

5.0 CONCLUSIONS

This section presents the conclusions for the first MNR report. Table 5-1 is a summary of compliance with IROD criteria, organized by medium.

5.1 SEDIMENT

Sediment cores were retrieved successfully from 34 locations for the shelf-wide program, and from 35 OA locations (near the Sanitation Districts' outfall diffusers). A significant amount of data was generated by testing more than 1,000 samples of recovered core material for both geotechnical and chemical parameters. The sample design and the methods of core collection, core cutting, and sample testing used during this study rendered high-quality data.

For the shelf-wide sampling program, the approach used for this study provided a sufficient data set with a level of confidence that allows for meaningful comparison to the 2009 data set as well as to any future data sets established to assess the progress of cleanup of DDT and PCBs.

The output from the geostatistical models indicated a widespread pattern of DDT contamination similar to EPA's 2009 data set and to patterns reported by previous investigators, including the Sanitation Districts and USGS. The model output also indicated a pattern of PCB contamination similar to EPA's 2009 data set. The pattern is similar to that of DDTs, with areas of higher concentrations at the Sanitation Districts' outfalls, but also with elevated concentrations extending seaward into deep water, and in areas both northwest and southeast of the outfalls.

Although interpretive patterns of COCs in the EA deposit have not changed appreciably over time, detected contaminant concentrations in surface sediment (0-2-cm bed-depth interval) have dropped significantly since 2002/2004. It is plausible that this is caused by deposition of clean material, and several factors of MNR, including: dechlorination; sediment erosion; and sediment resuspension with associated desorption of COCs from sediment into seawater (EPA, 2005).

Model output indicated an increase in COC mass between 2009 and 2013, though the mass values remain well below historical estimates. The apparent increase between 2009 and 2013 may be a function of the uncertainties in the sampling and analysis techniques, differences in MVS model assumptions, and in the demonstrated heterogeneity of the sediment deposit itself.

Model output also indicated mean (average) COC concentrations for the 0-8-cm bed-depth interval derived from the 2013 data set to be 77 mg/kg OC for Total DDTs and 5 mg/kg OC for Total PCBs (short list). These values were below the short-term objectives identified for the interim isolation cap (78 mg/kg OC DDTs; 7 mg/kg OC PCBs), as they were in 2009.

It is acknowledged that the selected remedy in the IROD, in particular the isolation cap component, was based heavily on interpretations of COC concentrations detected in samples of sediment collected from the 0-2-cm bed-depth interval; these samples were obtained using a different collection method from that used in the 2009 and 2013 coring programs. Because the results of EPA's coring programs present a picture of environmental conditions at PV Shelf significantly different than what was historically understood, and it is important to obtain a better understanding of actual site conditions, future sampling programs should be conducted using techniques similar to those used for the 2009 and 2013 programs.

5.2 WATER

Spatial distributions of DDTs and PCBs in the water column at PV Shelf were evaluated using two different methods:

- Water samples using a depth-discrete grab sampling method and then analyzing filtered samples using HRGC/HRMS for eight individual DDT forms and for 46 PCB congeners.
- PSDs were first prepared by impregnating with PRCs, then deployed at sea for approximately 30 days. The PSDs were then retrieved and lab-analyzed for DDTs and PCBs.

For both methods, summations of Total DDTs, Total DDT Compounds, and Total PCBs were calculated. The areal distributions of DDTs and PCBs in water appear similar to those found in shallow sediment, and the vertical concentration profiles of DDTs and PCBs at most water sampling locations decreased with increasing distance from the sea floor. The comparison of current high resolution water sampling results to previous water column data shows a general overall trend toward lower concentrations over time. These findings appear to confirm that contaminated sediments are a slowly decreasing source of DDT and PCB inputs to the water column at PV Shelf. However, concentrations of dissolved-phase p,p'-DDE and for PCBs exceed the corresponding IROD cleanup goals for human exposure in several locations and at several depth intervals. Exceedances of the IROD cleanup goal for dissolved-phase Total DDTs (ecological exposure) are less frequent.

5.3 FISH

Specimens of two fish species (BSB and WC) were caught during 2014 to 2016 from seven collection areas in the vicinity of PV Shelf. Concentrations of DDTs and PCBs in samples of fish tissue (skin-off filets) were measured using HRGC/HRMS techniques. The distribution patterns of DDTs and PCBs in each fish collection area were similar to those found in the sediment, and the average concentrations of DDTs and PCBs in fish from most collection areas decreased with increasing distance from the Sanitation Districts' outfalls (with the noted exception of BSB from Huntington Flats). The comparison of these results to previous fish sampling data indicates that maximum and average DDTs and PCBs concentrations have decreased since 2002 for both BSB and WC. However, EPC concentrations in WC remain higher than the IROD cleanup goal at several fish collection areas, most notably at the areas closest to the outfall diffusers, on PV Shelf. These findings suggest that contaminated sediment continues to be a source for DDT and PCB inputs to fish at PV Shelf, but that the likely input rate is decreasing.

5.4 SUMMARY

Conditions at PV Shelf regarding COC contamination appear to be improving – concentrations in the sediment 0-2-cm bed-depth interval continue to improve, and concentrations in the 0-8-cm bed-depth interval met the concentration performance objectives related to the interim cap described in the IROD, even without the cap. However, significant areas of sediment remain highly contaminated, and COC concentrations in samples of water and fish exceeded the associated IROD cleanup goals, both for DDTs and PCBs. EPA will continue the MNR sampling program to evaluate the effectiveness of MNR and to develop final remediation alternatives for PV Shelf cleanup.