

Draft comments on “Remedial Investigation Interim Data Submittal”, prepared by Milwaukee Solvay RI/FS Group, January 13, 2010.

Commented by Xiaochun Zhang, WDNR, April 26, 2010

After reviewing the Remedial Investigation Interim Data Submittal (Interim Data), I have some observations and main comments as follows:

1. The level of contamination observed in the sediment downstream of the KK River restoration project (downstream of KK Avenue) warrants either providing an engineering design for remediation or conducting additional assessment. Results of toxicity tests, macroinvertebrate taxonomy assessment, inorganic and organic bulk chemistry all show concerns or high probability of exceedance of EPA screening levels as elaborated below.
  - As shown in Figure 1 about 73% samples showed less than 60% survival (in average) downstream of KK Ave (RI/FS area) compared to 27% upstream of KK Ave (upstream area).
  - Oligochaeta organisms (an indicator of tolerant species in contaminated sediment) have relatively higher population in the RI/FS area than in the upstream area.
  - As high as 1,100 mg/kg of PAHs (KR03-10-12 feet) has been detected in the RI/FS area. Various PAH compounds exceeded the EPA screening levels. Taking the concentration of naphthalene as an example, it exceeded the EPA screening level in many sediment samples analyzed. In addition, the trend along the river flow direction showed higher concentrations in the RI/FS area compared to that in the upstream area (Figure 3). This trend is more prominent in sediment buried deeper than 0.3 feet as shown in Figure 4.
  - Similar to the distribution of naphthalene, the increase trend along the river flow is observed for concentrations of some metals (As) but not for others (note: concentration reported with a qualifier is used as it is) as shown in Figure 5. However, majority of samples contained metals exceeding the EPA screening levels.
  - Heavy metals are in much higher level in sediment buried deeper than 0.3 feet as shown in Figure 6.
2. PAH contamination in the RI/FS area was a result of combination of various sources if it can not entirely be contributed to the Solvay Coke site. However, it is inevitable that Solvay Coke site is a source based on naphthalene results. The reason is that naphthalene was detected in much higher level in the RI/FS area as shown in Figures 3 and 4 as well as in Figure 7. When contamination sources are investigated based on sediment data, two factors have to be considered. One is timing and the other the quantities. Concentration of contaminants in surface sediment samples are often the net results of potential existing on-going sources and the effect of sediment dynamic as well as change of chemical properties of the contaminants of concern. If the contamination was due to historical discharges, its concentrations are often lower than that in buried sediment due to complex dynamic processes of fate and transport of contaminants. In this case, concentration of naphthalene in sediment implies that there may exist on-going PAH sources and/or sediment buried in depth is disturbed and made available to surface.

Figure 1. Toxicity test results in terms of percent survival

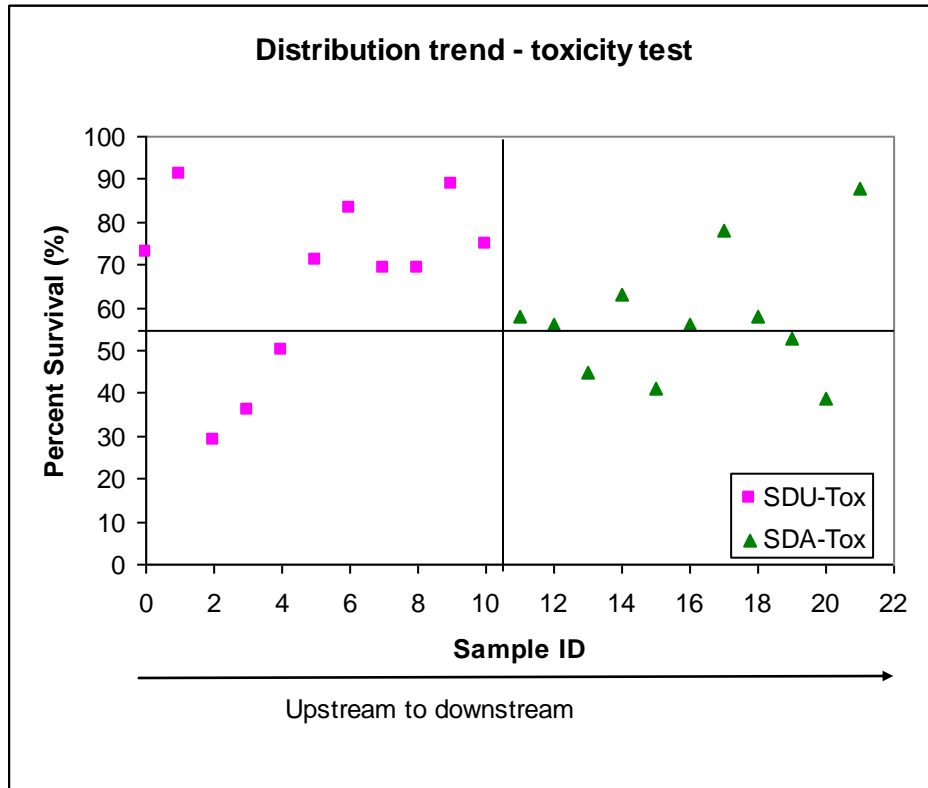


Figure 2. Results of macroinvertebrate taxonomy assessment

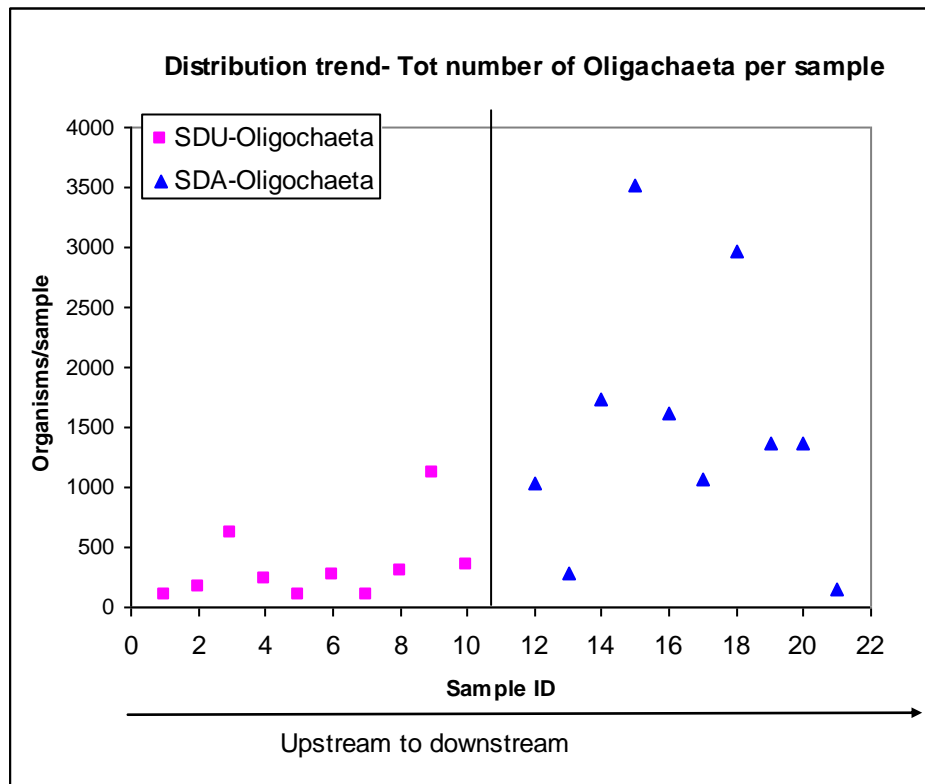


Figure 3. Concentrations of naphthalene in surface sediment

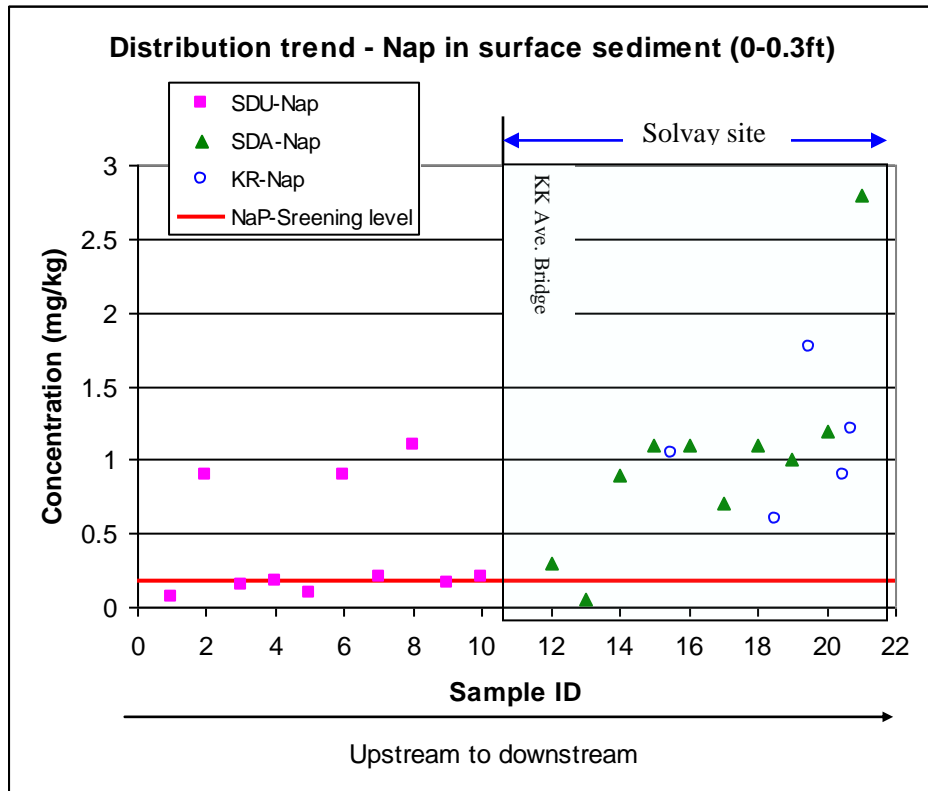


Figure 4. Concentration of naphthalene in sediment deeper than 0.3 feet

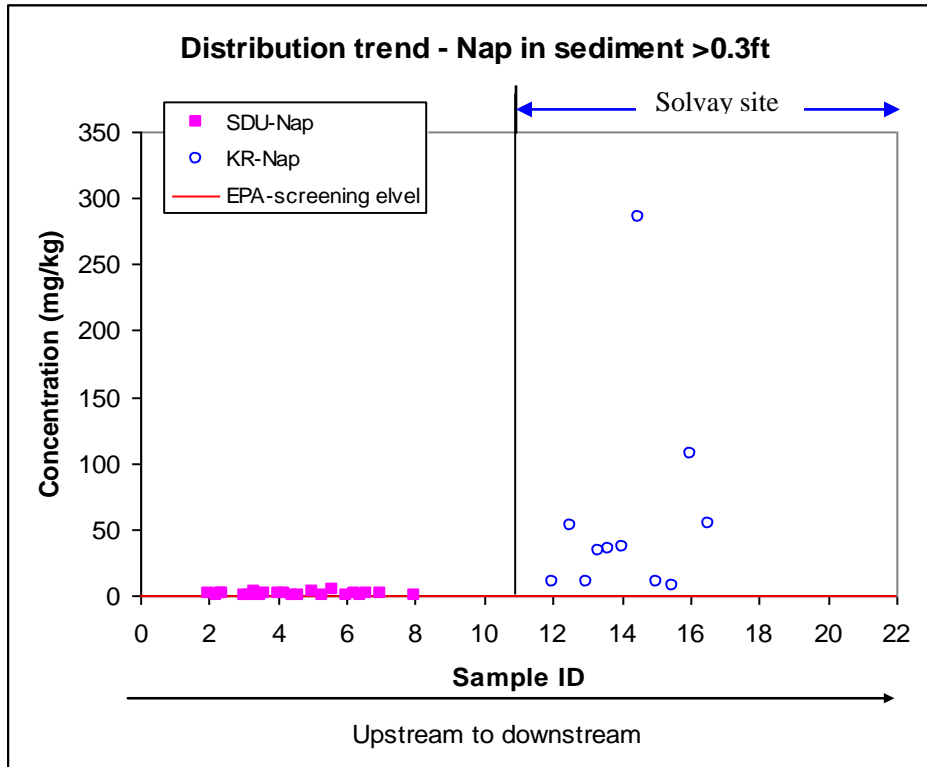


Figure 5. Concentrations of selected metals in surface sediment

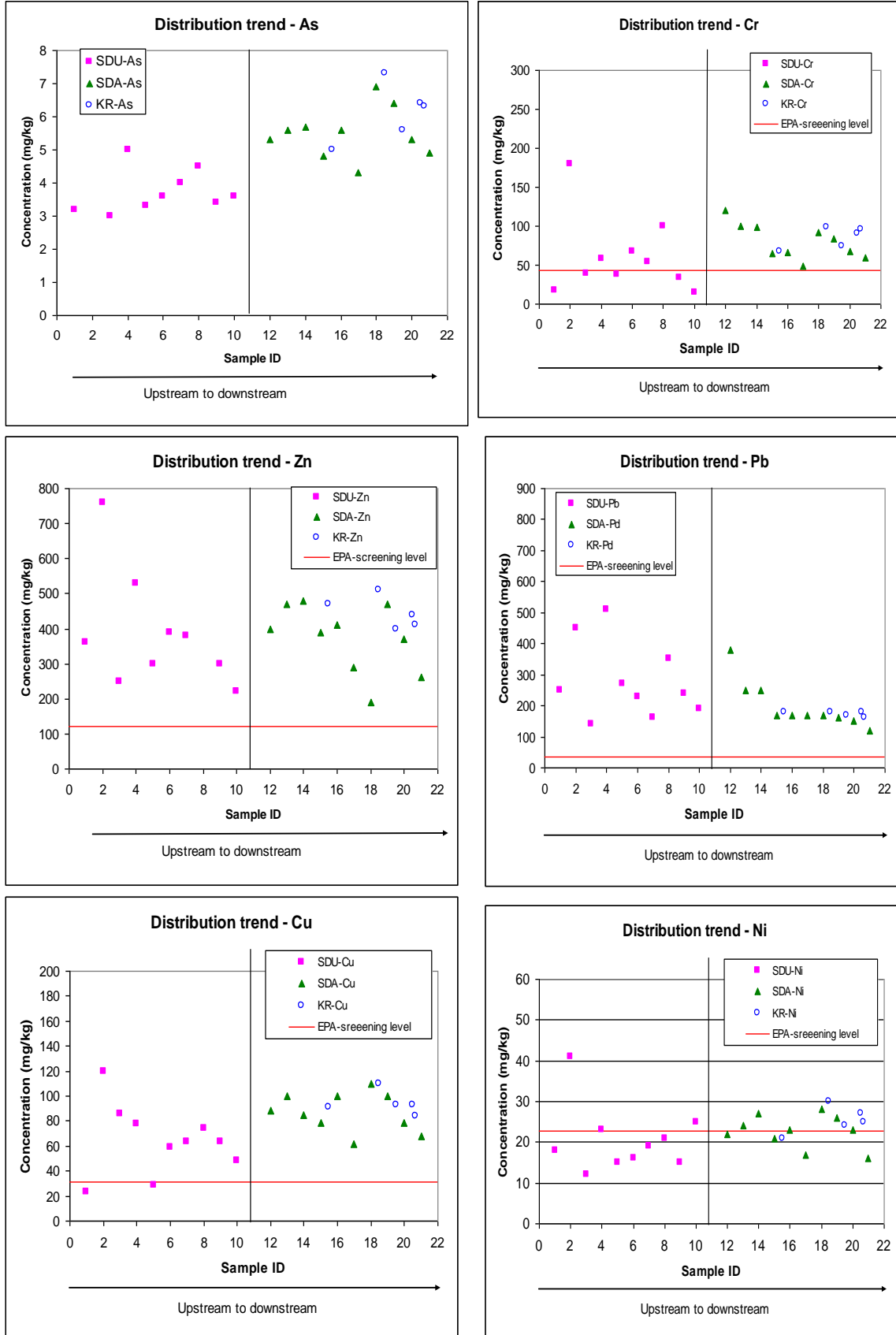


Figure 6. Concentrations of selected metals in sediment buried deeper than 0.3 feet

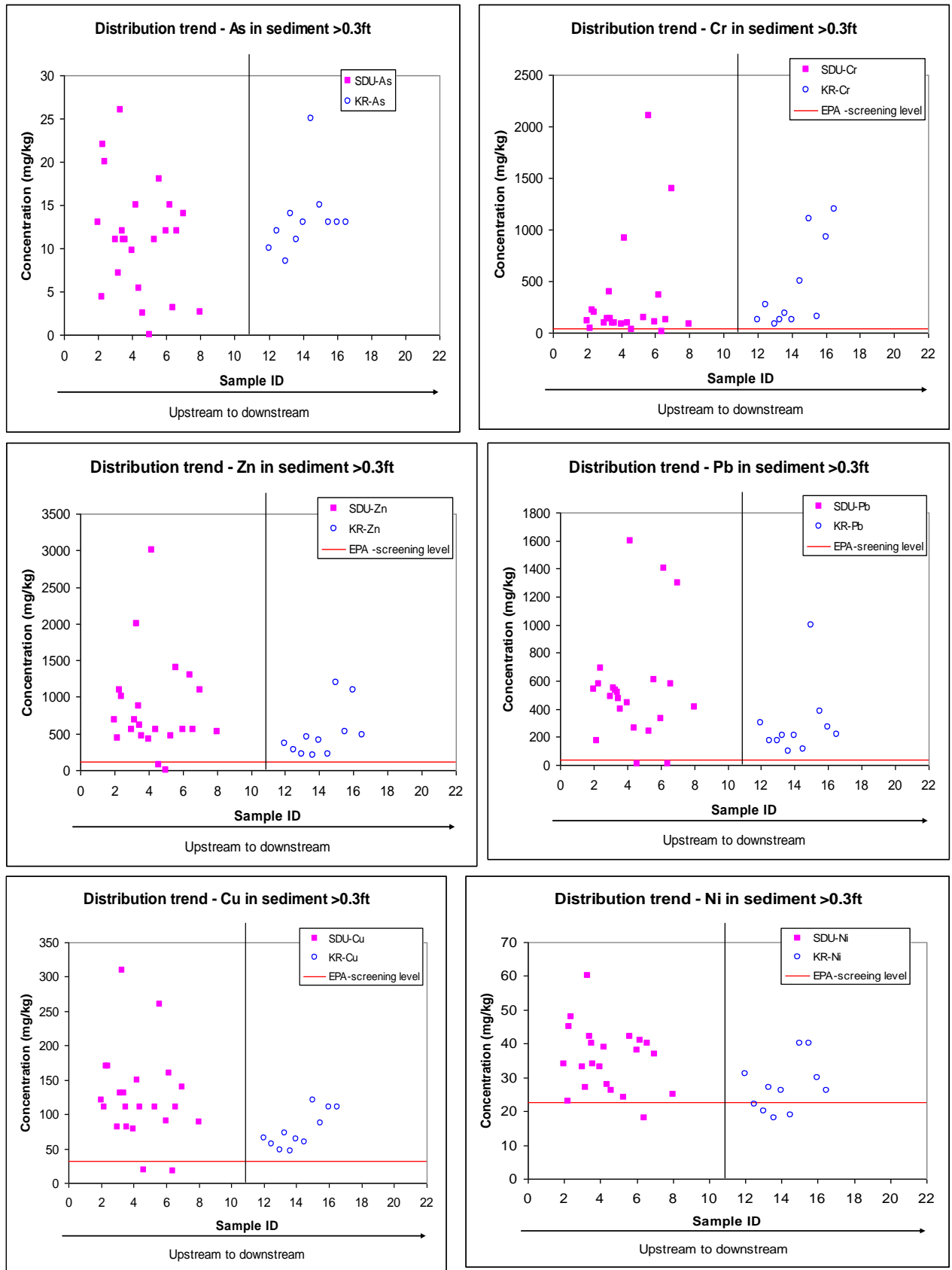


Figure 7. Distribution of PAH compounds in sediment (adopted from the Interim Report)

