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DMMP Status Report

Marine Sediment Quality Screening Levels: Adopting RSET Marine SLs for Use in DMMP

Prepared by Laura Inouye (Ecology) and David Kendall (Corps)

INTRODUCTION:
In 2011, the DMMP adopted the Regional Sediment Evaluation Team (RSET) marine screening levels (SLs), which were derived from the 1994 re-evaluation of the marine Apparent Effects Thresholds (AETs). However, in the evaluation of the technical feasibility and impacts of adopting the RSET SLs, many non-detect exceedances were noted for the pesticides. A comparison of the reported non-detects and an evaluation of Practicable Quantitation Levels (PQLs) conducted by Ecology indicated that for most compounds the new SLs were above achievable PQLs. The exceptions were hexachlorobutadiene (HCBD), total chlordane, dieldrin and heptachlor; for these compounds, best professional judgment (BPJ) would be applied when non-detected exceedances of SLs were reported. The DMMP agencies promised to review the ability of labs to meet the SLs for these four chemicals and the need for further BPJ.

DATA ANALYSIS:
Projects with sampling and analysis plan (SAPs) approved between the SMARM 2011 presentation and the adoption of the new SLs were compared to projects with SAPs approved after adoption of the new SLs (up to January 2013, when this analysis was conducted).

Analysis of projects prior to the adoption of the new SLs included eight projects, with a total of 50 dredged material management units (DMMUs)/Z-layers. For these projects, there were non-detected SL exceedances for 12% to 48% of the DMMUs/Z-layers, depending on the compound (Table 1). The only detected exceedances were for total chlordane (2 DMMUs). The other three compounds had no detected results. Overall, 56% of the DMMUs/Z-layers had at least one non-detected exceedance for at least one of the chemicals, and 6 of the 8 projects (75%) of the projects had at least one DMMU with non-detected exceedances.

Table 1. Summary of evaluated projects

		hexachlorobutatdiene (HCBD)	total Chlordane	Dieldrin	Heptachlor
	Old SL	29 ppb	10 ppb	10 ppb	10 ppb
	New SL	11 ppb	2.8 ppb	1.9 ppb	1.5 ppb
Prior to SL adoption 8 projects 50 DMMU/Z-layers	# non-detect exceedances	6	12	24	8
	% non-detect exceedances	12%	25%	48%	16%
	# detected exceedances	0	2	0	0
	% detected exceedances	0%	4.0%	0%	0%
After SL adoption 13 projects 111 DMMU/Z-layers	# non-detect exceedances	5	4	11	3
	% non-detect exceedances	4.5%	3.7%	9.9%	2.7%
	# detected exceedances	0	4	0	1
	% detected exceedances	0%	3.4%	0%	0.8%

For analysis of projects after the adoption of the new SLs, all projects that reported finalized data (as of January 2013) for all four compounds in question were evaluated. This included 13 projects with 111 DMMUs/Z-layers. For these projects, there were non-detected exceedances of SL for 2.7% to 9.9% of the DMMUs/Z-layers, depending on the compound (Table 1). There were four detections of total chlordane (three above the old SL, one below the new SL) and one detection for heptachlor (between

the old and new SL; this DMMU had multiple other COCs above their respective SLs). Dieldrin and HCBD had no detected results. Overall, 17% of the DMMUs/Z-layers had at least one non-detected exceedance for at least one of the chemicals, and seven of the 13 (54%) projects had non-detected exceedances for at least one of these compounds.

Table 2 compares the non-detect concentrations for each of the compounds. Hexachlorobutadiene showed a statistically significant change in the reporting limit when comparing the projects prior to the adoption of the new SLs to those from after the adoption of the new SLs. Differences for the reporting limits for the other compounds were not significantly different. In these cases, selective ion monitoring (SIM) may have been able to meet detection limits at or below the SLs.

Table 2. Range of non-detect exceedance concentrations (with average in parenthesis) for the evaluated projects.

Reported ND exceedance concentrations	Prior to SL adoption	After SL adoption
HCBD (SL 11)	18-20 (19.2)	13.5-18 (15)
Chlordane (SL 2.8)	3-8.1 (4.7)	3.4-12 (7.2)
Dieldrin (SL1.9)	2-3 (2.1)	2-10 (3)
Heptachlor (SL 1.5)	1.6-7 (3.1)	1.8-3.8 (2.5)

For projects that had SAPs accepted after the adoption of the new SLs, a more detailed evaluation of the seven projects where there were non-detected exceedances was conducted to determine how the new SLs impacted project decisions. The samples that had other COC exceedances or failed bioassays were set aside, since they were unsuitable for reasons other than the non-detected exceedances. It should be noted that in several cases, the presence of other chlorinated organic compounds may have resulted in elevated detection limits for the compounds being evaluated. Additionally, bioassays were triggered for two DMMUs (Corps project); both passed bioassays. BPJ was applied to three samples that were deemed to have minimal exceedances (all less than 1 ppb above SL, for heptachlor and dieldrin) and were designated suitable. The remaining three non-detect exceedances were for hexachlorobutadiene (13.5 to 14.9 ppb, compared to the SL of 11 ppb), and were also designated suitable.

SUMMARY AND CONCLUSION:

Laboratories were able to meet the new SLs for the vast majority of the analyzed sediments. The presence of non-detected exceedances of the new SLs dropped from 57% prior to adoption of the new values to 17% after adoption. The percentage of projects with non-detected SLs exceedances decreased for all four compounds once the new SLs were adopted, although the average reported non-detect exceedance only decreased for hexachlorobutadiene. In several cases, chlorinated co-contaminants may have contributed to elevated detection limits. After the adoption of the new SLs, BPJ was used to make suitable determinations for six samples from four projects. Two other samples with non-detected exceedances and no other COC SL exceedances had bioassays conducted and both of the samples passed bioassays.

The DMMP recommends the use of selective ion monitoring (SIM) when standard methodologies are unable to attain detection limits at or below the SLs. However it is recognized that in some cases interferences can occur that may not be resolved. In these cases, DMMP will continue to use BPJ.