

DIOXIN SYNTHESIS REPORT

Donald Yee, Jay Davis, SFEI, Richmond, CA

ESTIMATED COST: \$40,000
OVERSIGHT GROUP: Dioxin Workgroup

Proposed Deliverables And Timeline

Deliverable	Due Date
Task 1. Simple numerical models	Mar 2017
Task 2. Draft report	Oct 2017
Task 3. Final report	Dec 2017

Summary

Additional data on dioxin concentrations and loads have been collected in various media since the last dioxin synthesis in 2004. This effort would formally report and interpret this new information and evaluate the needs or potential for additional data collection or management action for dioxins. This effort is needed in 2017 to resolve the 303(d) impairment listings and in support of NPDES permitting strategy. In addition, the dioxin dataset generated under the RMP Dioxin Strategy was primarily generated in 2009-2012 and is getting dated - synthesis and interpretation of these data now will avoid any real or perceived consequence of using a dated dataset and a need to resample.

Background

San Francisco Bay was placed on the State of California's 303(d) list of impaired waters in 1998 as a result of elevated concentrations of dioxins and furans (commonly referred to as 'dioxin') in fish. RMP studies of contaminants in Bay sport fish conducted every three to five years since 1994 have found that dioxin concentrations are relatively unchanged over this time period and in some species, continue to greatly exceed screening values for human consumption. The available information for dioxin in the region was synthesized in a conceptual model/impairment assessment report in 2004 for the Clean Estuary Partnership. That report highlighted limited data and significant uncertainties and gaps in our understanding of spatial and temporal distributions of dioxin in Bay waters and sediments, and in estimated loading rates via various pathways. The Dioxin Strategy Workgroup and Workplan were established shortly thereafter to identify and address the highest priority data needs. Data on dioxin in ambient open bay sediments has been roughly doubled since then, and the number of water locations characterized increased ten-fold, but the last samples collected in these matrices were in 2011. Dioxin in wetland sediment cores collected in 2006 has also been characterized, suggesting a drastic decrease from recent (post WWII) past concentrations, whereas open Bay cores show more uniform distributions, with concentrations in upper sections higher than in very deep pre-industrial sediments, but generally similar to current surface sediment concentrations. Additional information on loads from pathways such as atmospheric deposition and stormwater runoff in selected watersheds has also been collected.

Together the information collected to date can be synthesized to update our understanding of environmental distributions and processes of dioxin, with the aim of addressing the highest priority

dioxin management questions (described below) and identifying remaining data needs or gaps/uncertainties.

This effort is needed in 2017 because the Water Board must resolve the 303(d) impairment listings and there is an associated NPDES interim permitting strategy that has allowed the Water Board and dischargers to avoid problematic limits in permits on the condition that studies are conducted to inform resolution of the listings. In addition, the dioxin dataset generated under the RMP Dioxin Strategy was primarily generated in 2009-2012 and is getting dated - synthesis and interpretation of these data now will avoid any real or perceived consequence of using a dated dataset and a need to resample.

Applicable RMP Objectives and Management Questions

The work to be synthesized in the report addresses the following RMP Objectives and Management Questions in the Dioxin Strategy, with the focus on questions identified by the Workgroup as most directly linked to possible management actions underlined:

MQ.1 Are chemical concentrations in the Bay at levels of potential concern and are associated impacts likely?

- Are the beneficial uses of San Francisco Bay impaired by dioxins?

MQ.2 What are the concentrations and masses of contaminants in the Bay and its segments?

- What is the spatial pattern of dioxin impairment?
- What is the dioxin reservoir in Bay sediments and water?

MQ.3 What are the sources, pathways, loadings, and processes leading to contaminant-related impacts in the Bay?

- What is the relative contribution of each loading pathway as a source of dioxin impairment in the Bay?

MQ.4 Have the concentrations, masses, and associated impacts of contaminants in the Bay increased or decreased?

- Have dioxin loadings/concentrations changed over time?

MQ.5 What are the projected concentrations, masses, and associated impacts of contaminants in the Bay?

- What future impairment is predicted for dioxins in the Bay?

Approach

The available (past and more recent data collected over the past decade) information will be applied to a simple one-box mass budget model to identify and prioritize remaining data gaps and/or conflicts with current conceptual models and expectations, in order to evaluate the needs for and possible designs of future monitoring and modeling efforts. Additionally, information on the other data collected (cores, spatial and temporal patterns in biota and ambient concentrations) will be examined to evaluate the likely trajectory of future sources and impairment. Optionally the data can

also be applied to a simple bioaccumulation model (both previously applied to PCBs and other organics), which can help project MQ5 future scenarios, but is not needed for evaluating current trends.

Reporting

Results of applied models and associated monitoring data in various matrices for the Bay will be reported as a RMP Technical Report, to be delivered in the fourth quarter of 2017.

Proposed Budget

Estimated costs for each of the elements are presented. Even if data are not applied to a numerical mass budget model, information will still need to be considered in the context of conceptual models of contaminant processes and fate, so costs for the first task can be reduced (roughly halved), but not eliminated.

Task	Estimated Cost
1. Application of data to mass budget and simple bioaccumulation model	\$20,000
2. Draft report	\$15,000
3. Final report	\$5,000
Total	\$40,000