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FROM FOREST TO FAUCET

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TECHNICAL MEMORANDUM

Summary of 2023 Groundwater Quality Impacts at Portland Water Bureau Wells Due to Contaminant Releases by the Boeing Company and Cascade Corporation at the East Multnomah County Site

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CC: Douglas Wise / Portland Water Bureau

Date: October 1, 2024

This technical memorandum presents the continuing analysis of the increasing trends in the concentration of trichloroethylene (TCE) in Portland Water Bureau (PWB) monitoring wells in the Troutdale Sandstone Aquifer (TSA).

Background

As the drinking water provider for nearly one quarter of Oregon's population, Portland Water Bureau (PWB) is concerned about any trichloroethylene (TCE) impacts in the vicinity of its groundwater wells in the Troutdale Sandstone Aquifer (TSA) and Sand and Gravel Aquifer (SGA). To that end, and in light of DEQ's issuance of a conditional No Further Action (NFA) determination for the Boeing/EMC Remediation in Zone A, PWB continues to urge DEQ to increase the required monitoring and analysis period to a duration sufficient to confidently determine decreasing or stable TCE concentration trends below the drinking water Maximum Contaminant Level (MCL) for the construction window of PWB's water right, which currently ends in 2085.

PWB presented analysis to DEQ in 2020 that indicated a statistically significant increasing trend in TCE concentrations at both monitoring wells PWB-1(UTS) and PWB-1(LTS) since the shutdown of several EMC extraction wells in 2010. While TCE concentrations in both PWB-1(UTS) and PWB-1(LTS) were and are currently below MCL (5 µg/l), which is the value stipulated in the site Record of Decision (ROD), the statistically significant trend shown in the data would indicate that, without any change, concentrations would exceed MCLs within 42 years. PWB has active water rights within the TSA with construction dates set to 2085, and an exceedance of the TCE MCL in the TSA at PWB-1(UTS) and PWB-1(LTS) would have a deleterious impact on operations of PWB's groundwater resources.

Current Updated TCE Trends at PWB-1

The most recent Mann-Kendall Analysis of trend in both PWB-1(uts) and PWB-1(lts) were completed after the most recent sampling at those wells (2023/5/16). The outcomes of those analyses are shown below in Figure 1 and 2.

Figure 1: Mann-Kendall Analysis at PWB-1(UTS)

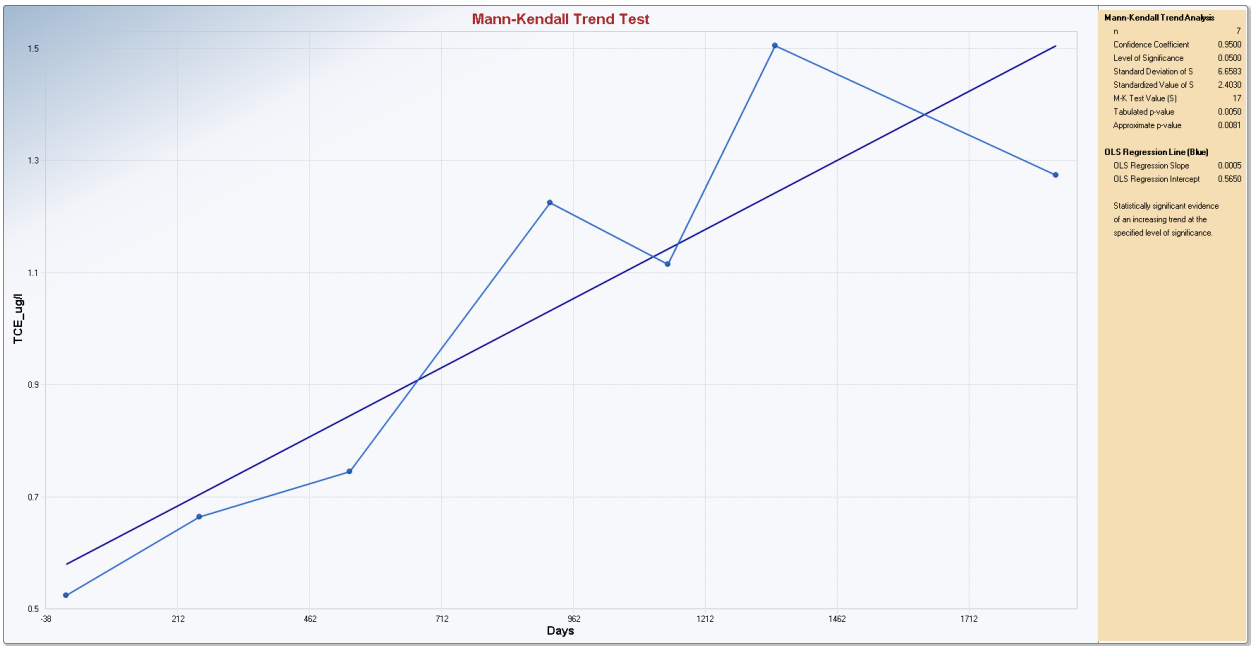

Figure 2: Mann-Kendall Analysis at PWB-1(LTS)

These updated Mann-Kendall Trend Analyses indicate a stronger statistical significance for the increasing TCE concentration trends at both wells. Table 1 presents the results of the Mann-Kendall analyses, and Ordinary Least Squares Trendline Regression analyses recently completed as well as summarizing previous results.

Table 1: Summary of Statistics for PWB-1-UTS and PWB-1-LTS	2019	2021		2023	
	PWB-1-LTS	*PWB-1-UTS*	*PWB-1-LTS*	*PWB-1-UTS*	*PWB-1-LTS*
Date of Last Sample	9/17/2019	11/30/2021	11/30/2021	5/16/2023	5/16/2023
Number of Events (n)	23	6	26	7	27
Mann-Kendall Test Value (S)	**100**	**13**	**134**	**17**	**160**
Approximate P-value	**0.00445**	**0.0121**	**0.00168**	**0.00813**	**0.00046**
OLS Slope	0.00017555	0.0006911	0.0002063	0.0004934	0.000238
Intercept	1.145	0.465	1.1	0.565	1.049
Confidence Level	95%	95%	95%	95%	95%
Increasing Trend Significant at Confidence Level?	Yes	Yes	Yes	Yes	Yes
Extrapolated Date of MCL Concentration	**10/31/2079**	**11/18/2039**	**9/7/2073**	**12/24/2047**	**10/16/2068**

The slopes of the trend lines remain similar to previous results, analysis of the trend from current modeled slope estimates of TCE concentrations indicate MCL exceedances for TCE concentrations at PWB-1(UTS) and PWB-1(LTS) in 23 (2047) and 44 (2068) years, respectively. The Remedial Action Objectives contained in the ROD (DEQ, pg. 6-1, 1996) require that Boeing and Cascade:

> *Restore the TSA to protective concentrations in a reasonable time, if feasible. If not feasible, minimize the extent of the TSA containing VOCs above MCLs, or 1x10-6 excess cancer risk levels, whichever is more stringent, and provide long-term containment of areas where concentrations are above MCLs.*

Action to address the demonstrated increasing trend through hydraulic control or other mitigation would therefore not be unreasonable.

PWB will continue monitoring TCE concentrations at the PWB-1 cluster of wells and update the statistical trend analysis. Continuing analyses will consider the estimated time to exceedance of the TCE MCLs at the PWB-1(UTS) and PWB-1(LTS) wells.

Further Discussion - PFAS Detections

In addition to increasing TCE levels at the PWB-1 monitoring wells, PFAS compounds have now been detected at PWB-1(UTS) in each of the four samples taken for this purpose by PWB. The most recent result of a PFOS concentration of 4.5 ng/l exceeds the applicable MCL of 4 ng/l. This information from monitoring wells associated with the Boeing/EMC site, together with the co-occurrence of PFAS with legacy VOC compounds that has been observed at other sites (e.g. Honeywell/Baron-Blakeslee, NE 148th Avenue, NE Holman, etc.), strongly indicates that additional source area sampling for PFAS should be undertaken at the Boeing/EMC site.