MEMORANDUM

Date: October 4, 2017

To: The Portland Harbor Superfund Site Pre-RD Group

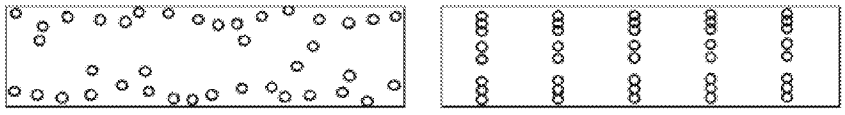
From: Jason Conder and Anne Fitzpatrick, Geosyntec

Re: **Sample Placement Approach (Grids/Cells vs. Transects) for the Unbiased Surface Sediment Sample Plan**

Geosyntec believes (as previously discussed with EPA, below) that placement of the unbiased surface sediment sampling locations using a grid-cell pattern, instead of transects proposed by EPA in their June 2017 scoping plan, will provide better spatial coverage in this dynamic river system.

Advantages of Grid Cell Placement:

- The grid cell approach will provide a more spatially-balanced dataset for SWAC calculation since the distances between the sample points are more equidistant.
- The transect system compresses the sample location to particular points on the river and leaves large gaps (~0.2 miles) between transects. These un-sampled gaps result in higher spatial uncertainty, and result in fewer rolling River Mile averages that can be calculated. Example: 40-sample layouts for a River Mile (river flow right to left):



- Transects are not randomly placed since they follow a simple line across the river. The placement of sample locations in the grid cells is random. Given the variability in physical processes of this dynamic river system, the transect approach could miss certain depositional/erosional environments.
- A spatially-weighted evaluation of surface sediment provides a way to optimize the dataset for future monitoring designs;
- Use of transects would not facilitate re-occupation of locations sampled in 2004 for analysis of recovery potential;
- A grid approach is being used/considered at other large, complex Region 10 Superfund sediment sites including PSNS Bremerton and the Lower Duwamish Waterway.

EPA Discussion/Agreement on Grid Cell Approach:

- 8-9-17 Meeting: EPA and Pre-RD group verbally agreed to evaluate sample placement approach for 345 unbiased samples.

- 8-17-17 Meeting: The Pre-RD group presented the grid cell placement approach to EPA. EPA verbally agreed to evaluate the approach further and requested the grid cell GIS files. Geosyntec provided the grid cell GIS files to EPA on 8/18/17.
- 8-22-17 Meeting: During web meeting between Pre-RD group and EPA technical staff (including S. Sheldrake, J. Kern, and K. Gustavson), EPA verbally agreed with the grid cell approach and requested that samples be placed randomly in each grid cell instead of at the center of each grid cell. EPA requested additional unbiased samples (420 instead of 345). Since that meeting, the Pre-RD Group has agreed to increase the number of unbiased samples to 428 as reflected in the latest draft of the Work Plan.

Last revised by JMC and AGF on 10/4/2017; saved in Geosyntec Seattle server in projects: Portland Harbor/ technical/AOC scope/ surface sed and geostats