



June 25, 2024

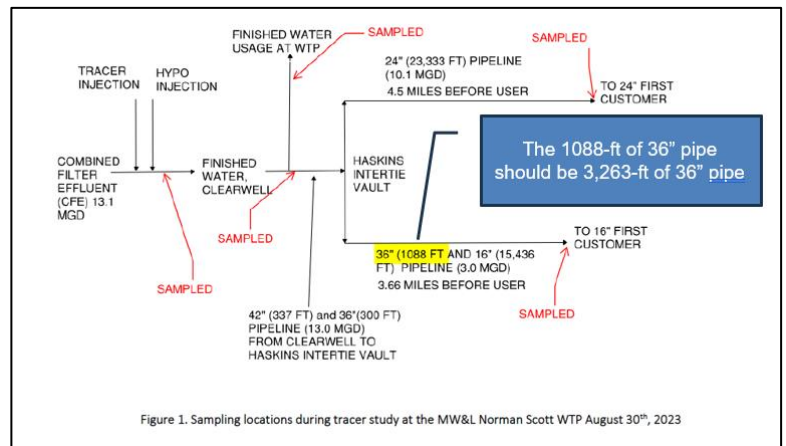
Ryan Sticka
McMinnville Water & Light
PO Box 638
McMinnville, OR 97128

**Re: McMinnville Water & Light (00497)
Tracer Study (PR# 139-2015)
Final Approval**

Dear Mr. Sticka:

This letter is to:

- 1) Issue Final Approval for plan review # 139-2015 based on the results of the tracer study conducted on August 30, 2023, and subsequent approval by Nicole Alfara in a letter dated January 29, 2024 (enclosed).



- 2) Notify you regarding the following error found in Figure 1 of the 12/18/23 final tracer study report: The 1,088-ft of 36” pipe in the diagram shown above should be 3,263-ft.

- 3) Notify you regarding the following error found in the supplemental data appendix of tracer study approval letter

4. Clearwell – 2nd User on the 16” pipeline:

Average Pipe Flowrate:	2062 gpm (2.97 MGD)
Pipe Dimensions:	337 ft of 42” + 300 ft of 36” + 18,700 ft of 16”
Total Pipe Volume	373,864 gallons
Contact Time (T ₁₀)	158 minutes

dated January 29, 2024: The pipe dimensions in appendix #4 for the 16” pipeline should be: 337-ft of 42” + 300-ft of 36” + 3,263-ft of 36” + 15,436-ft of 16” for a total pipe volume of 373,879 gallons when calculated using the following formulas in MS Excel:

- Pipe volume in ft³ = (PI())*0.25*((pipe diameter in inches/12)²)*(pipe length in ft).
- Pipe volume in gallons = (Volume in ft³) x (7.48052 gallons/ft³)

- 4) Allow a method of determining CT_{actual} and $CT_{required}$ using:
 - a. A single contact time value of 71 minutes, and
 - b. Disinfection parameters (chlorine residual, pH, and temperature) measured daily at the Norman Scott Water Treatment Plant (WTP) “cup sink”.

A contact time of 71 minutes represents the contact time of 33 minutes through the clearwell (determined during the August 30, 2023, tracer study) plus an additional 38 minutes of contact time using a peak flow of 10.1 gpm through the piping from the clearwell to the office cup sink. The pipeline calculations shown below were sent as an e-mail attachment from Craig Massie with Jacobs on May 30, 2024.

The August 30, 2023 tracer study, conducted at a peak flowrate of 13.1 MGD and an average clearwell level of 17.3ft, evaluated contact times at various locations post the clearwell. These findings are summarized below:

263 feet of 4" + 28 feet of 2" + 78 feet of 8" + 20 feet of 0.5"

2. Clearwell – 1st User at the Norman Scott WTP office tap:

Clearwell Contact Time (T_{10}): 33 minutes *see previous letter page

Calculated Pipe Flowrate (post clearwell to office): 10.1 gpm

Pipe Dimensions: 325 ft of 1" + 288 ft of 4" + 60 ft of 2" + 50 ft of 8" + 90 ft of 1.5"

Calculated Total Pipe Volume (post clearwell to office): 337 gallons

Contact Time (T_{10}) (post clearwell to office): 380 gallons — 33 minutes

380 gallons — 38

MWL calculated 66 minutes (33 minutes from clearwell + 33 minutes from finished WTP piping) of contact time is achieved through the clearwell to the 1st user at the Norman Scott WTP office tap.

Pipe Diameter, inches	Pipe Length, ft	Vol, ft ³	Pipe Volume, gallons
4	263	22.95106028	171.67
2	28	0.610864722	4.57
8	78	27.22711333	203.66
0.5	20	0.027270747	0.204
Total =	389	50.81630908	380.11

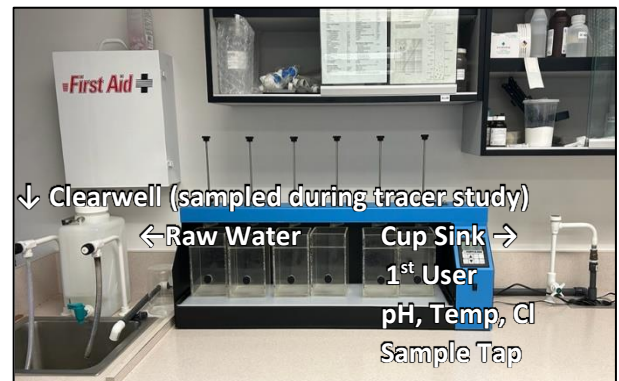
Flow, gpm 10.1

Contact Time = [Total Volume, gpm] / [Flow, gpm] = 37.63 minutes

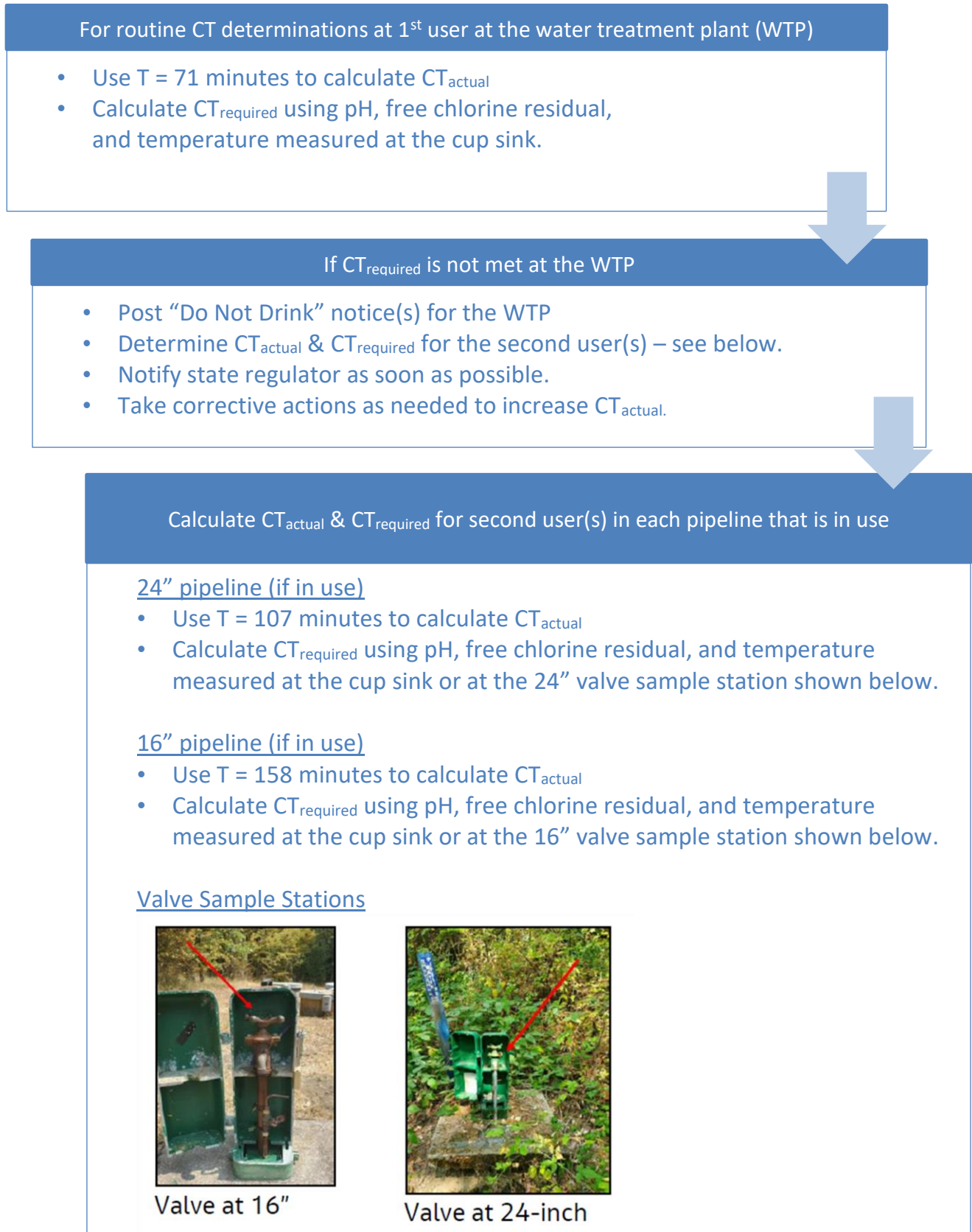
The sample location for measuring CT parameters (chlorine residual, pH, and temperature) is to be at the WTP cup sink shown below.

Although additional contact time is available in both 16” and 24” waterlines for the subsequent “second use” customers, the method above focuses on the available contact time and CT parameters to ensure potable water is provided at the treatment plant, which is considered the first customer.

You may continue to use the old method currently in use for the remainder of June 2024, however, please begin using the new method with 71 minutes of contact time beginning July 1, 2024.



The flow chart below shows some of the follow-up actions needed should the required CT not be met at the treatment plant.



CT calculations demonstrate that $CT_{required}$ is met under all contact time scenarios when the chlorine residual is at least 1 mg/l (pH = 7.5, temperature = 5°C & 0.5-log *Giardia* inactivation).

Contact time of 58-minutes used on 5/1/24 for May 2024 monthly operating report.

Minimum Cl ₂ Residual at 1st User (C) ³ [ppm or mg/L]	Contact Time (T) [minutes]	Actual CT C X T	Temp [° C]	pH	Required CT (0.5-log) formula	CT Met? ³ Yes / No	CT Ratio (CT _{actual} / CT _{required}) formula
1.29	58	74.8	12.0	7.29	19.3	YES	3.87
1	58	58.0	5.0	7.50	32.2	YES	1.80
1	33	33.0	5.0	7.50	32.2	YES	1.03
1	33	33.0	5.0	7.50	32.2	YES	1.03
1	48	48.0	5.0	7.50	32.2	YES	1.49
1	48	48.0	5.0	7.50	32.2	YES	1.49
1	71	71.0	5.0	7.50	32.2	YES	2.21
1	71	71.0	5.0	7.50	32.2	YES	2.21
1	107	107.0	5.0	7.50	32.2	YES	3.33
1	107	107.0	5.0	7.50	32.2	YES	3.33
1	158	158.0	5.0	7.50	32.2	YES	4.91
1	158	158.0	5.0	7.50	32.2	YES	4.91

Chlorine residual at which $CT_{required}$ would not be met are shown below:

Minimum Cl ₂ Residual at 1st User (C) ³ [ppm or mg/L]	Contact Time (T) [minutes]	Actual CT C X T	Temp [° C]	pH	Required CT (0.5-log) formula	CT Met? ³ Yes / No	CT Ratio (CT _{actual} / CT _{required}) formula
0.6	58	34.8	5.0	7.50	30.7	YES	1.13
0.5	58	29.0	5.0	7.50	30.4	NO	0.96
1	33	33.0	5.0	7.50	32.2	YES	1.03
0.9	33	29.7	5.0	7.50	31.8	NO	0.93
0.7	48	33.6	5.0	7.50	31.1	YES	1.08
0.6	48	28.8	5.0	7.50	30.7	NO	0.94
0.5	71	35.5	5.0	7.50	30.4	YES	1.17
0.4	71	28.4	5.0	7.50	30.0	NO	0.95
0.3	107	32.1	5.0	7.50	29.7	YES	1.08
0.2	107	21.4	5.0	7.50	29.3	NO	0.73
0.2	158	31.6	5.0	7.50	29.3	YES	1.08
0.1	158	15.8	5.0	7.50	29.0	NO	0.55

Contact times of 33, 48, 107, and 158 minutes were determined with a tracer study performed August 30, 2023:

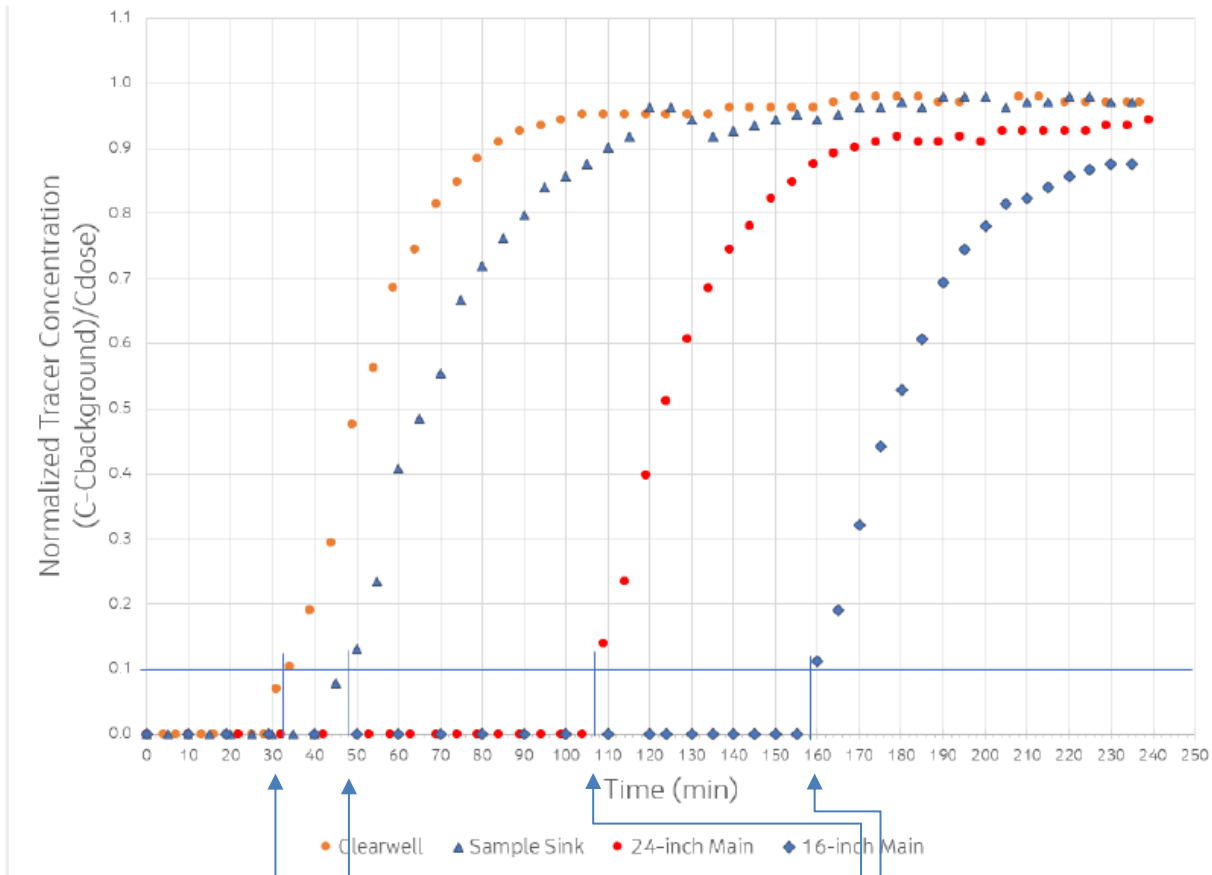


Figure 2. Normalized Fluoride Concentration with Time at Four Sampling Locations.

Table 3. T ₁₀ for Sampling Points and Calculated Baffling Factors for Segments during a 13.1 MGD Tracer Study		
Location	T ₁₀ (min)	Baffling factor for Segment
Clearwell	33	0.77
Operations s Building: Lab Sample; 1-in pipeline	48	0.9-1
Operations Building: Potable Water; 4-inch, 2-inch; 12-inch pipeline (estimated)	67-71	0.9-1
24-inch Main to first customer	107	0.9
16-inch Main to first customer	158	0.8

This approved method culminates from email correspondence from over the past 6 months as documented in the timeline & email correspondence enclosed with this letter.

As stated in Nicole's January 29, 2024, tracer study approval letter, the contact times and baffling factors determined by the August 30, 2003 tracer study are valid for use provided the system is operated within the parameters listed below:

1. Clearwell Reservoir level above 15.57-ft (10% below the avg tracer study reservoir level of 17.3 ft.); &
2. Flow up to 10,010 gpm (10% above the tracer study flow of 9,100 gpm).

Please be aware the contact time and the baffling factors are valid within these specific conditions/parameters listed and a new tracer study will be required if those conditions are not met.

As previously indicated, additional contact time, obtained through transmission pipelines (after the clearwell to the disinfection compliance location), can be determined using plug-flow calculations factoring in pipe pathways reflective of the inerties in use.

Thank you for your patience in awaiting this letter and if you have any further questions, please do not hesitate to contact me at any time at evan.e.hofeld@oha.oregon.gov or 971-200-0288.

Sincerely,



Evan Hofeld, Regional Engineer
Oregon Health Authority
Drinking Water Services

Cc:

James Burke, Engineering and Operations Director, MW&L: jwb@mc-power.com
Nick Wirth, Water Treatment Plant Supervisor: njw@mc-power.com
Craig Massie, Project Manager, Jacobs: Craig.Massie@jacobs.com
Humberto Jaramillo PhD, Drinking Water/Reuse Engineer, Jacobs: humberto.jaramillo@jacobs.com

Encl. Timeline & Email Correspondence

January 29, 2024 tracer study approval letter (showing corrections)

Timeline for last fall and the first half of 2024

- August 30, 2023: Tracer study was conducted.
- December 18, 2023: A final tracer study report and associated MS Excel file for McMinnville Water & Light (MW&L) was received via email from Craig Massie with Jacobs.
- January 24, 2024: Nicole Alfafara requested the following information to which Craig Massie replied on January 24, 2024, as indicated in italic blue font shown below (numbers in bold red font reflects updated pipe calculations provided by Craig Massie on May 30, 2024).
 - 1) A more detailed breakdown of how a 344-gallon volume was determined for the W1 pipe to the WTP Office/1st User. *There is 288 feet of 4 inch pipe, 60 feet of 2 inch pipe, 50 feet of 8 inch pipe, and 90 feet of 1.5 inch pipe routed inside the building to the first fixture. Those lengths and pipe sizes result in a volume of 344 gallons.* **263-ft of 4" + 28-ft of 2" + 78-ft of 8" + 20-ft of 0.5" yields a volume of 380-gallons with a contact time of 38 minutes.**
 - 2) a breakdown of how a 13-gallon volume was determined for the sample pipeline to the Op Building. *There is approximately 325 feet of 1 inch FW sample line from the clearwell to the sample sink in the lab. That length and pipe diameter results in 13 gallons volume.*
 - 3) Confirmation of the 10.1 gpm flowrate from the clearwell to the WTP Office Tap/1st User (11 gpm (5 faucets * 2.2 gpm max flow assumption) – 0.9 gpm flow to the sample pipeline = 10.1 gpm). *Correct assumption on the flowrate.*

- January 30, 2024: MW&L water treatment plant supervisor, Nicolas Wirth, e-mailed Nicole asking for clarification on what contact time is to be used.

1) what contact time we will be using for the state CT reports. Clearwell 33 minutes? Also, on the clearwell, why is there no time credit given for the piping, that we had calculated at 66 total minutes:

- a. Clearwell – 2nd user 24” pipeline was given a contact time of 107 minutes at 10.1 MGD
- b. Clearwell – 2nd user 16” pipeline was given a contact time of 158 minutes at 2.97 MGD

The letter was written with a focus on the assessment of the 33 minutes of contact time achieved in the clearwell at the 13.1 MGD flow rate/17.3 feet level. The Tracer Study demonstrated the clearwell alone provides 33 minutes and the system can calculate additional pipe contact time via plug-flow based on water flow paths possible given intertie configuration along the 24” and 16” main transmission lines.

- 2) I was hoping that we would just have 1 number to use and one sample location to use when this was all said and done. *While this provides flexibility it does not make contacting CT super straightforward.*
- 3) Are we to use the 2nd user on our state CT reports (either one, our preference) and just have a separate report that we don’t submit to the state for the Norman Scott WTP office tap?
- 4) When can we use the 16” contact time and when do we need to use the 24” contact time? During the summer when we are making, say 13.2MGD what number do we use on our report? *I suggest we set up a time to meet to go over this to ensure we are on the same page.*
- 5) Also, the approval letter starts off with the date stating August 2034, could we get a revised copy with the correct date? *A revised letter with the corrected date (January 29, 2024) was emailed on January 30, 2024.*

- January 30, 2024: Nicole Alfara issued the final approval letter dated January 29, 2024 for the tracer study.

- February 13, 2024: A meeting was held to discuss the following potential locations to determine CT/chlorine residual compliance:

- a. At WTP lab sink
- b. At 16 inch transmission line sample point (preferred)
- c. At 24 inch transmission line sample point

City to compare measurements of chlorine residual, pH, and temperature to determine if CT parameters were consistent across sample locations.

- May 30, 2024: Craig Massie emailed requesting that OHA approve the use of the sampling location at the lab for measuring CT parameters and provided information.
 - 1) Confirming that the sampling at the lab using the potable water path through the intentionally oversized piping sees essentially the same water temp as at the clearwell.
 - 2) Including updated piping lengths as marked in an attachment (and shown below) having even more piping to this point (including all the piping around the potable water pumps whereas previous estimates only included yard piping and piping in the building only).

The August 30, 2023 tracer study, conducted at a peak flowrate of 13.1 MGD and an average clearwell level of 17.3ft, evaluated contact times at various locations post the clearwell. These findings are summarized below:

263 feet of 4"+ 28 feet of 2"+ 78 feet of 8" + 20 feet of 0.5"

2. Clearwell – 1st User at the Norman Scott WTP office tap:

Clearwell Contact Time (T_{10}):

Calculated Pipe Flowrate (post clearwell to office):

Pipe Dimensions:

Calculated Total Pipe Volume (post clearwell to office):

Contact Time (T_{10}) (post clearwell to office):

33 minutes *see previous letter page

10.1 gpm

325 ft of 1" + 288 ft of 4" + 60 ft of 2" + 50 ft of 8" + 90 ft of 1.5"

337 gallons

33 minutes

380 gallons

38

MWL calculated 66 minutes (33 minutes from clearwell + 33 minutes from finished WTP piping) of contact time is achieved through the clearwell to the 1st user at the Norman Scott WTP office tap.

- June 12, 2024: email exchange between Evan Hofeld and Craig Massie to clarify some of the dimensions in the tracer study report, which resulted in confirming the two errors mentioned on the first page of this letter.
- June 14, 2024: Draft letter approving the sample location was emailed to the City for review and comment.

Email correspondence:

From: Massie, Craig <Craig.Massie@jacobs.com>
Sent: Monday, December 18, 2023 3:13 PM
To: Alfafara Nicole H <Nicole.H.Alfafara@oha.oregon.gov>
Cc: Nicholas Wirth <njw@mc-power.com>; Ryan Sticka <rls@mc-power.com>; James Burke <jwb@mc-power.com>; Jaramillo, Humberto <Humberto.Jaramillo@jacobs.com>
Subject: RE: Tracer Study Report Scott WTP with append.pdf

Think twice before clicking on links or opening attachments. This email came from outside our organization and might not be safe. If you are not expecting an attachment, contact the sender before opening it.

Nicole,

Final version attached with appendices and track changes accepted. I'll get you the spreadsheet shortly.

Craig Massie, PE*
Project Manager
W: 541 768 3478
M: 541 602 6895 (not answered while driving)

Jacobs
1100 NE Circle Blvd
Suite 300
Corvallis, OR 97330
www.jacobs.com | [LinkedIn](#) | [Twitter](#) | [Facebook](#) | [Instagram](#)

From: Alfafara Nicole H <Nicole.H.Alfafara@oha.oregon.gov>
Sent: Wednesday, January 24, 2024 10:20 AM
To: Massie, Craig <Craig.Massie@jacobs.com>
Cc: Nicholas Wirth <njw@mc-power.com>; Ryan Sticka <rls@mc-power.com>; James Burke <jwb@mc-power.com>; Jaramillo, Humberto <Humberto.Jaramillo@jacobs.com>
Subject: [EXTERNAL] RE: Tracer Study Report Scott WTP with append.pdf

Hi Craig,

1. Can I get a more detailed breakdown of how a 344 gallon volume was determined for the W1 pipe to the WTP Office/1st User? (i.e., pipe Length and size so I can verify area/volume calculations)
2. Can I get a breakdown of how a 13 gallon volume was determined for the sample pipeline to the Op Building?
3. Can you please confirm the following:
 - Flowrate from clearwell to WTP Office Tap/1st User: 10.1 gpm
 - o 11 gpm (5 faucets * 2.2 gpm max flow assumption) – 0.9 gpm flow to the sample pipeline = 10.1 gpm

I am in the training today but I will take a call anytime today before 4pm to discuss this.

Cheers,
Nicole

Nicole Alfafara
Drinking Water Services
Oregon Health Authority
Phone: (503) 278-1531
Fax: (971) 673-0694

From: Massie, Craig <Craig.Massie@jacobs.com>
Sent: Wednesday, January 24, 2024 11:32 AM
To: Alfafara Nicole H <Nicole.H.Alfafara@oha.oregon.gov>
Cc: Nicholas Wirth <njw@mc-power.com>; Ryan Sticka <rls@mc-power.com>; James Burke <jwb@mc-power.com>; Jaramillo, Humberto <Humberto.Jaramillo@jacobs.com>
Subject: RE: Tracer Study Report Scott WTP with append.pdf

Here is the math on the 344 gallon W1 piping:

There is 288 feet of 4 inch pipe, 60 feet of 2 inch pipe, 50 feet of 8 inch pipe, and 90 feet of 1.5 inch pipe routed inside the building to the first fixture. Those lengths and pipe sizes result in a volume of 344 gallons

Here is the math on the 13-gallon volume sample piping to the building:

There is approximately 325 feet of 1 inch FW sample line from the clearwell to the sample sink in the lab. That length and pipe diameter results in 13 gallons volume.

Correct assumption on the flowrate.

Craig Massie, PE*
Project Manager
W: 541 768 3478

From: Alfafara Nicole H <Nicole.H.Alfafara@oha.oregon.gov>
Sent: Monday, January 29, 2024 3:58 PM
To: Ryan L. Sticka <rls@mc-power.com>; Nicholas J. Wirth <njw@mc-power.com>; James W. Burke <jwb@mc-power.com>
Cc: Massie, Craig <Craig.Massie@jacobs.com>; Jaramillo, Humberto <Humberto.Jaramillo@jacobs.com>; Hofeld Evan E <EVAN.E.HOFELD@oha.oregon.gov>
Subject: RE: Tracer Study Report Scott WTP with append.pdf

Dear MWL Team,

I hope this email finds you well. I wanted to touch base with some important updates regarding the August 30, 2023 tracer study and express my gratitude for your ongoing efforts and cooperation throughout the entire process.

Attached is the approval letter for the tracer study conducted on August 30, 2023. Your diligence and attention to my MULTIPLE inquires/questions have been instrumental in ensuring disinfection compliance is accurately determined and documented. Your dedication to this tracer study process has been commendable. I want to take this opportunity to express my sincere appreciation for your patience and collaboration, both in the past and during the current tracer study review and approval process.

As some of you already know, I will be transitioning out of my role the DWS-contact/regulator for Yamhill County. Evan Hofeld will be taking over this responsibility as I shift my focus to assist systems in Tillamook County. I have full confidence that Evan will provide exceptional support and guidance to your team. You will be in good hands and while I no longer oversee your drinking water system I'm still with OHA- DWS so you can reach me at the same email/phone number. I am always here, committed to providing support, and willing to help.

If you have any questions or would like to discuss the tracer study further, please don't hesitate to reach out to me. I am more than willing to schedule a meeting at your convenience. Currently I am available this week (except for Friday) and next week (except for Tuesday, Wednesday before 1 pm, and Thursday before 10:30 am). Additionally, I am available throughout the week of the 12th (except for Tuesday, 1/13, between 9-11 am).

Sincerely,
Nicole



Nicholas J. Wirth <njw@mc-power.com>

To Alfafara Nicole H; Ryan L. Sticka; James W. Burke

Cc Massie, Craig; Jaramillo, Humberto; Hofeld Evan E

Reply
 Reply All
 Forward

Tue 1/30/2024 9:56 AM

From: Nicholas J. Wirth <njw@mc-power.com>
Sent: Tuesday, January 30, 2024 8:57 AM
To: Alfafara Nicole H <Nicole.H.Alfafara@oha.oregon.gov>; Ryan L. Sticka <rls@mc-power.com>; James W. Burke <jwb@mc-power.com>
Cc: Massie, Craig <Craig.Massie@jacobs.com>; Jaramillo, Humberto <Humberto.Jaramillo@jacobs.com>; Hofeld Evan E <EVAN.E.HOFELD@oha.oregon.gov>
Subject: RE: Tracer Study Report Scott WTP with append.pdf

You don't often get email from njw@mc-power.com. [Learn why this is important](#)

Nicole,

I am still a little confused on what contact time we will be using for our state CT reports.

Clearwell 33 minutes? Also on the clearwell, why is there no time credit given for the piping, that we had calculated at 66 total minutes

Clearwell – 2nd user 24" pipeline was given a contact time of 107 minutes at 10.1 MGD

Clearwell – 2nd user 16" pipeline was given a contact time of 158 minutes at 2.97 MGD

I was hoping that we would just have 1 number to use and one sample location to use when this was all said and done.

Are we to use the 2nd user on our state CT reports (either one, our preference) and just have a separate report that we don't submit to the state for the Norman Scott WTP office tap?


When can we use the 16" contact time and when do we need to use the 24" contact time? During the summer when we are making, say 13.2MGD what number do we use on our report?







Also, the approval letter starts off with the date stating August 2034, could we get a revised copy with the correct date?

Thanks,

Nicholas Wirth

Water Treatment Plant Supervisor

 Nicholas J. Wirth <njw@mc-power.com> ☺ ↩ Reply ↩ Reply All ➔ Forward 📧 ⋮ Tue 1/30/2024 9:56 AM

To:  Alfafara Nicole H;  Ryan L. Sticka;  James W. Burke
Cc:  Massie, Craig;  Jaramillo, Humberto;  Hofeld Evan E


From: Alfafara Nicole H <Nicole.H.Alfafara@oha.oregon.gov>
Sent: Tuesday, January 30, 2024 9:51 AM
To: Nicholas J. Wirth <njw@mc-power.com>; Ryan L. Sticka <rls@mc-power.com>; James W. Burke <jwb@mc-power.com>
Cc: Massie, Craig <Craig.Massie@jacobs.com>; Jaramillo, Humberto <Humberto.Jaramillo@jacobs.com>; Hofeld Evan E <EVAN.E.HOFELD@oha.oregon.gov>
Subject: RE: Tracer Study Report Scott WTP with append.pdf



Hi Nicholas,

Attached is the Tracer Study approval letter with the date corrections.
I understand your inquiry as the letter was written with a focus on the assessment of the 33 minutes of contact time achieved in the clearwell at the 13.1 MGD flow rate/17.3 feet level. The Tracer Study demonstrated the clearwell alone provides 33 minutes and the system can calculate additional pipe contact time via plug-flow based on water flow paths possible given intertie configuration along the 24" and 16" main transmission lines. While this provides flexibility it does not make contacting CT super straightforward. I suggest we set up a time to meet to go over this to ensure we are on the same page. Let me know when would work best for you.

Cheers,
Nicole

Nicole Alfafara
Drinking Water Services
Oregon Health Authority
Phone: (503) 278-1531
Fax: (971) 673-0694
Nicole.H.Alfafara@oha.oregon.gov

 Massie, Craig <Craig.Massie@jacobs.com> ☺ ↩ Reply ↩ Reply All ➔ Forward 📧 ⋮ Thu 5/30/2024 9:54 AM

To:  Hofeld Evan E;  Alfafara Nicole H

From: Massie, Craig <Craig.Massie@jacobs.com>
Sent: Thursday, May 30, 2024 9:46 AM
To: Alfafara Nicole H <Nicole.H.Alfafara@oha.oregon.gov>; Hofeld Evan E <EVAN.E.HOFELD@oha.oregon.gov>
Subject: FW: 00497-CT-LTR-2024-01(dates corrected) Jacobs edits.pdf

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Nicole and Evan,

We've confirmed the sampling at the lab using the potable water path through the intentionally oversized piping sees essentially the same water temp as at the clearwell. I've updated the piping lengths as marked in the attached. MW&L would like your approval to use this location for sampling. Note that we have even more piping to this point, and I included all the piping around the potable water pumps where as in the previous estimate I included the yard piping and piping in the building only.

From: Hofeld Evan E <EVAN.E.HOFELD@oha.oregon.gov>
 Sent: Wednesday, June 12, 2024 10:33 AM
 To: Massie, Craig <Craig.Massie@jacobs.com>; Alfafara Nicole H <Nicole.H.Alfafara@oha.oregon.gov>
 Subject: [EXTERNAL] RE: 00497-CT-LTR-2024-01(dates corrected) Jacobs edits.pdf

Hi Craig,

2

So at this point, I'm looking at the following "procedure", which will allow the City to use a single contact time and measuring CT parameters at the lab sink most of the time, but I had a few questions (see 4 questions below).

For routine CT determination at 1st user (WTP):

- 1) Use T = 48 minutes to calculate CT_{actual}
- 2) Calculate CT_{required} using pH, Cl, and temp measured at lab sink

If CT_{required} not met at the WTP:

- 1) Post "Do Not Drink" notice for WTP (other corrective actions may also be needed)
- 2) Determine CT_{actual} & CT_{required} for 2nd user(s) - see below
- 3) Notify state as soon as possible

Calculate CT_{actual} & CT_{required} for 2nd users in each pipeline that is in use:

- 24" pipeline (if in use):**
 Use T = 107 minutes to calculate CT_{actual}
 Calculate CT_{required} using pH, Cl, and temp measured prior to first 24" pipeline
- 16" pipeline (if in use):**
 Use T = 158 minutes to calculate CT_{actual}
 Calculate CT_{required} using pH, Cl, and temp measured prior to first 16" pipeline

- 2) If #1 above is true and the revised calculations do represent the lab sink, then why not just use the contact time demonstrated during the tracer study (48 minutes) rather than add the 33 minutes from the clearwell plus the 38 minutes calculated above (a total of 71 minutes, which is not well supported by the actual test results). **LONGER CT WHEN WE GO THROUGH THE LONGER AND LARGER DIAMETER PIPING.**

4

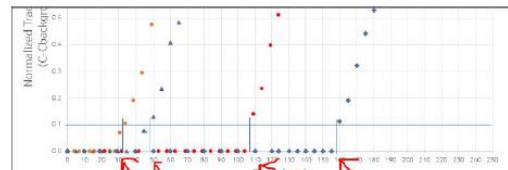


Figure 2. Normalized Fluoride Concentration with Time at Four Sampling Locations.

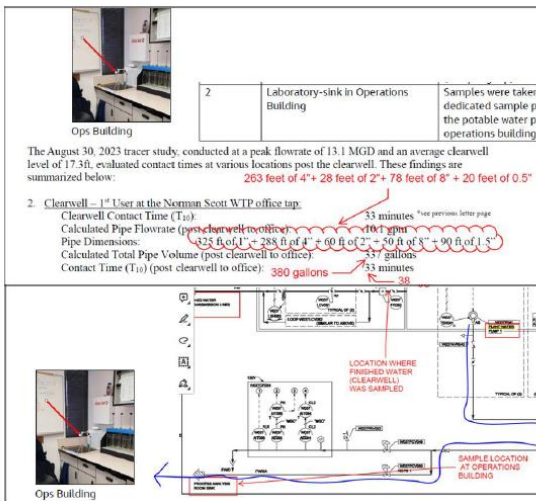
Table 3. T₁₀ for Sampling Points and Calculated Baffling Factors for Segments during a 13.1 MGD Tracer Study

Location	T ₁₀ (min)	Baffling factor for Segment
Clearwell	33	0.77
Operations s Building: Lab Sample; 1-in pipeline	48	0.9-1
Operations Building: Potable Water; 4-inch, 2-inch, 12-inch pipeline (estimated)	67-71	0.9-1
24-inch Main to first customer	107	0.9
16-inch Main to first customer	158	0.8

I had just a couple of clarifying questions:

- 1) Do the piping calculations you provided represent the path of water shown below to the lab sink identified in the tracer study as sampling location #2? NO, THE SINK IS THE CUP SINK JUST TO THE RIGHT AND OUT OF THE PICTURE. THE SAMPLE SINK IN THE PICTURE RECEIVES FROM VIA A 0.5 INCH LINE DIRECTLY FROM THE CLEARWELL POTABLE WATER PUMPS AND DOES NOT GO THROUGH THE OVERSIZED PIPING THAT THE CUP SINK POTABLE WATER FEED LINE PASSES THROUGH.

3



- 3) Do the baffling factors indicated for the "segment" represent the entire flow path (e.g., the baffling factor of 0.90 for the 24" main includes the flow through the clearwell and the 24" pipe) rather than just the individual segment (e.g., pipeline only)? **PIPING ONLY**

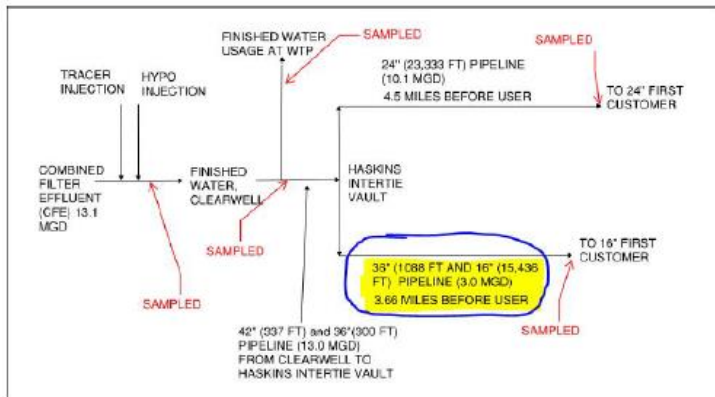
Table 3. T₁₀ for Sampling Points and Calculated Baffling Factor MGD Tracer Study

Location	T ₁₀ (min)
Clearwell	33
Operations s Building: Lab Sample; 1-in pipeline	48

24" pipeline			
Dia., inches	Length, ft	Vol, ft ³	Vol, gal
42	337	3,242.32	24,252.53
36	300	2,120.57	15,861.89
24	23333	73,302.72	548,304.34
		0	0.0
Total =	23,970	78,665.6	588,418.8
Baffling Factor (BF) from study =			0.9
Effective Vol, gal = Total Vol x BF =			529,576.9

Flow, gpm	7035	
Flow, MGD	10.1304	
Time = [Eff Vol, gal] / [flow, gpm] =	75.28	74 = 107 - 33
Time = [Tot Vol, gal] / [flow, gpm] =	83.64	
Tracer Study Cumulative Result, min =	107	

- 4) Was there a change from in the pipe lengths for the 16" waterline that resulted in different dimensions in Nicole's letter as they do not match what was provided in the tracer study report. I BELIEVE 15,436 IS THE CORRECT 16 INCH DIAMETER PIPE LENGTH. LOOKS LIKE 18,700 IS CLOSE TO THE SUM OF THE 36 AND 16 INCH PIPELINE LENGTHS TO THE USER ON THE 36"/16" LEG.



36"/16" Pipeline			
Dia., inches	Length, ft	Vol, ft ³	Vol, gal
42	337	3,242.32	24,252.53
36	300	2,120.57	15,861.89
36	1088	7,690.61	57,525.78
16	15436	21,552.70	161,214.22
Total =	17,161	34,606.2	258,854.4
Baffling Factor (BF) from study =			0.8
Effective Vol, gal = Total Vol x BF =			207,083.5

SEE SUMMARY OF THIS PIPELINE LEG BELOW:

6

HASKINS CREEK INTERTIE	L:D = 1,087.67		PANTHER CREEK INTERTIE	L:D = 11,577.00	
ID	36	inch dia	ID	16	inch dia
LENGTH	3,263	LF	LENGTH	15,436	LF
AREA	7.1	ft ²	AREA	1.4	ft ²
VOLUME	23,065	ft ³	VOLUME	21,553	ft ³
VOLUME	172,525	gal	VOLUME	161,215	gal
FLOW RATE	2,062	GPM	FLOW RATE	2,062	GPM
BAFFLING	90%		BAFFLING	76%	
HRT	83.67	min	HRT	78.18	min
OPEN	→ → →		OPEN	→ → →	

Evan Hofeld
 Regional Engineer
 OREGON HEALTH AUTHORITY - Public Health Division - Drinking Water Services
evan.e.hofeld@oha.oregon.gov
 Cell: 971-200-0288
 Fax: 971-673-0458
www.healthoregon.org/dwp

After-hours emergencies: evenings, weekends, holidays
 Contact on-call DWS manager (503) 704-1174

Hofeld Evan E

From: Massie, Craig <Craig.Massie@jacobs.com>
Sent: Wednesday, June 12, 2024 4:51 PM
To: Hofeld Evan E; Alfafara Nicole H
Subject: RE: 00497-CT-LTR-2024-01(dates corrected) Jacobs edits.pdf

See comments below:

Craig Massie, PE*
 Project Manager
 W: 541 768 3478
 M: 541 602 6895 (not answered while driving)

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 1100 NE Circle Blvd
 Suite 300
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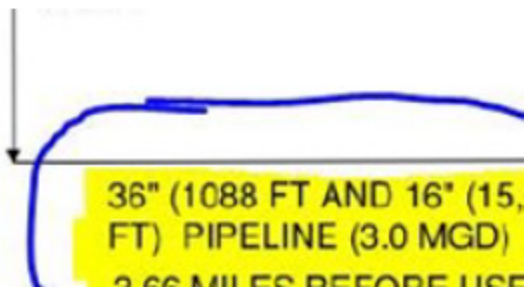
*OR, WA

From: Hofeld Evan E <EVAN.E.HOFELD@oha.oregon.gov>
Sent: Wednesday, June 12, 2024 4:31 PM
To: Massie, Craig <Craig.Massie@jacobs.com>; Alfafara Nicole H <Nicole.H.Alfafara@oha.oregon.gov>
Subject: [EXTERNAL] RE: 00497-CT-LTR-2024-01(dates corrected) Jacobs edits.pdf

Yes, I see that now that the 18,700 (3,263 + 15436 = 18,699)

HASKINS CREEK INTERTIE	L:D =	1,087.67		PANTHER CREEK INTERTIE	L:D =	11,577.00	
	ID	36 inch dia			ID	16 inch dia	
	LENGTH	3,263	LF		LENGTH	15,436	LF

So the 1,088-ft of 36" pipe in the diagram shown below should actually be 3,263-ft then? YES



Then 71 minutes would be the correct contact time (33 minutes through the clearwell + 38 minutes from the piping calcs you provided) and the measurements would be from the cup sink? YES

January 29, 2024 letter showing corrections to the supplemental data appendix:



PUBLIC HEALTH DIVISION
Center for Health Protection, Drinking Water Services
Tina Kotek, Governor



800 NE Oregon Street, Suite 640
Portland, OR 97232-2162
Phone: 971-673-0405
Fax: 503-673-0694
<http://www.healthoregon.org/dws>

January 29, 2024

Ryan Sticka (rls@mc-power.com)
McMinnville Water & Light
PO Box 638
McMinnville, OR 97128

**sent by email only*

August 2023 McMinnville Norman Scott WTP Finished Water Tracer Study --McMinnville Water & Light – PWS ID 00497

Dear Mr. Sticka:

Our office received tracer study results from McMinnville Water & Light (MWL), describing the tracer study performed on August 30, 2023. The water treatment plant is credited with a 2.5-log removal of *Giardia*. The disinfection process must gain the additional 0.5-log to meet the required 3-log total removal/inactivation of *Giardia*.

The following conclusions and data were gathered from the documentation submitted:

Tracer Study Segments:

The performed tracer study, conducted at a flowrate of 13.2 MGD and an average clearwell level of 17.3ft, evaluated contact time for multiple segments or flow paths;

1. The clearwell alone,
2. Through the clearwell to the 1st User at the Norman Scott WTP office tap,
3. Through the clearwell and to the 2nd User along the 24" pipeline, and
4. Through the clearwell and to the 2nd User along the 16" pipeline.

1. Clearwell Tracer Study Results:

Flowrate:	9,100 gpm (13.1 MGD)
Average Clearwell Reservoir Level at time of Tracer Study	17.3 ft
Average Clearwell Reservoir Volume at time of Tracer Study	395,559 gallons
Contact Time (T ₁₀):	33 minutes
Hydraulic Efficiency / Baffling Factor:	0.76

where the baffling factor is calculated by:

$$\text{Baffling Factor} = \frac{(T_{10}[\text{minutes}] * \text{Demand flowrate [gpm]})}{\text{Clearwell volume [gal]}}$$

MWL may now use 33 minutes of contact time or the 0.76 baffling factor in determining contact time achieved from the clearwell as long as the system is operated within the parameters listed below:

1. Clearwell Reservoir level above 15.57-ft (10% below the avg tracer study reservoir level of 17.3 ft.); &
2. Flow up to 10,010 gpm (10% above the tracer study flow of 9,100 gpm).

Please be aware the contact time and the baffling factor identified are valid within these specific conditions/parameters listed and a new tracer study will be required if those conditions are not met.

Additional contact time, obtained through transmission pipelines (after the clearwell to the disinfection compliance location), can be determined using plug-flow calculations factoring in pipe pathways facilitated from intertie valve configuration.

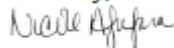
- This tracer study, conducted at a peak flowrate of 13.1 MGD and an average clearwell level of 17.3ft, evaluated contact times at various locations post the clearwell (1st User/WTP Office Tap, 2nd User on the 24" pipeline, and 2nd User on the 16" pipeline). Those observed contact times are summarized in the Supplemental Data Appendix to this letter.

The WTP office tap is the system's 1st User, however the 2nd User along one of the mainlines can serve as a disinfection compliance location if desired.

- Chlorine residual, temperature, and pH may be monitored at the 2nd User along one of the mainlines and used to calculate daily CT values and report disinfection compliance.
- Chlorine residual, temperature, and pH should be monitored and recorded daily at the WTP office tap to determine if CT is met at this location. If CT is not met at this location, the system should indicate water is non-potable at WTP locations (i.e., office, breakroom, bathroom) to inform on-site water system personnel.

If you have any questions or concerns, please feel free to contact me at (503) 278-1531 or Nicole.H.Alfajara@oha.oregon.gov. Thank you for your patience and cooperation.

Sincerely,



Nicole Alfajara
Technical Staff
Drinking Water Service

cc:

James Burke, Engineering and Operations Director, MW&L: jwb@mc-power.com

Nick Wirth, Water Treatment Plant Supervisor: njw@mc-power.com

Craig Massie, Project Manager, Jacobs: Craig.Massie@jacobs.com

Humberto Jaramillo PhD, Drinking Water/Reuse Engineer, Jacobs: humberto.jaramillo@jacobs.com

Evan Hofeld, Regional Engineer, OHA-DWS: evan.e.hofeld@oha.oregon.gov

Supplemental Data Appendix

The August 30, 2023 tracer study, conducted at a peak flowrate of 13.1 MGD and an average clearwell level of 17.3ft, evaluated contact times at various locations post the clearwell. These findings are summarized below:

263 feet of 4" + 28 feet of 2" + 78 feet of 8" + 20 feet of 0.5"

2. Clearwell – 1st User at the Norman Scott WTP office tap:

Clearwell Contact Time (T₁₀): 33 minutes *see previous letter page
 Calculated Pipe Flowrate (post clearwell to office): 10.1 gpm
 Pipe Dimensions: 325 ft of 1" + 288 ft of 4" + 60 ft of 2" + 50 ft of 8" + 90 ft of 1.5"
 Calculated Total Pipe Volume (post clearwell to office): 337 gallons
 Contact Time (T₁₀) (post clearwell to office): 330 gallons → 33 minutes

MWL calculated 66 minutes (33 minutes from clearwell + 33 minutes from finished WTP piping) of contact time is achieved through the clearwell to the 1st user at the Norman Scott WTP office tap.

3. Clearwell – 2nd User on the 24" pipeline:

Average Pipe Flowrate: 7035 gpm (10.1 MGD)
 Pipe Dimensions: 337 ft of 42" + 300 ft of 36" + 23,333 ft of 24"
 Total Pipe Volume 588,420 gallons
 Contact Time (T₁₀) 107 minutes

This tracery study demonstrated 107 minutes of contact time is achieved through the clearwell to the 2nd User on the 24" pipeline.

4. Clearwell – 2nd User on the 16" pipeline:

Average Pipe Flowrate: 2062 gpm (2.97 MGD)
 Pipe Dimensions: 337 ft of 42" + 300 ft of 36" + 18,700 ft of 16"
 Total Pipe Volume 373,864 gallons
 Contact Time (T₁₀) 158 minutes

This tracery study demonstrated 158 minutes of contact time is achieved through the clearwell to the 2nd User on the 16" pipeline.

The pipe dimensions in appendix #4 for the 16" pipeline should be: 337-ft of 42" + 300-ft of 36" + 3,263-ft of 36" + 15,436-ft of 16" for a total pipe volume of 373,879 gallons