Proposal for Determining the Stability of Contaminants in Archived Tissue Samples

Submitted to BOG
02/09/07

Introduction

The SWRCB funded the Toxic Substances Monitoring Program (TSM) and the State Mussel Watch Program (SMW) from 1976 to 2001. The program archived tissue from almost all those year's samples for the possibility of subsequent analyses. Recently, several programs (CALFED and SRWP funded) have archived fish tissue from the Sacramento and San Joaquin River systems as part of mercury studies. There is a substantial cost to operating this tissue archive. The rental of the freezer space alone is currently $8,000/year. There are other costs associated with cataloging, and retrieving samples that probably costs $1,000 to $2,000 additional/year.

Continuing to archive these tissues requires the implicit assumption that the archived samples maintain their integrity and do not lose their contaminants and do not get contaminated in the freezer. There are clearly some advantages to archiving if the integrity and contamination issues are resolved such as: 1. samples can be archived and analyzed at a later date if funds are limiting either the number or the types of analyses; 2. samples can be analyzed that exceed the recommended 1 year hold time criteria; and 3. samples can be stored in the archive and saved for special purposes studies. Validation of long-term tissue archival would also be advantageous to OEHHA in issuing health advisories and Regional Boards with 303d listings, TMDL assessments, or determining long term trends of contaminants.

The integrity of this tissue archive should be evaluated. The archival costs will increase as the freezer accumulates more tissue samples requiring more storage space. If the archive is deemed of limited value it should be discontinued to save costs.

Objectives

1. Determine the concentrations of contaminants in tissue samples that have been stored for 5 years and compare to concentrations determined at the time of collections.
2. Determine the comparability of the last 2 organic analysis methods (capillary GC-ECD and GC-MS-MS)
3. Write summary report of the findings that includes an evaluation of the analytical results and a literature review summarizing the existing information on contaminant stability in frozen tissue samples.

Methods

Samples will be retrieved from the archive at Moss Landing Marine Labs where they have been kept frozen since collection. Three different types of tissues will be analyzed—catfish (fatty fish), large mouth bass (non fatty fish) and mussels. Five replicate samples from each type of tissue will be analyzed for the following contaminants:

1. Metals (See target analyte list in Table 1)
2. Pesticides (See target analyte list in Table 1) Sample extracts will be analyzed by both GC-ECD and GC-MSMS.
3. PCBs (See target analyte list in Table 1). Sample extracts will be analyzed by both GC-ECD and GC-MSMS.

Report

The report will summarize the findings of study. The results between the original analysis and the recent analysis will be compared statistically. A literature search will be completed to determine if other studies have been done on this subject and if so the results will be summarized.

Budget

15 trace metal analytical samples @ $490 per sample	7,350
15 trace organic samples by ECD @ 933 per sample	13,995
15 trace organic samples by MSMS @933 per sample	13,995
Sample retrieval	2000
Report	10000
Total	$47,340

Table 1

Constituents to be Analyzed – OCs

Organochlorine Pesticides to be analyzed

Aldrin
Chlordane, cis-
Chlordane, trans-
Dacthal
DDD(o,p')
DDD(p,p')
DDE(o,p')
DDE(p,p')

DDMU(p,p')
DDT(o,p')
DDT(p,p')
Dieldrin
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
HCH, alpha
HCH, beta
HCH, gamma
HCH, delta
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Methoxychlor
Mirex
Nonachlor, cis-
Nonachlor, trans-
Oxadiazon
Oxychlordane
Tedion
Toxaphene

Surrogates

PCB 209 C_{13}(Surrogate)
Dibromooctafluorobiphenyl(Surrogate)
DDD*(p,p')(Surrogate)
DBCE(Surrogate)

Polychlorinated Biphenyl (PCB) Congeners and Arochlor Compounds

PCB 008	PCB 141
PCB 018	
PCB 027	
PCB 149	
PCB 151	
PCB 028	PCB 153
PCB 029	PCB 156
PCB 031	PCB 157
PCB 033	PCB 158
PCB 044	PCB 170
PCB 049	PCB 174
PCB 052	PCB 177
PCB 056	PCB 180
PCB 060	PCB 183
PCB 066	PCB 187
PCB 070	PCB 189
PCB 074	PCB 194
PCB 087	PCB 195

PCB 095 PCB 200
PCB 097 PCB 201
PCB 099 PCB 203
PCB 101 PCB 206
PCB 105 PCB 209
PCB 110 **Surrogate (% Recovery)**
PCB 114 PCB 209 C_{13}(Surrogate)
PCB 118 **Calculated values from Lab**
PCB 128 PCB AROCLOR 1248
PCB 137 PCB AROCLOR 1254
PCB 138 PCB AROCLOR 1260

Trace Metals

Ag
Cd
Cu
Cr
Ni
Mn
Pb
As
Se
Hg