

## Significant Digits in Data Reporting and Comparisons to Screening Levels

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### Introduction

Currently, the DMMP agencies do not provide guidance on the use of significant digits used in sediment characterization reports. When comparing to benthic toxicity screening levels, this is typically not an issue, but when dealing with bioaccumulative risk evaluation use of excessive significant digits results in reporting “greater than but not significantly different” data that imply risks that do not really exist.

The purpose of this paper is to clarify the DMMP’s guidance on reporting significant digits in data reports. This will not impact the actual significant digits in laboratory deliverables.

### Background

In the cleanup realm, the Sediment Cleanup User’s Manual (SCUM) provides guidance on how to apply significant digits in Chapter 6, section 3.5 (Ecology, 2021). Data close to or below quantitation limits (PQL/MDL) should have no more than 1 to 2 significant figures, while values well above quantitation limits may have 2 to 3 significant figures. For most chemicals of concern, environmental levels are well above the quantitation limit except for dioxins. However, given what is known about sample heterogeneity and laboratory variability, use of three significant digits for most chemicals infers accuracy in the value that does not really exist. The toxics cleanup program made a policy decision to use 2 significant figures across the board.

### Problem Identification and Analysis

The Elliott Bay disposal site monitoring report can be used to exemplify this issue, and drew attention to the fact that DMMP’s User Manual had no significant figure guidance.

Notably, total dioxin TEQs in *Macoma* pre-test tissues were reported as 0.23342695 ppb TEQ. The vast majority of the congeners were non-detect, and all tissue sum TEQ were below the Ecology-established PQL. While data conversion from congener concentration to TEQ should use the full laboratory-supplied significant digits prior to summing congeners for total TEQ, the reported total TEQ should be limited to a maximum of 2 significant digits. Reporting beyond 2 significant digits implies precision that does not exist.

While SCUM guidance allows up to 2-3 significant digits for data above the quantitation limit, there are arguments to using only 2 significant digits. Using 2 significant digits whether above or below quantitation limits allows consistent reporting.

**Proposed Clarification**

The DMMP agencies propose adopting a policy of reporting data to two significant digits for sediment and tissue chemistry results for reports (sediment characterization, data memos, etc.) and EIM data submission. For summed values, apply AFTER summation (e.g. dioxins). This does not apply to data in laboratory deliverables.

**References**

Ecology, 2021. Sediment Cleanup User's Manual (SCUM). Publication 12-09-057, Third Revision December 2021.