

# Appendix I-E

## **Methodology for Mass Loss/Export Rate Calculation for Far-field Stations During Phase I Dredging**

## Appendix I-E: Methodology for Mass Loss/Export rate calculation for far-field Stations during Phase 1 dredging

### Step 1: Calculate Mass of PCB Dredged

Daily Mass of Total PCB (or Tri+PCB) Dredged (kg) =  $V * Density * PCB \text{ concentration}$

where:

$V$  = daily volume ratio based on the bucket file \* daily volume dredged

*Daily volume ratio based on the bucket file: was per certification unit and per day basis. For example, on July 15, 2009, total volume based on the bucket file was 200 CY. CU1, CU3 and CU5 were dredged on that day with 30CY, 70CY and 100CY, respectively. Thus, the volume ratios of CU1, CU3 and CU5 were 15%, 35% and 50%.*

*Daily volume dredged: obtained from weekly report*

Density = Bulk density based on the bucket file or Density is used by GE

*Bulk density based on the bucket file: is per CU and per day basis.*

*Density is used by GE: is per CU basis; was obtained from 2009-07-15 Resuspension Engineering Evaluation Report from GE to EPA. Density here is calculated by:*

$$d = \frac{\text{Mass of TPCB (from Parsons Drawings – Figure 1)}}{\text{Average PCB Concentration (per CU) x total inventory sediment per CU}}$$

PCB Concentration: average TPCB/Tri+PCB per CU and per dredged pass basis.

*Average PCB concentration per CU and per dredged pass basis is calculated by: average of all the segments of particular CU and dredged pass whose total PCB is above 1ppm. For instance, CU1, dredge pass 1, the average TPCB and Tri+PCB concentration is calculated by using the set of segment samples whose total PCB concentration is above 1ppm.*

### Step 2: Estimate Transit Time to each station from Ft. Edward

Thompson Island: If the Ft. Edward flow is smaller than 3800cfs, then the transit time to TI was set to be 1 day, otherwise, 0 day.

Lock 5: If the Ft. Edward flow was smaller than 2,836 cfs, then the transit time of Lock 5 was 2 days; if the Ft. Edward flow was between 2,836 cfs and 6144 cfs, the transit time was 1 day; otherwise, 0 day.

Waterford: If the Ft. Edward flow was smaller than 2,987 cfs, the transit time was 4 days; if the Ft. Edward flow was between 2,987 cfs and 3,815 cfs, the transit time was 3 days; if the Ft. Edward flow was between 3,815 cfs and 5,281 cfs, the transit time was 2 days; if the Ft. Edward flow was between 5,281 cfs and 8,573 cfs, the transit time was 1 day. Otherwise, 0 day.

**Step 3: Comparable Daily Loads due to Transit time (kg/day)**

The comparable daily load was calculated based on the transit time of flow for each station and net daily load for each station. *For example, if the transit time of TID is 0 day, then the comparable daily load was equal to net daily load of that day. If the transit time was 1 day, the comparable daily load was set equal to the net daily load of the following day.*

**Step 4: Mass PCB Lost per unit Sediment Removed (daily, kg/CY)**

$$\text{Mass PCB lost per unit sediment removed (daily)} = \frac{\text{Comparable daily load}}{\text{daily volume dredged}}$$

**Mass PCB lost per unit sediment removed (cumulative, kg/CY)**

$$\text{Mass PCB lost per unit sediment removed (cumulative)} = \frac{\text{Comparable cumulative daily load}}{\text{cumulative daily volume dredged}}$$

Where

$$\text{cumulative daily volume dredged} = \text{daily volume dredged} + \text{previous day volume dredged}$$

**Step 5: Daily Dredged PCB percent lost to water column (%)**

$$\text{Daily dredged PCB(\%)lost to water column} = \frac{\text{Net daily load due to transit time}}{\text{daily PCB mass dredged}}$$

*Where: Net daily load due to transit time is depended on transit time from Ft. Edward to each station and daily load. For example, if the transit time was 1 day, the net daily load was equal to the daily load of the following day.*

$$\begin{aligned} \text{Weekly integrated dredged PCB(\%)lost to water column} \\ = \frac{\text{sum of 7 - day comparable daily load due to transit time}}{\text{sum of 7 - day daily mass dredged}} \end{aligned}$$

$$\text{dredged PCB(\%)lost to water column (cumulative)} = \frac{\text{Net Cumulative daily load due to transit time}}{\text{Cumulative PCB mass dredged}}$$

*Where: Net Cumulative daily load due to transit time depended on transit time from Ft. Edward to each station and daily load. For example, if the transit time was 1 day, the net cumulative load equal to the cumulative load of the following day.*