

MEMORANDUM

To: Lisa Celaya, Adam Jones, Jill Friedman, Ana Osante, City of San Diego
 From: Bill Stannard and John Wright, Raftelis
 Date: June 8, 2021
 Re: Raftelis Recommendation on Residential COD Loading

In the cost-of-service study, the COD strength loading assigned to Single and Multi-Family Residential customers was 766.4 mg/L. Stantec recommends a strength loading of 704 mg/L. Raftelis has reviewed the data that supported the original COD strength loading as well as additional sampling data provided by City staff. We believe the original strength loading used in the cost-of-service study represents a reasonable estimate of the strength of wastewater discharged by residential customers. As such, we do not believe an adjustment to the estimated COD loading for residential customers is warranted at this time.

The objective for determining the pollutant strengths is to provide a basis for assessing strength-related wastewater treatment costs in proportion to the relative pollutant strengths from customer sources. The goal of this effort is to achieve a more equitable distribution of the costs associated with wastewater treatment among the customer classes rather than treating the wastewater from those classes as being equivalent in nature.

City staff provided data on the wastewater pollutant strengths for three basins within the system that they believed to be representative of residential wastewater. The table below shows the statistical outcome of accepted test samples taken at each of these basins during the period 2014 - 2019. It is not surprising that the strength data varied by basin given the nature of the wastewater discharged by residential customers and the relative impact of water conservation on the results.

**Calculation of Weighted Average Residential Strength Loadings
Used in the Cost-of-Service Study**

Basin	Flow MGD	COD mg/l	TSS mg/l
SD18	1.26	925	291
LS2	2.66	709	286
WG1M	0.52	676	324
Basin	Flow MGD	COD Lbs./day	TSS Lbs./day
SD18	1.26	9,720	3,058
LS2	2.66	15,729	6,345
WG1M	0.52	2,932	1,405
Total	4.44*	28,380.7	10,807.8
* 4.44 MGD is approximately 12.2% of estimated average daily Single Family Residential discharges (36.4 MGD) and 7.0% of estimated average daily combined Single and Multi-Family Residential discharges (63.7 MGD).		COD Weighted Avg.	TSS Weighted Avg.
		766.4	291.9

Stantec questioned the use of limited data from only three basins for the analysis (table above). Specifically, they indicated that based on a visual drive-by review of Basin SD18, it appeared that this basin had significant sources of non-residential wastewater. Thus, Stantec recommended excluding Basin SD18 and using only Basins LS2 and WG1M for the residential strength analysis.

We examined an aerial view of Basin SD18 and were unable to confirm Stantec's perspective. Rather, we identified three schools and one warehouse as the principal non-residential users within Basin SD18. The wastewater discharged from those properties is expected to be sanitary wastewater in nature and similar to that of residential customers.

City staff also identified an additional basin with available strength monitoring data which staff believes is representative of residential customers (Basin SD1E). The table below shows the statistical outcome of accepted test samples taken during the period 2014 - 2019 with the addition of Basin SD1E. Note that Basin SD1E has a higher indicated COD strength loading than Basin SD18. The inclusion of Basin SD1E will increase the weighted average COD strength loading to 792.4 mg/L.

**Calculation of Weighted Average Residential Strength Loadings
with the Addition of a New Representative Basin (SD1E)**

Basin	Flow MGD	COD mg/l	TSS mg/l
SD18	1.26	925	291
LS2	2.66	709	286
WG1M	0.52	676	324
SD1E	1.78	857	292
Basin	Flow MGD	COD Lbs./day	TSS Lbs./day
SD18	1.26	9,720	3,058
LS2	2.66	15,729	6,345
WG1M	0.52	2,932	1,405
SD1E	1.78	12,722	4,335
Total	6.22*	41,103.0	15,142.6
* 6.22 MGD is approximately 17.1% of estimated average daily single family residential discharges (36.4 MGD) and 9.8% of estimated average daily combined single and multi-family residential discharges (63.7 MGD).		COD Weighted Avg.	TSS Weighted Avg.
		792.4	291.9

The objective is to develop an informed assumption and not a precise determination of the actual strengths of flows. It is important to note the variability and relatively limited extent of the data used in the cost-of-service study to estimate the average strength of wastewater discharged by residential customers. The inherent uncertainty of the data is shown when the calculation includes sampling results from a fourth basin identified by City staff. The addition of this fourth basin *increases* the estimated average residential strength loading. For this reason, it is our opinion that the average residential COD strength loading used in the cost-of-service study provides a reasonable assumption for this element of the study and should be maintained without modification (766.4 mg/L).

The development of estimates for the pollutant strength of residential and commercial customers as part of a cost-of-service study can be a challenging exercise due to the difficulty in obtaining broad levels of data. The City provided more extensive data that helped inform Raftelis in the cost-of-service study.

In our opinion, the data provided fairly reflects the relative strength of residential wastewater in relation to the other customer classes. Nevertheless, we agree with Stantec's recommendation that additional sampling of residential areas be conducted by the City prior to the next cost-of-service study to provide a broader basis for estimating the pollutant strength of wastewater discharged by residential customers.