NEWTOWN CREEK GROUP

Seeps Fact Sheet

Introduction to Seeps

Seeps are fluids that emerge from shorelines, bulkheads, or sediments into the waterway. They can contain contaminants of concern (COCs) such as PAHs, PCBs, and metals and can represent a potentially significant uncontrolled ongoing source of contaminants to the Newtown Creek Study Area. Concerns have been raised regarding the potential significance of seeps observed to emanate from bulkheads and shoreline areas of Newtown Creek under a variety of conditions, and specifically whether they contain contaminant loads significant enough to affect remedial decision-making. These concerns are often raised based on observations or reports of seeps, without any detail as to contaminant loadings or discharge volumes or calculated loading.

The focus of this fact sheet will be on seeps from upland sites where Non Aqueous Phase Liquids (NAPL) may have been historically, or are now present as part of upland site current or former operations. It will also focus on NAPL seeps in the East Branch of Newtown Creek and how they apply to the NCG's East Branch Focused Feasibility Study (EB FFS), as seeps may impact the East Branch remedy.

When NAPL reaches surface water via a seep, it disperses, and depending on the physical properties of the NAPL and the quantity present, the NAPL can either break down or break into small droplets, transitioning to a thin sheen on the water surface. Some of that surface water NAPL sheen undergoes degradation, in which it is broken down by sunlight, biodegradation, evaporation, and dissolution of sheen constituents into the surface water. As the NAPL or sheen breaks down, it may be transported by wind and surface water flow. Migration is influenced by water and wind currents, boat traffic, and the presence of bulkheads. Other NAPL sheens undergo deposition, in which NAPL dispersed in or on the surface water as discrete droplets or residual sheen attach to solids particles suspended in or on the surface water causing them to sink within the water column and deposit on the sediment bed, where COCs dissolved in the NAPL can add to the surface sediment COC concentration.

Seeps are not the only mechanism that can introduce NAPL into surface water. Gas ebullition, point sources, CSOs, stormwater discharges, and overwater activities can introduce NAPL as well. NAPL flux has been extensively studied and quantified during the RI/FS. (See Appendix D of the Final RI Report and the Feasibility Study Gas Ebullition Data Evaluation Report; Anchor QEA 2022a).

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Evaluating the Significance of Seeps

To assess whether seeps represent a significant source of recontamination in Newtown Creek that could affect remedial decision making, Anchor QEA developed a conservative approach to quantitatively bound the potential loading from seeps using existing seep sampling data and the USEPA –accepted Long Term Equilibration (LTE) model. This evaluation, known as quantitative bounding analysis, was performed to determine how much higher the amount of contaminants associated with TPAH (34) contained in NAPL seeps would need to be in East Branch in order to be considered a significant source that needs to be taken into account prior to the East Branch Early Action remedy implementation.

Anchor QEA increased the hypothetical input values of the seep-related NAPL load to East Branch model incrementally, until the LTE model showed surface sediment concentrations would exceed the risk-based NAPL Preliminary Remedial Goal (PRG). They found that the additional NAPL seep-related NAPL load needed to cause sediment concentrations in East Branch to exceed the risk-based PRG was 36 kilograms per year. Researchers then compared this hypothetical seep-related NAPL contamination load to the actual annual measured ongoing NAPL load coming from other external sources to East Branch and found that the hypothetical NAPL seep load would be larger than all other sources of NAPL loading combined in the East Branch which is not plausible given the limited observations of NAPL seeps in East Branch. (Section 7 of Appendix F of the RI Report).

Anchor QEA then used conservative concentration data to calculate the volume of non-NAPL containing seeps (i.e., aqueous seeps) that would have to be entering East Branch surface water to result in that additional NAPL load and found that 23 gallons per minute of aqueous seeps would need to be entering East Branch from each of the ten observed aqueous seeps in East Branch to cause such a load. Conservatively using the upper-bound NAPL concentration and the hypothetical additional NAPL seep load of 36 kg/yr, the seep flow rate would need to be 360 million gallons per year into East Branch. This is approximately 34 times greater than the estimated total lateral groundwater discharge rate into the East Branch that is presented in the RI groundwater investigation. Based upon seep observations, such a volume is not remotely plausible.

Finally, as an independent check on the assumption, Anchor QEA estimated the hypothetical area of sheen that would be seen in the East Branch if the hypothetical additional seep-related NAPL load was actually occurring. Calculating the NAPL volume

needed to result in the hypothetical NAPL load of 36 kg/yr results in an observable sheen of 1.1 to 6.8 acres in size each and every low tide, clearly something which has never been observed in the East Branch prior to or during the Remedial Investigation.

Conclusions

Bounding calculations using data collected during both RI/FS field activities and non-RI/FS studies by various stakeholders indicate that NAPL seeps, although observed within the Study Area, represent a comparatively minor source of contaminants to sediment in the East Branch and the rest of the Newtown Creek Study Area. The calculated hypothetical NAPL seep-related NAPL loads and resulting NAPL volumetric flow rates and aqueous seep flow rates that would need to be present to affect remedial decision making are much higher than existing and well characterized loads and flow rates. Finally, although the existence of observed localized NAPL seeps should not impact remedial decision-making, the NCG supports the mitigation of visible seeps by the relevant parties and agencies.