------|----------------------|------------------------|

|   | ACTIVE SERVICE CONNECTIONS | DOH USE ONLY!<br>CALCULATED ACTIVE CONNECTIONS | DOH USE ONLY!<br>APPROVED CONNECTIONS |
|---|----------------------------|--|---------------------------------------|
| <b>25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)</b>  | 0                          | 4875   | Unspecified                           |
| A. Full Time Single Family Residences (Occupied 180 days or more per year)  | 3749                       |  |                                       |
| B. Part Time Single Family Residences (Occupied less than 180 days per year)  | 0                          |  |                                       |
| <b>26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)</b>                              |                            |  |                                       |
| A. Apartment Buildings, condos, duplexes, barracks, dorms   | 183                        |  |                                       |
| B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year | 1126                       |  |                                       |
| C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year | 0                          |  |                                       |
| <b>27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)</b>                                     |                            |  |                                       |
| A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)         | 0                          | 0  |                                       |
| B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.                                  | 360                        | 360  |                                       |
| <b>28. TOTAL SERVICE CONNECTIONS</b>  |                            | <b>5235</b>                                    |                                       |

|  |       |
|--|-------|
| <b>29. FULL-TIME RESIDENTIAL POPULATION</b>                          |       |
| A. How many residents are served by this system 180 or more days per | 12288 |

| <b>30. PART-TIME RESIDENTIAL POPULATION</b>             | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| A. How many part-time residents are present each month? |     |     |     |     |     |     |     |     |     |     |     |     |
| B. How many days per month are they present?            |     |     |     |     |     |     |     |     |     |     |     |     |

| <b>31. TEMPORARY &amp; TRANSIENT USERS</b>   | JAN   | FEB   | MAR   | APR   | MAY   | JUN   | JUL   | AUG   | SEP   | OCT   | NOV   | DEC   |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month? | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 |
| B. How many days per month is water accessible to the public?  | 30    | 30    | 30    | 30    | 30    | 30    | 30    | 30    | 30    | 30    | 30    | 30    |

| <b>32. REGULAR NON-RESIDENTIAL USERS</b>  | JAN  | FEB  | MAR  | APR  | MAY  | JUN  | JUL  | AUG  | SEP  | OCT  | NOV  | DEC  |
|---|------|------|------|------|------|------|------|------|------|------|------|------|
| A. If you have schools, daycares, or businesses connected to your water system, how many students daycare children and/or employees are present each month? | 1967 | 1967 | 1967 | 1967 | 1967 | 1642 | 1642 | 1842 | 1967 | 1967 | 1967 | 1967 |
| B. How many days per month are they present?  | 20   | 20   | 20   | 20   | 20   | 20   | 20   | 20   | 20   | 20   | 20   | 20   |

| <b>33. ROUTINE COLIFORM SCHEDULE</b> | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                                      | 15  | 15  | 15  | 15  | 15  | 15  | 15  | 15  | 15  | 15  | 15  | 15  |

**35. Reason for Submitting WFI:**

Update - Change  
  Update - No Change  
  Inactivate  
  Re-Activate  
  Name Change  
  New System  
  Other \_\_\_\_\_

|  |
|--|
| <p><b>36. I certify that the information stated on this WFI form is correct to the best of my knowledge.</b></p> <p>SIGNATURE: _____</p> <p>DATE: _____</p> <p>PRINT NAME: _____</p> <p>TITLE: _____</p> |
|--|

| <u>WS ID</u> | <u>WS Name</u> |
|--------------|----------------|
| 38000        | KELSO, CITY OF |

**Total WFI Printed: 1**



STATE OF WASHINGTON  
DEPARTMENT OF HEALTH  
SOUTHWEST DRINKING WATER REGIONAL OPERATIONS  
P.O. Box 47823 Olympia, Washington 98504-7823  
TDD Relay 1-800-833-6388

|   |                                      |                   |
|---|--------------------------------------|-------------------|
| June 26, 2012<br><br>Paul Reeb<br>City of Kelso<br>Post Office Box 819<br>Kelso, Washington 98626 | <b>Kelso, City of<br/>ID #38000L</b> |                   |
|   | County:                              | Cowlitz           |
|   | System Type:                         | Group A Community |
|   | Operating Permit Color:              | Green             |
|   | Surveyor:                            | Arlene Hyatt      |
|   | Inspection Date:                     | May 1, 2012       |

Thank you for meeting with me and Teresa Walker to conduct a survey of this system. Sanitary surveys are the Office of Drinking Water's (ODW) way to inspect public water systems through a field visit. ODW is also able to offer technical assistance to help utilities improve their system operations and ensure that public health is protected.

Overall, this system appears well managed and the operators were knowledgeable about the system and routine operation and maintenance (O&M). Staff members involved in this survey are clearly committed to the goal of providing safe and reliable drinking water within their community. Keep up the good work!

This report documents the findings of this survey. The following summarizes the deficiencies that require attention.

### SIGNIFICANT DEFICIENCIES

- No significant deficiencies were observed during this survey.

### OTHER FINDINGS

- The Behshel #1 Reservoir has some tree limbs on or near the top of the tank, which should be cut-back. The Behshel #2 Reservoir has plants growing in the gutters installed along the top edge of the tank. Routine maintenance and inspections for all reservoirs should be added to the O&M program. **Please address these issues prior to the next survey.**
- The Behshel Reservoirs #1 and #2 have combined overflows and drains that discharge into a below-grade storm drain. The drain was full of water and could not be inspected during this survey. Therefore, the protection of the overflow could not be verified. This system should install air-gaps on the overflow lines that are screened or otherwise protected and can be easily inspected during routine O&M. **Please address these issues prior to the next survey.**
- The combined drain and overflow at the Rocky Point Reservoir does not seal completely and may allow entry of insects. Please adjust as needed to ensure a tight seal and include inspection of the flapper valve in routine inspections. A rock was found in the line that was large enough to wedge the flapper open. **Please address these issues prior to the next survey.**
- **Please send photos of all reservoir hatches (open and closed), reservoir vent screens, and any other tank penetrations on each reservoir roof by September 30, 2012.**

- Within the 2011 cross-connection annual summary report, this system has identified 18 connections with high hazards and, of these, only 15 are protected by air gap or reduced pressure backflow assembly (RPBA). The report indicates that no exceptions have been granted. This system must either grant exceptions to these facilities in accordance with regulations or proper protections must be installed. **Please address this issue prior to December 31, 2012.**
- The Paxton Road reservoir project included plans for a booster pump station to serve the homes nearest the reservoirs, which have been on individual booster pumps for many years. This system was instructed to install the pump station because individual booster pumps are allowed only as an interim measure. The Paxton Road booster pump station must be installed and the individual booster pumps removed. **Please address these issues within the Water System Plan (WSP) and install the booster station prior to the next survey.**
- Please complete the Water Facilities Inventory (WFI) form with commercial/industrial connections (section 27 B) and estimated populations for transient and non-transient users (Sections 31 A & B and 32 A & B). You may contact Brad Brooks at (360) 236-3049 for assistance with reasonable population estimates. **Please address this issue prior to December 31, 2012.**

## RECOMMENDATIONS

- The Rocky Point Booster station requires both pumps to provide adequate pressures in distribution. This system should consider replacing these pumps with boosters of adequate size to serve the area individually or installing a third pump for reliability.
- Standing water was observed on the upgradient side of both Behshel reservoirs as well as the Carroll Reservoir. This system should improve drainage on the upgradient side of the tank to avoid soil instability or damage to the reservoirs.
- An unscreened drain, possibly from Minor Road reservoir, was found discharging into a ditch. **Please confirm where this discharge originates and screen the outlet, as needed.**

As you complete the items noted above, send me photo verification of the items you have completed. Include the system name, ID number, and the date the deficiencies were corrected. You can send them to me by e-mail at [Arlene.Hyatt@doh.wa.gov](mailto:Arlene.Hyatt@doh.wa.gov) or by mail at PO Box 47823, Olympia, Washington 98504-7823.

As a result of recent regulation changes, all Community water systems in Washington have been changed to a three-year sanitary survey cycle. Systems with no coliform violations, no more than one monitoring violation, and no outstanding significant deficiencies from a previous survey can qualify for reduced survey frequency. This system qualifies for the reduced survey frequency. The next survey will be in five years.

## SYSTEM INFORMATION

In the 1920s, this system supplied treated water from the Cowlitz River. The surface water plant was replaced with a Ranney well in 1979. Iron and Manganese treatment was added in 1984 and upgraded to a surface water treatment plant in 2002. This system currently serves 5,600 connections [more than 12,000 equivalent residential units (ERU)] and is growing at roughly 0.5 percent per year.

## SECTION 1: SOURCE

This system utilizes a Ranney well collector with seven laterals as its source. It was constructed in the late 1970s to replace the original Cowlitz River surface water source. The well has experienced bio-fouling of the laterals by iron reducing bacteria over the years. This system has used monthly super-chlorination of the laterals and routine cleaning by Liquivision divers to address this issue. This system has recently purchased the

necessary equipment to begin the lateral cleaning by city staff and a contracted diver. This system has interties with the Longview Water Department and the Beacon Hill Water and Sewer District. The interties permit water wheeling between the three entities.

| Source ID # | Name:                     | Description:                       |
|-------------|---------------------------|------------------------------------|
| S02         | Ranney                    | Ranney well collector – 7 laterals |
| S03         | Longview Water Department | 48100                              |

The source is more thoroughly described in the *Sanitary Survey of Rapid Rate Filter Plant* report.

**SECTION 2: DISINFECTION**

Disinfection is described within the *Sanitary Survey of Rapid Rate Filter Plant* report.

**SECTION 3: OTHER TREATMENTS**

All treatments are described within the *Sanitary Survey of Rapid Rate Filter Plant* report.

**SECTION 4: DISTRIBUTION SYSTEM**

Treated water is stored in the clear well and pumped to distribution via two high-lift distribution pumps. A pressure switch at each reservoir controls the booster pump stations. This system has 72 miles of distribution piping, which consists of 29 miles of cast iron, 27 miles of ductile iron, 12 miles of asbestos cement, and some PVC and steel. This system maintains their own distribution lines within the city limits and urban growth areas. This system has interties with the City of Longview and Beacon Hill Water and Sewer District and all three have wholesale purchase and water wheeling agreements between services areas. Prior to 2010, the system distribution contained approximately 10 miles of 2- and 4-inch water mains that are deficient for fire flow, and in 2010 there were 19 distribution breaks and 7 low pressure events. However, in the last two years this system has dedicated considerable funds and effort to extensive waterline replacements and associated upgrades. The exact values of distribution upgrades will be contained in the forthcoming WSP. The operator indicated that line breaks and pressure loss events have dropped significantly with only 9 breaks and 10 low pressure events in 2011 and only 3 line breaks had occurred by May 1, 2012.

| FEATURES  | Yes                                 | No                                  |
|---|-------------------------------------|-------------------------------------|
|   | Service area and facility map       | <input checked="" type="checkbox"/> |
| Minimum pressure requirements met                                 | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Service meters (reading frequency _____)                          | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Leak detection program  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Water system leakage (%)  | 12.5                                |                                     |
| Adequate valving for flushing and pipe repair                     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Blow-offs on dead ends  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Routine flushing (frequency: <u>Monthly, Quarterly/Annually</u> ) | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Routing valve exercise (frequency: <u>Annually</u> )              | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

Leak percent was 11.1 in 2009 and 12.5 in 2010. This system performs leak detection investigations on ¼ of the distribution system each year.

| <b>CROSS CONNECTION CONTROL (Community Systems)</b> | Yes                                 | No                       |
|---|-------------------------------------|--------------------------|
| System has enabling authority                       | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Ongoing hazard inspections                          | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| High hazards identified                             | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| High hazards protected                              | 13/18                               |                          |
| Annual testing                                      | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| System has installation standards                   | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

BMI handles this system's cross connection control program. Within the 2011 cross-connection annual report, this system has identified 18 connections with high hazards and of these only 15 are protected by air gap or RPBA's. The report indicates that no exceptions have been granted. This system must either grant exceptions to these facilities in accordance with regulations or proper protections must be installed. In 2011, 99 percent of all installed assemblies were tested as required.

#### **SECTION 5: FINISHED WATER STORAGE**

This system has twelve total storage reservoirs with more than seven million gallons that supply the five pressure zones. One reservoir (Paxton Road #1) is currently off-line for repairs. The reservoirs were installed over time, as needed, with the most recent addition being the Paxton Road Reservoir #2, which addressed a 1.5 million gallon storage deficit noted in the 2005 WSP. Reservoir roof inspections and maintenance should be increased to a minimum of an annual inspection. Moss and plants growing on the roof of Rocky Point and Behshel Heights suggest that maintenance is not consistent or frequent.

| <b>RESERVOIR</b> | <b>RESERVOIR NAME</b> | <b>DESCRIPTION</b> | <b>YEAR BUILT</b> | <b>TOTAL VOLUME (GAL)</b> |
|------------------|-----------------------|--------------------|-------------------|---------------------------|
| 1*               | Minor Road No. 1      | Concrete           |                   | 1 MG                      |
| 2*               | Minor Road No. 2      | Concrete           |                   | 1 MG                      |
| 3*               | Williams Finney       | Welded Steel       |                   | .5 MG                     |
| 4                | Behshel Heights No. 1 | Welded steel       |                   | .25 MG                    |
| 5                | Behshel Heights No. 2 | Bolted steel       |                   | .5 MG                     |
| 6                | Carrolls Road         | Welded Steel       |                   | .5 MG                     |
| 7                | Rocky Point           | Welded Steel       |                   | .5 MG                     |
| 8*               | Paxton Road No. 1     | Welded Steel       |                   | .5 MG                     |
| 9                | Paxton Road No. 2     | Concrete           | 2011              | 2 MG                      |
| 10*              | East Hills No. 1      | Bolted Steel       |                   | .2 MG                     |
| 11*              | East Hills No. 2      | Bolted Steel       |                   | .2 MG                     |
| 12               | Highland Park         | Bolted Steel       | 1998              | .02 MG                    |

\*Inspected at previous survey



| HATCH                     | Behshel 1                |                          | Behshel 2                |                          | Carroll                  |                          |
|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                           | Yes                      | No                       | Yes                      | No                       | Yes                      | No                       |
| Locked                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Watertight seal or gasket | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Over-lapping cover        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| HATCH                     | Highland Park            |                          | Rocky                    |                          | Paxton 2                 |                          |
|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                           | Yes                      | No                       | Yes                      | No                       | Yes                      | No                       |
| Locked                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Watertight seal or gasket | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Over-lapping cover        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

The purveyor will send photos of the hatches.

| FEATURES                               | Behshel 1                           |                                     | Behshel 2                           |                                     | Carroll                             |                                     |
|--|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
|  | Yes                                 | No                                  | Yes                                 | No                                  | Yes                                 | No                                  |
| Separate inlet/outlet                  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Protected drain outlet*                | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Buried                              |                                     |
| Protected overflow outlet*             | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Buried                              |                                     |
| Screened air vent                      | Need photos                         |                                     | Need photos                         |                                     | Need photos                         |                                     |
| Operational water level gauge          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Bypass piping or isolation possibility | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Protected from unauthorized entry      | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Low level alarms                       | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Sample tap at outlet                   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

\*Behshel #1 and #2 have combined overflows and drains that discharge into a below-grade storm drain. The drain was full of water and could not be inspected during this survey. This system should install air-gaps on the overflow lines that are screened or otherwise protected and can be easily inspected during routine O&M.

| FEATURES                               | Highland Park                       |                                     | Rocky                               |                                     | Paxton 2                            |                                     |
|--|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
|  | Yes                                 | No                                  | Yes                                 | No                                  | Yes                                 | No                                  |
| Separate inlet/outlet                  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Protected drain outlet                 | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Protected overflow outlet              | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Screened air vent                      | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| Operational water level gauge          | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Bypass piping or isolation possibility | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Protected from unauthorized entry      | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Low level alarms                       | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

| FEATURES             | Highland Park            |                                     | Rocky                    |                                     | Paxton 2                            |                          |
|----------------------|--------------------------|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|
|                      | Yes                      | No                                  | Yes                      | No                                  | Yes                                 | No                       |
| Sample tap at outlet | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

| MAINTENANCE                      | Behshel 1                           |                          | Behshel 2                           |                          | Carroll                             |                          |
|----------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|
|                                  | Yes                                 | No                       | Yes                                 | No                       | Yes                                 | No                       |
| Frequency of interior inspection | 5 years                             |                          | 5 years                             |                          | 5 years                             |                          |
| Frequency of routine site visit  | Weekly                              |                          | Weekly                              |                          | Weekly                              |                          |
| Exterior in good condition       | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Clear of excessive vegetation    | *                                   | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

\*Behshel #1 has some tree limbs on or near the top of the tank, which should be cut-back. Behshel #2 has plants growing in the gutters installed along the top edge of the tank.

| MAINTENANCE                      | Highland Park                       |                          | Rocky                               |                          | Paxton 2                            |                          |
|----------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|
|                                  | Yes                                 | No                       | Yes                                 | No                       | Yes                                 | No                       |
| Frequency of interior inspection | 5 years                             |                          | 5 years                             |                          | 5 years                             |                          |
| Frequency of routine site visit  | Weekly                              |                          | Weekly                              |                          | Weekly                              |                          |
| Exterior in good condition       | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Clear of excessive vegetation    | <input checked="" type="checkbox"/> | <input type="checkbox"/> | *                                   | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

\*Rocky Point has moss on top of the tank that should be removed to ensure a longer tank life.

## SECTION 6: PRESSURE TANKS

There are two small bladder tanks serving as pump protection at the Rocky Point Booster Pump Station (BPS). Both appear to be in good working condition.

| BLADDER               | Rocky BPS                           |                          |
|-----------------------|-------------------------------------|--------------------------|
|                       | Yes                                 | No                       |
| Isolation valve       | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Pressure relief valve | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Pressure gauge        | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

| BUILDINGS/ENCLOSURE         | Site: 1                             |                          |
|-----------------------------|-------------------------------------|--------------------------|
|                             | Yes                                 | No                       |
| Facility secure             | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Structure in good condition | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

## SECTION 7: BOOSTER PUMPS AND FACILITIES

This system employs seven BPSs to transfer water between reservoirs and to serve the five pressure zones. All BPSs are in the process of upgrades to include structure repairs and addition of telemetry. The Rocky Point Booster Station requires both pumps to provide adequate pressures in distribution. This system should consider

replacing these pumps with boosters of adequate size to serve the area individually or installing a third pump for redundancy. The Paxton Road reservoir project included plans for a booster pump station to serve the homes nearest the reservoirs, which have been on individual booster pumps for many years. This system was instructed to install the pump station because individual booster pumps are allowed only as an interim measure. The Paxton Road booster pump station must be installed and the individual booster pumps removed.

| Facility | Name                              | Description   | Total Capacity (gpm) |
|----------|-----------------------------------|---|----------------------|
| 1*       | Minor Road                        | Two 50-HP Boosters to Williams-Finney reservoir and Pressure Zone | 1600                 |
| 2        | Carroll Road                      | Two 25-HP Boosters to Carroll Road Res. and Pressure Zone         | 260                  |
| 3*       | 18 <sup>th</sup> Ave Pump Station | Two 50-HP Boosters to Behshel Heights Res. and Pressure Zone      | 1200                 |
| 4        | Rocky Point                       | Two 5-HP Boosters to Rocky Point Pressure Zone                    | 150                  |
| 5        | Behshel Heights                   | Three 5-HP, 15-HP and 40-HP to Mt. Brynion Estates Pressure Zone  | 1620                 |
| 6        | Lower Haussler                    | Two 15-HP Boosters to Highland Park Pressure Zone                 | 300                  |
| 7*       | Highland Park                     | Three 15-HP Boosters to East Hills Res. and Pressure Zone         | 525                  |

\*Inspected at previous survey

| BOOSTER PUMPS                   | Carroll                             |                                     | Rocky                               |                                     | Behshel                             |                                     | L. Haussler                         |                                     | Highland                            |                                     |
|---------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
|                                 | Yes                                 | No                                  | Yes                                 | No                                  | Yes                                 | No                                  | Yes                                 | No                                  | Yes                                 | No                                  |
| Number of pumps                 | 2                                   |                                     | 2                                   |                                     | 3                                   |                                     | 3                                   |                                     | 3                                   |                                     |
| Frequency of routine site visit | 2x/week                             |                                     | 2x/week                             |                                     | 2x/week                             |                                     | 2x/week                             |                                     | 2x/week                             |                                     |
| Isolation valves                | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Pressure gauge(s)               | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Pressure relief valve           | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Pump failure alarm              | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Control systems functional      | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Protected from flooding         | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Redundant pumps                 | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Equipment in good condition     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

| BUILDINGS/ENCLOSURE         | Carroll                             |                          | Rocky                               |                          | Behshel                             |                          | L. Haussler                         |                                     | Highland                            |                          |
|-----------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|
|                             | Yes                                 | No                       | Yes                                 | No                       | Yes                                 | No                       | Yes                                 | No                                  | Yes                                 | No                       |
| Facility secure             | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Structure in good condition | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

**SECTION 8: WATER QUALITY MONITORING AND REPORTING**

All monitoring is current and satisfactory.

Refer to the Water Quality Monitoring Report (WQMR) for monitoring requirements. If you have any questions on source monitoring, please contact Sophia Petro at (360) 236-3046.

| Entry Point # | Description                           |
|---------------|---------------------------------------|
| 1             | After treatment prior to distribution |

| CHEMICAL  | Entry Point #1                      |                          |
|---|-------------------------------------|--------------------------|
|   | Yes                                 | No                       |
| Monitoring adequate                                     | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| ODW WQ data reviewed                                    | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Sample collection sites correct                         | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| System has prior:                                       |                                     |                          |
| <input type="checkbox"/> Nitrate results above 5 mg/L   |                                     |                          |
| <input type="checkbox"/> Nitrite results above 0.5 mg/L |                                     |                          |
| <input type="checkbox"/> Primary MCL                    |                                     |                          |
| <input type="checkbox"/> Secondary MCL exceedance(s)    |                                     |                          |
| <input type="checkbox"/> Organic detections             |                                     |                          |
| <input type="checkbox"/> Other _____                    |                                     |                          |

| COLIFORM                          | Yes                                 | No                       |
|-----------------------------------|-------------------------------------|--------------------------|
| Monitoring adequate               | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Monitoring plan adequate          | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Monitoring plan followed          | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| # of violations since last survey | 0                                   |                          |

| LEAD & COPPER              | Yes                                 | No                       |
|----------------------------|-------------------------------------|--------------------------|
| Monitoring adequate        | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Results below action level | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

| DISINFECTION BYPRODUCTS  | Yes                                 | No                       |
|--------------------------|-------------------------------------|--------------------------|
| Monitoring adequate      | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| # of treatment plants    | 1                                   |                          |
| Monitoring plan adequate | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Monitoring plan followed | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Results satisfactory     | Yes                                 |                          |

**SECTION 9: SYSTEM MANAGEMENT AND OPERATIONS**

This system is operated under the auspices of the Kelso Public Works Department Operations Section. The WSP update is currently underway and completion is anticipated by the end of July 2012. The water operations staff hold more than the minimum required certifications and adequate staffing appears to exist for this system based on complexity and size. A telemetry system transmits reservoir water level data to the treatment plant and all booster pumps will be added to the telemetry system upon completion of the booster station work that is currently in progress.

| <b>PROJECT/PLANNING</b>               | Yes                                 | No                                  |
|---------------------------------------|-------------------------------------|-------------------------------------|
| System approved                       | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Current WSP/SWSMP                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Year WSP/SWSMP approved               | 2005                                |                                     |
| Distribution main submittal exception | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Emergency response plan               | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

The joint Longview, Cowlitz PUD (Now Beacon Hill Water and Sewer District) WSP was approved in 2005. Each system is now submitting its own plan for this new planning cycle. The Kelso plan is expected to arrive within the next two months but was due in 2011.

| <b>REPORTING</b>  | Yes                                 | No                       |
|---|-------------------------------------|--------------------------|
| WFI reviewed and updated with purveyor                  | <input type="checkbox"/>            | <input type="checkbox"/> |
| Consumer confidence report (Community's Only)           | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Water use efficiency report (Municipal Water Suppliers) | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Cross connection control annual report (> 1000 conn)    | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

From WUE:

*"Additional measures that will remain or be funded to meet water conservation goals:*

*1) Water bill showing consumption history for residential. 2) Water bill showing consumption history for industrial. 3) CCR w/WUE education for residential. 4) Meter all inerties. 5) Post water saving tips on web site.*

*6) Utilize seasonal rates.*

*2005 ADD was 2.340 MGD and in 2010 ADD was 2.218 MGD, this is a 5.2% reduction and amounts to a reduction of 122,000 gallons per day.*

*2005 MDD was 3.70 MGD and in 2010 MDD was 3.59 MGD, this is about a 2.97% reduction just shy of our 3% goal."*

The Cross Connection Control (CCC) Program is contracted out to BMI backflow (Garrett Yates BAT Cert. B4798). Overall the CCC program appears to meet the requirements with the one noted exception identified in the "Other Findings" section of the cover sheet.

### OPERATOR CERTIFICATION

This system is required to have four certified operators.

| Name of Operator | Certification Number | Certifications    | Mandatory Operator                  |
|------------------|----------------------|-------------------|-------------------------------------|
| Paul Reebs       | 002513               | WTPO3, WDM3, CCS  | <input checked="" type="checkbox"/> |
| Lamont Salte     | 003507               | WTPO3, CCS        | <input checked="" type="checkbox"/> |
| Jason Cook       | 011064               | WDM2, CCS, WTPO2? | <input checked="" type="checkbox"/> |
| M. Randy Johnson | 010952               | WDM2, CCS         | <input checked="" type="checkbox"/> |
| Devin Mackin     | 011613               | WDM2, CCS         |                                     |

WDS-Water Distribution Specialist; WDM-Water Distribution Manager; WTPO-Water Treatment Plant Operator, BTO-Basic Treatment Operator; CCS-Cross Connection Specialist; BAT-Backflow Assembly Tester

If you have any questions or this information is inaccurate, please contact Operator Certification at (800) 525-2536.

| OPERATIONS  | Yes                                 | No                                  |
|---|-------------------------------------|-------------------------------------|
|   | Operational records maintained      | <input checked="" type="checkbox"/> |
| Complaints followed up                              | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Complaints documented                               | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| # of complaints recorded at ODW (since last survey) | 0                                   |                                     |
| Operation and maintenance program                   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Previous survey deficiencies/findings corrected     | See (A) below                       |                                     |

### PREVIOUS SURVEY RECOMMENDATIONS

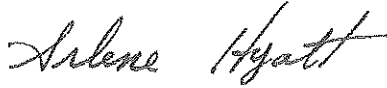
1. This system should continue to inspect and find sources of leaks at the Minor Road reservoir. The concrete tank is leaking and this system has tried divers and epoxy with minimal success.
  - A. This tank continues to leak and the leak location has not been identified.
2. This system should consider the design and installation of a small booster station adequate to serve the Paxton area without fire protection. The City of Kalama may have a spare package booster pump station, which might meet this need.
  - A. The booster station was designed but it has not been installed.
3. This system should begin cross-training additional personnel in treatment plant operations.
  - A. Cross-training has begun with Jason Cook.
4. This system should develop a unidirectional flushing program as part of its annual maintenance.
  - A. A flushing program has been initiated. The areas with the greatest need are flushed monthly. All other areas are flushed either quarterly or annually as water quality indicates.

**CLOSING**

Regulations establishing a schedule of fees, including fees for sanitary surveys, were adopted August 3, 2007 (WAC 246-290-990). An invoice for \$1,836 is enclosed.

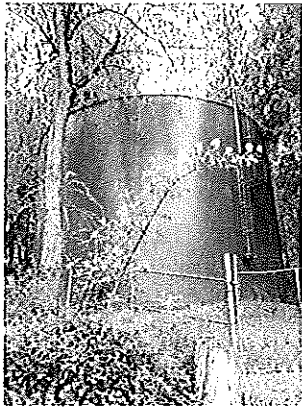
If you have any questions, please contact me at (360) 236-3019 or by e-mail at [Arlene.Hyatt@doh.wa.gov](mailto:Arlene.Hyatt@doh.wa.gov).

Sincerely,



Arlene Hyatt  
Office of Drinking Water, Regional Sanitarian

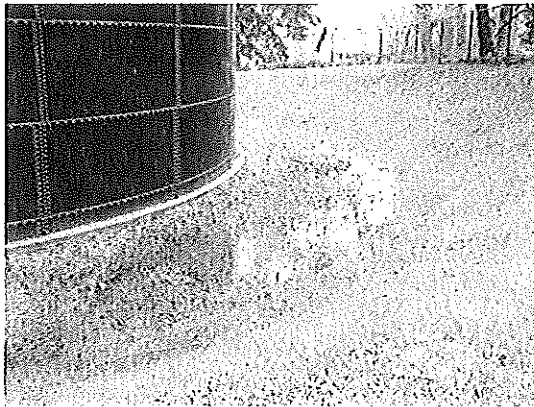
cc: Denise Miles, ODW  
Teresa Walker, ODW



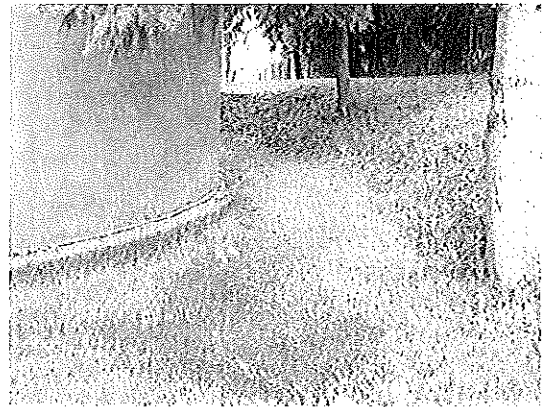
**Rocky Point Reservoir**



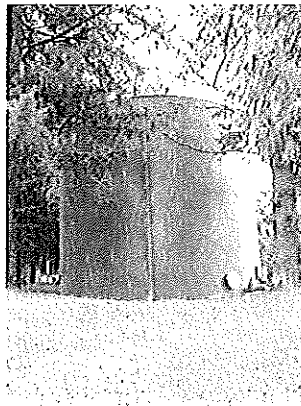
**Behshel Heights #2**



**Behshel Heights #2 Standing water around tank**



**Behshel Heights #1 standing water around tank**

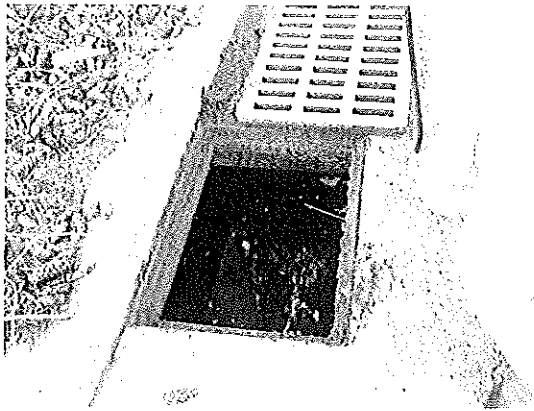


**Behshel Heights #1**



**Behshel Heights enclosure vandalism**

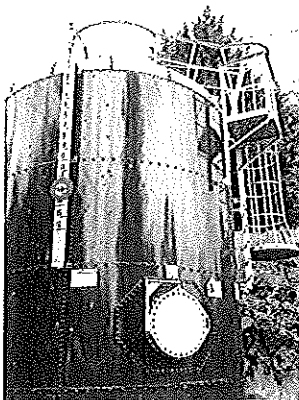




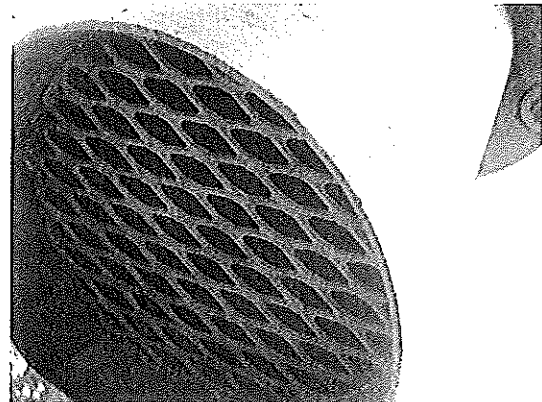
**Behshel Heights combined vent and drain outlet full of standing water**



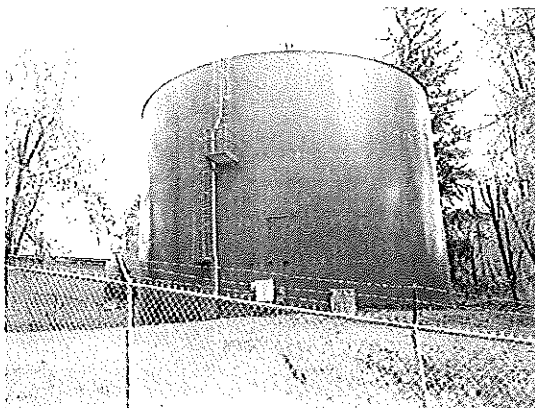
**Overview of drain location**



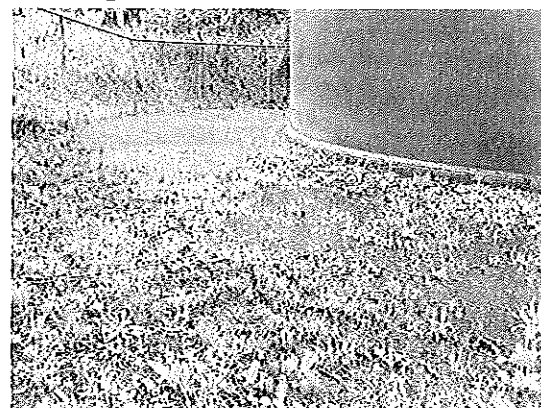
**Highland Park Reservoir**



**Highland Park screened overflow**



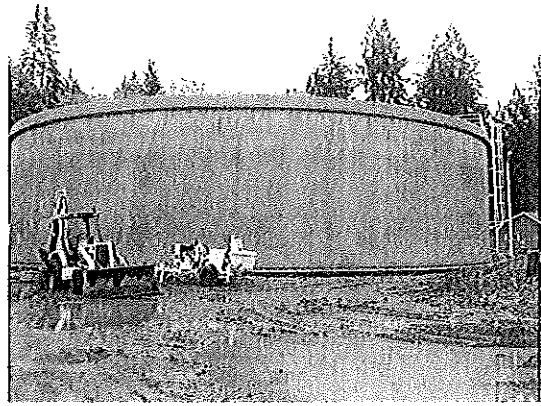
**Carrolls Road Reservoir**



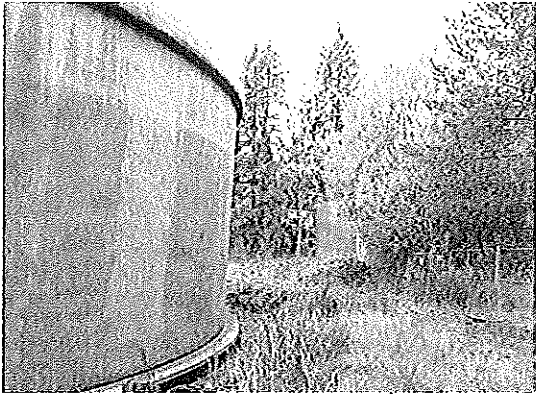
**Carrolls Road reservoir standing water around tank**



**Carrolls Road Combined overflow and drain outlet -  
buried**



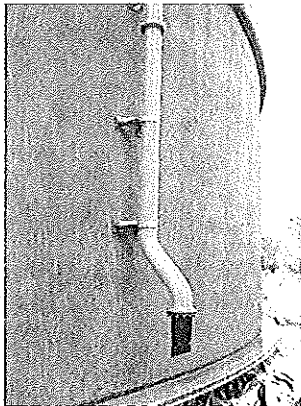
**Paxton Road Reservoir #2**



**Paxton Road #1 (foreground) and #2 (background)**



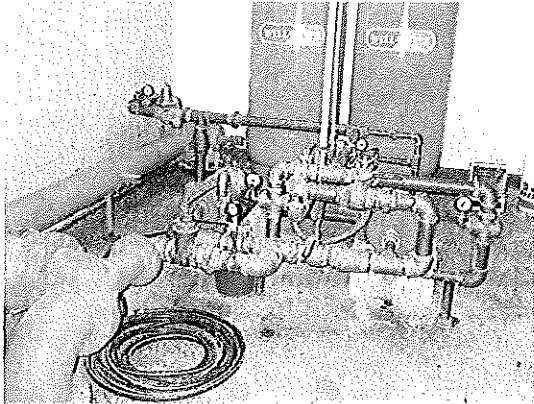
**Paxton #2 access ladder**



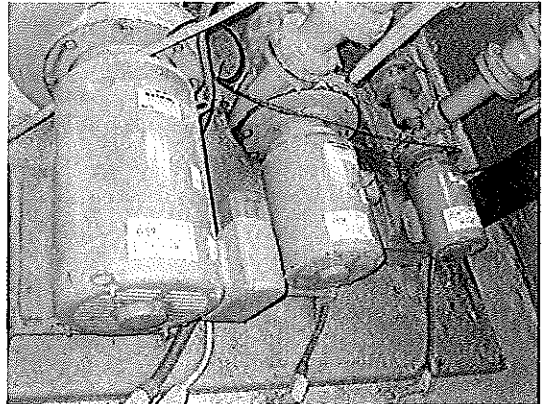
**Paxton #2 Overflow**



**Paxton #2 second access ladder**



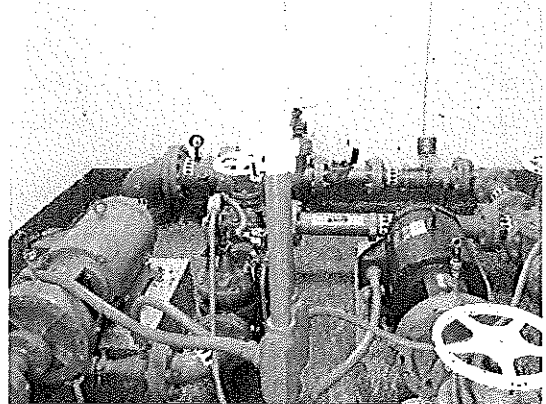
**Rocky Point BPS**



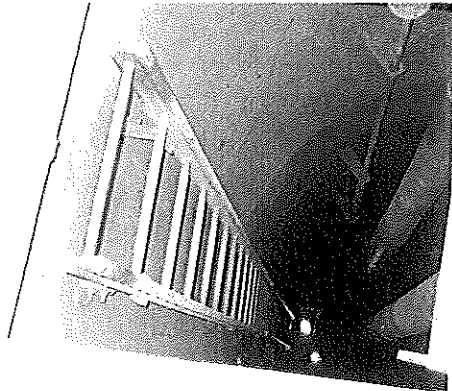
**Behshel Heights BPS**



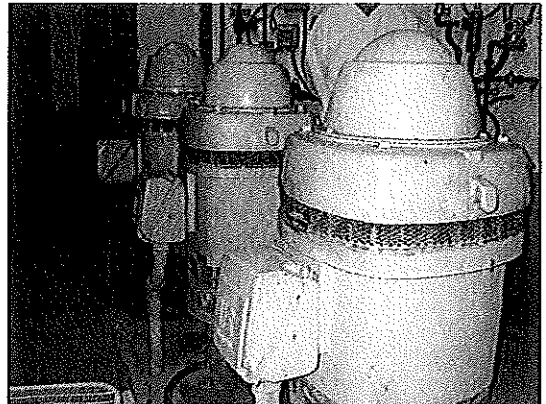
**Lower Haussler BPS**



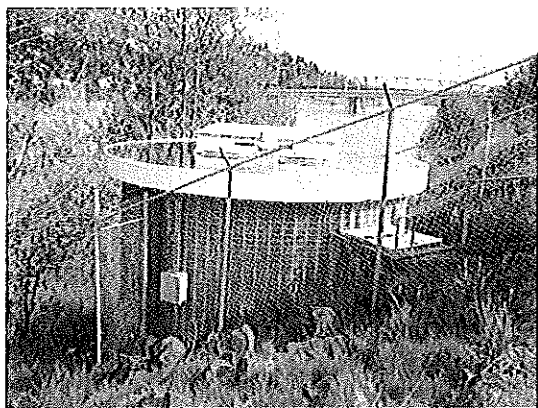
**Carrolls Road BPS**



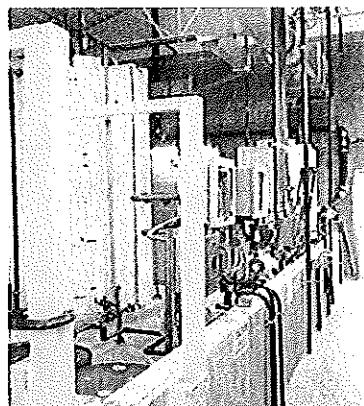
**Ranney well**



**Source pumps at Ranney enclosure**



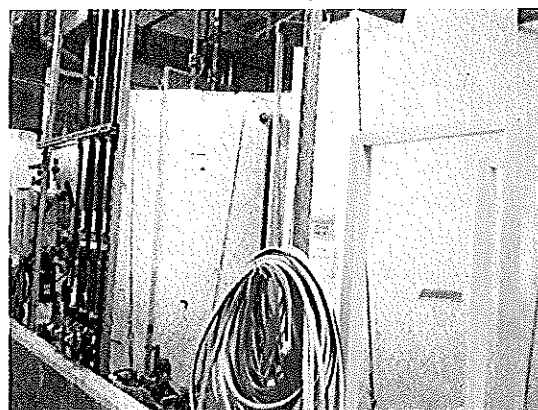
**Ranney Building**



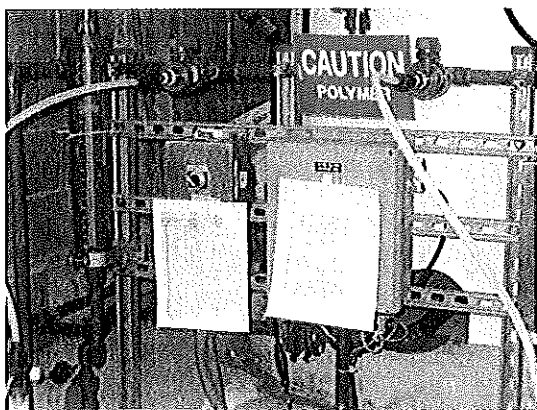
**Chemical Day Tanks**



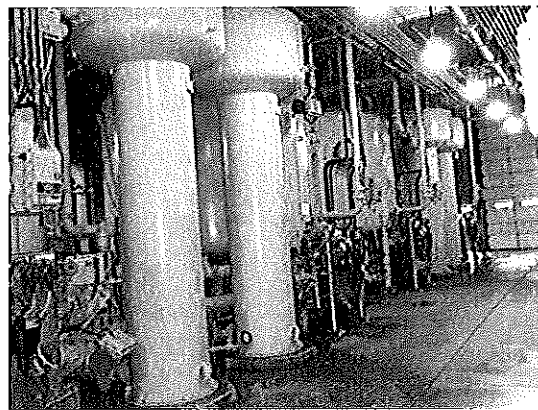
**Static Mixer and Chem injection**



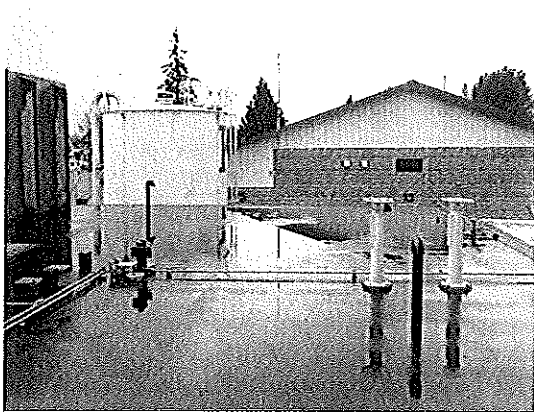
**Hypochlorite tanks**



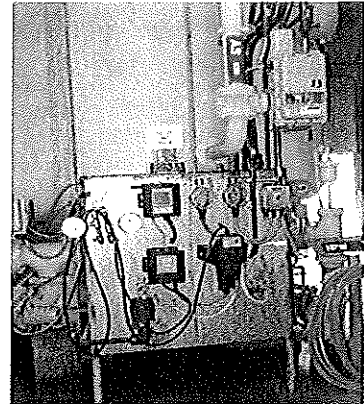
**Polymer feeds**



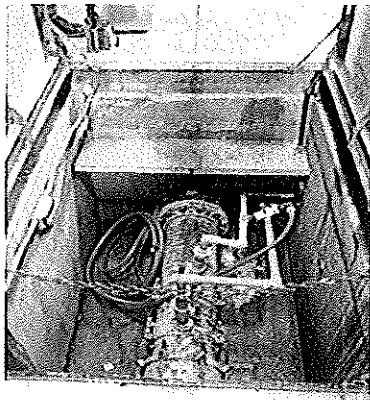
**Filter and aeration tanks**



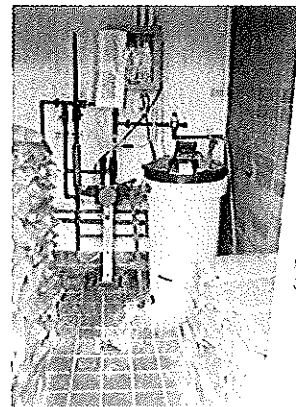
**Top of clearwell**



**IFE instrumentation**



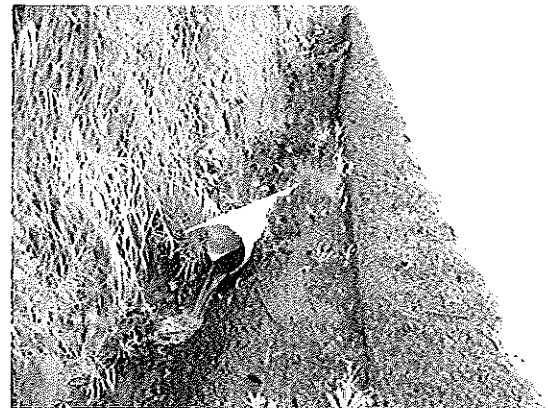
**Hypochlorite injection (prior to CW)**



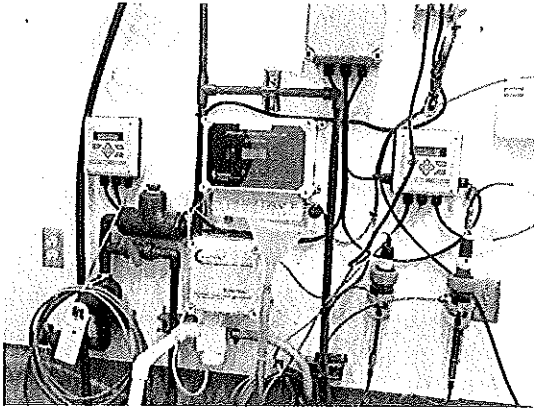
**Fluoride saturator**



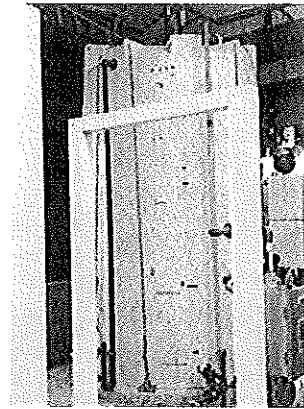
**Minor Rd reservoir Bldg in middle houses outlet piping**



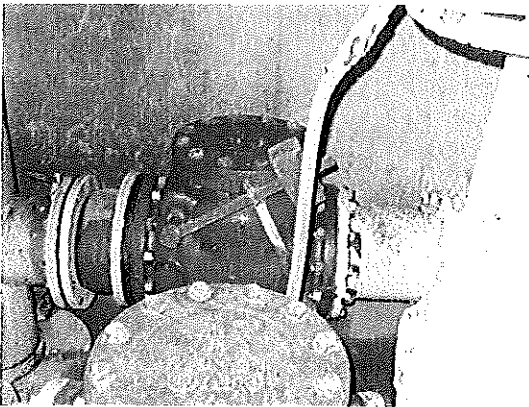
**Discharge from Minor Rd reservoir**



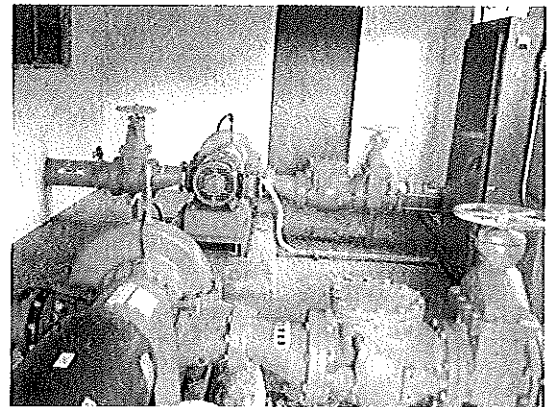
**Streaming Current Monitor**



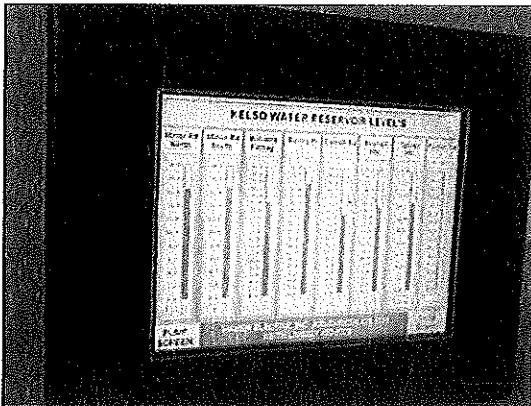
**Caustic tank**



**Ranney Transmission valves**



**Minor Rd Pump station**



**reservoir level display**

|  |                       |  |   |                                |
|--|-----------------------|--|---|--------------------------------|
| System Name<br>City of Kelso   | I.D. Number<br>38000L | Date<br>May 1, 2012                            | Evaluation By<br>Teresa Walker                            |                                |
| Operator(s) Present<br>Paul Reeb<br>Lamont "Monte" Salte<br>Jason Cook | WTPO#<br>2513<br>3507 | Certification Level<br>WTPO3<br>WTPO3<br>WTPO2 | Title<br>Water Superintendent<br>WTP Operator<br>Operator | Phone Number<br>(360) 577-1085 |

Paul signs the reports. Paul and Monte split the lead operator position and have been with Kelso for over thirty years. Jason is a new operator in training since the last survey.

**Source Water & Watershed Information** (Review Watershed Risk Report from Surface Water Database (SWDB); Gather information needed if incomplete) Intake: Protection provided to Intake facilities; adequate screening; adjustable levels of withdrawal; pumped or gravity (reliability concerns)? Frequency and location of raw water turbidity and fecal coliform samples.

Raw water source is a Ranney collector, which includes seven laterals, located on the Cowlitz River near the Treatment Plant. The Cowlitz has periodically flooded over the years, including in 1996 when the Ranney collector was partially submerged. Since then, some effort has been made to seal and otherwise protect electrical equipment from inundation. Raw Water is pumped from a wet well using three 2500 gpm turbine pumps.

Kelso finished their first round of LT2 Cryptosporidium sampling with no detects. Bin 1. Raw water coliform remain very low, typically <1/100ml.

There are seven 10-in laterals in the Ranney well. Chlorine is injected at 100 ppm monthly into the laterals for iron bacteria removal. The laterals were cleaned in 2010 by divers. Lateral are cleaned every six years. Some of the laterals have horizontal cracks. There has been an ongoing issue of biofouling caused by iron bacteria in the laterals. Once a month, the WTP is shut down and super-chlorinated water is pumped into the laterals. A temperature adjusted specific capacity is determined at this time. Based on this specific capacity data, laterals are scheduled for inspection and cleaning, which occurs once every 5-6 years.

A 10-in and 12-in. transmission main conveys water from the Ranney well to the Plant. The mains go under the railroad and the Cowlitz River dike. There is a major leak in the 10-in main, discovered by leaks in the dike, and the 10-in main has been valved off as repairing it requires the railroad to be shut down. Only the 12-in main is active now. It is unknown when or if the 10-in main will be repaired.

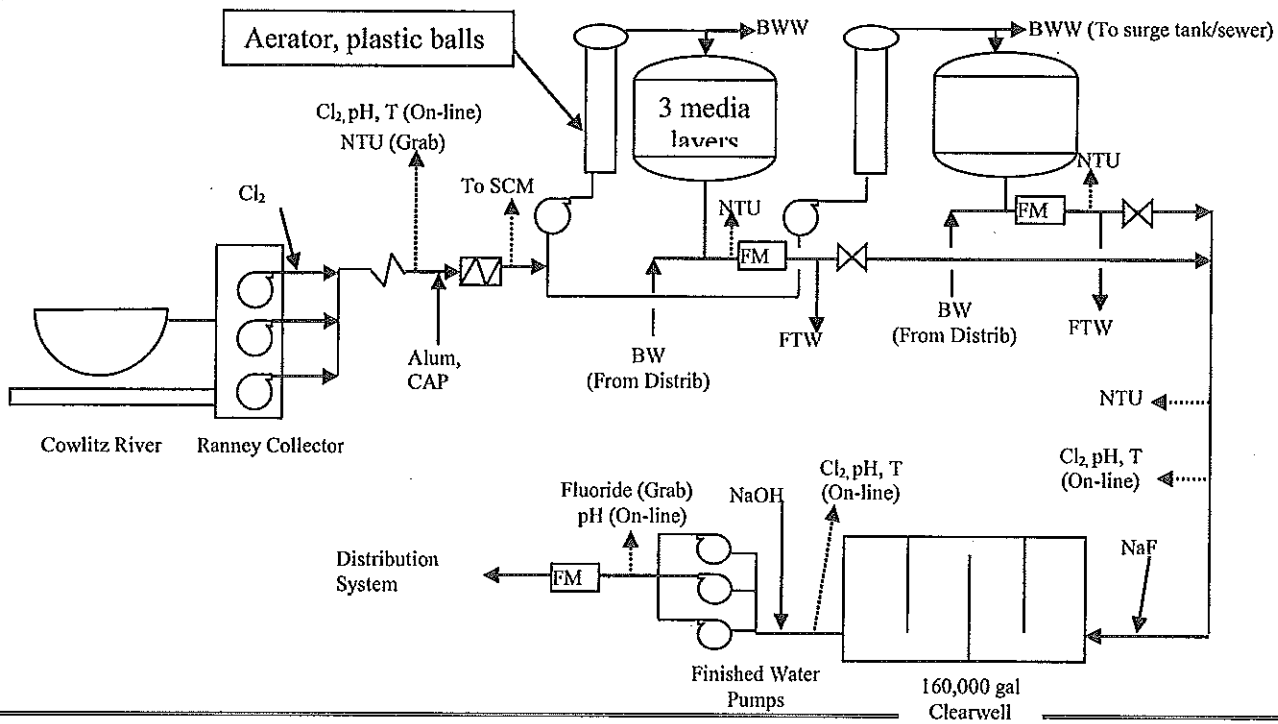
Raw water turbidity typically varies between 0.2 and 6.0 NTU. Raw water turbidity is sampled with daily grabs at the plant, after chlorine injection. As the sediment in the Cowlitz River increases, Kelso's raw water quality actually improves due to increased pre-filtration through the sediment.

One on-going concern is continued build-up of silt in the river; specifically the increased flooding risk of the Ranney Building.

Watershed Risk Rating for this Plant is High, based on the many industrial and wastewater plants upstream.

Kelso is also looking at new groundwater sources in the Riverside area. A test well was drilled in 2009 but had very high iron and manganese. They will investigate other potential areas and probably drill a few new test wells in the Riverside area in the next two years.

**Plant Schematic** – Use schematic from Comprehensive Performance Evaluation (CPE) report, if available; Show actual compliance monitoring locations for Combined Filter Effluent (CFE) turbidity, Concentration of Residual x Time of Contact (CT), and residuals @ entry point to Distribution System (DS); Place arrow and letter at chemical addition points and identify in tables below.



**Chemical Addition - Coagulant(s), Filter Aid(s), pH Adjustment, Pre-Cl<sub>2</sub>/Rapid Mix:**

| <u>Chemical</u>           | <u>Location</u> | <u>Dose</u>  | <u>Chemical</u> | <u>Location</u> | <u>Dose</u> |
|---------------------------|-----------------|--------------|-----------------|-----------------|-------------|
| Alum                      |                 |              | Soda Ash        |                 |             |
| Ferric Cl/SO <sub>4</sub> |                 |              | Caustic Soda    |                 |             |
| PACl                      |                 |              | Lime            |                 |             |
| CAPolymer:                |                 |              | Pre Chlorine    | X               | Ranney Well |
| CAPolymer:                | X               | 0.2-0.4 mg/l | Potassium Perm  |                 |             |
| FAPolymer:                |                 |              | Other:          |                 |             |

All chemicals used in the WTP NSF Standard 60 Approved:



Note: PACl = Polyaluminum Chloride; CAP = Coagulant Aid Polymer; FAP = Filter Aid Polymer; Insert name(s).  
How are dosages determined; how are they controlled? (Jar tests, Visual floc formation, streaming current monitor, historical, monitoring data, etc.); what turbidity variation triggers a change? (Compare monthly chemical usage to dosage.) Bulk storage? Day tanks?

Operators stopped using alum in 2010 in order to extend filter runs and reduce sewer discharges. They use more polymers and have improved finished water turbidity by making this change.

Rapid Mix Type:    Static Mixer     Mechanical Mixers     Injection Mixers     In-line Blender Mixers

Mixing Energy (G or GT): unknown

---

**Flocculation:**

Flocculator Type:    NONE

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**Sedimentation/Clarification:**

NONE  
(Direct  
Filtration)   

---

**Filtration:    Pressure filters**

Single Media     Dual Media     Mixed Media     Pressure Filter     Deep Bed Mono-media   
Media Type:                      Sand     Anthracite     Garnet     Other: \_\_\_\_\_

Filter Dimensions:    Diameter: 12.5 ft.    Area: 120 sf    No. Filters: 7  
Total Area: 840 sf                      Max. plant flow rate: 3.6 MGD                      Filter Rate: 3 gpm/sf

Individual Filter Turbidimeters     Combined Filter Effluent Turbidimeter     Calibration Date: quarterly

Backwash criteria: when turbidity starts to increase                      Filters normally have 2-3 day runs                      Rate: 360 gpm                      Time : 5- 6 minutes of air scour

Backwash to:    Lagoon     Lagoon to Raw Water     Plant intake     Sanitary Sewer

Filter-to-waste: No  Yes  Time: 26-42 min (22 minimum) Stopped @ 0.06 NTU

*Condition of media (moulding, cracking, mudballs); when replaced; Control of filter rate and backwash rate; Variability of filter rate; Turbidimeters properly operating? Numbers reported when plant is running? Models of turbidimeters: continuous and benchtop; FTW at all start-ups or after BW?*

The most recent major plant modifications were completed in October 2002. These upgrades included completely rebuilding the filters were completely rebuilt with 36 inches of filter media and 18 inch gravel in the underdrains. Media is inspected quarterly.

Backwashing is initiated as soon as turbidity levels begin to steady climb or is initiated on time. Normal runs are 5-6 days per filter.

This plant meets the optimization criteria as set forth by EPA with filtered water turbidity is less than 0.1 NTU 95% of the time. The plant optimization criteria is 0.03 NTU all of the time. Plant staff has developed their own SOP specifically aimed at filter treatment plant optimization that is periodically revised.

Backwash program is automatically controlled and the sequence is periodically adjusted based upon operator review of performance and changes in water temperature. The current program consists of air scour for 3 minutes, a three minute ramp-up to the high rate wash, a high rate wash of 1850 gpm (15.4 gpm/sf) for about 6 minutes, and a ramp down in flow over 1.5 minutes. Filter to waste is conducted until the filtered water turbidity is 0.1 NTU or less.

The pressure filters are usually inspected once every three months and at least every 6 months to meet the requirements of WAC 246-290-654(6). The inspection includes completion of a comprehensive checklist for each filter. No visible problems (media cracking/pulling away from the walls or unequal air distribution) were observed. DOH approved an increased filtration rate of 4.0 gpm as a temporary basis in 2006 and permanently in 2012.

Backwash and FTW water accounts for 2-6% of total production.

**Chemical Addition – Disinfection:**

| <u>Chemical</u>        | <u>Location</u> | <u>Dose</u>  | <u>Chemical</u> | <u>Location</u> | <u>Dose</u> |
|------------------------|-----------------|--|-----------------|-----------------|-------------|
| Gas Chlorine           |                 |  | UV*             |                 |             |
| Liquid Cl <sub>2</sub> | X               | 2.5 - 3.5 mg/l<br>Target finished residual: 0.9-1.2 mg/L | Ozone           |                 |             |
| Na(OCl) <sub>2</sub>   |                 |  | Chloramines     |                 |             |
| ClO <sub>2</sub>       |                 |  | Other:          |                 |             |

\* For UV, request records on bulb cleaning/replacement; check sensors and readings; dose = fluence, mJ/cm<sup>2</sup>

Clearwell Dimensions: Length: 50 ft. Width: 30 ft. Depth: 15.2 ft. (max)

**High/Low Levels:**

15.2 ft. (max. plant shutdown)  
 14.8 ft. (lag finished water pump on)  
 14.2 ft. (lead finished water pump on)  
 12.3 ft. (lead off)  
 11.5 ft. (alarm)

No. Basins: 2 Total Volume: 160, 000 gals (nominal);  
 10, 860 gals/ft.

| <u>Parameter Monitored</u> | <u>Location</u>                  | <u>When/ Frequency</u> |
|----------------------------|----------------------------------|------------------------|
| pH                         | Mixer vault, CFE, Post clearwell | continuously           |
| Temperature                | Mixer vault, CFE, Post clearwell | continuously           |
| Disinfectant Residual      | Mixer vault, CFE, Post clearwell | continuously           |
| Peak Hourly Flow (PHF)     | Mixer vault, Post clearwell      | continuously           |

Other:

*Redundancy of equipment; Contact time (T) evaluation – how derived, variable or constant; How is PHF determined – compare to value used for T in CT calcs; Check CT Summary Report in database, complete as necessary (If CT summary Report is not available, review CT determination in system files); Clearwell vents and screens; Calibration of pH meters and disinfectant residual monitors*

One-log Giardia inactivation is required, as the plant receives a 2.0 log Giardia removal credit through filtration. The required CT is met by calculating CT in three segments:

- 1) Ranney Collector to the primary coagulant feed point/vault (T10/T = 1.0 assumed)
- 2) Coagulant feed vault to combined filter effluent (T10/T = 0.7 assumed)
- 3) Combined filter effluent to the post clearwell (T10/T = 0.768 based on a tracer study conducted in 2006)

The CT calculation through the clearwell incorporates flow, clearwell level (volume), and chlorine residual to identify the minimum CT in this segment.

1. An approved tracer study conducted in 2007, gave The baffle factor for the clearwell is **0.7689**
2. CT will be calculated daily based on three separate sections that are added together for the final CT as follows:
  - Pipe: Volume of pipe/PHF (a maximum of 749 LF of 10-inch pipe, 919 LF of 12-in pipe, 293 LF of 16-in pipe).
  - Aerator and Filters: 5900 gallons X 0.7/Peak filter flow at PHF for one filter and one aerator.
  - Clearwell: Volume at PHF \* 0.7689/PHF = (1452 sf X 7.48) X clearwell height at PHF X 0.7689/PHF.
3. A maximum flow rate of 2575 gallons per minute (gpm) based on 3.0 gpm/sf filtration rate.

The clearwell is baffled. It is an above grade structure with screened vents and a well locked hatch. It is inspected once every 5 years using divers and was last inspected in 2010. Kelso sends in a monthly disinfection spreadsheet, recording levels of clearwell and peak hour flow on a daily basis.

**Chemical Addition – Corrosion Control/Stability/Other:**

| <u>Chemical</u> | <u>Location</u> | <u>Dose</u>    | <u>Chemical</u>                | <u>Location</u> | <u>Dose</u> |
|-----------------|-----------------|----------------|--------------------------------|-----------------|-------------|
| Soda Ash        |                 |                | Orthophosphate                 |                 |             |
| Caustic Soda    | X               | Post clearwell | 4.2% solution;<br>2.6-8.7 mg/L | Polyphosphate   |             |
| Lime            |                 |                | Other:                         |                 |             |
|                 |                 |                |                                |                 |             |

Fluoridation: NONE  Hydrofluosilicic Acid   
 Sodium Fluoride (Saturator)  Sodium Silicofluoride (Dry Feed)

*Location and Dose:*

Fluoride is added as water enters the clearwell. Fluoride has settled out and accumulates in the clearwell. The fluoride residual is 0.8 mg/l. RPs have been added to prevent fluoride overfeeds. **Please verify that a flow meter is on the saturator and that flow is minimized to avoid disruption to the saturated bed.** Caustic soda is added to adjust the pH for corrosion control. The target pH is 7.4 to 7.6.

**General Plant Operations/ Cross-Connection Protection (CCP)**

*Has purveyor had plant hazard evaluation by CCS? Internal CCP – chemical makeup; use of day tanks; chemical feed/ makeup interconnections; surface washers? Protection from overfeed? Any other treatment provided?*

All chemical feeds have installed backflow prevention devices. Backwash water is obtained from the distribution system, so there is a very large (12" or so) RP device protecting the distribution system from a backflow incident. Smaller backflow assemblies are located throughout the plant to provide cross connection control for finished water used in the plant.

Is plant staffed during all times of operation?

No

Yes

Hours of operation: Start: 7:30 am Stop: 4:00 PM, Number of Shifts one

*Plant staffing – plant rating/mandatory level; certification levels of operators; coverage, shift operation; vacations/ weekends/holidays*

The plant runs 24 hours/day. The plant is shutdown monthly for maintenance of the Ranney collector laterals. There are about 3-5 other shutdowns throughout the year. The plant must be restarted manually by the operators.

Weekend and holiday shifts are usually covered by either Paul or Monte, who are both WTPO3s. Jason Cook, who is a WTPO2, periodically operates the plant under the supervision of Paul or Monte. The plant staff has SOPs for all operations at the WTP and they are updated as needed. Both Paul and Monte are nearing retirement.

**Alarms:**

| Parameter                              | Monitoring Point                            | Alarm Level                     | Shutdown Level                  | Response                          |
|--|---|---------------------------------|---------------------------------|-----------------------------------|
| Turbidity – Combined Filter Effluent   | Combined filter effluent prior to clearwell | 0.03 NTU                        | 0.1 NTU                         | SCADA Dial up operators; shutdown |
| Turbidity – Individual Filter Effluent | Individual filter pipe, prior to FTW.       | 0.05 NTU                        | 0.1 NTU                         | SCADA Dial up operators; shutdown |
| Chlorine Residual                      | Mixing Vault                                | Low -0.7 mg/l<br>High -6.2 mg/l | Low -0.7 mg/l<br>High -6.2 mg/l | SCADA Dial up operators; shutdown |
| Chlorine Residual                      | Combined filter effluent prior to clearwell | Low -0.6 mg/l<br>High -3.5 mg/l |                                 | SCADA Dial up operators; shutdown |
| Chlorine Residual                      | Combined filter effluent prior to clearwell | Low -0.6 mg/l<br>High -3.5 mg/l |                                 | SCADA Dial up operators; shutdown |
| pH                                     | Entry point to distribution                 | High-8.1                        | High - 8.1                      | SCADA Dial up operators; shutdown |
| Clearwell level                        | Clearwell                                   | Low – 11.5 ft.                  | High - 15.2 ft.                 | SCADA Dial up operators; shutdown |
| Polymer                                |   | Flow/no flow                    |                                 |                                   |

There is no backup power at the plant. The plant will shut down in event of power outages. A manual re-start is required.

Shutdown alarms are tested every three months, which requires a plant shutdown. Others are tested twice a month. Individual filter alarms are tested monthly

Version 01; September 2002



Date Submitted: 6/16/2010

## Water Use Efficiency Annual Performance Report - 2009

WS Name: KELSO, CITY OF

Water System ID# : 38000

WS County: COWLITZ

Report submitted by: Paul Reeb

### Meter Installation Information:

Is your water system fully metered? Yes

If not fully metered - Current status of meter installation:

### Production, Authorized Consumption, and Distribution System Leakage Information:

12-Month WUE Reporting Period: 01/01/2009 To 12/31/2009

Incomplete or missing data for the year? Yes

If yes, explain:

*Hydrant use for flushing and fire along with water breaks are not closely tracked and likely amount for less than one percent of water use.*

### Distribution System Leakage Summary:

|  |                     |
|--|---------------------|
| Total Water Produced and Purchased (TP) – Annual Volume            | 832,000,000 gallons |
| Authorized Consumption (AC) – Annual Volume                        | 739,500,000 gallons |
| Distribution System Leakage – Annual Volume TP – AC                | gallons             |
| Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100 | 0.0 %               |
| 3-year annual average  | 9.5 %               |

### Goal-Setting Information:

Date of Most Recent Public Forum: 01/15/2008 Has goal been changed since last performance report? No

Note: Customer goal must be re-established every 6 years through a public process

### WUE Goals:

Customer Goal (Demand Side):

*Reduce ADD and MDD by 3 percent over the next 6 years. "2006 thru 2011" Promote conservation program by distributing brochures during peak usage months. Meter and record upper zone pump station usage. Establish true ADD and MDD within the zone. Continue leak detection program and meter replacement program. - Conduct a biannual system leak detection survey. - Allocate \$100,000 per year to replace old 2-, 4-, 6-, and 6-inch water lines of any material (mainly AC, cast iron, and galvanized steel).*

### Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

Customer education was included in our annual CCR, along with distributing brochures during peak usage months.

"ADD" 2005 @ 2.340 MGD, 2006 @ 2.346 MGD, 2007 @ 2.248 MGD, 2008 @ 2.265 MGD, 2009 @ 2.286.

"MDD" 2005 @ 3.7 MGD, 2006 @ 3.6 MGD, 2007 @ 3.52 MGD, 2008 @ 3.32 MGD, 2009 @ 3.7 MGD.

#### **Additional Information Regarding Supply and Demand Side WUE Efforts**

Include any other information that describes how you and your customers use water efficiently:

*Residential customer use, 2005 @ 187-gallons per day, 2006 @ 189-gallons per day, 2007 @ 190-gallons per day, 2008 @ 182-gallons per day, 2009 @ 180-gallons per day. In 2009, 127 of the oldest meters were replaced, also a 5 day leak detection program was carried out with 7 leaks found and repaired. In addition several days were spent with divers working on reducing the leakage from our Minor Road Reservoirs. 3 large water main replacement projects are currently out for bid in 2010. A new 2 million gallon reservoir is under design with plans for construction in 2011 and will allow more flexibility for repairs to or replacement of the Minor Road Reservoirs. Meter additions and upgrades are also planned for our water pump stations in 2010.*

**Do not mail, fax, or email this report to DOH**



Date Submitted: 6/29/2011

## Water Use Efficiency Annual Performance Report - 2010

WS Name: KELSO, CITY OF

Water System ID# : 38000

WS County: COWLITZ

Report submitted by: Paul Reeb

### Meter Installation Information:

Is your water system fully metered? Yes

If not fully metered - Current status of meter installation:

### Production, Authorized Consumption, and Distribution System Leakage Information:

12-Month WUE Reporting Period: 01/01/2010 To 12/31/2010

Incomplete or missing data for the year? No

If yes, explain:

### Distribution System Leakage Summary:

|   |                     |
|---|---------------------|
| Total Water Produced and Purchased (TP) – Annual Volume                   | 809,800,000 gallons |
| Authorized Consumption (AC) – Annual Volume                               | 708,540,000 gallons |
| Distribution System Leakage – Annual Volume TP – AC                       | gallons             |
| Distribution System Leakage – Percent DSL = $[(TP - AC) / TP] \times 100$ | 0.0 %               |
| 3-year annual average   | 11.2 %              |

### Goal-Setting Information:

Date of Most Recent Public Forum: 01/15/2008 Has goal been changed since last performance report? No

Note: Customer goal must be re-established every 6 years through a public process

### WUE Goals:

Customer Goal (Demand Side):

*Current Goals are listed in our 2005 comprehensive water plan where applicable along with our WUE program as adopted thru the public process. Reduce ADD and MDD by 3 percent over the next 6 years. Promote conservation program by distributing brochures during peak usage months. Meter and record upper zone pump station usage. Establish true ADD and MDD within the zone. Continue leak detection program and meter replacement program. Conduct a biannual system leak detection survey. Allocate \$100,000 per year to replace old 2, 4, 6 and eight inch water lines of any material (mainly AC, Cast Iron, and Galvanized steel).*

### Describe Progress in Reaching Goals:

## Customer (Demand Side) Goal Progress:

*Additional measures that will remain or be funded to meet water conservation goals: 1) Water bill showing consumption history for residential. 2) Water bill showing consumption history for industrial. 3) CCR w/WUE education for residential. 4) Meter all inerties. 5) Post water saving tips on web site. 6) Utilize seasonal rates.*

*2005 ADD was 2.340 MGD and in 2010 ADD was 2.218 MGD, this is a 5.2% reduction and amounts to a reduction of 122,000 gallons per day.*

*2005 MDD was 3.70 MGD and in 2010 MDD was 3.59 MGD, this is about a 2.97% reduction just shy of our 3% goal.*

## Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

*Kelso has implemented a water loss control action plan as outlined in our "Water Use Efficiency Program".*

*In 2010 Kelso was aggressive in water line replacement taking advantage of lower interest rates and grant money to complete more than \$700,000 in water line projects.*

*In 2011 within this continued atmosphere of lower contractor services, Kelso has accelerated water projects that include \$3,000,000 for water line & associated upgrades along with \$3,500,000 for a new reservoir.*

*Meter replacement was ramped up in 2010 to provide better data on water being sold to our customers; this program is being accelerated in 2011. Old meters under-read, new meters will better insure that all of our customers are paying for the water that they use, and will allow Kelso to more closely calculate water losses.*

*This big investment in our water infrastructure now, while project costs are down, will result in future cost savings to our customers. The water lines being replaced will reduce water loss due to fewer water breaks along with reducing the costs associated with repairs. Other big advantages to improving our water supply infrastructure are improved fire protection and being in a better position to handle future growth, which can bring much needed jobs to our community.*

*Also on the supply side in mid 2010, improvements were made to the water plant filtration process, extending filter runs, thus saving about 1 million gallons of treated water per month.*

**Do not mail, fax, or email this report to DOH**





Date Submitted: 6/27/2012

## Water Use Efficiency Annual Performance Report - 2011

WS Name: KELSO, CITY OF

Water System ID# : 38000

WS County: COWLITZ

Report submitted by: Paul Reeb

### Meter Installation Information:

Estimate the percentage of metered connections: 100%

If not fully metered - Current status of meter installation:

### Production, Authorized Consumption, and Distribution System Leakage Information:

12-Month WUE Reporting Period: 01/01/2011 To 12/31/2011

Incomplete or missing data for the year? No

If yes, explain:

### Distribution System Leakage Summary:

|  |                     |
|--|---------------------|
| Total Water Produced and Purchased (TP) – Annual Volume            | 785,541,000 gallons |
| Authorized Consumption (AC) – Annual Volume                        | 693,653,000 gallons |
| Distribution System Leakage – Annual Volume TP – AC                | 91,888,000 gallons  |
| Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100 | 11.7 %              |
| 3-year annual average  | 11.8 %              |

### Goal-Setting Information:

Date of Most Recent Public Forum: 01/15/2008 Has goal been changed since last performance report? No

Note: Customer goal must be re-established every 6 years through a public process

### WUE Goals:

Customer Goal (Demand Side):

*Reduce ADD and MDD by 3% over the next 6 years.*

### Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

*2006 ADD was 2.346 MGD and in 2011 ADD was 2.176 MGD, this represents a 7.25% reduction over the last 6 years. 2006 MDD was 3.6 MGD and in 2011 MDD was 3.18 MGD, this represents a 11.67% reduction over the last 6 years.*

### Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

*A new goal setting meeting will occur in 2012. The City of Kelso continues to focus on old water main replacement, meter replacement and leak detection and repair, these projects are helping to lower the distribution system water leakage.*

**Do not mail, fax, or email this report to DOH**

## **Appendix B**

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### Water Service, Water Wheeling and Emergency Services Agreements

- Water Service Areas Agreement – March 1977
- Water Utilities' Mutual Assistance Plan – 1971
- Water Service Agreement (Davis Terrace) – August 1991
- Water Wheeling Agreements
  - Kelso and BHWSD – 28 December 2010
- Sharing Service of Administration and Command Personnel – 12 November 1996
- Fire Services Study and Analysis – 27 August 1994
- Fire Services Agreement, Cowlitz County Fire Protection District No. 2 and Kelso, 1991

## WATER SERVICE AREAS AGREEMENT

The attached map is the geographic representation of the water services area responsibility agreement among the Cities of Longview, Kelso and Cowlitz PUD. The following good utility practices and principles determined the need for service areas:

1. To provide the urban area with an adequate potable water supply, both now and in the future.
2. To plan orderly system improvements to meet growth.
3. To provide a basis for decision-making on how to serve new customers with water without costly duplication of facilities.

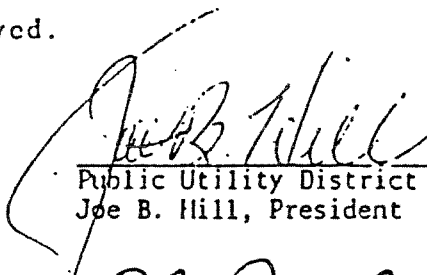
Because service area designation is an exclusive responsibility to serve the people in a designated area, the assigned utility agrees, if feasible, to provide adequate utility services to all of those in the area who request it on a fair and non-discriminatory basis. The acceptance of the service area assignments shall also obligate the assigned utility to extend water service at a fair and non-discriminatory basis into that service area. Rates charged shall be reasonable and based upon the costs of providing the service.

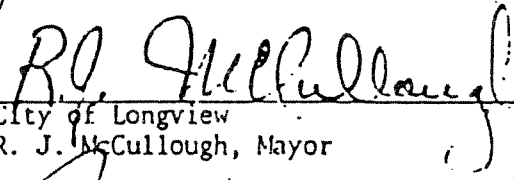
Where city facilities within the city limits or city service area are reasonably close to a new customer, the city will be responsible for the extension, if feasible. In addition, where the PUD facilities are inadequate, obsolete, worn out or unfit, and it is as feasible for the city to make the replacement as the PUD, then the city shall make service available to existing customers. When areas annex to the cities, the

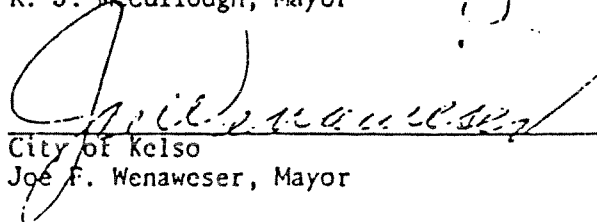
cities may take appropriate steps to acquire ownership of existing systems within the service area.

In order to move the required water from the treatment facility(ies) to the service area point of delivery, without duplication of facilities, long-term wheeling agreements will allow the utilities to use each other's facilities. The agreements shall be used for long-range planning so that the capacity for the extra water is available when needed. Wheeling of water is intended to be used to move water from a bulk source point to a general distribution service area and not to divide service responsibilities by political boundaries within a distribution service area.

Disputes or questions arising with regard to providing service to areas along the service area boundaries shall be resolved by mutual agreement between the entities involved.

  
Public Utility District #1 of Cowlitz County  
Joe B. Hill, President

  
City of Longview  
R. J. McCullough, Mayor

  
City of Kelso  
Joe F. Wenaweser, Mayor

WATER UTILITIES'

MUTUAL ASSISTANCE PLAN

in

COWLITZ COUNTY, WASHINGTON

OBJECTIVE

To provide the best possible service to water customers by coordinating the manpower and equipment resources of several water purveyors for restoration of service in emergencies.

METHOD

Plan and institute a method of communication and procedure to secure and expedite the allocation of mutual assistance resources among purveyors of water.

MUTUAL ASSISTANCE AGREEMENT

THIS AGREEMENT entered into by and among all contracting parties hereto is established for the purpose of mutual aid to provide restoration of water service to their respective customers under emergency conditions where additional manpower, equipment and material are needed to make necessary repairs to their systems.

I. PRINCIPLES OF EXCHANGE OF ASSISTANCE

It is agreed that in all cases the dispatching of aid is voluntary on the part of the party being asked for aid. When such aid is provided it will be under the following conditions:

1. Personnel will remain on the payroll of its respective employer.

The aiding party will bill the aided party its direct costs plus applicable overhead.

2. Aided party will cover actual expenses of emergency workers and actual operating costs of vehicles and equipment at the scale of wages and rates of equipment charges as set forth in Exhibits A, B, and C, which will be provided by each party hereto and be

attached and made a part hereof.

3. Aiding party will be reimbursed promptly upon presentation of an invoice for all applicable charges incurred in providing the requested assistance.

## II EMERGENCY

Upon request of any party to this agreement for assistance from any other party to the agreement the aiding party shall furnish such manpower and equipment as may be requested by the aided party; provided, however, that the aiding party shall not be required to adversely affect the operation of its system in providing aid and shall be the sole judge of its ability and capacity to furnish manpower and equipment. Requests for aid shall be made through those listed on Exhibit C hereof.

## III EQUIPMENT CHARGES

Any party receiving assistance of equipment from any other party shall promptly reimburse the party furnishing the equipment upon receipt of an invoice therefor. Applicable charges will be made at the rates shown for equipment on Exhibit A of the party furnishing said equipment.

The cost shall be computed from the time the equipment leaves the yard, place of storage, or place of duty, until the time the equipment has been returned to its usual place of storage.

Each party may modify its Exhibit A at its option. Said modification shall be in the form of a new Exhibit A and shall be filed with all parties to this agreement at least thirty (30) days before its effective date.

## IV LABOR CHARGES

Any party receiving assistance of manpower from any other party shall promptly reimburse the party furnishing said manpower upon receipt of an invoice. Wages paid for labor shall be at the established scale of wages and incidental costs of the party furnishing manpower, as shown in Exhibit B. Pay will be allowed from the time men leave home or place of duty until they return, except for non-

compensatory periods of rest. Each party may modify its Exhibit B at its option. Said modification shall be in the form of a new Exhibit B and shall be filed with all parties to this agreement.

#### V EQUIPMENT DAMAGE OR LOSS

Any party receiving assistance of equipment from any other party shall, upon receipt of invoice therefor, promptly pay for the cost of replacing or repairing any equipment lost or damaged while engaged in rendering such service, including transportation to and returning from the disaster or emergency area, unless the loss or damage is caused by the negligence or carelessness of the owner of the equipment or its agents or employees while engaged in rendering the services provided for herein.

#### VI PERSONNEL

Personnel furnished by parties to this agreement shall be deemed to remain an employee of the party furnishing such personnel for emergency work and shall remain on the payroll and be covered by all usual coverages and benefits provided in its regular working agreement.

#### VII HOLD HARMLESS CLAUSE

Participation in this program of mutual assistance shall not be held or construed to confer a right of action for damages upon any contracting party, or any person, firm or corporation for the operation or failure to operate under this program. This provision shall not apply with respect to liability for cost of manpower or equipment furnished. The aided party agrees to indemnify and hold the aiding party harmless from any claim for damage to person or property of others arising out of the use of manpower or equipment while under the control of the aided member.

#### VIII TERM OF AGREEMENT

This agreement and the rules and regulations governing mutual assistance among the contracting parties shall be in force from and after the execution of this agreement by all parties which shall be the date of signing by each party; subject, however, to the right of any party to cancel its participation in this



agreement at any time by giving thirty (30) days' written notice to all other parties participating in the mutual agreement.

IX ADDITIONAL PARTIES

1. Additional parties may join this agreement at any time that all existing parties agree to such joinder. Such joinder shall be evidenced by the execution of an addendum entitled "Agreement Joining an Additional Party." Said addendum shall bear the date of execution and be signed by the joining additional party and all existing parties. The joining additional party shall also, at the time of execution, provide its Exhibits A, B, and C, and enough copies of the addendum and exhibits for all parties to the agreement. The complete "Agreement Joining Additional Party" shall then be attached to and made a part of this "Water Utilities' Mutual Assistance Plan."
2. Parties wishing to join this agreement shall make written application to any existing party who will act as sponsor and provide the necessary forms, information and assistance in processing the "Agreement Joining an Additional Party."

IN WITNESS WHEREOF the parties hereto have set their hands and seals.

Public Utility District No. 1 of Cowlitz County, Washington

By Robert L. McKinney  
Robert L. McKinney, General Manager

Dated this 18 day of August 1971.

City of Longview, Washington

By Charles H. Mangan

Dated this 18 day of August 1971.

City of Kelso, Washington

By *James Phillips*

Dated this 18 day of Aug. 1971.

County of Cowlitz, State of Washington.

By *J. Redman County Engr*

Dated this 18 day of Aug 1971.

Town of Castle Rock, Washington

By *Michael D. Hanson*

Dated this 18 day of Aug. 1971.

Town of Kalama, Washington

By \_\_\_\_\_

Dated this \_\_\_\_ day of \_\_\_\_\_ 1971.

~~Town~~ <sup>City</sup> of Woodland, Washington

By *Walter Church*

18 Aug 1971

Carrolls Water Association

By *Bernard E Molt*

Dated this 18 day of August 1971.

Cloverdale Water Users' Association

By *Harold H Buck*

Dated this 18 day of August 1971.

WATER UTILITIES'  
MUTUAL ASSISTANCE PLAN  
in  
COWLITZ COUNTY, WASHINGTON

**EXHIBITS A, B AND C**


**Note:** The attached exhibits are for informational purposes only. The schedules of rates charges and reimbursements noted in Exhibits A, B and C are no longer valid.

EXHIBIT A

NAME Cowlitz County Public Utility District No. 1

960 Commerce Avenue, Longview, Washington 98632

The following schedule of charges will be used in computing costs of equipment for reimbursement under the Mutual Assistance Plan entered into among this purveyor of water and others participating.

Signed by   
Robert L. McKinney

Title General Manager

Effective Date 1st day of October, 1979

| <u>Type of Equipment</u>                     | <u>Rate by hour and/or mile</u>   |
|--|---|
| Case 580 C with front-end loader and backhoe | \$4.00 per hour, without operator; with operator, \$17.79, including direct overhead. |
| 1-ton service truck                          | \$4.00 per hour, without operator; with operator, \$17.79                             |
| 1½-ton dump truck                            | \$4.00 per hour, without operator; with operator, \$17.79                             |
| Ditch Witch                                  | \$9.50 per hour, without operator; with operator, \$23.29                             |
| Davis Trencher                               | \$7.00 per hour, without operator; with operator, \$20.77                             |

EXHIBIT B

NAME Cowlitz County Public Utility District No. 1

960 Commerce Avenue, Longview, Washington 98632

The following schedule of pay rates and incidental costs will be used in computing charges for reimbursement under the Mutual Assistance Agreement entered into among this purveyor of water and others participating

| <u>Classification</u>     | <u>Pay Rate</u>                                    | <u>Overtime Rate</u>                               | <u>Call Time</u>           | <u>Direct Overhead</u>                    |
|---------------------------|--|--|----------------------------|---|
| Senior Water Serviceman   | <del>14.36</del><br><del>\$10.75</del><br>per hour | Double regular rate<br><del>\$21.50</del><br>28.72 | 2 hr. min. @ overtime rate | 42.5% <sup>ST</sup> <sub>O.T.</sub> 1.588 |
| Water Serviceman          | 12.94<br><del>\$ 9.68</del><br>per hour            | Double rate<br><del>\$19.36</del><br>25.88         | " " "                      | " "                                       |
| Equipment Operator        | 12.94<br><del>\$ 9.68</del><br>per hour            | Double rate<br><del>\$19.36</del><br>25.88         | " " "                      | " "                                       |
| Water Serviceman's Helper | 10.05<br>\$ 7.52<br>per hour                       | Double rate<br><del>\$15.04</del><br>20.10         | " " "                      | " "                                       |
|                           | *to<br><del>\$ 8.55</del> 11.42<br>per hour        | Double rate<br><del>\$17.10</del><br>22.84         | " " "                      | " "                                       |

\* Four steps depending upon length of time

*as of April 1st  
prior to Apr. 1 - reduce by 8%*

Signed by

Robert L. McKinney  
Robert L. McKinney

Title

General Manager

Effective Date 1st day of October, 1979

EXHIBIT C

PERTINENT DATA

Date October 1, 1979

NAME Cowlitz County Public Utility District No. 1

ADDRESS 960 Commerce Avenue, Longview, Washington 98632

TELEPHONE 423-2210

TWENTY-FOUR HOUR TELEPHONE NUMBER 423-2210  
8:30 a.m. to 5:00 p.m.,

423-2211  
5:00 p.m. to 8:30 a.m. Weekends and Holidays - 423-2211

PRIORITY LISTING OF PEOPLE AUTHORIZED TO DISPATCH PERSONNEL AND EQUIPMENT FOR EMERGENCY ASSISTANCE

| <u>NAME</u>   | <u>TITLE</u>             | <u>BUSINESS PHONE</u> | <u>HOME PHONE</u>               |
|---|--------------------------|-----------------------|---------------------------------|
| <del>Laery Stevens</del><br><del>Darrell Sorenson</del> | Water Superintendent     | 577-7515              | <del>425-6108</del><br>673-5119 |
| M. J. Baldwin   | General Superintendent   | 577-7534              | 636-4584                        |
| Ray E. Nelson   | Assistant Superintendent | 577-7531              | 577-1455                        |
| Ray Moulton   | Assistant Superintendent | 577-7533              | 577-6306                        |

GENERAL DESIGN OF SYSTEM

KIND & SIZE OF MAINS

Steel, Dipped, Wrapped and Galv.  
2" to 8"

Cast Iron  
4" - 12"  
16"

Asbestos Cement  
4" to 12"

P.V.C.  
2" to 6"

KIND AND SIZE OF SERVICES

Galv.  
3/4" - 1" - 1 1/2" & 2"

Copper Tube  
3/4" & 1"

Polyethelyne Hi-Mol Plastic  
3/4" & 1"

P.V.C.  
2"

## AGREEMENT

AN AGREEMENT by which the City of Kelso, Washington, a municipal corporation of the State of Washington, ("City"), agrees to provide certain system assessment services to the Davis Terrace Water District, a special purpose district of the State of Washington, ("District"), in anticipation of the City's eventual acceptance of the District's water system as a part of the City's system and dissolution of the District.

### W I T N E S S E T H

WHEREAS, the property owners within the District seek to have the City take over the District's water system ("system") and thereafter receive water services as municipal water customers, and

WHEREAS, the City is only willing to accept the District's system if the District agrees to make those improvements necessary to meet City standards, and

WHEREAS, the exact condition of the system can only be ascertained by a comprehensive inventory of the system, and

WHEREAS, the parties agree that the most economical and efficient way to ascertain the condition of the system would be for the City to conduct such an assessment and inventory.

NOW, THEREFORE, in consideration of the mutual covenants contained herein, the parties hereto agree as follows:

SECTION 1. Upon execution of this Agreement, the City shall immediately undertake an assessment and inventory of the facilities of the District's water system, including an evaluation of the cost of constructing certain improvements to the system, such as replacement of existing water mains and service lines, installation of fire-hydrants, and replacement and/or rehabilitation of the reservoir and/or pump station. Said evaluation shall be completed no later than November 1, 1991.

SECTION 2. Compensation for the services provided by the City shall not exceed \$6,335.00. A break-down of the component costs of the inventory and evaluation are as set forth in Exhibit A attached hereto and by this reference incorporated herein. The sum of \$3,167.50 shall be paid at the time the work is commenced. Final payment shall be made within 30 days of the completion of work, based on the City invoice which shall describe all work performed and the billable amount for each element.

SECTION 3. Upon completion of the inventory, the City will provide to the District an estimate of costs to improve the system to City standards. The District shall review the estimate and notify the City if they agree to pay the costs of the improvements. Upon assurances to the City that the District will make the necessary improvements, City Staff agrees to recommend City acceptance of the District's system for operation and maintenance.

SECTION 4. City agrees to exercise due care in evaluation the system, provided however, if any portion of the system is damaged in conjunction with such analysis, the City shall not be liable for



damage incurred, unless damage is as a result of City's negligence.

SECTION 5. All work product created by this analysis shall be provided to the District as a part of the services provided.


DATED this 30 day of August, 1991.

FOR THE CITY OF KELSO:

  
\_\_\_\_\_  
DOUGLAS K. ROBINSON  
CITY MANAGER

FOR DAVIS TERRACE WATER DISTRICT:

  
\_\_\_\_\_  
JIM HOLLINGSWORTH  
PRESIDENT

  
\_\_\_\_\_  
CITY ATTORNEY  
APPROVED AS TO FORM

PER CITY COUNCIL ACTION OF SEPTEMBER 3, 1991

EXHIBIT A

DAVIS TERRACE WATER SYSTEM TOPOG ESTIMATE  
=====

APPROX 9,000 ft. OF PIPE IN SYSTEM  
-----

9,000 ft. / 600 ft. per day = 15 days

|           |  |
|-----------|--|
| TOPOG     | 15 (days) * 8 (hrs.) * 16.84 (TOM) = 2,020.80  |
| LOCATE    | 15 (days) * 8 (hrs.) * 16.15 (CRAG) = 1,938.00 |
| SVC TRUCK | 15 (days) * 8 (hrs.) * 3.00 (VAN) = 360.00     |
| POTHOLING | 5 (days) * 8 (hrs) * 17.00 (BACKHOE) = 680.00  |
| OPERATOR  | 5 (days) * 8 (hrs) * 16.65 (MARK) = 666.00     |
| DRAWING   | 5 (days) * 8 (hrs) * 16.75 (JACK) = 670.00     |

TOTAL COST = \$6,334.80  
=====

December 2010

WATER WHEELING AGREEMENT

BETWEEN

CITY OF KELSO

AND

BEACON HILL WATER AND SEWER DISTRICT

WATER WHEELING AGREEMENT

THIS AGREEMENT, made and entered into this 28<sup>th</sup> day of December, 2010 by and between the City of Kelso, a municipal corporation, formed and existing under the Laws of the State of Washington, hereinafter called "Kelso" and BEACON HILL WATER AND SEWER DISTRICT of COWLITZ COUNTY, WASHINGTON, a public utility district, formed and existing under the Laws of the State of Washington, hereinafter called the "District".

ARTICLE I

DEFINITION OF TERMS

The following words and phrases used in this Agreement shall have the following meaning:

1. "Wheeling Service" shall mean the utilization of the capacity of a portion of a Local Distribution System of one water purveyor to transmit water belonging to another water purveyor.
2. "Local Distribution System" shall mean all of the facilities owned or operated by the purveyors for the distribution of water.
3. "Carrier" shall mean that utility providing wheeling service.
4. "Receiver" shall mean that utility receiving wheeling service.
5. "System Point of Delivery" shall mean that point (or group of points classified as a single point) on a Carrier's system where water is received by a Carrier for transmission to a Receiver.

6. "Receiver's Point of Delivery" shall mean that point (or group of points classified as a single point) on a Carrier's system where water is delivered to a Receiver from an intervening Carrier.

7. "Receiver's Point of Metering" shall mean that point (or group of points classified as a single point) where water delivered to a Receiver is metered for the purpose of billing.

## ARTICLE II

### WHEELING APPLICATIONS

The applications of Wheeling Service covered by this Agreement shall be designated as follows:

Wheeling Service Applications:

| <u>Receiver Area</u> | <u>Carrier</u> | <u>Receiver</u> |
|----------------------|----------------|-----------------|
| Cowlitz Gardens      | Kelso          | District        |
| Williams-Finney      | Kelso          | District        |

System point of delivery for both areas shall be the point of metering located adjacent to the City of Longview's Fishers Lane water treatment facility site at which Kelso's 8-inch transmission line connects to the City of Longview's facilities.

The parties may extend Wheeling Service to additional areas by amending this Agreement.

## ARTICLE III

## RIGHTS OF PARTIES

Wheeling Service provided under this Agreement shall be based on the utilization by the Receiver of surplus capacity in the existing facilities of the Carrier. The Carrier shall have the right to determine the amount and availability of capacity in its Local Distribution System for use by the Receiver. If a change is required in the Carrier's facilities which are being used to provide Wheeling Service, the Carrier shall have the right, in its sole discretion to make the all decisions in the planning and construction of any new facilities, provided however, that the Carrier shall consult with the Receiver before making a final planning or construction decision related to the Local Distribution System being used to provide Wheeling Service.

In the event sufficient surplus capacity to provide Wheeling Service does not exist in the Carrier's facilities, the parties shall agree, subject to engineering and economic feasibility, to negotiate to develop a plan for improving and expanding the Carrier's facilities and the sharing of costs of the new or expanded facilities by the Receiver and the Carrier.

It shall be the responsibility of each party to maintain and operate their Local Distribution System at standards not less than those required by applicable State and Federal regulatory agencies. Each party shall endeavor to make improvements to and maintain its Local Distribution System to keep water losses at a prudent level.

The parties may, from time to time prepare and amend such supplemental operating routines or working practices as they mutually agree to be necessary or desirable to effectively administer the provisions of this Agreement.

## ARTICLE IV

### CHARGES FOR WHEELING SERVICE

Charges for Wheeling Service shall be based on the Carrier's annual cost of owning, operating, and maintaining the facilities used in wheeling, and shall be determined on the basis of use of the facility by the Carrier and Receiver.

For the purpose of determining water wheeling charges the Receiver shall assume an average loss factor of ten percent (10%) through the Carrier's facilities.

The wheeling rate for each of the wheeling applications shall be determined as set forth in Appendix A. After 2014 any or all of the wheeling rates applicable under this Agreement shall be reviewed jointly by the parties and be adjusted to the current actual annual distribution costs divided by the annual volume used. Rates shall automatically be adjusted by 80% of the Urban Portland-Salem CPI if no other adjustment is made. If the Carrier adjusts the rates, the new rates shall apply commence with the next regular billing rendered after the effective date of the rate change.

## ARTICLE V

### METER SYSTEM PROTOCOL

The Wheeling Service Applications shall be metered by way of individual master meters as follows:

1. The master meters shall be calibrated on or before June 1 of each year by the District. Written certification of calibration shall be provided to Kelso within 30 days of calibration.
2. Meter readings for Wheeling Service Applications shall be provided bi-monthly by the District to Kelso.
3. Charges for Wheeling Service shall be billed by Kelso on the basis of metered delivery of water unless otherwise agreed to in writing. Billings shall be submitted bi-monthly and shall be paid within thirty (30) days after the bills have been submitted.
4. Williams-Finney currently has and shall maintain a 4" Master Meter.
5. Cowlitz Gardens shall have a Master Meter installed by the District prior to December 31, 2011. Until Cowlitz Gardens' Master Meter is installed, the individual service meters shall be totaled to provide the measured volume total.

## ARTICLE VI

### EXPANSION OF SERVICE AREA

It is acknowledged by both parties that the Water Service Areas Agreement includes a provision whereby "when areas annex to the city, the city may take appropriate steps to acquire ownership of existing systems within the service area." In the event a change of ownership of any of the portions of the District's water system served under the Agreement should occur, it is agreed that this Agreement relating to that Wheeling Service Application location shall be automatically terminated as of the date of transfer



of the system, but all liabilities accrued up to the date of transfer shall be and are hereby preserved.

## ARTICLE VII

### WAIVER OF EXISTING AGREEMENTS

No waiver by either party of any terms or conditions of this Agreement shall be deemed or construed as a waiver of any other terms or conditions, nor shall a waiver of any breach be deemed to constitute a waiver of any subsequent breach whether of the same or a different provision of this Agreement.

The existing Wholesale Water Supply Agreement, executed between Kelso and the District on January 20, 1976, and any other agreement, negotiation, or representation between the parties hereto relating to the subject matter hereof are by mutual consent hereby terminated and superseded at the effective date of this Agreement, but all liabilities accrued thereunder shall be and are hereby preserved.

## ARTICLE VIII

### INSURANCE AND INDEMNIFICATION

The City and the District each agree that at its own cost and expense, each will maintain commercial general liability insurance with limits not less than \$2,000,000 for injury to or death of one or more persons in any one occurrence and \$500,000 for damage or destruction to property in any one occurrence. In lieu of the requirement to obtain the required insurance hereunder, each party agrees that the other's participation and

membership in a self-insurance pool, meeting the above minimum coverage limits shall constitute compliance with this section.

To the fullest extent permitted by law, each party agrees to defend, indemnify and hold the other party, its officers, officials, employees and volunteers harmless from any and all claims, injuries, damages, losses or suits arising out of or in connection with the performance of this Agreement, except for injuries or damages caused by the sole negligence of the indemnifying party. More particularly and in addition, this indemnification provision shall specifically apply to instances of interruption in service or availability of capacity due to malfunctions of the Local Distribution System.

#### ARTICLE IX

##### NO THIRD PARTY BENEFICIARY

The Agreement is made and entered into for the benefit of the Parties hereto and their successors and assigns. No other person or entity is an intended third party beneficiary. No other person or entity shall have any right of action under this Agreement.

#### ARTICLE X

##### FORCE MAJEURE

The City will not be responsible for delays or interruptions in delivery due to acts of God, fire, strikes, epidemics, war, riot, or delay in transportation, provided the City notifies the District immediately in writing of each pending or actual delay or interruption.

## Appendix A.

### Water Wheeling Rates:

Rates for this agreement bulk water for resale purposes shall be at cost as determined by the actual annual Kelso system distribution cost multiplied by the ratio of total volume consumed by customer over the total Kelso water produced annually. The base year in this calculation is 2009. Rates were raised for 2010-2014 at 7.5% /year to match Kelso's preprogrammed adopted rates in place to accomplish the distribution CIP through 2014. Rates are for every 100 cubic feet of water delivered as follows:

|             |             |             |             |             |             |
|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>2009</b> | <b>2010</b> | <b>2011</b> | <b>2012</b> | <b>2013</b> | <b>2014</b> |
| \$1.36      | \$1.46      | \$1.57      | \$1.69      | \$1.82      | \$1.96      |

INTERLOCAL AGREEMENT  
FOR  
SHARING SERVICES OF  
ADMINISTRATION AND COMMAND PERSONNEL

This Interlocal Agreement is entered into by and between the CITY OF LONGVIEW, WASHINGTON, a non-charter optional code city of the State of Washington, (sometimes hereinafter referred to as "City") and COWLITZ 2 FIRE AND RESCUE, a Fire District of the State of Washington, (sometimes hereinafter referred to as "C2F&R") pursuant to the authority granted in RCW 52.12.031, 35A.11.040, and chapter 39.34.

The purpose of this agreement is to establish a COORDINATED ADMINISTRATION EMERGENCY COMMAND TEAM for the purpose of training, supervising, and managing the services of the Longview Fire Department and Cowlitz 2 Fire and Rescue in order to minimize duplication of employees, to develop consistency in training, and to provide for the public safety and welfare.

The City of Longview employs a Deputy Chief/Fire Marshall and the C2F&R has need of the services of such officer; C2F&R employs a Deputy Chief/Administrative Support Services and a Deputy Chief/Operations, and the City of Longview has need for the services of such officers; and the City of Longview employs three Suppression Battalion Chiefs that directly supervise the activities of the two fire stations of the City of Longview, and C2F&R has need for Suppression Battalion Chiefs to directly supervise the activities of the six fire stations of the C2F&R.

In consideration of the benefits that each of the parties hereto anticipates from the exchange of professional services from the other, it is hereby agreed as follows:

1. CITY PERSONNEL TO PROVIDE SERVICE TO C2F&R FIRE DEPARTMENT:

The Deputy Chief/Fire Marshall, and the Suppression Battalion Chiefs of the Longview Fire Department, shall serve simultaneously and separately as Deputy Chief/Fire Marshall and as Suppression Battalion Chiefs for C2F&R and for the Longview Fire Department, devoting as much time and effort to each fire department as deemed by them to be necessary. When serving in such capacity for C2F&R, they shall act under the instructions and direction of the Chief of C2F&R and as if they were employees of and subordinate to such Chief. All employees and volunteers of C2F&R whose rank is subordinate to such Deputy Chief/Fire Marshall

or such Suppression Battalion Chiefs, shall act under the instructions and direction and as if they were employees of and subordinate to such Deputy Chief/Fire Marshall and Suppression Battalion Chiefs.

(a) All working hours and schedules shall be determined by the joint determination of the Chiefs of the Longview Fire Department and C2F&R, and all vacations, holidays, or other time off shall be coordinated between the Deputy Chief/Fire Marshall and the Suppression Battalion Chiefs and the Chief of the department which will be affected by such vacation or time off.

(b) For purposes of Worker's Compensation, Employment Security, LEOFF I, LEOFF II, Federal Income Tax, and Federal Social Security reporting, payments contributions and benefits, the City of Longview shall, at all times be deemed to be the employer of said Deputy Chief/Fire Marshall and Suppression Battalion Chiefs.

(c) Such Deputy Chief/Fire Marshall and Suppression Battalion Chiefs shall be, at all times, employees of the City of Longview and all compensation, employment benefits, discipline, promotion, demotion, and all other matters relating to employment shall be the responsibility of the City of Longview.

(d) The City of Longview shall indemnify and hold C2F&R free and harmless from any and all liabilities of whatever kind and nature arising by reason of the acts or omissions of such Deputy Chief/Fire Marshall and Suppression Battalion Chiefs, while acting under this agreement and within the scope of their duties, including any defense costs.

## 2. C2F&R PERSONNEL TO PROVIDE SERVICE TO CITY FIRE DEPARTMENT:

The Deputy Chief/Administrative Support Services and the Deputy Chief/Operations of C2F&R shall serve simultaneously and separately as Deputy Chief/ Administrative Support Services and as Deputy Chief/Operations for C2F&R and for the Longview Fire Department, devoting as much time and effort as is deemed by them to be necessary. When serving in such capacity for the Longview Fire Department, they shall act under the instructions and direction of the Chief of the Longview Fire Department and as if they were employees of and subordinate to such Chief. All employees the Longview Fire Department whose rank is subordinate to such Deputy Chief/Administrative Support Services or such Deputy Chief/Operations, shall act under the instructions and direction and

as if they were employees of and subordinate to such Deputy Chief/Administrative Support Services and Deputy Chief/Operations.

(a) All working hours and schedules shall be determined by the joint determination of the Chiefs of the Longview Fire Department and C2F&R, and all vacations, holidays, or other time off shall be coordinated between the Deputy Chief/Fire Marshall and the Deputy Chief/Operations and the Chief of the department which will be affected by such vacation or time off.

(b) For purposes of Worker's Compensation, Employment Security, LEOFF I, LEOFF II, Federal Income Tax, and Federal Social Security reporting, payments contributions and benefits, the C2F&R shall be the employer of said Deputy Chief/Administrative Support Services and Deputy Chief/Operations.

(c) Such Deputy Chief/Administrative Support Services and Deputy Chief/Operations shall be, at all times, employees of C2F&R and all compensation, employment benefits, discipline, promotion, demotion, and all other matters relating to employment shall be the responsibility of the C2F&R.

(d) C2F&R shall indemnify and hold the City of Longview free and harmless from any and all liabilities of whatever kind and nature arising by reason of the acts or omissions of such Deputy Chief/Administrative Support Services and Deputy Chief/Operations, while acting under this agreement and within the scope of their duties, including any defense costs.

### 3. BARGAINING UNIT AND CIVIL SERVICE PROTECTIONS:

Each of the parties hereto, and their employees, is governed by labor agreements that have been negotiated by bargaining representatives; the City of Longview is governed by Civil Service regulations; and C2F&R has entered into "Personal Service Contracts" with many of its employees. All of the provisions of such regulations, labor agreements and contracts shall be followed and respected, including, but not limited to, all provisions relative to promotions, demotions, discipline, wages and salaries, benefits, and grievances.

### 4. PROVISIONS FOR REPLACEMENT OF TERMINATED PERSONNEL:

The fire departments of City of Longview and C2F&R are both organized in the same manner, and both have similar chains of command

and similar positions and titles of employment. The qualifications for the positions of employment in both departments are similar, and the duties of all of such positions are similar in both departments. All full-time employees of the City of Longview department are governed by the laws respecting Civil Service. At the time that this Agreement is entered into, C2F&R does not employ a Deputy Chief/Fire Marshall, the Longview Fire Department does not employ a Deputy Chief/Administrative Support Services or a Deputy Chief/Operations, and C2F&R does not employ any Suppression Battalion Chiefs. Neither C2F&R nor the City of Longview intends to employ such officers to fill such vacancies within their respective departments as long as this Agreement is effective. In the event that a person presently or hereafter employed as a Deputy Chief/ Administrative Support Services, Deputy Chief/Operations, Deputy Chief/Fire Marshall, or Suppression Battalion Chief should retire, resign, or otherwise terminate or be terminated from such employment, promotion from within either the Longview Fire Department or C2F&R may occur to fill vacancy, and this Agreement shall be amended to reflect any change in origin of any such employee. In the event that such vacancy is not filled by such promotion but is filled by recruitment from outside of both the Longview Fire Department and C2F&R, this Agreement shall be amended to reflect any change in origin of such employee. It is understood and agreed that an employment position to which this Agreement refers may initially be filled by an employee of one of the parties hereto, and upon termination of employment of such employee, such position may be filled by promotion of an employee or employment of an "outside" employee by the other party hereto, and in the event of such change in personnel origin this Agreement shall be amended to reflect the same.

#### 5. TERM OF AGREEMENT:

This Agreement is for an indefinite term, subject to cancellation by either party hereto upon 90 days' advance written notice to the other.

#### 6. NO ENTITY CREATED:

There is no separate organization or administrative entity created or necessitated by this Agreement.

#### 7. MANNER OF FINANCING:

There are no provisions for financing of the terms of this Agreement. Each of the parties hereto shall provide for the financing of its own Fire Department and emergency response equipment and personnel,

including, but not limited to, all benefits, overtime, retirement contributions, social security contributions and income tax withholding.

8. ADMINISTRATION OF CONTRACT:

The administration of the provisions of this Agreement shall be undertaken by the City and the C2F&R, as provided herein.

9. OWNERSHIP OF FACILITIES:

There are no facilities or properties to be acquired or purchased as a result of this Agreement.

10. EFFECTIVE DATE:

This Agreement shall become effective on the \_\_\_ day of \_\_\_\_\_, 199\_\_\_, or upon the execution hereof by both both of the parties hereto, whichever is last to occur.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the day and date that is hereafter shown alongside the signatures of their respective authorized officers.

Dated: \_\_\_\_\_

Dated: \_\_\_\_\_

CITY OF LONGVIEW, WASHINGTON

COWITZ 2 FIRE AND RESCUE

By: \_\_\_\_\_  
City Manager

By: Bill Hallanger  
Commissioner

Attest: \_\_\_\_\_  
City Clerk

[Signature]  
Commissioner

Approved as to form:  
\_\_\_\_\_  
City Attorney

Kerry B. Fraser  
Commissioner

4 Doyle Carpenter  
Commissioner

[Signature]  
Commissioner



**INTERLOCAL AGREEMENT**  
**FOR**  
**FIRE SERVICES STUDY AND ANALYSIS**

THIS AGREEMENT is between the CITY OF LONGVIEW, a noncharter code City of the State of Washington, hereinafter referred to as the "City", and COWLITZ 2 FIRE AND RESCUE, a Fire District of the State of Washington, hereinafter referred to as "District";

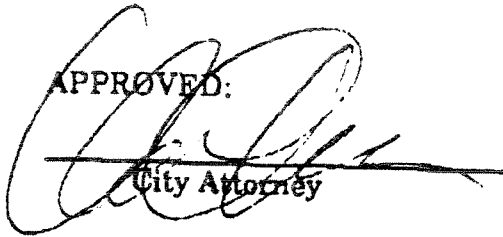
**WITNESSETH:**

**PURPOSE OF AGREEMENT:** The parties hereto desire to investigate the fire service delivery systems of the City and the District and the feasibility of consolidating such services or otherwise streamlining the provisions for fire suppression and related services in order that greater efficiency and economy may be realized. In order to perform such investigation, it is deemed desirable to jointly contract for a study to be performed, and proposals for such a study have been sought and obtained. The consulting firm of David M. Griffith and Associates, Ltd. has been selected by the parties hereto to perform such a study and the cost thereof is to be borne and paid equally by the City and the District.

NOW, THEREFORE, in consideration of the benefits to be derived by the City and the District, it is hereby promised and agreed as follows:

1. **DURATION OF AGREEMENT:** This Agreement shall continue until the investigation provided for herein is completed and the results thereof accepted by the parties hereto.
2. **NO ENTITY CREATED:** There is no separate organization or administrative entity created or necessitated by this Agreement.
3. **MANNER OF FINANCING:** The City and the District shall each provide up to Fifteen Thousand Five Hundred Dollars (\$15,500.00). Each of

APPROVED:

  
\_\_\_\_\_  
City Attorney

COWLITZ 2 FIRE AND RESCUE

By

  
\_\_\_\_\_  
Chairman

APPROVED:

\_\_\_\_\_  
Attorney for District

COPY

AGREEMENT

COPY

This agreement is entered into between COWLITZ COUNTY FIRE PROTECTION DISTRICT NO. 2, a municipal corporation, hereafter referred to as "District", and the CITY OF KELSO, a municipal corporation, hereafter referred to as "City".

It is acknowledged by the parties that the District has no statutory duty to provide building inspection services that might be required under the uniform fire code or any ordinances of the City and has no authority or duty to enforce any provisions of such codes or to enforce any ordinances of the City. The authority of the District to provide such services within the City is established by this agreement.

The City has been annexed into the District and the District, provides fire prevention, fire suppression, emergency medical and hazardous materials incident response services within the boundaries of the City.

This agreement is entered into by the City under the authority of RCW 35A.11.040 and the District under the authority of RCW 52.12.031 and in conformity with RCW 39.34, the Interlocal Cooperation Act.

To carry out the purposes of this agreement and in consideration of the benefits to be received by each party, it is agreed as follows:

- 1. **Effective Date and Termination Agreement.** This agreement shall be effective on January 1, 1991, and shall be automatically renewed on January 1 of each year unless written notice of termination is given by the legislative body of the District or the City Manager, to the other party prior to the first day of October of the calendar year in which this contract shall terminate.
- 2. **Definitions.** The following phrases as used in this agreement shall have the meanings indicated.
  - 2.1 *Advanced life support* means invasive emergency medical services requiring advance medical treatment skills as defined by chapter 18.71 RCW.
  - 2.2 *Basic life support* means noninvasive emergency medical services requiring basic medical treatment skills as defined in chapter 18.73 RCW.

3. **Services.** The District agrees to furnish the following services to the City:

- 3.1 The District agrees to furnish fire protection, basic life support and advanced life support services and hazardous materials incident first response services to all persons and property located within the City including City owned or leased real and personal properties. Such services shall be rendered on a basis equal to or greater than such protection is rendered to other areas within the District or with which the District has contracts, but the District assumes no liability for failure to do so by reason of any circumstances beyond its control. In the event of simultaneous emergencies occurring within the City and outside of the City whereby facilities of the District are taxed beyond its ability to render equal protection, the officers and agents of the District shall have discretion as to which call shall be answered first. The District shall be the sole judge as to the most expeditious manner of handling and responding to emergency calls. The District, however, agrees that it will staff its headquarters station, located within the City, with full time, fully paid fire fighters. In the event that the District shall be required to dispatch such personnel to the scene of an emergency outside of the City, personnel and equipment from District stations located outside of the City limits will be immediately reassigned to the headquarters station to insure that emergency services are available within the City at all times.
- 3.2 During the term of this agreement, the District shall furnish emergency medical services within the geographical boundaries of the City and any areas that may be annexed to the City. All emergency medical services supplied by the District and the vehicles and personnel used to supply such services shall meet the statutory and regulatory requirements set forth in chapters 18.71 and 18.73 RCW and chapters 248-15 and 248-71 WAC.
- 3.3 The District agrees to provide inspection services in accordance with the uniform fire code within the City. The City shall by ordinance vest the District Chief and Fire Marshal with authority to administer and enforce the uniform fire code. The District's obligation will consist of providing the required inspections; notifying the building owners or occupants and the City Attorney of any fire code violations and of the remedial measures

necessary to affect code compliance; perform a reinspection of the facilities to determine compliance; and, if the property remains in violation of the fire code, to consult with the City Attorney, to issue citations where appropriate and provide evidence and testimony in subsequent court proceedings. All subsequent legal procedures that may be available to enforce compliance with the fire code will be the responsibility of the City Attorney.

3.4 Plan review services in accordance with the uniform fire code for proposed new construction.

3.5 The services of the District Fire Chief and Fire Marshal who shall serve in such capacity for the City.

3.6 Administration of the uniform fire code as adopted by the City.

4. **Payment by City for Services.** In exchange for the services to be supplied by the District, the City agrees as follows:

4.1 To pay a minimum annual fee of three hundred thousand dollars (\$300,000.00) per year during the term of this agreement. This fee is based on the level of services that the District agrees to provide under the agreement and on the physical status of the City at the time of the execution of the agreement, that is, the geographical boundaries and nature of commercial and industrial facilities within the City boundaries. The parties agree to review the District's projected budget for the following year and to negotiate any additional increase that may be necessary.

4.2 In the event that the City contemplates issuing a permit for the construction of any facilities which would require the District to provide specialized equipment, services, or training not contemplated at the time of the execution of this agreement, and not within the current capabilities of the District, the annual fee will be increased by an amount to be negotiated by the parties.

4.3 The annual fee shall be paid in four equal quarterly installments beginning

February 15th of each year.

- 4.4 The District is required by RCW 84.52.020 to file its budget and tax levy with the county on or before November 15th of each year. To enable the District to meet the deadline, the parties agree to commence the annual fee negotiations provided for in paragraph 4.1 and 4.2 no later than September 15th of each year.
5. **District Budget.** The proposed District annual budget shall be submitted to the City Manager three (3) weeks prior to its final adoption by the District Board of Commissioners for the Manager's review and comment. The Board of Commissioners shall review and consider any comments received from the City prior to final adoption of the budget.
6. **Enforcement of City Codes.** The City agrees during the term of this agreement to enact and enforce building and fire codes at a level at least equal to the codes and enforcement provided by Cowlitz County within the area of Cowlitz County served by the District. The City further agrees to consult with the District in the preparation and enactment of suitable water and hydrant codes relating to placement of water lines, capacity of water lines, spacing and design of hydrants and fire flow requirements. The District agrees to provide the City with its recommendations and requirements in respect to such code provisions.
7. **Police Support.** The City agrees that in the event the District shall require police assistance at the scene of any emergency within the City limits, that the City shall provide the necessary police support services if available.
8. **Liability.** Each of the parties shall, at all times, be solely responsible for the acts or the failure to act of its personnel that occur or arise in any way out of the performance of this contract by its personnel only and to save and hold the other party and its personnel and officials harmless from all costs, expenses, losses and damages, including cost of defense, incurred as a result of any acts or omissions of the party's personnel relating to the performance of this contract.
9. **Insurance Coverage.** The District agrees to provide insurance coverage for the station facilities owned by the District. The District agrees to provide insurance

coverage for all fire and medical service vehicles owned or operated by the District. The District further agrees to provide insurance coverage covering the actions of personnel of the District. The District agrees to include the City as an additional insured on all insurance policies covering the District's facilities and operations. The public liability insurance coverage provided by the District shall be not less than one million dollars (\$1,000,000.00), per occurrence, combined single limit.

10. **City Maps.** The City shall furnish the District a proper chart or map showing all roads and hydrants, and shall keep such map up-to-date as changes and alterations are made.
11. **City Equipment.** During the term of this agreement, the District shall have possession of and the right to the use of all City fire fighting personal property. If any items of personal property are required to be returned by the District to the City after the termination of the agreement, the return of such items shall be subject to normal wear and tear from usage. In the event that any items have been consumed or destroyed without the fault of the District during the course of this agreement, such items need not be returned. In the event that any items of such property become obsolete, or are in need of replacement, in the opinion of the District, the City shall declare such items surplus and the items shall be disposed of for the best price obtainable, in accordance with applicable statutory requirements. The funds received from the sale of the items shall be paid to the District for the purpose of applying such funds to the cost of replacement items. Replacement items purchased by the District shall constitute property of the District.
12. **Maintenance of City Equipment and Property.** All equipment (including vehicles) owned by the City and used by the District shall be reasonably maintained by the District in operable condition during their useful life; normal wear and tear and damage by the elements excepted.
13. **Equipment Location.** The District equipment listed on Exhibit "A" shall be assigned to and stationed in the District station located within the City of Kelso, when practicable, provided however, that such equipment may be used for and temporarily stationed at other locations within the District for a period not to

exceed sixty (60) days without approval of the City when deemed necessary by the Fire District administration. In the event that such District equipment shall be out of service, the District agrees to temporarily assign comparable equipment to the Kelso station as deemed necessary by the Fire District administration. The District Fire Department administration shall advise the City of any proposed permanent assignment, changes, or replacements of any equipment listed on Exhibit "A" prior to the time that the permanent change shall become effective. Such notification shall be made as soon as is practicable.

14. **Annual Report.** The District shall provide the City with an annual report of the operations of the District showing the facilities and equipment owned or operated by the District and the District personnel employed as paid or volunteer employees.
15. **Annual Meeting.** The Board of Commissioners of the District, the City Council and respective staff personnel, shall hold an annual joint meeting to review the operation of the fire department during the preceding year and to discuss the operating budget and capital improvement budget for the following year. This meeting shall be set at an agreeable time on or before June 1. The City may request special meetings of the Board of Commissioners as the need arises.
16. **Commissioner's Meetings.** The Kelso City Manager or the Manager's designee may attend all regular and special meetings of the District Board of Commissioners.
17. **Arbitration.** Any controversy which shall arise between the City and the District regarding the rights, duties or liabilities hereunder of either party shall be settled by arbitration. Such arbitration shall be before one disinterested arbitrator if one can be agreed upon, otherwise before three disinterested arbitrators, one named by the City, one by the District and one by the two so selected. In the event the two arbitrators are unable to agree on the third arbitrator, the selection shall be made by the Cowlitz County Superior Court. The arbitrator or arbitrators shall determine the controversy in accordance with the laws of the State of Washington as applied to the facts and in accordance with chapter 7.04 RCW.
18. **Notices.** All notices, requests, demands and other communications required by



this agreement shall be in writing and, except as expressly provided elsewhere in this agreement, shall be deemed to have been given at the time of delivery if personally delivered or at the time of mailing if mailed by first class, postage pre-paid and addressed to the party at its address as stated in this agreement or at such address as any party may designate at any time in writing.

19. **Severability.** If any provision of this agreement or its application is held invalid, the remainder or the agreement or the application of the remainder of the agreement shall not be affected.

20. **Modification.** This agreement represents the entire agreement between the parties. No change, termination or attempted waiver of any of the provisions of this agreement shall be binding on either of the parties unless executed in writing by authorized representatives of each of the parties. The agreement shall not be modified, supplemented or otherwise affected by the course of dealings between the parties.

21. **Benefits.** This agreement is entered into for the benefit of the parties to this agreement only and shall confer no benefits, direct or implied, on any third persons.

Dated: DECEMBER 11, , 1990

Dated: December 12, , 1990

CITY OF KELSO

COWLITZ COUNTY FIRE PROTECTION  
DISTRICT NO. 2

By: Donald B. Gregory  
MAYOR

By: George Moore  
Chair of Board of Commissioners

Attested By:

Shirley K. ...  
City Clerk

By: Shirley K. ...  
Secretary

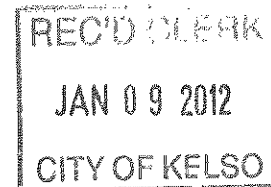
Approved as to form:

Patrick P. ...  
City Attorney



# Cowlitz 2

## FIRE & RESCUE




### Memorandum of Understanding

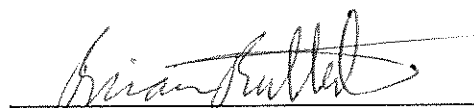
THIS MEMORANDUM OF UNDERSTANDING (MOU) is entered into this 6<sup>th</sup> day of January, 2012, between the CITY OF KELSO, a municipal corporation, referred to as "CITY" and COWLITZ 2 FIRE & RESCUE, a municipal corporation, referred to as "DISTRICT."

Due to the current distressed economic conditions, the CITY and the DISTRICT agree that the current annual fee of \$300,000 identified in the Interlocal Agreement for Fire and Emergency Medical Services with the CITY dated January 1, 1991, will again be temporarily reduced to \$240,000 for the 2012 budget year. Effective January 1, 2013, the Interlocal Agreement fee shall be restored to the full \$300,000 unless otherwise agreed to in writing after further negotiation between the parties. This MOU will not alter other provisions of the Agreement.

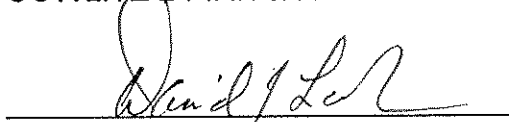
DATED this 6<sup>th</sup> day of January, 2012.

CITY OF KELSO:

  
\_\_\_\_\_  
City Manager

  
\_\_\_\_\_  
City Clerk

COWLITZ 2 FIRE & RESCUE:

  
\_\_\_\_\_  
Fire Chief

  
\_\_\_\_\_  
District Secretary

## **Appendix C**

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### Treatment Plant Information

- Tracer Study and Detention Evaluation
- Letter of Authorization to Increase Filter Loading Rate,  
Department of Health

**TO:** Teresa Walker, P.E.  
Department of Health, Regional Engineer

**FROM:** David Sypher, P.E.  
City of Kelso, Director of Public Works

**DATE:** May 15, 2007

**RE:** Tracer Study and Detention Evaluation  
DOH Project# 06-0713

## **INTRODUCTION**

This report presents results of a tracer study and detention time evaluation conducted on the Kelso Water Treatment Plant. The tracer tests were conducted on September 11, 2006 and September 18, 2006.

The City of Kelso last preformed a tracer study in 1998, plant upgrades since then includes the addition of baffles in the clear wells, new raw water line, new transmission line and relocation of the chlorine injection point upstream to the wellhead. These changes have increased our contact time and thus merited a new tracer study and evaluation of our contact time.

## **STUDY OBJECTIVE**

- The first objective of the tracer study and detention evaluation is to determine the detention time within the entire treatment process, from the point of injection of the disinfectant prior to leaving the Ranney well, see picture #2 page 25, to the point prior to the first customer (the point of compliance).
- The second objective is to evaluate the new detention time, with the Surface Water Treatment Rule (SWTR) CT disinfection requirements.

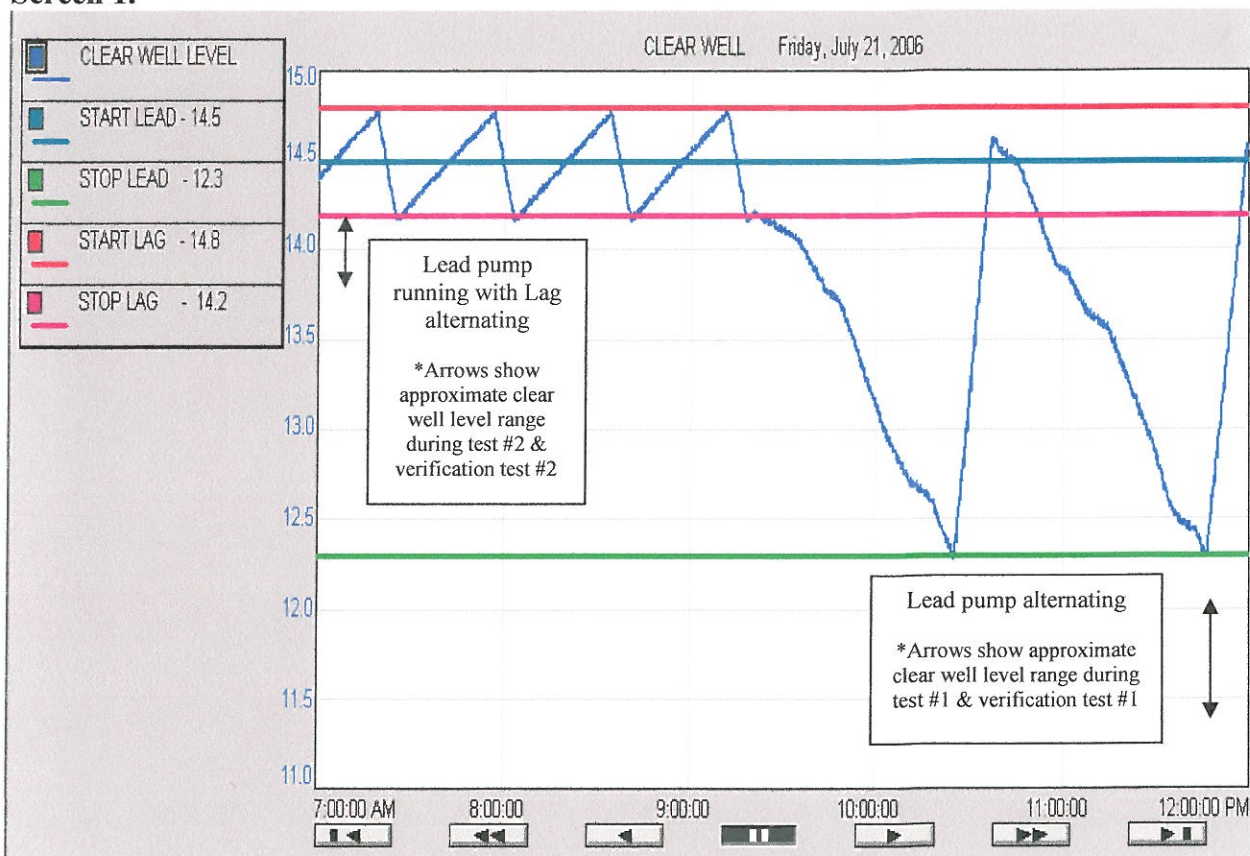
## **TRACER STUDY PROCEDURE**

- The clearwell tracer study was preformed using a “step dose method” in accordance with procedures outlined in Appendix C: *Determination of Disinfection Contact Time* of the *SWTR Guidance Manual* (1990), and the Washington State Department of Health *Guidance Manual SWTR* (1995).
- Sodium Fluoride was used as the tracer for the clearwells.

- Because the pumping system out of the clearwell has two levels of operation, the clearwell has two operational volumes. At lower flows the clearwell uses only one “lead” pump to deliver water to the distribution system. At higher flows when the filter flow exceeds the capacity of the lead-pump, the clearwell fills past the normal lead-pump-on-set-point and reaches a higher level where the lag-pump-on-set-point, is then activated. Because the lag-pump on and off set-points, are higher than that of the lead-pump, there is more volume in the clearwell during higher flows. Given this information two test flow rates and levels were then selected for the clearwell.

Screen 1. Shows the how the level of the clearwell is controlled during pumping. The left hand side of the screen shows high flow conditions, with the lead pump always on, and the lag pump is turning off at 14.2 feet and then back on at 14.8 feet. The right hand side of the screen shows lower flows where only the lead pump was needed, it shows how the lead pump turns on at 14.5 feet and then off at 12.3 feet. The arrows show the clearwell level range during tracer testing.

### Screen 1.



Note: The clearwell is considered full at 14.8 feet and near overflow at this level.

- 9-11-06, Test # 1 –Low clearwell operation: (lead pump running) This was at 2,297 gallons per minute or about 92% of the current design filter loading rate of 2,500 gallons per minute. The clearwell level was stabilized below its “normal low operating lead pump off set point” of 12.3 feet throughout this tracer test, and dropped only slightly during the test. This simulated normal (lead) pumping conditions at conservative clearwell operation levels. See attachments, tracer data page 19, Screen 2 and Screen 3, for flow and clearwell level data recorded during the test.
- 9-18-06, Test # 2 – High clearwell operation: (two pumps running) This was at 2,835 gallons per minute (highest flow currently possible) or about 113% of the current design

filter loading rate of 2,500 gallons per minute. The clearwell level was stabilized below its “normal low operating lag pump off set point” of 14.2 feet throughout this tracer test, and dropped only slightly during the test. This simulated normal (lead/lag) pumping conditions at conservative clearwell operations. See attachments, tracer data page 20, Screen 4 and Screen 5, for flow and clearwell level data recorded during the test.

- In each test, sodium fluoride was injected just down stream of the filters, prior to the clearwell, see picture #1 page 23. For a plant flow diagram see attachments tracer data page 21, Figure 5. Samples were collected at the finished water pump discharge leaving the clearwell at 3 minute intervals through out the tests, see picture #3 page 25. The duration of the tests through the clearwell was 5 hours and 12 minutes for test # 1, and 3 hours and 24 minutes for test # 2. The fluoride injection was turned off mid way through each test in order to verify and retest the T<sub>10</sub> on the fluoride concentration drop.
- Fluoride concentrations were analyzed by the treatment plant personnel using a HACH DR/890 Colorimeter. See attachments tracer data pages 15 thru 18, Tables 10 thru 13.

## THEORETICAL T<sub>10</sub> VALUES

Theoretical T<sub>10</sub> Values for a flow of 2,297 gpm are listed in table 1.

| Basin                                  | (minutes) | Basis of Calculation <sup>(1)</sup>   |
|--|-----------|---|
| Aerators, Filters and Pipe (plug Flow) | 17.5      | <u>Aerators</u><br>7 Aerators; 11-foot high; 32-inch diameter assume T <sub>10</sub><br>T = 0.7 <sup>(2)</sup>  |
|  |           | <u>Filters</u><br>7 Filters; 8-foot high; 12.5-foot diameter; 3-foot media height; porosity = 0.3; assume T <sub>10</sub> T = 0.7 <sup>(2)</sup>  |
|  |           | <u>Pipe (plug flow)</u><br>749-feet 10-inch pipe <sup>(5)</sup> ; 919-feet 12-inch pipe <sup>(6)</sup> ; 293-feet 16-inch pipe <sup>(7)</sup> ; assume T <sub>10</sub> T = 1.0 <sup>(3)</sup> |
| Clearwells                             | 40.4      | Interior dimensions: 30 feet x 50 feet; four baffle walls: 18 feet x 8-inch thick; 12.2-foot operating height; assume T <sub>10</sub> T = 0.7 <sup>(4)</sup>                                  |

<sup>(1)</sup> From As Built Drawings and field measurements.

<sup>(2)</sup> Based on superior baffling conditions for filter as recommended in Appendix C: *Determination of Disinfection Contact Time* of the SWTR Guidance Manual (1990)

<sup>(3)</sup> Based on Perfect (Plug Flow) baffling classifications as listed in table C-5 of Appendix C: *Determination of Disinfection Contact Time* of the SWTR Guidance Manual (1990)

<sup>(4)</sup> Based on superior baffling classifications as listed in table C-5 of Appendix C: *Determination of Disinfection Contact Time* of the SWTR Guidance Manual (1990)

<sup>(5)</sup> 749-feet of 10-inch piping from chlorine injection point to the filter influent header.

<sup>(6)</sup> 919-feet of 12-inch piping from chlorine injection point to the filter influent header.

<sup>(7)</sup> 293-feet of 16-inch piping from plant effluent header to the first connection.

Theoretical T<sub>10</sub> Values for a flow of 2,835 gpm are listed in table 2.

| TABLE 2<br>THEORETICAL T <sub>10</sub> VALUES FOR FLOW OF 2,835 GPM |  |  |
|---|--|--|
| Basin   | Theoretical T <sub>10</sub><br>(minutes) | Basis of Calculation <sup>(1)</sup>  |
| Aerators, Filters and Pipe (plug Flow)                              | 14.2                                     | <u>Aerators</u><br>7 Aerators; 11-foot high; 32-inch diameter assume T <sub>10</sub> T = 0.7 <sup>(2)</sup><br><br><u>Filters</u><br>7 Filters; 8-foot high; 12.5-foot diameter; 3-foot media height; porosity = 0.3; assume T <sub>10</sub> T = 0.7 <sup>(2)</sup><br><br><u>Pipe (plug flow)</u><br>749-feet 10-inch pipe <sup>(5)</sup> ; 919-feet 12-inch pipe <sup>(6)</sup> ; 293-feet 16-inch pipe <sup>(7)</sup> ; assume T <sub>10</sub> T = 1.0 <sup>(3)</sup> |
| Clearwells  | 38.1                                     | Interior dimensions: 30 feet x 50 feet; four baffle walls: 18 feet x 8-inch thick; 14.2-foot operating height; assume T <sub>10</sub> T = 0.7 <sup>(4)</sup>   |

<sup>(1)</sup> From As Built Drawings and field measurements.  
<sup>(2)</sup> Based on superior baffling conditions for filter as recommended in Appendix C: *Determination of Disinfection Contact Time* of the SWTR Guidance Manual (1990)  
<sup>(3)</sup> Based on Perfect (Plug Flow) baffling classifications as listed in table C-5 of Appendix C: *Determination of Disinfection Contact Time* of the SWTR Guidance Manual (1990)  
<sup>(4)</sup> Based on superior baffling classifications as listed in table C-5 of Appendix C: *Determination of Disinfection Contact Time* of the SWTR Guidance Manual (1990)  
<sup>(5)</sup> 749-feet of 10-inch piping from chlorine injection point to the filter influent header.  
<sup>(6)</sup> 919-feet of 12-inch piping from chlorine injection point to the filter influent header.  
<sup>(7)</sup> 293-feet of 16-inch piping from plant effluent header to the first connection.

### TRACER TEST RESULTS

The data collected during the tracer test is presented in the attachments, tracer data, pages, 15 thru 18, Tables 10 thru 13. A graphical analysis of the data to determine T<sub>10</sub> values is presented in Figures 1 and 2 for the tracer test 1 at a flow of 2,297 gpm. And Figures 3 and 4 for the tracer test 2 at a flow of 2,835 gpm.

The tracer concentration at the sampling point is equal to the measured fluoride concentration minus the background fluoride concentration. For tracer test 1 at the flow rate of 2,297 gpm the background fluoride level was .15 mg/L and the dose was 1.2681 mg/L. For tracer test 2 at the flow rate of 2,835 gpm the background fluoride level was .2218 mg/L and the dose was 1.32 mg/L. The T<sub>10</sub> for the aerators, filters and pipe (plug flow) is based on Table 1 and Table 2.

DOH *Guidance Manual SWTR* (1995), page 14, 1.2.7.1 Step-dose Method

“The graphical method of evaluating step-dose test data involves plotting a graph of dimensionless concentration versus time and reading the value for T<sub>10</sub> directly from the graph at the appropriate dimensionless concentration.”

Using the “graphical method” of evaluation, the results for clearwell Tracer Tests were as follows. Test #1, at 2,297gpm, T<sub>10</sub> = 43.7 minutes and Test #2, at 2,835gpm, T<sub>10</sub> = 42.0 minutes Both tests were verified by shutting off the fluoride and measuring the concentration drop. The verification tests had slightly lower T<sub>10</sub> times corresponding to the drop in clearwell levels. Verification Test #1, at 2,297gpm, T<sub>10</sub> = 42.0 minutes (clearwell approx. 4,887gal. lower) Verification Test #2, at 2,835gpm, T<sub>10</sub> = 40.5 minutes (clearwell approx. 4,344gal. lower)

Figure 1. Clearwell Test #1 at 2,297 gpm. Results C/Co versus Elapsed Time

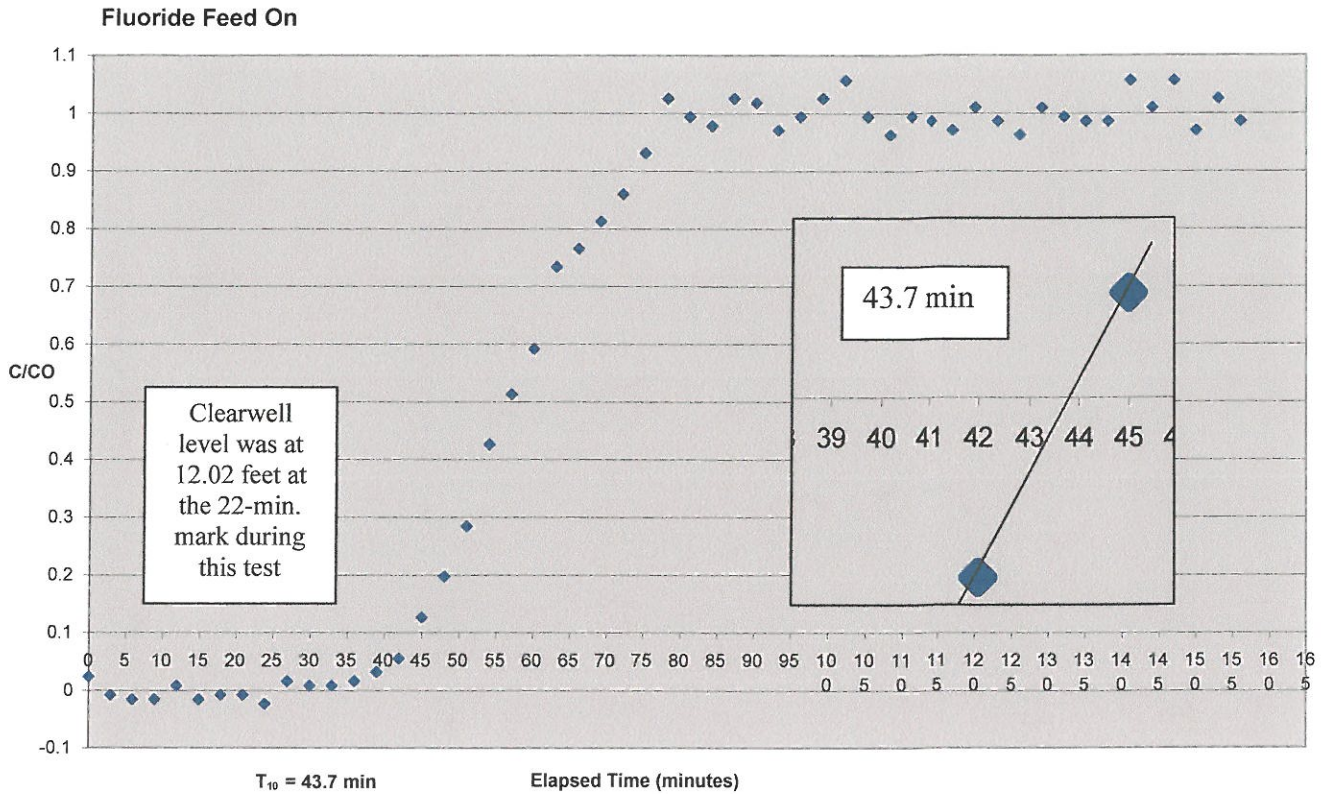


Figure 2. Clearwell Verification Test # 1 at 2,297 gpm. Results C/Co versus Elapsed Time

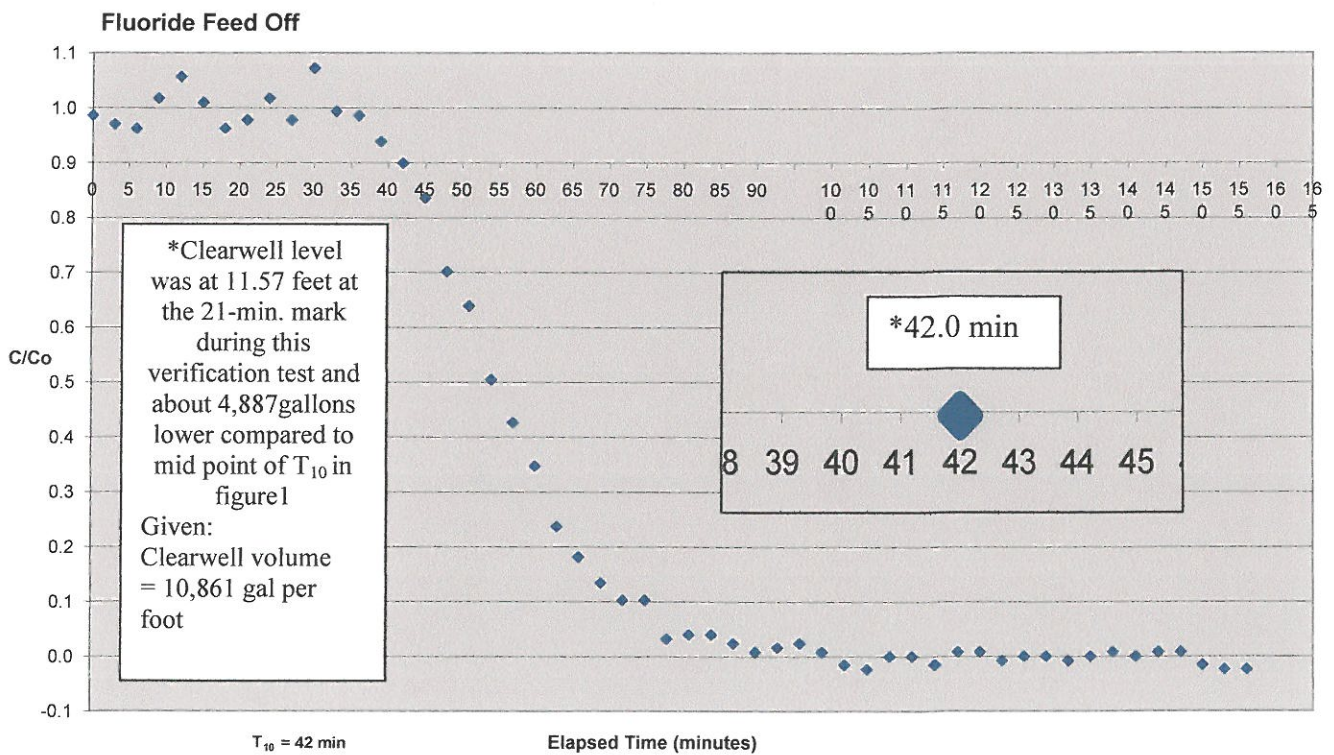




Figure 3. Clearwell Test # 2 at 2,835 gpm. Results C/Co versus Elapsed Time

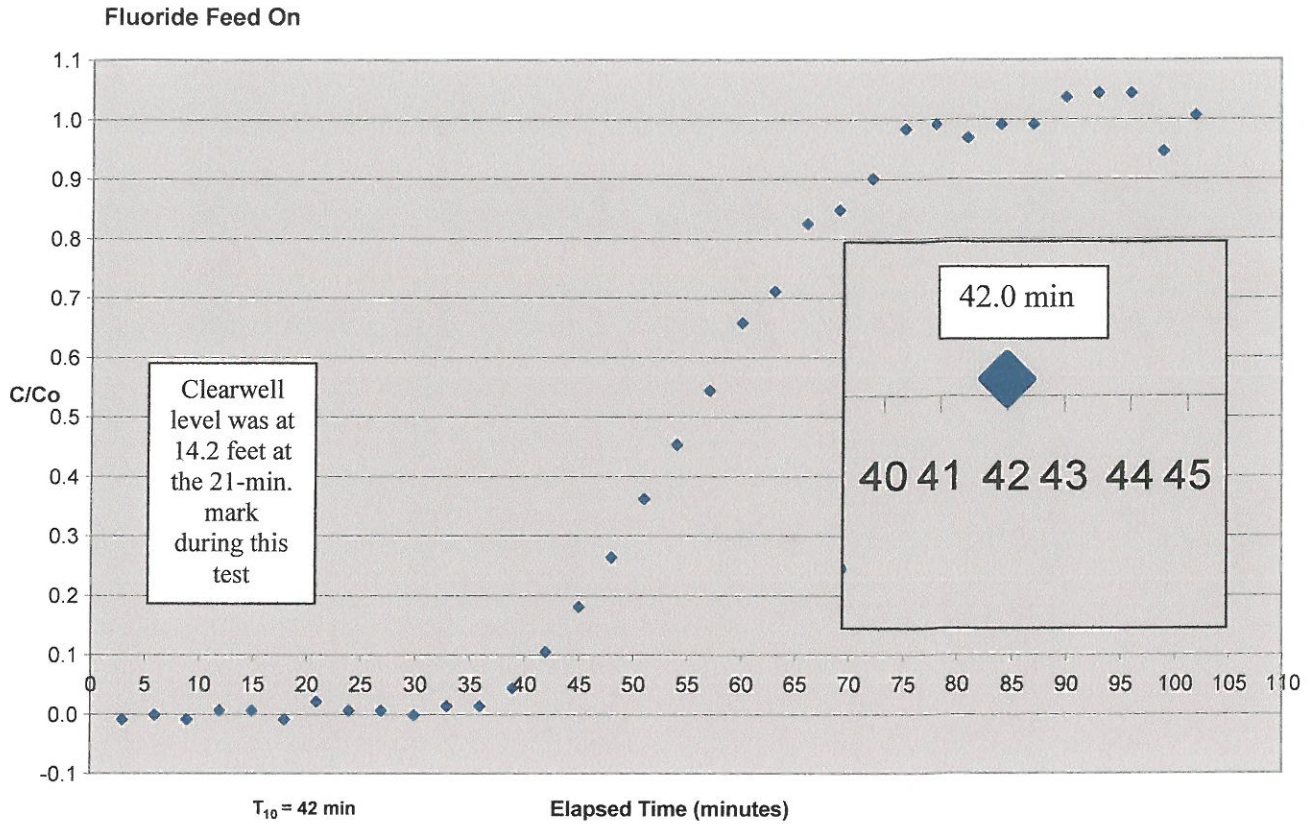
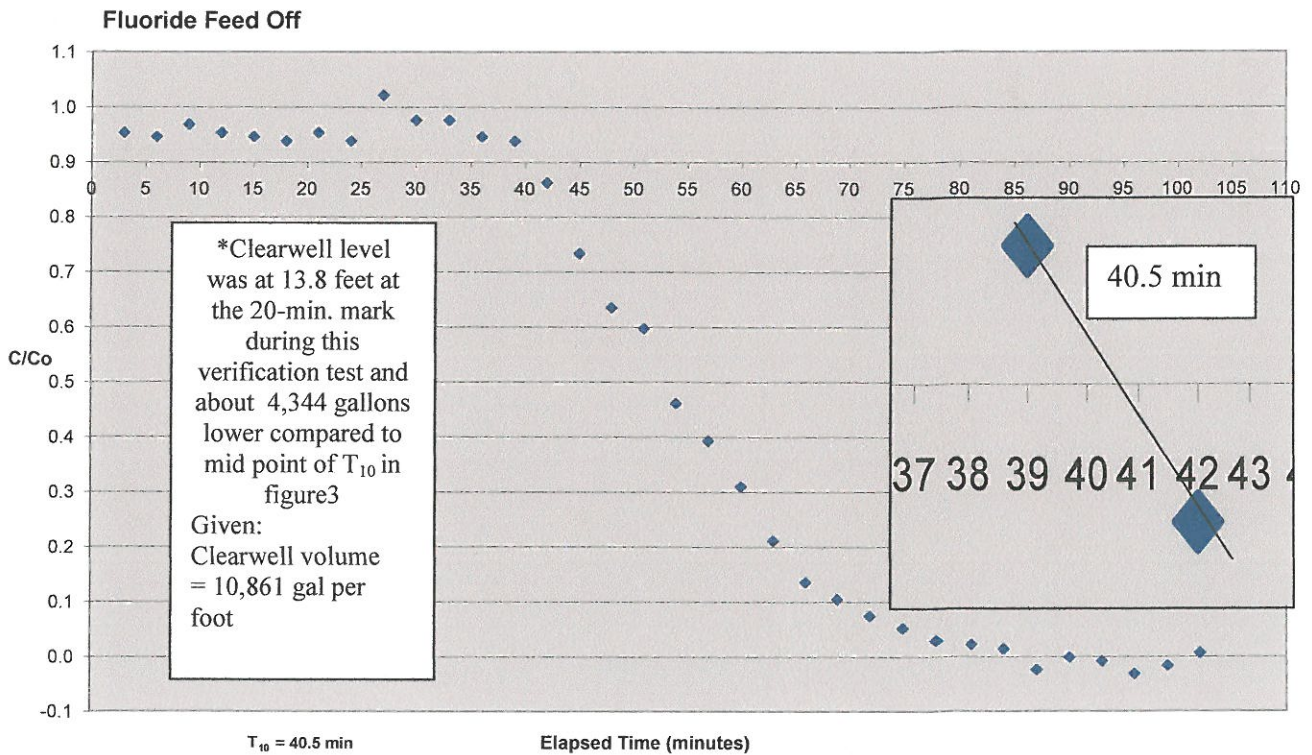


Figure 4. Clearwell Verification Test #2 at 2,835 gpm. Results C/Co versus Elapsed Time



## T<sub>10</sub> VALUES

The T<sub>10</sub> value (the time for ten percent of the tracer to pass through the sampling point) for the tracer test may be read directly from the plot of C/Co versus elapsed time. It is equal to the elapsed time associated with a C/Co value of 0.1. For the clearwell, the T<sub>10</sub> for tracer study #1 is 43.7 minutes and for tracer study #2 is 42 minutes. The T<sub>10</sub> for the aerators filters and pipe (plug flow) for both tracer studies are based on the empirical values presented in Table 1 and Table 2.

Using T<sub>10</sub> values for the tracer study flows of 2,297gpm and 2,835 gpm, T<sub>10</sub> values for other flows may be determined through the following equation:

$$T_{10S} = T_{10T} \times Q_T / Q_D$$

Where:

- T<sub>10S</sub> = T<sub>10</sub> at system flow rate
- T<sub>10T</sub> = T<sub>10</sub> at tracer flow rate
- Q<sub>T</sub> = Tracer study flow rate
- Q<sub>D</sub> = System flow rate

Given:

Tracer Study #1 Results, 43.7 minutes @ 2,297 gpm (clearwell)

Tracer Study #2 Results, 42.0 minutes @ 2,835 gpm (clearwell)

T<sub>10</sub> values for the range of flows which are expected at the treatment plant are summarized in Table 3.

| Flow (gpm)              | Table<br>T <sub>10</sub> (minutes) |                         |                        |       |
|-------------------------|------------------------------------|-------------------------|------------------------|-------|
|                         | Plug Flow                          | Aerators and<br>Filters | Clearwell              | Total |
| 1,148 (low demand)      | 10.0                               | 25.1                    | 87.4                   | 122.5 |
| 1,722 (average day)     | 6.7                                | 16.7                    | 58.3                   | 81.7  |
| 2,297 (tracer study #1) | 5.0 <sup>(a)</sup>                 | 12.5 <sup>(b)</sup>     | 43.7 <sup>actual</sup> | 61.2  |
| 2,400                   | 4.8                                | 12.0                    | 49.6                   | 66.4  |
| 2835 (tracer study #2)  | 4.1 <sup>(a)</sup>                 | 10.2 <sup>(b)</sup>     | 42.0 <sup>actual</sup> | 56.2  |
| 3270 <sup>(c)</sup>     | 3.5                                | 8.8                     | 36.4                   | 48.7  |

<sup>(a)</sup> T<sub>10</sub> value for pipe (plug flow) is based on the theoretical value as presented in Table 1 and Table 2  
<sup>(b)</sup> The T<sub>10</sub> value for the filters and aerators is based on the theoretical value as presented in Table 1 & 2  
<sup>(c)</sup> Approximates future demand flows at the filter loading rate of 4 gal/sqft/min.

**TABLE 3 CALCULATIONS – Using  $T_{10s} = T_{10T} \times Q_T / Q_D$**

| UNIT PROCESS       | FLOW - GPM | $T_{10T}$ | $Q_T / Q_D$ | $T_{10s}$ |
|--------------------|------------|-----------|-------------|-----------|
| PLUG               | 1148       | 5.00      | 2297/1148   | 10.0      |
|                    | 1722       | 5.00      | 2297/1722   | 6.7       |
|                    | 2400       | 4.06      | 2835/2400   | 4.8       |
|                    | 3270       | 4.06      | 2835/3270   | 3.5       |
| AERATORS & FILTERS | 1148       | 12.52     | 2297/1148   | 25.1      |
|                    | 1722       | 12.52     | 2297/1722   | 16.7      |
|                    | 2400       | 10.20     | 2835/2400   | 12.0      |
|                    | 3270       | 10.20     | 2835/3270   | 8.8       |
| CLEARWELL          | 1148       | 43.70     | 2297/1148   | 87.4      |
|                    | 1722       | 43.70     | 2297/1722   | 58.3      |
|                    | 2400       | 42.00     | 2835/2400   | 49.6      |
|                    | 3270       | 42.00     | 2835/3270   | 36.4      |

It is recommended that the equations to calculate T at PHF be applied separately to each unit process, and these added to acquire total plant T. The following equations show an example of how T could be calculated during the first tracer test at 2297 gpm. Given that filters were all running at same flow rate. And clearwell level was 12.02 feet.

- Plug Flow T. = Volume of pipe / PHF = (8450 gallons / 2297gpm) = 3.68 minutes
- Aerator & Filter T. = Volume / Peak filter at PHF = (5872.4 gallons / 328 gpm = 12.53 minutes.
- Clearwell T. = Volume at PHF X Baffle Factor / PHF = (((30\*50\*7.48\*12.02)-(4\*18\*0.666\*7.48\*12.02))\* .7689) / 2297gpm = ((130553 gallons x .7689) / 2297gpm) = 43.7 minutes.
- Total T = 3.68 + 12.53 + 43.7 = 59.9 minutes.

## CT COMPLIANCE EVALUATION

Compliance with the SWTR is evaluated on the CT value where:

C = Residual chlorine concentration at the point of compliance (mg/L)

T =  $T_{10}$  for the point of compliance at the operating flow

Compliance is attained when:  $CT_{actual} / CT_{required} \geq 1$

The SWTR currently establishes that a 3.0-log (99.9 percent) inactivation of *Giardia cyst* and a 4.0-log (99.99 percent) inactivation of viruses be provided prior to the first customer. The treatment plant operates as an in-line filtration plant and receives a 2.0-log *Giardia cyst* removal credit and a 1.0-log virus removal credit for filtration. Disinfection is required to provide a 1.0-log inactivation of *Giardia cyst* and a 3.0-log inactivation of viruses.

$CT_{required}$  values increase with increasing pH and decreasing temperature. Table 4 lists the  $CT_{required}$  values for 1.0-log inactivation of *Giardia cyst* by free chlorine at a pH range of 6.4 to 6.6 and a water temperature range of 7 to 16°C, with a range of residual chlorine concentration of .2 to 1.0 mg/L. Table 5 list the  $CT_{required}$  values for 3.0-log inactivation of viruses by free chlorine at a pH range of 6 to 9 and a water temperature range of 5 to 15°C.

| TABLE 4<br>CT <sub>required</sub> VALUES FOR 1.0-LOG INACTIVATION OF <i>GIARDIA</i> CYST |     |                      |            |            |            |            |
|--|-----|----------------------|------------|------------|------------|------------|
| Water Temp (°C)  | pH  | CT Values (mg/L-min) |            |            |            |            |
|  |     | C=0.2 mg/L           | C=0.4 mg/L | C=0.6 mg/L | C=0.8 mg/L | C=1.0 mg/L |
| 7  | 6.4 | 34                   | 34         | 35         | 36         | 36         |
|  | 6.5 | 34                   | 35         | 36         | 37         | 38         |
|  | 6.6 | 36                   | 36         | 37         | 38         | 39         |
| 12   | 6.4 | 24                   | 24         | 25         | 26         | 26         |
|  | 6.5 | 25                   | 25         | 26         | 27         | 27         |
|  | 6.6 | 26                   | 26         | 27         | 28         | 28         |
| 16   | 6.4 | 18                   | 18         | 18         | 18         | 19         |
|  | 6.5 | 19                   | 19         | 19         | 18         | 20         |
|  | 6.6 | 20                   | 20         | 20         | 20         | 21         |

Source: DOH Look-up Table for Required CT for 1 Log Reduction in Giardia at Various Temp, Cl and pH

| TABLE 5<br>CT <sub>required</sub> VALUES FOR 3.0-LOG<br>INACTIVATION OF VIRUSES BY FREE<br>CHLORINE |        |                      |
|---|--------|----------------------|
| Water Temperature (°C)  | pH     | CT Values (mg/L-min) |
| 5   | 6 to 9 | 6                    |
| 10  | 6 to 9 | 4                    |
| 15  | 6 to 9 | 3                    |

Source: Table 3-8, "CT Values" of the SWTR Guidance Manual

## INACTIVATION

Historical temperature ranges during the last four years for the treatment plant are from 7.6 degrees to 15.4 degrees Celsius, and historical ranges for PH are 6.4 to 6.6 units.

## VIRUSES

CT<sub>actual</sub> values for both the complete system (clearwell, aerators, filters and piping (plug flow) and the clearwell alone were calculated using chlorine concentrations of 0.2, 0.4, 0.6, 0.8, 1.0, and 1.2mg/L and the T<sub>10</sub> values from Table 3. The results are presented in Tables 6.A, 7.A, 8.A and 9.A. For 3.0-log inactivation of viruses by free chlorine, the CT<sub>required</sub> values range from 3 to 6 mg/L-min. CT<sub>actual</sub> / CT<sub>required</sub> is greater than 1.0 for 3.0 log inactivation of viruses under all conditions, indicating compliance is attained.

## GIARDIA CYSTS

CT compliance is evaluated by comparing the CT<sub>actual</sub> values with the The CT<sub>required</sub> values. The results of this numerical evaluation are presented in Tables 6.B 7.B 8.B and 9.B. The range of conditions for which CT compliance is not attained (i.e. CT<sub>actual</sub> / CT<sub>required</sub> <1) for 1.0-log inactivation of *Giardia cysts* is indicated by the yellow shaded cells in the table. Non shaded cells indicate compliance is attained. Typically a chlorine residual >0.6 mg/l will attain compliance.

**TABLE 6. CT EVALUATION THROUGH PIPING, AERATORS, FILTERS, AND CLEARWELL (LOW-FLOWS)**

A. CT<sub>actual</sub> (mg/L-min)

| Flow (gpm) | T <sub>10</sub> | Residual Chlorine Concentration (mg/l) |      |      |      |       |
|------------|-----------------|--|------|------|------|-------|
|            |                 | 0.2                                    | 0.4  | 0.6  | 0.8  | 1     |
| 1,148      | 122.5           | 24.5                                   | 49.0 | 73.5 | 98   | 122.5 |
| 1,722      | 81.7            | 16.3                                   | 32.7 | 49.0 | 65   | 81.7  |
| 2,297      | 61.2            | 12.2                                   | 24.5 | 36.7 | 49.0 | 61.2  |

B. CT<sub>actual</sub> / CT<sub>required</sub>

| Temp. (Celsius) | Flow (gpm) | pH  | Residual Chlorine Concentration (mg/l) |      |      |      |      |
|-----------------|------------|-----|--|------|------|------|------|
|                 |            |     | 0.2                                    | 0.4  | 0.6  | 0.8  | 1    |
| 7               | 1,148      | 6.4 | 0.72                                   | 1.44 | 2.1  | 2.72 | 3.4  |
|                 |            | 6.5 | 0.7                                    | 1.4  | 2.04 | 2.65 | 3.22 |
|                 |            | 6.6 | 0.68                                   | 1.36 | 1.99 | 2.58 | 3.14 |
|                 | 1,722      | 6.4 | 0.48                                   | 0.96 | 1.4  | 1.82 | 2.27 |
|                 |            | 6.5 | 0.47                                   | 0.93 | 1.36 | 1.77 | 2.15 |
|                 |            | 6.6 | 0.45                                   | 0.91 | 1.32 | 1.72 | 2.09 |
|                 | 2,297      | 6.4 | 0.36                                   | 0.72 | 1.05 | 1.36 | 1.7  |
|                 |            | 6.5 | 0.35                                   | 0.7  | 1.02 | 1.32 | 1.61 |
|                 |            | 6.6 | 0.34                                   | 0.68 | 0.99 | 1.29 | 1.57 |
| 12              | 1,148      | 6.4 | 1.02                                   | 2.04 | 2.94 | 3.77 | 4.71 |
|                 |            | 6.5 | 0.98                                   | 1.96 | 2.83 | 3.63 | 4.54 |
|                 |            | 6.6 | 0.94                                   | 1.88 | 2.72 | 3.5  | 4.38 |
|                 | 1,722      | 6.4 | 0.68                                   | 1.36 | 1.96 | 2.51 | 3.14 |
|                 |            | 6.5 | 0.65                                   | 1.31 | 1.89 | 2.42 | 3.03 |
|                 |            | 6.6 | 0.63                                   | 1.26 | 1.82 | 2.33 | 2.92 |
|                 | 2,297      | 6.4 | 0.51                                   | 1.02 | 1.47 | 1.88 | 2.35 |
|                 |            | 6.5 | 0.49                                   | 0.98 | 1.41 | 1.81 | 2.27 |
|                 |            | 6.6 | 0.47                                   | 0.94 | 1.36 | 1.75 | 2.19 |
| 16              | 1,148      | 6.4 | 1.36                                   | 2.72 | 4.08 | 5.44 | 6.45 |
|                 |            | 6.5 | 1.29                                   | 2.58 | 3.87 | 5.16 | 6.13 |
|                 |            | 6.6 | 1.23                                   | 2.45 | 3.68 | 4.9  | 5.83 |
|                 | 1,722      | 6.4 | 0.91                                   | 1.82 | 2.72 | 3.63 | 4.3  |
|                 |            | 6.5 | 0.86                                   | 1.72 | 2.58 | 3.44 | 4.09 |
|                 |            | 6.6 | 0.82                                   | 1.63 | 2.45 | 3.27 | 3.89 |
|                 | 2,297      | 6.4 | 0.68                                   | 1.36 | 2.04 | 2.72 | 3.22 |
|                 |            | 6.5 | 0.64                                   | 1.29 | 1.93 | 2.58 | 3.06 |
|                 |            | 6.6 | 0.61                                   | 1.22 | 1.84 | 2.45 | 2.91 |

Notes:

  CT<sub>actual</sub> / CT<sub>required</sub> < 1.0 (CT Compliance not attained for 1.0-log inactivation of *Giardia* Cysts)

**TABLE 7. CT EVALUATION THROUGH PIPING, AERATORS, FILTERS, AND CLEARWELL (HIGH-FLOWS)**

A. CT<sub>actual</sub> (mg/L-min)

| Flow (gpm) | T <sub>10</sub> | Residual Chlorine Concentration (mg/l) |      |      |      |      |
|------------|-----------------|--|------|------|------|------|
|            |                 | 0.2                                    | 0.4  | 0.6  | 0.8  | 1    |
| 2,400      | 66.4            | 13.3                                   | 26.6 | 39.8 | 53.1 | 66.4 |
| 2,835      | 56.2            | 11.2                                   | 22.5 | 33.7 | 45.0 | 56.2 |
| 3,270      | 48.7            | 9.7                                    | 19.5 | 29.2 | 39.0 | 48.7 |

B. CT<sub>actual</sub> / CT<sub>required</sub>

| Temp. (Celsius) | Flow (gpm) | pH  | Residual Chlorine Concentration (mg/l) |      |      |      |      |
|-----------------|------------|-----|--|------|------|------|------|
|                 |            |     | 0.2                                    | 0.4  | 0.6  | 0.8  | 1    |
| 7               | 2,400      | 6.4 | 0.39                                   | 0.78 | 1.14 | 1.48 | 1.84 |
|                 |            | 6.5 | 0.38                                   | 0.76 | 1.11 | 1.44 | 1.75 |
|                 |            | 6.6 | 0.37                                   | 0.74 | 1.08 | 1.4  | 1.7  |
|                 | 2,835      | 6.4 | 0.33                                   | 0.66 | 0.96 | 1.25 | 1.56 |
|                 |            | 6.5 | 0.32                                   | 0.64 | 0.94 | 1.22 | 1.48 |
|                 |            | 6.6 | 0.31                                   | 0.62 | 0.91 | 1.18 | 1.44 |
|                 | 3,270      | 6.4 | 0.29                                   | 0.57 | 0.83 | 1.08 | 1.35 |
|                 |            | 6.5 | 0.28                                   | 0.56 | 0.81 | 1.05 | 1.28 |
|                 |            | 6.6 | 0.27                                   | 0.54 | 0.79 | 1.03 | 1.25 |
| 12              | 2,400      | 6.4 | 0.55                                   | 1.11 | 1.59 | 2.04 | 2.55 |
|                 |            | 6.5 | 0.53                                   | 1.06 | 1.53 | 1.97 | 2.43 |
|                 |            | 6.6 | 0.51                                   | 1.02 | 1.48 | 1.9  | 2.37 |
|                 | 2,835      | 6.4 | 0.47                                   | 0.94 | 1.35 | 1.73 | 2.16 |
|                 |            | 6.5 | 0.45                                   | 0.9  | 1.3  | 1.67 | 2.08 |
|                 |            | 6.6 | 0.43                                   | 0.86 | 1.25 | 1.61 | 2.01 |
|                 | 3,270      | 6.4 | 0.41                                   | 0.81 | 1.17 | 1.5  | 1.87 |
|                 |            | 6.5 | 0.39                                   | 0.78 | 1.12 | 1.44 | 1.8  |
|                 |            | 6.6 | 0.37                                   | 0.75 | 1.08 | 1.39 | 1.74 |
| 16              | 2,400      | 6.4 | 0.74                                   | 1.48 | 2.21 | 2.95 | 3.49 |
|                 |            | 6.5 | 0.7                                    | 1.4  | 2.1  | 2.8  | 3.32 |
|                 |            | 6.6 | 0.66                                   | 1.33 | 1.99 | 2.66 | 3.16 |
|                 | 2,835      | 6.4 | 0.62                                   | 1.25 | 1.87 | 2.5  | 2.96 |
|                 |            | 6.5 | 0.59                                   | 1.18 | 1.77 | 2.37 | 1.81 |
|                 |            | 6.6 | 0.56                                   | 1.12 | 1.69 | 2.25 | 2.68 |
|                 | 3,270      | 6.4 | 0.54                                   | 1.08 | 1.62 | 2.16 | 2.56 |
|                 |            | 6.5 | 0.51                                   | 1.03 | 1.54 | 2.05 | 2.44 |
|                 |            | 6.6 | 0.49                                   | 0.97 | 1.46 | 1.95 | 2.32 |

Notes:

CT<sub>actual</sub> / CT<sub>required</sub> < 1.0 (CT Compliance not attained for 1.0-log inactivation of *Giardia* Cysts)

**TABLE 8. CT EVALUATION THROUGH CLEARWELL ONLY (LOW-FLOWS)**

A. CT<sub>actual</sub> (mg/L-min)

| Flow (gpm) | T <sub>10</sub> | Residual Chlorine Concentration (mg/l) |      |      |      |      |
|------------|-----------------|--|------|------|------|------|
|            |                 | 0.2                                    | 0.4  | 0.6  | 0.8  | 1    |
| 1,148      | 87.4            | 17.5                                   | 35.0 | 52.4 | 69.9 | 87.4 |
| 1,722      | 58.3            | 11.7                                   | 23.3 | 35.0 | 46.6 | 58.3 |
| 2,297      | 43.7            | 8.7                                    | 17.5 | 26.2 | 35.0 | 43.7 |

B. CT<sub>actual</sub> / CT<sub>required</sub>

| Temp. (Celsius) | Flow (gpm) | pH  | Residual Chlorine Concentration (mg/l) |      |      |      |      |
|-----------------|------------|-----|--|------|------|------|------|
|                 |            |     | 0.2                                    | 0.4  | 0.6  | 0.8  | 1    |
| 7               | 1,148      | 6.4 | 0.51                                   | 1.03 | 1.5  | 1.94 | 2.43 |
|                 |            | 6.5 | 0.5                                    | 1    | 1.46 | 1.89 | 2.3  |
|                 |            | 6.6 | 0.49                                   | 0.97 | 1.42 | 1.84 | 2.24 |
|                 | 1,722      | 6.4 | 0.34                                   | 0.69 | 1    | 1.3  | 1.62 |
|                 |            | 6.5 | 0.33                                   | 0.67 | 0.97 | 1.26 | 1.53 |
|                 |            | 6.6 | 0.32                                   | 0.35 | 0.95 | 1.23 | 1.49 |
|                 | 2,297      | 6.4 | 0.26                                   | 0.51 | 0.75 | 0.97 | 1.21 |
|                 |            | 6.5 | 0.25                                   | 0.5  | 0.73 | 0.94 | 1.15 |
|                 |            | 6.6 | 0.24                                   | 0.49 | 0.71 | 0.92 | 1.12 |
| 12              | 1,148      | 6.4 | 0.73                                   | 1.46 | 2.1  | 2.69 | 3.36 |
|                 |            | 6.5 | 0.7                                    | 1.4  | 2.02 | 2.59 | 3.24 |
|                 |            | 6.6 | 0.67                                   | 1.34 | 1.94 | 2.5  | 3.12 |
|                 | 1,722      | 6.4 | 0.49                                   | 0.97 | 1.4  | 1.79 | 2.24 |
|                 |            | 6.5 | 0.47                                   | 0.93 | 1.35 | 1.73 | 2.16 |
|                 |            | 6.6 | 0.45                                   | 0.9  | 1.3  | 1.67 | 2.08 |
|                 | 2,297      | 6.4 | 0.36                                   | 0.73 | 1.05 | 1.34 | 1.68 |
|                 |            | 6.5 | 0.35                                   | 0.7  | 1.01 | 1.29 | 1.62 |
|                 |            | 6.6 | 0.34                                   | 0.67 | 0.97 | 1.25 | 1.56 |
| 16              | 1,148      | 6.4 | 0.97                                   | 1.94 | 2.91 | 3.88 | 4.6  |
|                 |            | 6.5 | 0.92                                   | 1.84 | 2.76 | 3.68 | 4.37 |
|                 |            | 6.6 | 0.87                                   | 1.75 | 2.62 | 3.5  | 4.16 |
|                 | 1,722      | 6.4 | 0.65                                   | 1.3  | 1.94 | 2.59 | 3.07 |
|                 |            | 6.5 | 0.61                                   | 1.23 | 1.84 | 2.45 | 2.92 |
|                 |            | 6.6 | 0.58                                   | 1.17 | 1.75 | 2.33 | 2.78 |
|                 | 2,297      | 6.4 | 0.49                                   | 0.97 | 1.46 | 1.94 | 2.3  |
|                 |            | 6.5 | 0.46                                   | 0.92 | 1.38 | 1.84 | 2.19 |
|                 |            | 6.6 | 0.44                                   | 0.87 | 1.31 | 1.75 | 2.08 |

Notes:

  CT<sub>actual</sub> / CT<sub>required</sub> < 1.0 (CT Compliance not attained for 1.0-log inactivation of *Giardia* Cysts)

**TABLE 9. CT EVALUATION THROUGH CLEARWELL ONLY (HIGH-FLOWS)**

A. CT<sub>actual</sub> (mg/L-min)

| Flow (gpm) | T <sub>10</sub> | Residual Chlorine Concentration (mg/l) |      |      |      |      |
|------------|-----------------|--|------|------|------|------|
|            |                 | 0.4                                    | 0.6  | 0.8  | 1    | 1.2  |
| 2,400      | 49.6            | 19.8                                   | 29.8 | 39.7 | 49.6 | 59.5 |
| 2,835      | 42              | 16.8                                   | 25.2 | 33.6 | 42.0 | 50.4 |
| 3,270      | 36.4            | 14.6                                   | 21.8 | 29.1 | 36.4 | 43.7 |

B. CT<sub>actual</sub> / CT<sub>required</sub>

| Temp. (Celsius) | Flow (gpm) | pH  | Residual Chlorine Concentration (mg/l) |      |      |      |      |
|-----------------|------------|-----|--|------|------|------|------|
|                 |            |     | 0.4                                    | 0.6  | 0.8  | 1    | 1.2  |
| 7               | 2,400      | 6.4 | 0.58                                   | 0.85 | 1.1  | 1.38 | 1.61 |
|                 |            | 6.5 | 0.57                                   | 0.83 | 1.07 | 1.31 | 1.57 |
|                 |            | 6.6 | 0.55                                   | 0.8  | 1.04 | 1.27 | 1.49 |
|                 | 2,835      | 6.4 | 0.49                                   | 0.72 | 0.93 | 1.17 | 1.36 |
|                 |            | 6.5 | 0.48                                   | 0.7  | 0.91 | 1.11 | 1.33 |
|                 |            | 6.6 | 0.47                                   | 0.68 | 0.88 | 1.08 | 1.26 |
|                 | 3,270      | 6.4 | 0.43                                   | 0.62 | 0.81 | 1.01 | 1.18 |
|                 |            | 6.5 | 0.42                                   | 0.61 | 0.79 | 0.96 | 1.15 |
|                 |            | 6.6 | 0.4                                    | 0.59 | 0.77 | 0.93 | 1.09 |
| 12              | 2,400      | 6.4 | 0.83                                   | 1.19 | 1.53 | 1.91 | 2.2  |
|                 |            | 6.5 | 0.79                                   | 1.14 | 1.57 | 1.84 | 2.13 |
|                 |            | 6.6 | 0.76                                   | 1.1  | 1.42 | 1.77 | 2.05 |
|                 | 2,835      | 6.4 | 0.7                                    | 1.01 | 1.29 | 1.63 | 1.87 |
|                 |            | 6.5 | 0.67                                   | 0.97 | 1.24 | 1.56 | 1.8  |
|                 |            | 6.6 | 0.65                                   | 0.93 | 1.2  | 1.5  | 1.74 |
|                 | 3,270      | 6.4 | 0.61                                   | 0.87 | 1.12 | 1.4  | 1.62 |
|                 |            | 6.5 | 0.58                                   | 0.84 | 1.08 | 1.35 | 1.56 |
|                 |            | 6.6 | 0.56                                   | 0.81 | 1.04 | 1.3  | 1.51 |
| 16              | 2,400      | 6.4 | 1.1                                    | 1.65 | 2.2  | 2.61 | 3.13 |
|                 |            | 6.5 | 1.04                                   | 1.57 | 2.09 | 2.48 | 2.98 |
|                 |            | 6.6 | 0.99                                   | 1.49 | 1.98 | 2.36 | 2.83 |
|                 | 2,835      | 6.4 | 0.93                                   | 1.4  | 1.87 | 2.21 | 2.65 |
|                 |            | 6.5 | 0.88                                   | 1.33 | 1.77 | 2.1  | 2.52 |
|                 |            | 6.6 | 0.84                                   | 1.26 | 1.68 | 2    | 2.4  |
|                 | 3,270      | 6.4 | 0.81                                   | 1.21 | 1.62 | 1.92 | 2.3  |
|                 |            | 6.5 | 0.77                                   | 1.15 | 1.53 | 1.82 | 2.18 |
|                 |            | 6.6 | 0.73                                   | 1.09 | 1.46 | 1.73 | 2.08 |

Notes:

  CT<sub>actual</sub> / CT<sub>required</sub> < 1.0 (CT Compliance not attained for 1.0-log inactivation of *Giardia* Cysts)



## CONCLUSIONS

Based on the information gained during the tracer study conducted at the Kelso Treatment Plant on September 11, 2006 and September 18, 2006, the following conclusions are made.

1. The Kelso Treatment Plant, as currently configured, is capable of providing the necessary disinfection contact time at 3,270 (27% above the filter loading rate design flow of 2575 gpm).
2. At the higher flow ranges of plant capacity, combined with lower water temperatures, the plant operators will need to continue, paying attention to CT requirements, to ensure that adequate disinfection is consistently achieved.
3. The baffling of the clearwell was very successful and produced  $T_{10}$  times above the theoretical values.

## RECOMMENDATIONS

The data collected during the tracer study conducted at the Kelso Treatment Plant on September 11, 2006 and September 18, 2006, produced the following recommendations.

1. Lower the current chlorine levels of the water delivered to the consumers to provide more palatable tasting water. (current chlorine residuals for the past year leaving the plant range from 1.06 mg/l to 2.01 mg/l) While lowering the chlorine levels leaving the plant, operators will need to pay close attention to insure that distribution chlorine residuals remain detectable thru out the distributions system.
2. The proper function of the clearwell baffle system is critical to plant operations. It is recommended that a combination of scheduled inspections by divers and chlorine tracer tests be used to insure clearwell baffle system functionality.
3. Free chlorine levels leaving the plant should be maintained between 0.6 mg/l and 1.0 mg/l.
4. The 16-inch distribution piping (plug flow) downstream of the finished water pumps should not be tapped for future water services. If any changes are made to this piping, adjustments will need to be made to the plug flow volumes to reflect changes in contact time.
5. The resulting unit process volume equations, for calculating T are shown in table 14 on page 23 in the attachments, it is recommended that the more conservative clearwell baffle factor (0.7689) from test #1 @ 2,297gpm be used for the plant operators to calculate T.
6. Data for CT compliance is collected from chlorine, ph, and temperature analyzers located both upstream and downstream of the clearwell and the Standard Operating Procedure will be as follows.
  - Review data trend screens for the 24 hour period.
  - Record lowest clearwell level during the 24 hour period.
  - Record lowest chlorine level leaving the plant to distribution system.
  - Review data looking at all chlorine levels regardless of flow to insure that compliance was maintained at all times.
  - Review data and find the peak hourly flow (PHF) with the lowest chlorine level and record the following data onto the daily sheet.
    - Peak hourly flow rate, time, combined filter clearwell entry ph, temp, chlorine, finished water clearwell exit ph, temp, chlorine level and the highest individual filter flow rate during PHF. Also at the time of PHF record the PH of the 16-inch finished water line leaving the plant and its PHF( this data will not

normally be used to achieve compliance but records will be maintained for future use if needed).

- Enter the following data from the daily sheet into the master spread sheet, use the most conservative data obtained during PHF from the analyzers.
    - Lowest chlorine level, highest ph, lowest temperature, highest individual filter flow during PHF and review level of inactivation achieved.
7. Clearwell operating levels should be maintained at the current set-points.
- Start Lead Pump at 14.5 feet
  - Stop Lead Pump at 12.3 feet
  - Start Lag Pump at 14.8 feet
  - Stop Lag Pump at 14.2 feet

**Attachments  
Tracer Data**

Table 10.

Test #1 at 2,297 GPM  
Clearwell Data – Fluoride Feed On

9-11-06

| Time (h:m) | Elapsed Time (minutes) | Measured FI (mg/l) | Tester | Tracer <sup>(1)</sup> (mg/l) | C/Co <sup>(2)</sup> |
|------------|------------------------|--------------------|--------|------------------------------|---------------------|
| 9:00 AM    | 0                      | 0.18               | MRS    | 0.03                         | 0.02                |
| 9:03 AM    | 3                      | 0.14               | MRS    | -0.01                        | -0.01               |
| 9:06 AM    | 6                      | 0.13               | MRS    | -0.02                        | -0.02               |
| 9:09 AM    | 9                      | 0.13               | MRS    | -0.02                        | -0.02               |
| 9:12 AM    | 12                     | 0.16               | MRS    | 0.01                         | 0.01                |
| 9:15 AM    | 15                     | 0.13               | MRS    | -0.02                        | -0.02               |
| 9:18 AM    | 18                     | 0.14               | MRS    | -0.01                        | -0.01               |
| 9:21 AM    | 21                     | 0.14               | MRS    | -0.01                        | -0.01               |
| 9:24 AM    | 24                     | 0.12               | MRS    | -0.03                        | -0.02               |
| 9:27 AM    | 27                     | 0.17               | MRS    | 0.02                         | 0.02                |
| 9:30 AM    | 30                     | 0.16               | MRS    | 0.01                         | 0.01                |
| 9:33 AM    | 33                     | 0.16               | MRS    | 0.01                         | 0.01                |
| 9:36 AM    | 36                     | 0.17               | MRS    | 0.02                         | 0.02                |
| 9:39 AM    | 39                     | 0.19               | MRS    | 0.04                         | 0.03                |
| 9:42 AM    | 42                     | 0.22               | MRS    | 0.07                         | 0.06                |
| 9:45 AM    | 45                     | 0.31               | MRS    | 0.16                         | 0.13                |
| 9:48 AM    | 48                     | 0.4                | MRS    | 0.25                         | 0.20                |
| 9:51 AM    | 51                     | 0.51               | MRS    | 0.36                         | 0.28                |
| 9:54 AM    | 54                     | 0.69               | MRS    | 0.54                         | 0.43                |
| 9:57 AM    | 57                     | 0.8                | MRS    | 0.65                         | 0.51                |
| 10:00 AM   | 60                     | 0.9                | MRS    | 0.75                         | 0.59                |
| 10:03 AM   | 63                     | 1.08               | MRS    | 0.93                         | 0.73                |
| 10:06 AM   | 66                     | 1.12               | MRS    | 0.97                         | 0.76                |
| 10:09 AM   | 69                     | 1.18               | MRS    | 1.03                         | 0.81                |
| 10:12 AM   | 72                     | 1.24               | MRS    | 1.09                         | 0.86                |
| 10:15 AM   | 75                     | 1.33               | MRS    | 1.18                         | 0.93                |
| 10:18 AM   | 78                     | 1.45               | MRS    | 1.3                          | 1.03                |
| 10:21 AM   | 81                     | 1.41               | MRS    | 1.26                         | 0.99                |
| 10:24 AM   | 84                     | 1.39               | MRS    | 1.24                         | 0.98                |
| 10:27 AM   | 87                     | 1.45               | MRS    | 1.3                          | 1.03                |
| 10:30 AM   | 90                     | 1.44               | MRS    | 1.29                         | 1.02                |
| 10:33 AM   | 93                     | 1.38               | MRS    | 1.23                         | 0.97                |
| 10:36 AM   | 96                     | 1.41               | MRS    | 1.26                         | 0.99                |
| 10:39 AM   | 99                     | 1.45               | MRS    | 1.3                          | 1.03                |
| 10:42 AM   | 102                    | 1.49               | MRS    | 1.34                         | 1.06                |
| 10:45 AM   | 105                    | 1.41               | MRS    | 1.26                         | 0.99                |
| 10:48 AM   | 108                    | 1.37               | MRS    | 1.22                         | 0.96                |
| 10:51 AM   | 111                    | 1.41               | MRS    | 1.26                         | 0.99                |
| 10:54 AM   | 114                    | 1.4                | MRS    | 1.25                         | 0.99                |
| 10:57 AM   | 117                    | 1.38               | MRS    | 1.23                         | 0.97                |
| 11:00 AM   | 120                    | 1.43               | MRS    | 1.28                         | 1.01                |
| 11:03 AM   | 123                    | 1.4                | MRS    | 1.25                         | 0.99                |
| 11:06 AM   | 126                    | 1.37               | MRS    | 1.22                         | 0.96                |
| 11:09 AM   | 129                    | 1.43               | MRS    | 1.28                         | 1.01                |
| 11:12 AM   | 132                    | 1.41               | MRS    | 1.26                         | 0.99                |
| 11:15 AM   | 135                    | 1.4                | MRS    | 1.25                         | 0.99                |
| 11:18 AM   | 138                    | 1.4                | MRS    | 1.25                         | 0.99                |
| 11:21 AM   | 141                    | 1.49               | MRS    | 1.34                         | 1.06                |
| 11:24 AM   | 144                    | 1.43               | MRS    | 1.28                         | 1.01                |
| 11:27 AM   | 147                    | 1.49               | MRS    | 1.34                         | 1.06                |
| 11:30 AM   | 150                    | 1.38               | MRS    | 1.23                         | 0.97                |
| 11:33 AM   | 153                    | 1.45               | MRS    | 1.3                          | 1.03                |
| 11:36 AM   | 156                    | 1.4                | MRS    | 1.25                         | 0.99                |

<sup>(1)</sup> Measured fluoride concentration minus background and residual concentration (0.15 mg/l)  
<sup>(2)</sup> C/Co = The tracer concentration divided by the fluoride dosage. Co= 1.268 mg/l

Table 11.

Verification Test #1 at 2,297 GPM  
Clearwell Data – Fluoride Feed Off

9-11-06

| Time (h:m) | Elapsed Time (minutes) | Measured FI (mg/l) | Tester | Tracer <sup>(1)</sup> (mg/l) | C/Co <sup>(2)</sup> |
|------------|------------------------|--------------------|--------|------------------------------|---------------------|
| 11:36 AM   | 0                      | 1.4                | MRS    | 1.25                         | 0.99                |
| 11:39 AM   | 3                      | 1.38               | MRS    | 1.23                         | 0.97                |
| 11:42 AM   | 6                      | 1.37               | MRS    | 1.22                         | 0.96                |
| 11:45 AM   | 9                      | 1.44               | MRS    | 1.29                         | 1.02                |
| 11:48 AM   | 12                     | 1.49               | MRS    | 1.34                         | 1.06                |
| 11:51 AM   | 15                     | 1.43               | MRS    | 1.28                         | 1.01                |
| 11:54 AM   | 18                     | 1.37               | MRS    | 1.22                         | 0.96                |
| 11:57 AM   | 21                     | 1.39               | MRS    | 1.24                         | 0.98                |
| 12:00 PM   | 24                     | 1.44               | MRS    | 1.29                         | 1.02                |
| 12:03 PM   | 27                     | 1.39               | MRS    | 1.24                         | 0.98                |
| 12:06 PM   | 30                     | 1.51               | MRS    | 1.36                         | 1.07                |
| 12:09 PM   | 33                     | 1.41               | MRS    | 1.26                         | 0.99                |
| 12:12 PM   | 36                     | 1.4                | MRS    | 1.25                         | 0.99                |
| 12:15 PM   | 39                     | 1.34               | MRS    | 1.19                         | 0.94                |
| 12:18 PM   | 42                     | 1.29               | MRS    | 1.14                         | 0.90                |
| 12:21 PM   | 45                     | 1.21               | MRS    | 1.06                         | 0.84                |
| 12:24 PM   | 48                     | 1.04               | MRS    | 0.89                         | 0.70                |
| 12:27 PM   | 51                     | 0.96               | MRS    | 0.81                         | 0.64                |
| 12:30 PM   | 54                     | 0.79               | MRS    | 0.64                         | 0.50                |
| 12:33 PM   | 57                     | 0.69               | MRS    | 0.54                         | 0.43                |
| 12:36 PM   | 60                     | 0.59               | MRS    | 0.44                         | 0.35                |
| 12:39 PM   | 63                     | 0.45               | MRS    | 0.3                          | 0.24                |
| 12:42 PM   | 66                     | 0.38               | MRS    | 0.23                         | 0.18                |
| 12:45 PM   | 69                     | 0.32               | MRS    | 0.17                         | 0.13                |
| 12:48 PM   | 72                     | 0.28               | MRS    | 0.13                         | 0.10                |
| 12:51 PM   | 75                     | 0.28               | MRS    | 0.13                         | 0.10                |
| 12:54 PM   | 78                     | 0.19               | MRS    | 0.04                         | 0.03                |
| 12:57 PM   | 81                     | 0.2                | MRS    | 0.05                         | 0.04                |
| 1:00 PM    | 84                     | 0.2                | MRS    | 0.05                         | 0.04                |
| 1:03 PM    | 87                     | 0.18               | MRS    | 0.03                         | 0.02                |
| 1:06 PM    | 90                     | 0.16               | MRS    | 0.01                         | 0.01                |
| 1:09 PM    | 93                     | 0.17               | MRS    | 0.02                         | 0.02                |
| 1:12 PM    | 96                     | 0.18               | MRS    | 0.03                         | 0.02                |
| 1:15 PM    | 99                     | 0.16               | MRS    | 0.01                         | 0.01                |
| 1:18 PM    | 102                    | 0.13               | MRS    | -0.02                        | -0.02               |
| 1:21 PM    | 105                    | 0.12               | MRS    | -0.03                        | -0.02               |
| 1:24 PM    | 108                    | 0.15               | MRS    | 0                            | 0.00                |
| 1:27 PM    | 111                    | 0.15               | MRS    | 0                            | 0.00                |
| 1:30 PM    | 114                    | 0.13               | MRS    | -0.02                        | -0.02               |
| 1:33 PM    | 117                    | 0.16               | MRS    | 0.01                         | 0.01                |
| 1:36 PM    | 120                    | 0.16               | MRS    | 0.01                         | 0.01                |
| 1:39 PM    | 123                    | 0.14               | MRS    | -0.01                        | -0.01               |
| 1:42 PM    | 126                    | 0.15               | MRS    | 0                            | 0.00                |
| 1:45 PM    | 129                    | 0.15               | MRS    | 0                            | 0.00                |
| 1:48 PM    | 132                    | 0.14               | MRS    | -0.01                        | -0.01               |
| 1:51 PM    | 135                    | 0.15               | MRS    | 0                            | 0.00                |
| 1:54 PM    | 138                    | 0.16               | MRS    | 0.01                         | 0.01                |
| 1:57 PM    | 141                    | 0.15               | MRS    | 0                            | 0.00                |
| 2:00 PM    | 144                    | 0.16               | MRS    | 0.01                         | 0.01                |
| 2:03 PM    | 147                    | 0.16               | MRS    | 0.01                         | 0.01                |
| 2:06 PM    | 150                    | 0.13               | MRS    | -0.02                        | -0.02               |
| 2:09 PM    | 153                    | 0.12               | MRS    | -0.03                        | -0.02               |
| 2:12 PM    | 156                    | 0.12               | MRS    | -0.03                        | -0.02               |

<sup>(1)</sup> Measured fluoride concentration minus background and residual concentration (0.15 mg/l)  
<sup>(2)</sup> C/Co = The tracer concentration divided by the fluoride dosage. Co= 1.268 mg/l

Table 12.

Test #2 at 2,835 GPM  
Clearwell Data – Fluoride Feed On

9-18-06

| Time (h:m) | Elapsed Time (minutes) | Measured FI (mg/l) | Tester | Tracer <sup>(1)</sup> (mg/l) | C/Co <sup>(2)</sup> |
|------------|------------------------|--------------------|--------|------------------------------|---------------------|
| 11:00 AM   | 0                      | 0.2                | PLR    | -0.02                        | -0.02               |
| 11:03 AM   | 3                      | 0.21               | PLR    | -0.01                        | -0.01               |
| 11:06 AM   | 6                      | 0.22               | PLR    | 0.00                         | 0.00                |
| 11:09 AM   | 9                      | 0.21               | PLR    | -0.01                        | -0.01               |
| 11:12 AM   | 12                     | 0.23               | PLR    | 0.01                         | 0.01                |
| 11:15 AM   | 15                     | 0.23               | PLR    | 0.01                         | 0.01                |
| 11:18 AM   | 18                     | 0.21               | PLR    | -0.01                        | -0.01               |
| 11:21 AM   | 21                     | 0.25               | PLR    | 0.03                         | 0.02                |
| 11:24 AM   | 24                     | 0.23               | PLR    | 0.01                         | 0.01                |
| 11:27 AM   | 27                     | 0.23               | PLR    | 0.01                         | 0.01                |
| 11:30 AM   | 30                     | 0.22               | PLR    | 0.00                         | 0.00                |
| 11:33 AM   | 33                     | 0.24               | PLR    | 0.02                         | 0.01                |
| 11:36 AM   | 36                     | 0.24               | PLR    | 0.02                         | 0.01                |
| 11:39 AM   | 39                     | 0.28               | PLR    | 0.06                         | 0.04                |
| 11:42 AM   | 42                     | 0.36               | PLR    | 0.14                         | 0.10                |
| 11:45 AM   | 45                     | 0.46               | PLR    | 0.24                         | 0.18                |
| 11:48 AM   | 48                     | 0.57               | PLR    | 0.35                         | 0.26                |
| 11:51 AM   | 51                     | 0.7                | PLR    | 0.48                         | 0.36                |
| 11:54 AM   | 54                     | 0.82               | PLR    | 0.60                         | 0.45                |
| 11:57 AM   | 57                     | 0.94               | PLR    | 0.72                         | 0.54                |
| 12:00 PM   | 60                     | 1.09               | PLR    | 0.87                         | 0.66                |
| 12:03 PM   | 63                     | 1.16               | PLR    | 0.94                         | 0.71                |
| 12:06 PM   | 66                     | 1.31               | PLR    | 1.09                         | 0.82                |
| 12:09 PM   | 69                     | 1.34               | PLR    | 1.12                         | 0.85                |
| 12:12 PM   | 72                     | 1.41               | PLR    | 1.19                         | 0.90                |
| 12:15 PM   | 75                     | 1.52               | PLR    | 1.30                         | 0.98                |
| 12:18 PM   | 78                     | 1.53               | PLR    | 1.31                         | 0.99                |
| 12:21 PM   | 81                     | 1.5                | PLR    | 1.28                         | 0.97                |
| 12:24 PM   | 84                     | 1.53               | PLR    | 1.31                         | 0.99                |
| 12:27 PM   | 87                     | 1.53               | PLR    | 1.31                         | 0.99                |
| 12:30 PM   | 90                     | 1.59               | PLR    | 1.37                         | 1.04                |
| 12:33 PM   | 93                     | 1.6                | PLR    | 1.38                         | 1.04                |
| 12:36 PM   | 96                     | 1.6                | PLR    | 1.38                         | 1.04                |
| 12:39 PM   | 99                     | 1.47               | PLR    | 1.25                         | 0.95                |
| 12:42 PM   | 102                    | 1.55               | PLR    | 1.33                         | 1.01                |

<sup>(1)</sup> Measured fluoride concentration minus background and residual concentration (0.2218 mg/l)  
<sup>(2)</sup> C/Co = The tracer concentration divided by the fluoride dosage. Co= 1.32 mg/l

Table 13.

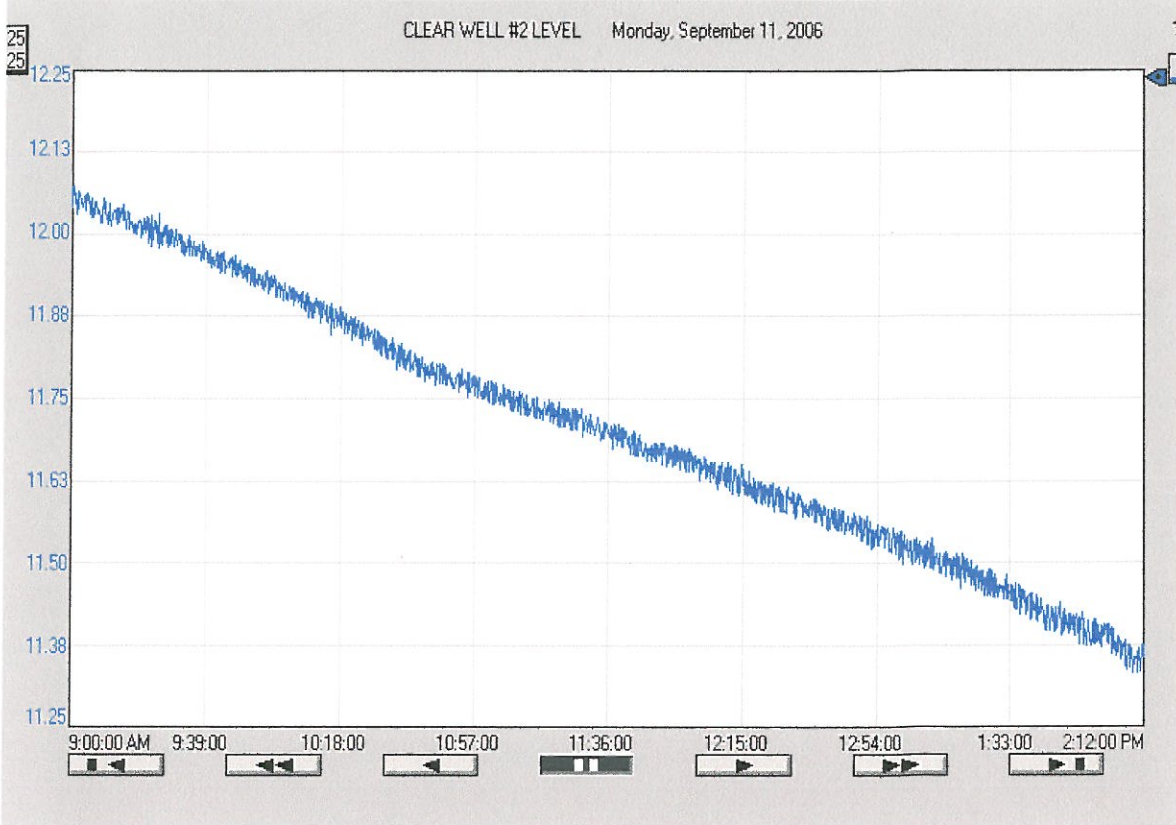
Verification Test #2 at 2,835 GPM  
Clearwell Data – Fluoride Feed Off

9-18-06

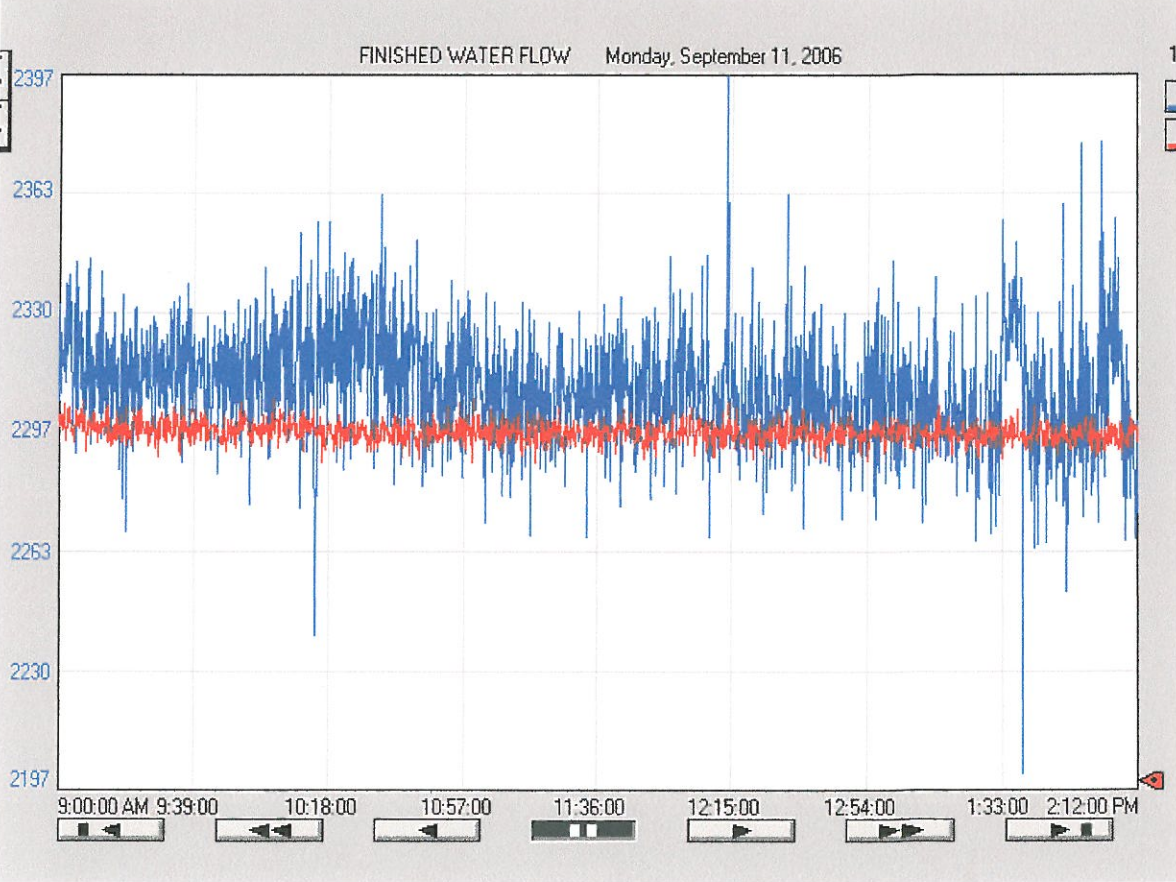
| Time (h:m) | Elapsed Time (minutes) | Measured FI (mg/l) | Tester | Tracer <sup>(1)</sup> (mg/l) | C/Co <sup>(2)</sup> |
|------------|------------------------|--------------------|--------|------------------------------|---------------------|
| 12:42 AM   | 0                      | 1.55               | PLR    | 1.33                         | 1.01                |
| 12:45 AM   | 3                      | 1.48               | PLR    | 1.26                         | 0.95                |
| 12:48 AM   | 6                      | 1.47               | PLR    | 1.25                         | 0.95                |
| 12:51 AM   | 9                      | 1.5                | PLR    | 1.28                         | 0.97                |
| 12:54 AM   | 12                     | 1.48               | PLR    | 1.26                         | 0.95                |
| 12:57 AM   | 15                     | 1.47               | PLR    | 1.25                         | 0.95                |
| 1:00 AM    | 18                     | 1.46               | PLR    | 1.24                         | 0.94                |
| 1:03 AM    | 21                     | 1.48               | PLR    | 1.26                         | 0.95                |
| 1:06 AM    | 24                     | 1.46               | PLR    | 1.24                         | 0.94                |
| 1:09 AM    | 27                     | 1.57               | PLR    | 1.35                         | 1.02                |
| 1:12 AM    | 30                     | 1.51               | PLR    | 1.29                         | 0.98                |
| 1:15 AM    | 33                     | 1.51               | PLR    | 1.29                         | 0.98                |
| 1:18 AM    | 36                     | 1.47               | PLR    | 1.25                         | 0.95                |
| 1:21 AM    | 39                     | 1.46               | PLR    | 1.24                         | 0.94                |
| 1:24 AM    | 42                     | 1.36               | PLR    | 1.14                         | 0.86                |
| 1:27 AM    | 45                     | 1.19               | PLR    | 0.97                         | 0.73                |
| 1:30 AM    | 48                     | 1.06               | PLR    | 0.84                         | 0.64                |
| 1:33 AM    | 51                     | 1.01               | PLR    | 0.79                         | 0.60                |
| 1:36 AM    | 54                     | 0.83               | PLR    | 0.61                         | 0.46                |
| 1:39 AM    | 57                     | 0.74               | PLR    | 0.52                         | 0.39                |
| 1:42 AM    | 60                     | 0.63               | PLR    | 0.41                         | 0.31                |
| 1:45 AM    | 63                     | 0.5                | PLR    | 0.28                         | 0.21                |
| 1:48 AM    | 66                     | 0.4                | PLR    | 0.18                         | 0.14                |
| 1:51 AM    | 69                     | 0.36               | PLR    | 0.14                         | 0.10                |
| 1:54 AM    | 72                     | 0.32               | PLR    | 0.10                         | 0.07                |
| 1:57 AM    | 75                     | 0.29               | PLR    | 0.07                         | 0.05                |
| 2:00 AM    | 78                     | 0.26               | PLR    | 0.04                         | 0.03                |
| 2:03 AM    | 81                     | 0.25               | PLR    | 0.03                         | 0.02                |
| 2:06 AM    | 84                     | 0.24               | PLR    | 0.02                         | 0.01                |
| 2:09 AM    | 87                     | 0.19               | PLR    | -0.03                        | -0.02               |
| 2:12 AM    | 90                     | 0.22               | PLR    | 0.00                         | 0.00                |
| 2:15 AM    | 93                     | 0.21               | PLR    | -0.01                        | -0.01               |
| 2:18 AM    | 96                     | 0.18               | PLR    | -0.04                        | -0.03               |
| 2:21 AM    | 99                     | 0.2                | PLR    | -0.02                        | -0.02               |
| 2:24 AM    | 102                    | 0.23               | PLR    | 0.01                         | 0.01                |

<sup>(1)</sup> Measured fluoride concentration minus background and residual concentration (0.2218 mg/l)  
<sup>(2)</sup> C/Co = The tracer concentration divided by the fluoride dosage. Co = 1.32 mg/l

Screen 2. Clearwell Level data, showing drop from 12.05 feet to 11.31 feet. 9-11-06

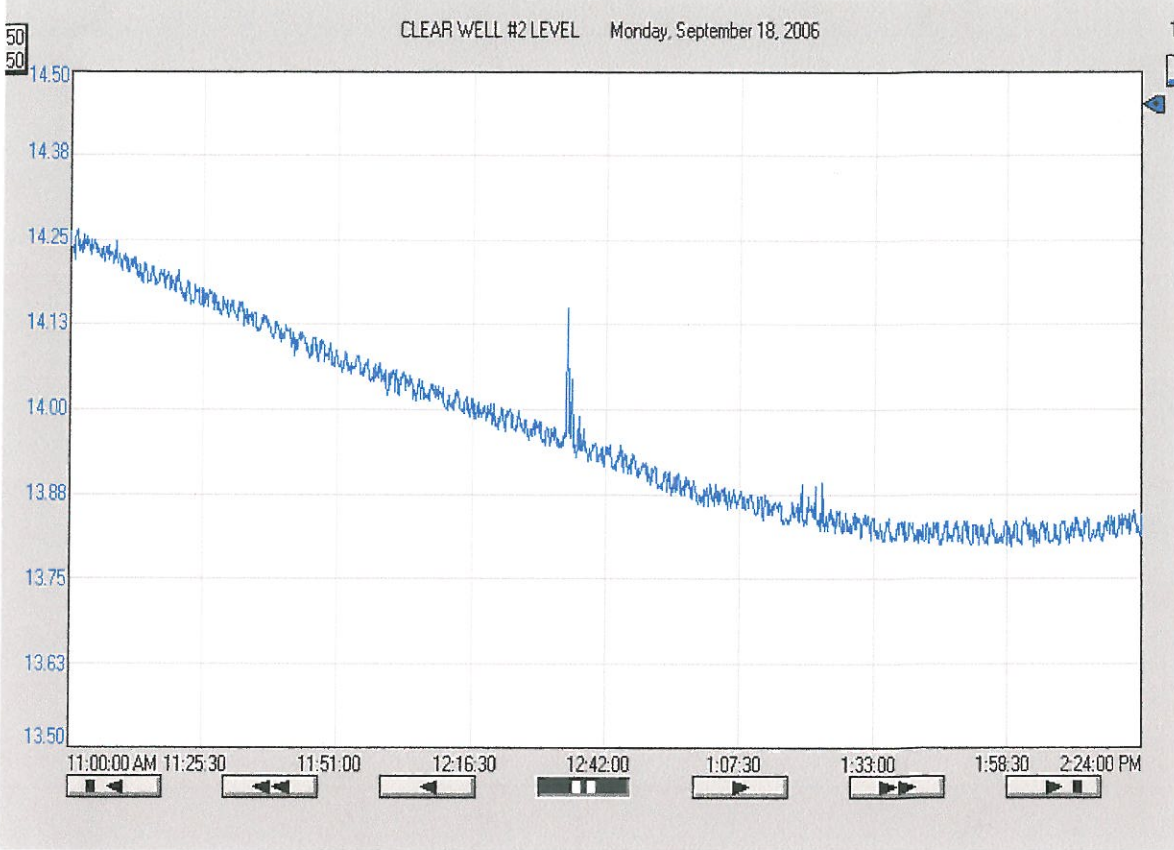


Screen 3. Clearwell inflow and outflow, 2297 GPM. 9-11-06

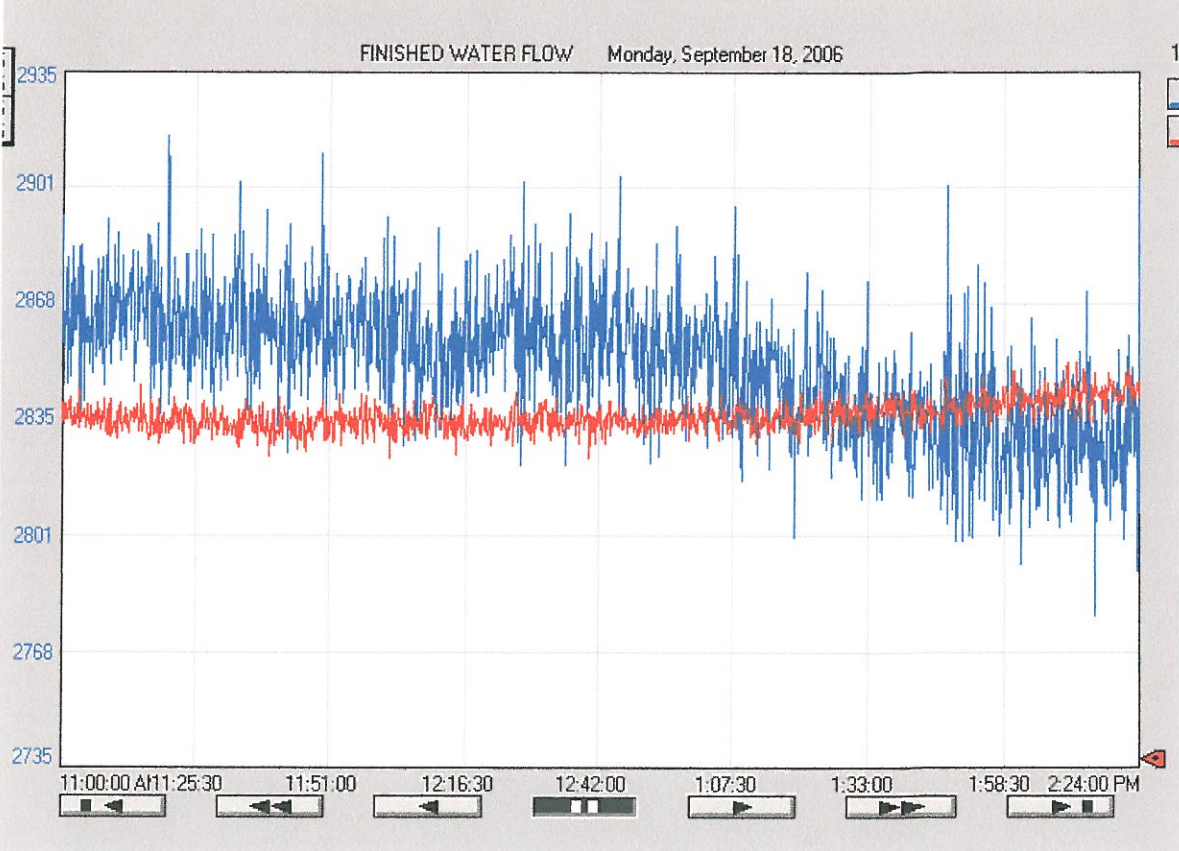




Screen 4. Clearwell Level data, showing drop from 14.24 feet to 13.81 feet. 9-18-06



Screen 5. Clearwell inflow and outflow, 2835 GPM. 9-18-06



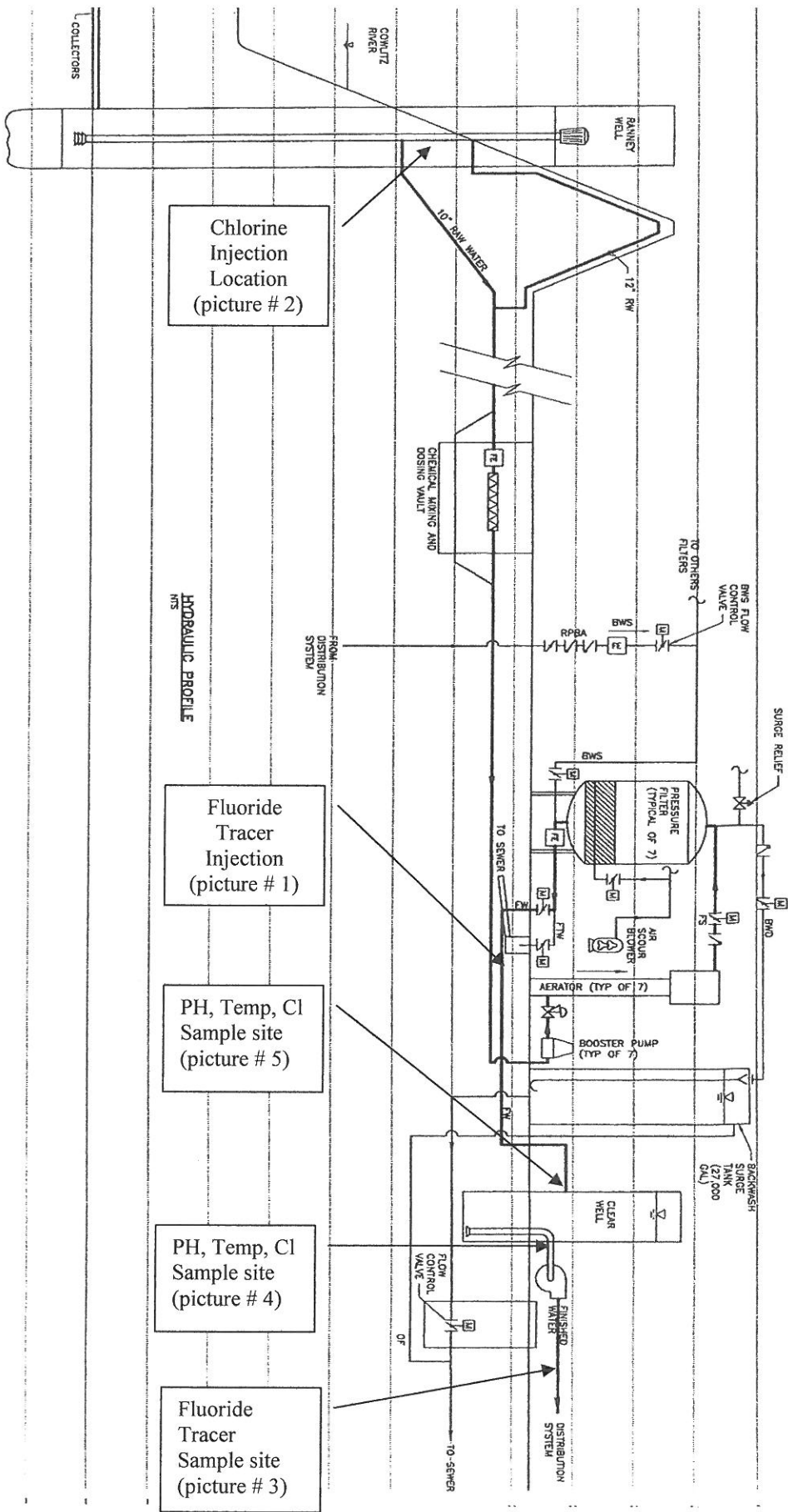
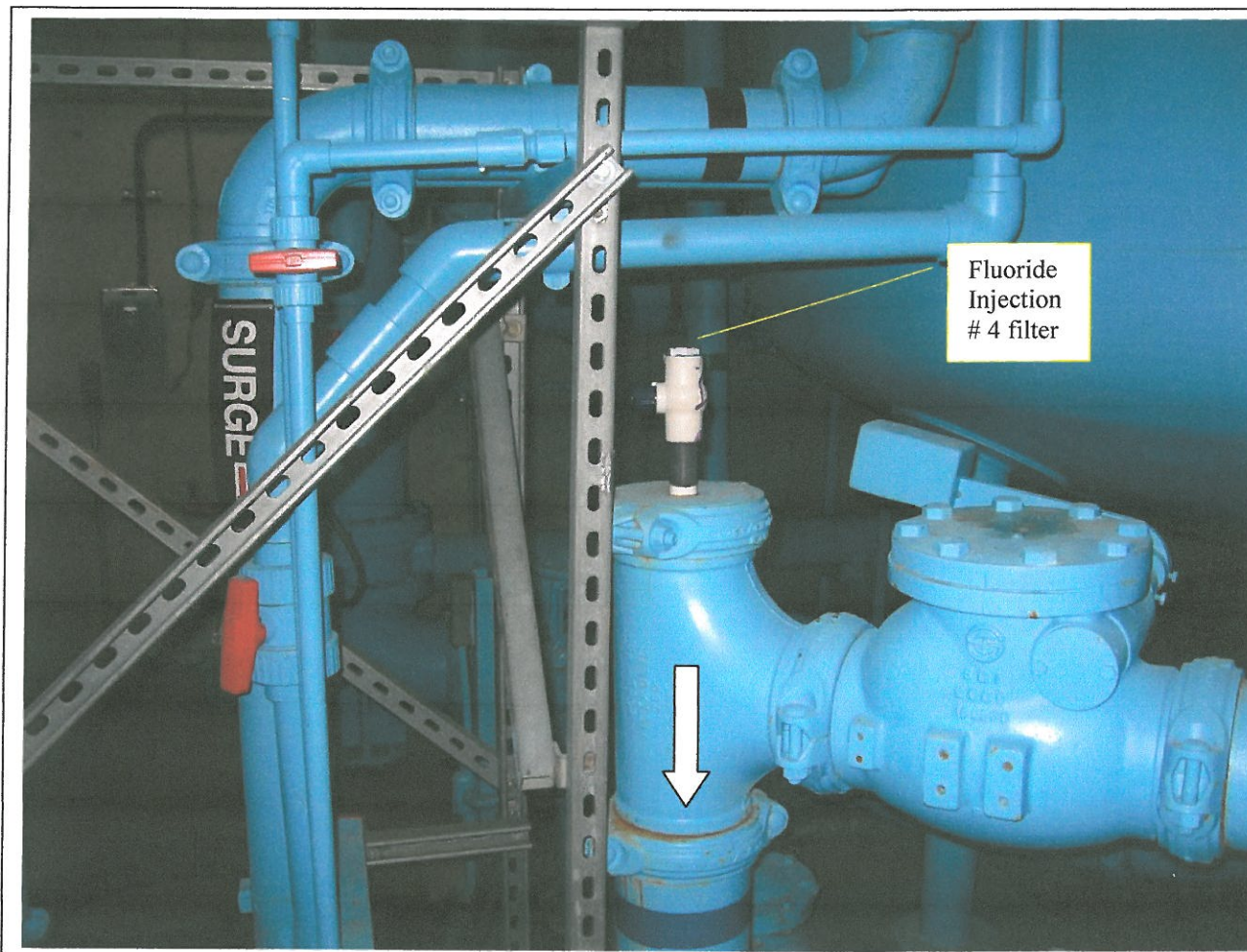


Figure 5. Kelso Water Treatment Plant Process Flow Diagram

Table 14. Calculated Baffle Factors

| Baffel factor of clearwell as determined by tracer study |             |                           |          |          |             |  |
|--|-------------|---------------------------|----------|----------|-------------|--|
| Clearwell -  | Volume Gal. | T <sub>10</sub> Test Min. | flow gpm | V / time | baff factor |  |
| Test #1  | 130553      | 43.7                      | 2297     | 2987.484 | 0.768874    |  |
| Test #2  | 154231      | 42                        | 2835     | 3672.16  | 0.772025    |  |

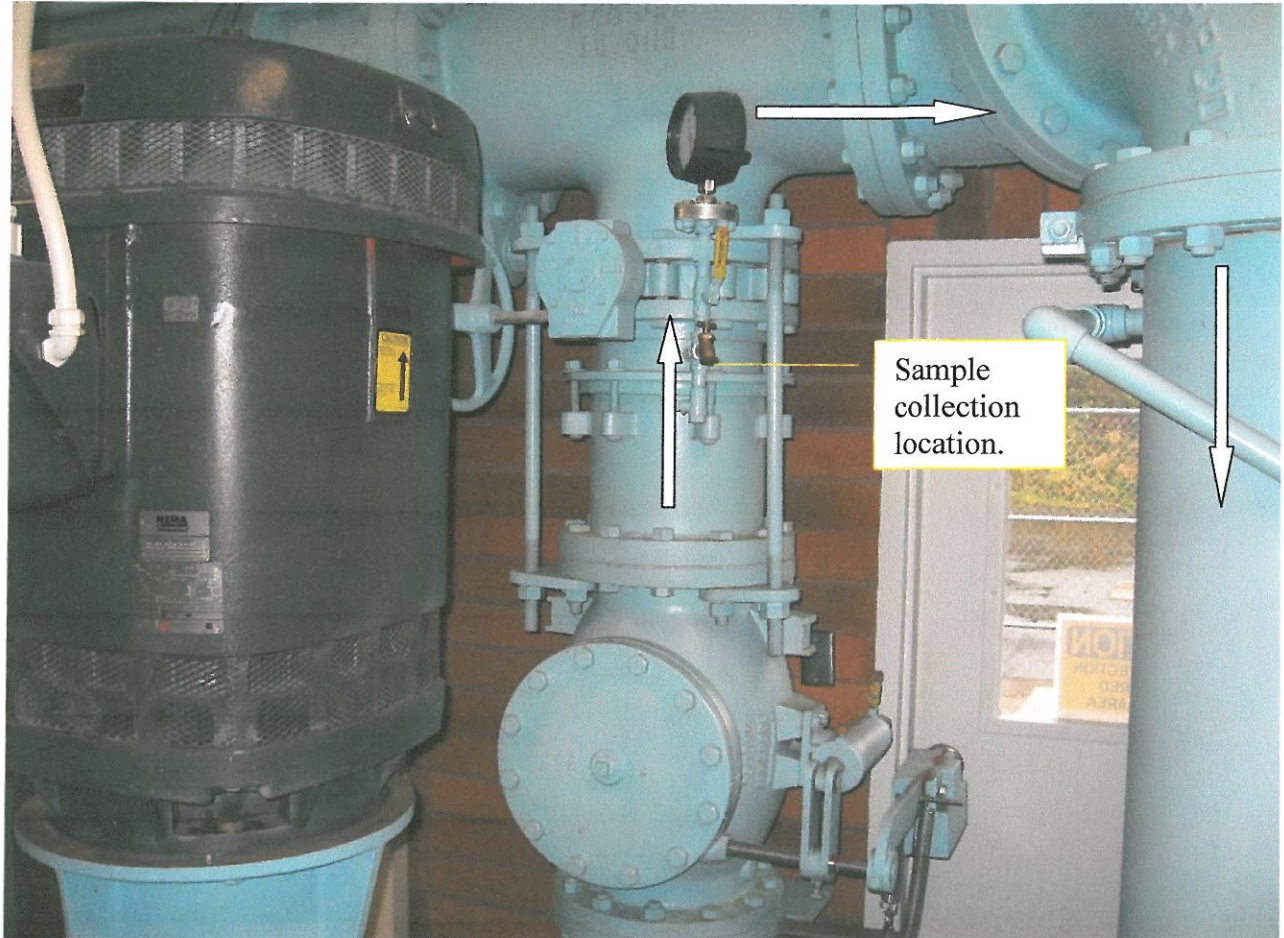
Picture 1. Fluoride injection, Filter # 4 (prior to clearwell) Note: Carry water was used at 3gpm, and fluoride system was running to waste (by-pass) just prior to injection point. This allowed for “instant fluoride injection start up” at beginning of tracer test by closing the by-pass and opening the fluoride injection valve. The injection tube extends past the side discharge of the tee and further reduces any lag time at fluoride injection start up.



Picture 2. Chlorine injection point at Ranney Well, Tee feeds into 12 inch pipe above and 10 inch pipe below. Note: the piping between the chlorine injection and where it exits the Ranney well wall was not used for plug flow calculations to allow for mixing of chlorine. The measurements for pipe (plug flow) start after leaving the Ranney well wall.

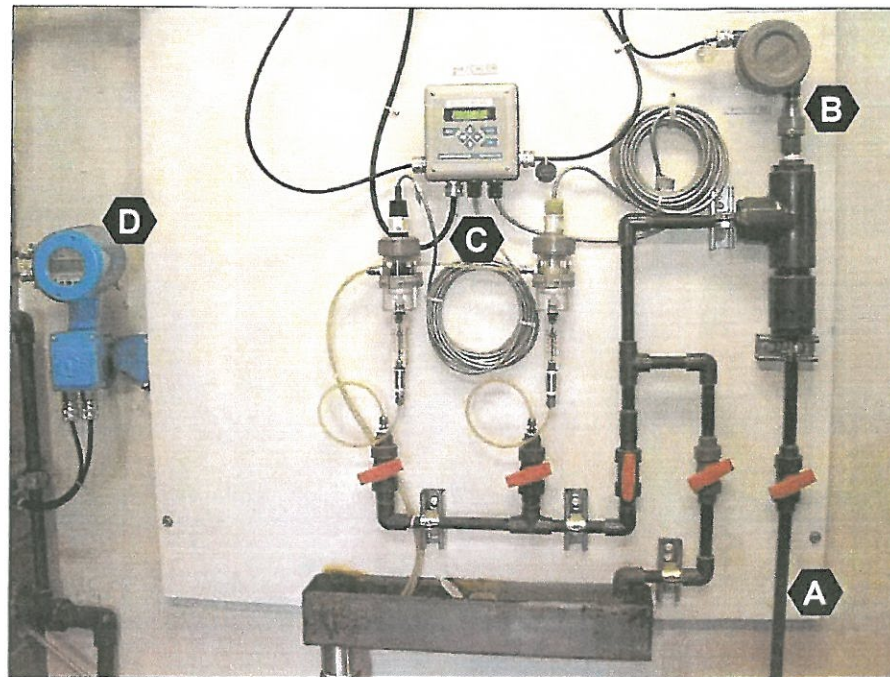


Picture 3. Fluoride “tracer” Sample collection point.



Picture 4. Chlorine, PH, and temperature collection point.

*Kelso Water Treatment Plant*



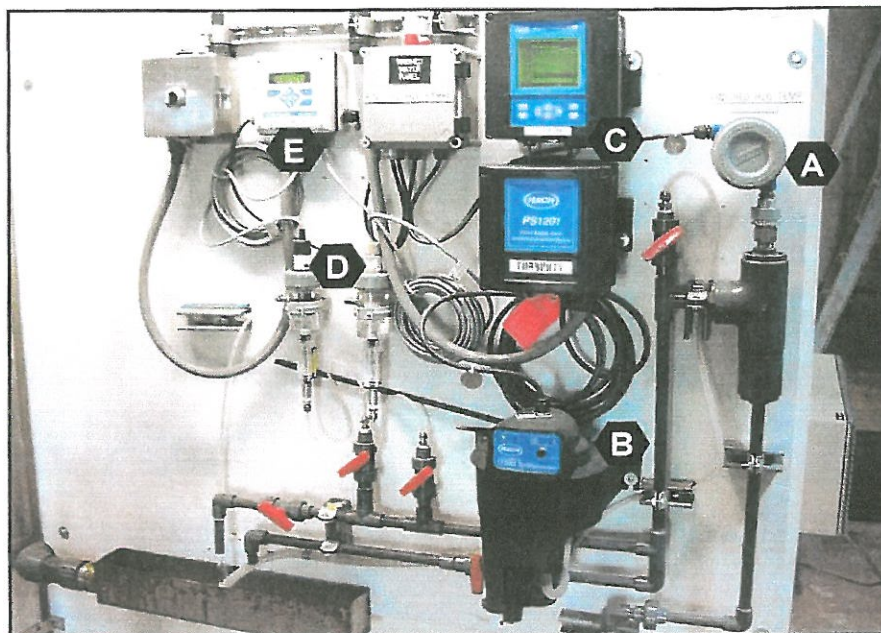
**Figure 7-11 Water to Distribution - Monitoring Instruments**

| ITEM | DESCRIPTION   |
|------|---|
| A    | A sample line delivers water from the finished water pump discharge line to the instrument panel.                     |
| B    | A temperature probe is provided.  |
| C    | pH and chlorine residual analyzers monitor these parameters for determination of the disinfection CT value.           |
| D    | A flowmeter measures the amount of water sent to the distribution system. The local indication for the meter is here. |

*Finished Water Fluoride Addition, Pumping and pH Adjustment*

Picture 5. Chlorine, PH, and temperature collection point.

*Kelso Water Treatment Plant*



**Combined Finished Water Instruments**

| ITEM | DESCRIPTION   |
|------|---|
| A    | Temperature probe.                                      |
| B    | Turbidimeter flow-through cell.                         |
| C    | Turbidimeter transmitter and local display.             |
| D    | Chlorine residual and pH probes.                        |
| E    | Chlorine residual and pH transmitter and local display. |

*Finished Water Fluoride Addition, Pumping and ph Adjustment*



STATE OF WASHINGTON  
DEPARTMENT OF HEALTH  
SOUTHWEST DRINKING WATER REGIONAL OPERATIONS  
PO Box 47823, Olympia, Washington 98504-7823  
TDD Relay 1-800-833-6388

February 14, 2012

Paul Reeb  
City of Kelso  
Post Office Box 819  
Kelso, Washington 98626

Subject: City of Kelso Water System, ID #38000L, Cowlitz County; Request for Increasing Filter Rate

Dear Paul Reeb:

This letter is in response to the request received by the Office of Drinking Water (ODW) on September 24, 2008, to allow the Kelso Water Treatment Plant to increase the filtration rate of its direct pressure mixed media filters. The regulatory limit for a direct filtration plant is three gallons per minute per square foot (gpm/sf). This system would like approval to increase that rate to four gpm/sf. This request is **APPROVED**.

This approval was based on several factors:

1. This system has a very high raw water quality, obtaining its water from a Ranney Well collector on the Cowlitz River. Average raw water turbidity in summer months is 0.5 NTU.
2. The treatment plant is equipped with an automatic plant shutdown triggered by alarms.
3. This system has been ranked in the top five rapid rate filtration plants for the past five years and has an average 95 percent finished water turbidity of 0.03 NTU.

Provided that this approval is contingent upon maintaining its optimization status with the plant and submitting an annual report, which shows the maximum monthly filtration rate and the maximum filtered turbidity.

If you have any questions, please contact me at (360) 236-3032 or by e-mail at [teresa.walker@doh.wa.gov](mailto:teresa.walker@doh.wa.gov)

Sincerely,

Teresa A. Walker, P.E.  
Office of Drinking Water, Regional Engineer

cc: Stephen Baker, ODW  
Joseph Bezovics, ODW

