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## **DMMP ISSUE PAPER**

### **REVISIONS TO THE BIOACCUMULATIVE CONTAMINANTS OF CONCERN (BCOC) LIST**

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#### **INTRODUCTION**

Washington State's Dredged Material Management Program (DMMP) currently identifies thirty-one bioaccumulative chemicals of concern (BCOCs) that are listed in Table 6-5 of the Users Manual (2000). If sediment concentrations of any these BCOCs exceed bioaccumulation trigger levels (BT) established by the DMMP, then there is "reason to believe" that a potential risk may be posed to human and/or ecosystem health due to the accumulation of contaminants in aquatic organisms. In such cases, the DMMP agencies require bioaccumulation testing in addition to toxicity tests in order determine suitability for unconfined, open-water disposal.

#### **PROBLEM IDENTIFICATION**

The current list of BCOCs (Attachment 1) was developed fifteen years ago based on the best available sediment monitoring and risk assessment information (PSDDA, 1988). In 1998, the DMMP presented the rationale and general approach for re-evaluating bioaccumulation testing and interpretation which included revising the list of bioaccumulative contaminants required for analysis (DMMP, 1998 and Hoffman, 1998). The DMMP also convened the Bioaccumulation Work Group (BWG) to participate in the list revision. The BWG is a technical advisory group made up of representatives from regulatory agencies, tribes, research organizations, regulated entities, and environmental consulting firms.

In 2001-02, the BWG recommended an approach to list revision, that included specifying:

- a list of prospective chemicals for consideration,
- the data needed to characterize a chemical of bioaccumulative concern, and
- the conceptual criteria for defining four different BCOC lists.

Four draft BCOC lists were presented as an Issue Paper at the 2002 SMARM (DMMP, 2002). Based on feedback received in 2002 at the BWG meeting and at the SMARM, revisions were made to the draft lists. These revisions primarily address concerns about the adequacy of the tissue data used to determine the list placement of a chemical. Specifically, the DMMP defined the minimum criteria for data sufficiency that must be met for a chemical to be placed on Lists 1-4. The DMMP also decided to use only detected concentrations when deriving summary statistics for tissue data.

## **PROPOSED ACTION**

The purpose of this issue paper is to present the final BCOC lists (Attachment 2) and provide an overview of the programmatic changes in dredged material testing that will occur as a result of their implementation. Details on the criteria defining each list, the data used, and the process for placing chemicals on a particular list will be provided in a separate technical appendix to be completed and posted on the DMMO web site in Fall 2003.

### **The Revised Lists**

Revising the DMMP's BCOC list involved creation of the following four separate BCOC Lists (Attachment 2):

**List 1** - is the primary list of bioaccumulative contaminants of concern. Analysis for these 20 chemicals in sediments (and potentially tissues) is required to determine dredged material suitability. List 1 will replace the current list of bioaccumulative compounds as of the beginning of the new dredging year (June 16, 2003).

**List 2** - is the candidate list of bioaccumulative contaminants. Analysis of List 2 chemicals will be decided on an as-needed basis depending on the specifics of the project. List 2 chemicals will also be evaluated by the DMMP as part of disposal site monitoring and other special projects.

**List 3** - are chemicals that are potentially bioaccumulative but do not meet the criteria to be placed on any of the other lists. Many of the List 3 chemicals have been highlighted in the scientific literature as potentially bioaccumulative, but of unknown human/ecological toxicity. The List 3 chemicals will only be considered for analysis if there is a project-specific reason to believe that they may be present. It is expected that updates to the BCOC database will have the greatest implications for List 3 chemicals.

**List 4** - are chemicals that are not currently considered by the DMMP to be bioaccumulative based on the criteria used to develop these lists. A majority of the chemicals that were placed on List 4 have low octanol-water partitioning ( $\text{Log Kow} < 3.5$ ). The remaining chemicals were placed on this list because of a preponderance of regional information showing that they rarely (if ever) occur in sediments and tissues at levels of toxicological relevance.

The BCOC list is a "living" document. The lists will evolve as new information is made available from regional monitoring programs and in the scientific literature. For example, the DMMP recognizes that the sediment and tissue data used to develop these lists are more representative of marine and estuarine systems. Our intent is to add one or more freshwater tissue data sets to the database and revise the lists, highlighting those bioaccumulative chemicals that occur in fresh water systems. Any future revisions to the

lists will go through the BWG and the SMARM public review process. A schedule for periodically updating the BCOC lists is under development.

### **Implementation of the lists**

Analysis of List 1 chemicals will be required for all sediments being tested for open water disposal effective as of the beginning of the new dredging year (June 16, 2003).

- There are three chemicals (chromium, selenium, and alpha-benzene hexachloride)<sup>1</sup> on List 1 which are new to the DMMP program and are being added to the DMMP's Chemicals of Concern List (COC) (Attachment 3). Standard methods for analyzing these three chemicals are listed in Table 1. Note that selenium is the only new List 1 chemical whose inclusion requires the addition of a new standard method.

When measured sediment concentrations of the List 1 contaminants exceed the bioaccumulation trigger values (BT) presented in Table 1, bioaccumulation testing must be performed to determine the suitability of the test sediment. Twelve of the twenty chemicals in List 1 already have BT values. Interim BT values (italicized in Table 1) were developed for six of the new List 1 chemicals using the same algorithm<sup>2</sup> that was used to derive BTs for the original BCOC list (EPTA, 1988). Interim BTs for selenium and alpha-benzene hexachloride were developed in consideration of sediment concentrations reported in the literature to be associated with adverse ecological effects from bioaccumulation. These values are designated as "interim" pending a planned BWG review of all List 1 BTs and Target Tissue Levels (TTLs) in 2003/04.



Where available, the TTLs listed in Table 1 will be used to interpret the results of bioaccumulation testing. For chemicals that don't currently have a TTL, a residue-effect based value will be developed on a project-by-project basis as has been done in the past for other chemicals.

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<sup>1</sup> Dioxins and Furans do not appear on the DMMP COC list because they are only required for sediments (and tissue) evaluation when there is a site-specific reason-to-believe that they may be present.

<sup>2</sup> All six chemicals (cadmium, chromium, copper, lead, pyrene, and zinc) have either sediment screening level (SL) and maximum level (ML) values or Low AET and High AET values. The BT was calculated as 70% of the difference between the ML (or HAET) and the SL (or LAET) (EPTA, 1988).

Table 1. Bioaccumulation Triggers (BT), Target Tissue Levels (TTL) and Method Information for List 1 Chemicals

Chemical	BT ug/kg dry wt. <sup>1</sup>	TTL mg/kg wet wt.	Method
Alpha-Benzene Hexachloride 	<i>10 mg/kg OC</i> <sup>2</sup>	TBD	SW846 M.8081
Arsenic	507.1 mg/kg	10.1	SW846 M.6020
Cadmium	<i>11.3 mg/kg</i>	TBD	SW846 M.7131
Chlordane <sup>3</sup>	37	0.3	SW846 M.8081
Chromium	<i>267 mg/kg</i>	TBD	SW846 M.6020
Copper	<i>1027 mg/kg</i>	TBD	SW846 M.6020
Dioxins/Furans	5 ng/kg <sup>4</sup> 	n/a	EPA 1613
Fluoranthene	4600	8400	SW846 M.8270
Hexachlorobenzene	168	180	SW846 M.8081
Lead	<i>975 mg/kg</i>	TBD	SW846 M.7421
Mercury	1.5 mg/kg	1.0	SW846 M.7471
Nickel	370 mg/kg	20,000	SW846 M.6020
Pentachlorophenol	504	900	SW846 M.8270
Pyrene	<i>11,980</i>	TBD	SW846 M.8270
Selenium	<i>3 mg/kg</i> <sup>5</sup>	TBD	SW846 M.7740 <sup>6</sup>
Silver	6.1	200	SW846 M.7761
TBT	0.15 ug/L <sup>7</sup>	0.6 <sup>8</sup>	Krone/Unger
Total Aroclor PCB	38 mg/kg OC	0.75 <sup>8</sup>	SW846 M.8081/2
Total DDT <sup>9</sup>	50	5.0	SW846 M.8081
Zinc	2783	TBD	SW846 M.6010

*Italics indicate Interim BTs*

TBD = to be determined on a project-specific basis.

<sup>1</sup>Except where noted otherwise.

<sup>2</sup>Interim BT based on the severe effect level from the Ontario Provincial Sediment Quality Guideline for Alpha-BHC.

<sup>3</sup>Chlordane includes all chlordane isomers including cis-Chlordane, trans-Chlordane, cis-Nonachlor, trans-Nonachlor, alpha-Chlordene, gamma-Chlordene, and heptachlor

<sup>4</sup>Value refers to bulk 2378-TCDD. Alternatively, a 15 ng/kg TEQ will trigger bioaccumulation testing.

<sup>5</sup>Interim BT for selenium based on review of sediment effect values from the literature and BPJ.

<sup>6</sup>Method 7740 is not currently required on the DMMP's COC list.

<sup>7</sup>Measured in interstitial water.

<sup>8</sup>Target Tissue Level is based on site-specific considerations which may not be appropriate for all disposal sites.

<sup>9</sup>Total DDT is determined by summing the p,p'- isomers of DDT and its metabolites (DDD, and DDE).

## **REFERENCES**

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