Evaluating Source Control Sufficiency with TIGSED, a Small-Scale Sediment Contamination Model

Battelle Eleventh International Conference on the
Remediation and Management of Contaminated Sediments

Nicholas D. Rose (nrose@intell-group.com) (TIG Environmental, New York, NY, USA)
Philip Spadaro (pspadaro@intell-group.com) (TIG Environmental, Seattle, WA, USA) and Jason Dittman (jdittman@intellgroup.com) (TIG Environmental, Syracuse, NY USA)

Background/Objectives. In-water sediment remediation projects can be complex and large-scale projects whose design and implementation can cost significant sums of money. Examples of such projects include: the Berry's Creek Study Area, the Lower Duwamish Waterway, and the Portland Harbor Superfund Site. Due to the scale of such projects, there are usually multiple sources that are currently contributing or have historically contributed contamination to the area of concern. These sources can reach sediment through various pathways, including direct discharges, stormwater outfalls, overland runoff, riverbank erosion, and sediment transport. Given the costs associated with designing and implementing a contaminated sediment remedy, it is important to ensure that ongoing sources are sufficiently controlled such that they will not re-contaminate a given remediation area. Consistent with these concerns, EPA Region 10 has begun requiring sufficiency assessments as part of the remediation work in or adjacent to the Lower Duwamish Waterway and the Portland Harbor Superfund Site. A sufficiency assessment identifies key sources, contaminants, and pathways and evaluates the risk of recontamination. Modeling of in-water and upland source contributions to sediments can be used to determine whether sources present a potential for re-contamination and/or the most efficient method for controlling them. We present a method for modeling these inputs and assessing re-contamination potential.

Approach/Activities. SEDCAM is a modeling approach developed by Jacobs et al. (1988) for estimating the contribution of source loadings to sediment in Commencement Bay, a sediment Superfund site in Puget Sound. This model was developed to evaluate problem areas based on the area-wide contributions to them with steady conditions across the period of time evaluated. The modeling approach we developed, TIGSED, combines the SEDCAM equation with stormwater and sediment modeling data to provide sediment contamination concentrations on a much smaller scale than possible with the original SEDCAM equation. TIGSED provides the ability to calculate millions of SEDCAM equation results in a matter of minutes allowing for parameters to be adjusted on a year-by-year basis and the application of SEDCAM equations on a very small spatial scale. This can be combined with information on upland and in water sources to understand whether these sources will result in re-contamination, identify the specific areas likely to be re-contaminated, and assess the most efficient ways to control multiple sources.

Results/Lessons Learned. TIGSED can present a small-scale picture of the anticipated sediment concentrations from ongoing sources and is easily adjusted to consider a wide range of scenarios. Thus, this methodology can be more useful in identifying areas where ongoing source contributions could result in re-contamination of sediment due to overlapping source contributions and identifying the most efficient mechanisms for controlling those sources. Through case studies, we will show how TIGSED can be applied to determine whether current sources are sufficiently controlled. We will also discuss the way this methodology can be used to evaluate the potential for controlling multiple sources when the results determine that source are likely to result in re-contamination.