Appendix E: Email Exchange Discussing Difference in Water Quality Values Between Step 2 and Step 4 Reports

From:	Hafeznezami, Saeedreza@Waterboards
To:	Alex Waite; Megill, Matthew@Waterboards
Cc:	Sunny Wang; Kim, Terry@Waterboards; Densmore, Jeff@Waterboards; Adam Zacheis; Erin Mackey
Subject:	RE: Question regarding influent concentrations in steps 2 and 4
Date:	Wednesday, January 3, 2024 4:38:02 PM
Attachments:	image001.png image002.png

Hi Alex,

Thanks for the explanation. One note, I think in your Step 4 column below you have misplaced the PCE and TCE concentrations (PCE should be 20 and TCE 16).

Thanks,
Saeed

From: Alex Waite <Alex.Waite@santamonica.gov>
Sent: Wednesday, January 3, 2024 4:24 PM
To: Megill, Matthew@Waterboards <Matthew.Megill@Waterboards.ca.gov>
Cc: Sunny Wang <Sunny.Wang@santamonica.gov>; Kim, Terry@Waterboards <Terrence.Kim@waterboards.ca.gov>; Hafeznezami, Saeedreza@Waterboards <Saeedreza.Hafeznezami@Waterboards.ca.gov>; Densmore, Jeff@Waterboards <Jeff.Densmore@waterboards.ca.gov>; Adam Zacheis <azacheis@brwncald.com>; Erin Mackey <emackey@brwncald.com>
Subject: RE: Question regarding influent concentrations in steps 2 and 4

EXTERNAL:

Hi Matthew – There are two reasons the design influent values in the Step 4 report from the Step 2 report. First, the Step 2 report assumed a flow blend of 700, 700, and 600 gpm were contributed by SM-4, SM-8, and SM-9, respectively. This flow split represented the most typical operations that would occur. However, the SM-4 well prior to its loss of capacity could operate at a maximum production of 900 gpm, and historical data showed elevated concentrations in the monitoring wells surrounding and directly from SM-4 compared to the other wells. So, for purposes of designing a fully robust multi-barrier treatment system, the City and design team decided to modify the flow balance in the Step 4 report to increase flow from SM-4 to 900 gpm and reduced to 550 gpm each from SM-8 and SM-9. This represents a more conservative blend concentration, and this note is captured in Step 4 report Table 2-1, Note a.

Second, the Step 2 report applied the 1.5 safety factor to the blended flow's UCL95 concentration. The Step 4 report applied the 1.5 safety factor to each independent well's calculated UCL95 from the Step 2 report and rounded up to the nearest whole number to provide a second layer of conservatism. The influent Olympic AWTF estimated concentration was then calculated based on the blend concentration described above. The implementation of the safety factor is described in the Step 4 report, Section 2. The table below summarizes the results from the two reports and compares the methodology used in each to calculate the estimated influent concentration. The estimates used in the Step 4 report were utilized to design the treatment system.

	Step 2 – UCL95 Estimate			Step 2 – Estimated Concentration with 1.5 Safety Factor	Step 4 – UCL95 Estimate calculated in Step 2 report x 1.5 safety factor and rounded to nearest whole number			Step 4 – Estimated Concentration	Percent Difference (Step 4 vs Step 2)
	SM-4	SM-8	SM-9	Total	SM-4	SM-8	SM-9	Total	
Flow (gpm)	700	700	600	2000	900	550	550	2000	
1,4-Dioxane (µg/L)	35.4	2.1	2.2	20.7	54 (35.4 x 1.5 = 53.1 -> 54)	4	4	27	31%
TCE (µg/L)	22.2	0.92	0.44	12.3	34	2	1	20	63%
PCE (µg/L)	27.7	0.77	1.5	15.6	42	2	3	16	3%

Hopefully this clarifies the discrepancy. Please let me know if you have any further questions.

Thanks,

Alex Waite
Office: 424.299.6733
Email: alex.waite@santamonica.gov

From: Megill, Matthew@Waterboards <Matthew.Megill@Waterboards.ca.gov>
Sent: Wednesday, January 3, 2024 3:16 PM
To: Alex Waite <Alex.Waite@santamonica.gov>
Cc: Sunny Wang <Sunny.Wang@santamonica.gov>; Kim, Terry@Waterboards <Terrence.Kim@waterboards.ca.gov>; Hafeznezami, Saeedreza@Waterboards <Saeedreza.Hafeznezami@Waterboards.ca.gov>; Densmore, Jeff@Waterboards <Jeff.Densmore@waterboards.ca.gov>; Adam Zacheis <azacheis@brwncald.com>; Erin Mackey <emackey@brwncald.com>
Subject: Question regarding influent concentrations in steps 2 and 4

Hello Alex,

We are seeking some clarification regarding the influent concentration of PCE, TCE, and 1,4-Dioxane used in the Initial Design. We noticed that the concentrations in Table 2-1 from the Step 4 report do not match those in Tables 6-5 and 7-1 in the Step 2 report.

Table 2-1. Olympic Influent Concentrations: Initial Design

Constituent of Potential Concern	Units	MCL	NL	1.5X UCL95 Estimates, Except 1,2,3-TCP (1.2X)			Olympic AWTF Influent[a]
				SM-4	SM-8	SM-9	
1,1-Dichloroethane (1,1-DCA)	µg/L	5	-	0.41	0.06	0.02	0.21
1,1-Dichloroethylene (1,1-DCE)	µg/L	6	-	1.65	0.30	0.12	0.86
1,2,3-Trichloropropane (1,2,3-TCP)	µg/L	0.005	-	0.045	0.018	0.017	0.030
1,4-Dioxane (1,4-D)	µg/L	-	1	54	4	4	27
Carbon Tetrachloride	µg/L	0.5	-	0.54	0.07	0.04	0.27
Cis-1,2-Dichloroethylene (cis-1,2-DCE)	µg/L	6	-	0.33	3.15	0.08	1.04
Tetrachloroethylene (PCE)	µg/L	5	-	42	2	3	20
Trichloroethylene (TCE)	µg/L	5	-	34	2	1	16
1,1,2-Trichloroethane	µg/L	5	-	0.50	ND	ND	0.23
1,2-Dichloroethane	µg/L	0.5	-	0.20	0.10	0.10	0.15
Benzene	µg/L	1	-	0.10	0.20	ND	0.10
Methyl tert-butyl ether (MTBE)	µg/L	13	-	0.30	0.30	ND	0.22
Perfluorooctanoic acid (PFOA)	ng/L	-	0.1	1.70	0.10	0.20	0.85
trans-1,2-Dichloroethylene	µg/L	10	-	ND	0.10	0.10	0.06
Vinyl Chloride	µg/L	0.5	-	ND	0.20	ND	0.06

a. *Blended* treated water concentration assuming Olympic well flows of SM-4 = 900 gpm, SM-8 = 550 gpm, SM-9 = 550 gpm. Note: SM-4 flow is elevated and SM-8 and SM-9 reduced to create the most conservate blend concentration at the maximum flow (SM-4 at maximum flow).

µg/L = microgram per liter
ng/L = nanogram per liter

Table 7-1 Summary of Estimated Concentrations in Treatment Plant Influent for Key Synthetic Organic COPCs

Constituent [Units]	MCL or NL	Using UCL95*		Using Production Well Concentrations From 2020**	
		Plant Influent Concentration Estimates	With Safety Factor Applied***	Plant Influent Concentration Estimates	With Safety Factor Applied***
1,2,3-TCP [µg/L]	**0.005**	**0.022**	**0.026**	0.00091	0.0011
1,4-Dioxane [µg/L]	**1**	**13.8**	**20.7**	**9.9**	**14.9**
PCE [µg/L]	**5**	**10.4**	**15.6**	**31**	**46.5**
TCE [µg/L]	**5**	**8.2**	**12.3**	**23**	**34.5**

Notes: *µg/L = micrograms per liter; values above respective MCLs or NLs are highlighted* ***bold****.*
** From production wells concentration estimates.*
***Maximum observed values from production wells from available 2020 sampling data (provided for information only).*
****A safety factor of 1.5 was applied for each constituent, except for 1,2,3-TCP which used a safety factor of 1.2.*

Best,

Matthew Megill
Water Resource Control Engineer
State Water Resources Control Board | Division of Drinking Water
500 N. Central Ave. Suite 500, Glendale, CA 91203
Main: (818) 551-2004
Direct: (818) 551-2033
Matthew.Megill@waterboards.ca.gov

From: Alex Waite
To: Megill, Matthew@Waterboards
Cc: Clendenin, Gary; Sunny Wang; Adam Zacheis; Erin Mackey; Densmore, Jeff@Waterboards; Kim, Terry@Waterboards; Hafeznezami, Saeedreza@Waterboards
Subject: Re: Question regarding Tables 6-4, 6-5, and 7-1 from Step 2 report
Date: Thursday, February 1, 2024 5:17:42 PM
Attachments: image001.png

EXTERNAL:

Hi Matthew - Thanks for the follow-up questions. Gary conferred with his team and has the following responses:

1. Yes, UCL 95 was only calculated for the monitoring well data set (in each aquifer zone).
2. There were multiple samples collected in 2020 for the two older wells, SM-3 and SM-4, and one sample collected at each new well, SM-8 and SM-9, in 2020:
    a. SM-3 was sampled eight times (monthly samples except April, May, June and December) for the DDW permit suite
    b. SM-4 was sampled four times (January, February and March [DDW Permit suite]) and again in June (97-005 suite)
    c. New Well SM-8 was sampled once in June 2020 for the 97-005 suite
    d. New Well SM-9 was sampled once in May 2020 for the 97-005 suite
3. The maximum COC concentration from all of the 2020 production well samples (4 wells, 14 samples) was used to estimate the influent concentrations in Table 7-1.

Thank you,

Alex Waite
Office: 424.299.6733
Email: alex.waite@santamonica.gov

From: Megill, Matthew@Waterboards <Matthew.Megill@Waterboards.ca.gov>
Sent: Wednesday, January 31, 2024 1:03 PM
To: Alex Waite <Alex.Waite@santamonica.gov>
Cc: Clendenin, Gary <gary.clendenin@icf.com>; Sunny Wang <Sunny.Wang@santamonica.gov>; Adam Zacheis <azacheis@brwncald.com>; Erin Mackey <emackey@brwncald.com>; Densmore, Jeff@Waterboards <Jeff.Densmore@waterboards.ca.gov>; Kim, Terry@Waterboards <Terrence.Kim@waterboards.ca.gov>; Hafeznezami, Saeedreza@Waterboards <Saeedreza.Hafeznezami@Waterboards.ca.gov>
Subject: RE: Question regarding Tables 6-4, 6-5, and 7-1 from Step 2 report

EXTERNAL

Hi Alex,

Just a few clarification questions.

1. The UCL95 figures were determined, using only monitoring well data and not any production well data. Is that correct?

2. Gary mentioned the following:

> The production well data represents historic concentrations; in Table 7-1, the maximum production well concentrations for 2020 (**assumes the maximum concentration hits each well at the same time**, so it most likely over-estimates influent concentrations).

Were there multiple samples taken in 2020? If so, how many? This statement is a bit confusing for us and not really explained how this is the case. Are the maximum production well concentrations for 2020 taking sample results for analytes from different sample batches from different wells?

Best,

Matthew Megill
Direct: (818) 551-2033

From: Alex Waite <Alex.Waite@santamonica.gov>
Sent: Tuesday, January 30, 2024 4:08 PM
To: Megill, Matthew@Waterboards <Matthew.Megill@Waterboards.ca.gov>
Cc: Clendenin, Gary <gary.clendenin@icf.com>; Sunny Wang <Sunny.Wang@santamonica.gov>; Adam Zacheis <azacheis@brwncald.com>; Erin Mackey <emackey@brwncald.com>; Densmore, Jeff@Waterboards <Jeff.Densmore@waterboards.ca.gov>; Kim, Terry@Waterboards <Terrence.Kim@waterboards.ca.gov>; Hafeznezami, Saeedreza@Waterboards <Saeedreza.Hafeznezami@Waterboards.ca.gov>
Subject: Fwd: Question regarding Tables 6-4, 6-5, and 7-1 from Step 2 report

EXTERNAL:

Hi Matthew - Looks like the responses to your questions didn't make it to you. Please see the email response below from our consultant regarding the maximum concentration values in the Step 2 report.

Please let me know if you have any questions. We can also discuss this when we meet tomorrow.

Thanks,

Alex Waite
E. alex.waite@santamonica.gov
P. 424.299.6733

From: Clendenin, Gary <Gary.Clendenin@icf.com>
Sent: Monday, January 22, 2024 11:09 AM
To: matthew.magill@waterboards.ca. <matthew.magill@waterboards.ca>
Cc: Chris Aguillon <Chris.Aguillon@santamonica.gov>; 'Trudell, Mark (Orange County)' <MARK.TRUDELL@advisian.com>; Alex Waite <Alex.Waite@santamonica.gov>; Sunny Wang <Sunny.Wang@santamonica.gov>; Cole, Matthew (Orange County) <Matthew.Cole@advisian.com>; Myden, Melanie (Monrovia) <Melanie.Myden@Advisian.com>
Subject: RE: Question regarding Tables 6-4, 6-5, and 7-1 from Step 2 report

EXTERNAL

Hi Matthew,

Alex and his team at the City of Santa Monica asked ICF to help them respond to your questions pertaining to information provided in the Step 2 and 4 reports. I hope this explanation helps. I would like to begin by providing some background context and then directly answer the questions you asked.

Background Context

For the Step 2 report we had two different data sets: one from production well sampling, representing recent/historic water quality from the wells, and one for monitoring wells within the capture zones of the production wells, to represent the water quality coming into the production wells in the future. The UCL 95 approach was **only** used for the monitoring well data set.

It is important to remember that the production wells are screened across multiple depth intervals (aquifer zones), they average the water quality both by lateral extent of the water being captured, and vertically by the amount of flow from each screened aquifer zone.

The monitoring well data set was selected based on wells located within the 10-year capture zone of each production well. The monitoring wells are screened within a discrete aquifer zone and have been sampled over a long period of time (for this analysis, we used 2012 to 2020, mainly quarterly sampling data). To approximate the averaging of water quality that occurs in the production wells, we used a statistically robust, yet conservative, concentration for each COC in monitoring wells for each aquifer zone. Because of the large number of data points (>58k) the UCL95 was used to calculate a representative chemical of concern (COC) value for each aquifer zone based on monitoring well data, while eliminating extreme outliers (represented by the maximum values) that would likely not represent water quality coming into the production wells in the future, if we had used maximum concentrations.

To estimate production well COC concentrations, the UCL95s for each screened aquifer (from the monitoring well data set) were used to calculate a flow weighted COC concentration for each production well using the screen length in each aquifer zone. Once the flow-weighted 95UCL COC concentration was calculated for each production well, it was multiplied by a safety factor of 1.5 to estimate influent concentrations to the treatment plant (1.2X for 1,2,3-TCP).

Answer to Questions

The production well data represents historic concentrations; in Table 7-1, the maximum production well concentrations for 2020 (assumes the maximum concentration hits each well at the same time, so it most likely over-estimates influent concentrations). It was ***simply presented as a frame of reference*** to look at the future predictions. For treatment system design purposes, we wanted to predict future concentrations, so we used the monitoring well UCL95 data.

The ***maximum*** concentration values from the monitoring well data set were included in the UCL95 calculation. If the maximum values for each COC had been used, that would assume that each monitoring well had its respective maximum COC concentration at the same time, over an 8 year monitoring period (32 quarters). The historic data demonstrates that didn't happen, so the result would have been unrealistically conservative.

Let us know if you have any additional questions.

Thanks,

Gary Clendenin, PG | Principal/Senior Project Director | gary.clendenin@icf.com
ICF | +1.714.478.2690 mobile

From: Alex Waite <Alex.Waite@santamonica.gov>
Sent: Wednesday, January 17, 2024 8:15 AM
To: Sunny Wang <Sunny.Wang@santamonica.gov>; Chris Aguillon <Chris.Aguillon@santamonica.gov>; 'Trudell, Mark (Orange County)' <MARK.TRUDELL@advisian.com>; Cole, Matthew (Orange County) <Matthew.Cole@advisian.com>; Myden, Melanie (Monrovia) <Melanie.Myden@Advisian.com>; Clendenin, Gary <Gary.Clendenin@icf.com>
Subject: RE: Question regarding Tables 6-4, 6-5, and 7-1 from Step 2 report

Hi All – Please see the question below from the DDW regarding the Olympic Well Field Restoration 97-005 Step 2 report. Could the Advisian/ICF team help respond to their question of why the UCL95 value was used for the purposes of design versus the maximum value? And just for reference, this is a continuance of a previous question regarding a discrepancy between the Step 4 report values and Step 2 (see attached email conversation for reference).

Appreciate your help!

Alex Waite
Office: 424.299.6733
Email: alex.waite@santamonica.gov

From: Megill, Matthew@Waterboards <Matthew.Megill@Waterboards.ca.gov>

Sent: Friday, January 12, 2024 9:40 AM
To: Alex Waite <Alex.Waite@santamonica.gov>
Cc: Hafeznezami, Saeedreza@Waterboards <Saeedreza.Hafeznezami@Waterboards.ca.gov>; Kim, Terry@Waterboards <Terrence.Kim@waterboards.ca.gov>; Densmore, Jeff@Waterboards <Jeff.Densmore@waterboards.ca.gov>; Sunny Wang <Sunny.Wang@santamonica.gov>; Adam Zacheis <azacheis@brwncald.com>; Erin Mackey <emackey@brwncald.com>
Subject: Question regarding Tables 6-4, 6-5, and 7-1 from Step 2 report

EXTERNAL

Hi Alex,

We briefly mentioned having a question regarding some of the production well values from Tables 6-4, 6-5, and 7-1 (shown below) of the Step 2 Full Raw Water Quality Characterization during our most recent meeting. I'm following up about that question here.

We noticed that some of the values that used the production well concentrations from 2020 were significantly higher than those that used the UCL95 values. It's also noted that the values that used the 2020 production well data were provided for information only. We would like to better understand what that means and the reasoning behind the decision to use the UCL95 values, rather than using the more conservative values that used the 2020 production well data.

Table 7-1 Summary of Estimated Concentrations in Treatment Plant Influent for Key Synthetic Organic COPCs

Constituent [Units]	MCL or NL	Using UCL95*		Using Production Well Concentrations From 2020**	
		Plant Influent Concentration Estimates	With Safety Factor Applied***	Plant Influent Concentration Estimates	With Safety Factor Applied***
1,2,3-TCP [µg/L]	**0.005**	**0.022**	**0.026**	0.00091	0.0011
1,4-Dioxane [µg/L]	**1**	**13.8**	**20.7**	**9.9**	**14.9**
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TCE [µg/L]	**5**	**8.2**	**12.3**	**23**	**34.5**

Notes: *µg/L = micrograms per liter; values above respective MCLs or NLs are highlighted* ***bold****.*
** From production wells concentration estimates.*
***Maximum observed values from production wells from available 2020 sampling data (provided for information only).*
****A safety factor of 1.5 was applied for each constituent, except for 1,2,3-TCP which used a safety factor of 1.2.*

Best,

Matthew Megill
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