

Attachment A:  
DEQ Review Comments on  
Ethylene Dibromide in Groundwater – Occurrence, Hydrogeology and Possible Sources  
Dated December 6, 2016

1. Section 4.1: Surface Water in the Immediate Vicinity of the Subject Property – This section begins with the statement that there are no lakes, creeks, or wetland features on the property but goes on to note that there is an unnamed “storm water retention” pond in the NE corner. DEQ understands that this pond historically received runoff from spray irrigation of process waste water, which currently goes to the municipal sewer system. The site map (Figure 1) shows a small creek “No Name Creek” crossing the southwest portion on former lot 14. Sediment sampling has been completed in this creek to assess former pesticide runoff.
2. Section 4.2: Site Hydrostratigraphic Units – Under Troutdale Sandstone Aquifer (TSA) the description of unit thickness is ambiguous. The first sentence reports that the upper 2/3 of the unit is sandstone and the lower third is conglomerate. Later in the section it is reported that the sandstone is much thinner than the conglomerate. It would be better to state that thickness is variable.
3. Section 4.3: Summary – Conceptual Hydrogeological Model and Section 4.4.3: Groundwater Capture and Time of Travel Curves – The first section discusses regional groundwater flow and introduces Figure 8. This figure appears to be a compilation of two or more time of travel modeling efforts. The figure is misleading because two or more groundwater studies have been combined but they were prepared with different modeling methods. By their elongated shape the green capture zones clearly incorporate a groundwater flow direction and gradient (particle tracking analysis) while the yellow and purple capture zones (concentric circles typical of a wellhead protection analysis) do not. Wells CWV #2 and #3 are shown interacting with each other but not with the other wells. The figure is used to support an interpretation that EDB contamination in TFI #3 is not related to similar EDB contamination in City of Fairview wells. However, all wells would likely interact with each other if modeled together. Capture zones depend on pumping rates, pumping duration, flow direction, groundwater gradient and screened interval, among other factors.
4. Section 4.4.4: Wells in Geologic Cross Sections - Under the first bullet it is asserted that the NE trending groundwater gradient, which aligns with surface topography, is demonstrated by the cross section in Figure 5 and that this also explains why TFI’s well capture area does not include City of Fairview well #6. However, the capture area of TFI well (MULT 63487) is shown as cylindrical indicating that it was calculated using a different method than that of the City of Fairview wells. Capture area is influenced by gradient, flow direction, and pumping rate. The report does not indicate that such data were collected or evaluated in support of this argument.

Static water levels do suggest that flow would be to the northeast, but high volume supply well pumping can easily overcome static flow direction, causing reverse flow. Pumping in COF well #6 (likely at a fairly high flow rate) could draw in groundwater from the TFI well area. Moreover, Figure 5 shows the confining CU1 unit slopes downward to the SW and could enhance flow in a SW direction during City of Fairview supply well pumping. Therefore, this argument is not conclusive.

5. Discussion under the third bullet of Section 4.4.4 depends on analysis of the areal extent of the capture areas shown in Figure 8. However, because capture areas were estimated using different methods, the comparison of well capture areas is not appropriate.
6. Section 5.3.1: Rapid Soil Solutions Letter Report dated August 26, 2015 – DEQ has previously commented on the RSS letter report. Concisely, soil sampling from 2-6 feet bgs would be extremely unlikely to detect EDB used decades earlier, owing to its volatility. If there had been an on-site source, trace amounts might be found in groundwater below the site but not in near surface soil.
7. Section 5.3.2: Extent of EDB in Ground Water - Under the second sub-bullet for TFI #3 it is noted that of all the wells in the study area the maximum concentration of EDB was detected in this well. The text suggests that this does not indicate that TFI is the source, but rather that this particular well may be in more of a direct line than City of Fairview wells to the source area. DEQ understands that a historic pesticide mixing area existed on site in the general vicinity of the TFI wells under discussion. However, EDB is reported not to have been used. Overall, the argument presented is inconclusive.
8. Section 5.3.2: Extent of EDB in Ground Water -Fourth sub-bullet, City of Fairview Well #6: It is reported that this well has had the highest EDB concentrations of the City of Fairview wells and more detections than all the other supply wells. It should also be pointed out that this supply well is the nearest well to the TFI wells and thus relatively more likely to be impacted by any source, if it existed there.
9. Section 6.0 Discussion: It is pointed out that sampling intervals are not consistent and pumping rate and intervals for supply wells are unknown. DEQ agrees that all these factors make interpretation more difficult and uncertain.
10. Figure 10 is presented in a data modeling to provide support for an interpretation that the source for EDB must be upgradient or south of the City of Fairview wells. The model and figure assumptions are difficult to interpret, possibly due to the difficulty of preparing figures affected by inconsistent sampling over time at the wells, relatively low concentration near analytical reporting limits. From Table 1, DEQ notes that except for one TFI well #3 sampling event on 2/11/05 (result=ND) no TFI wells were sampled between 2001 and 2010. The first EDB detections in the area were in TFI well #2 in 1994. This well extends to 136 feet below ground

surface (bgs) but was abandoned by 2003. TFI well #3 is screened from 205-245 bgs so it's much deeper screened interval would be expected to detect contamination at a later date. Fairview wells #6 and #5 first detected EDB in 2005 but the next earliest sampling event for these wells was in 2002.

11. At the concentrations measured, detection vs. non-detection is influenced by sampling technique, normal laboratory analytical error or other issues not directly related to groundwater conditions. The lack of consistently collected sampling data over time make this interpretation difficult. In addition, other factors such as groundwater pumping rate, pumping intervals, and geologic heterogeneity also add complexity. The fact that TFI well #2 was the first well to detect EDB by over 10 years while nearby City of Fairview wells were being sampled every 2-3 years is also a consideration. The lack of consistently collected sampling data and the extrapolation from limited data makes this kind of modeling very unreliable.
12. Section 7.0: Summary and Conclusions: In the long experience of the DEQ Tanks program, EDB from gas station sources is very rare in the Portland area. DEQ considers an agricultural source more likely for this area.
13. Section 7.0: The text states that if the EDB detections in TFI #3 reflect EDB detects in City of Fairview well #6 then there should be early detections in City of Fairview #6 at the same early date of detection in TFI #2. This might be the case if there was an upgradient source but the fact that EDB was not detected in City of Fairview well #6 until 2005 suggests a possible downgradient source. Further, the much greater depth for the screen interval in City of Fairview well #6 is consistent with a later detection from a downgradient source.