MEMORANDUM

March 21, 2007

To: RMP Technical Review Committee

From: Meg Sedlak, Don Yee, and Jay Davis

Re: Reanalysis of Bivalve Samples

In 2004 and 2005, many organic compounds (e.g., PBDEs, PAHs, PCBs, etc) in the tissue samples were not reported because results were below detection limits. At present, the 2006 tissue samples have been archived pending identification of a new laboratory that can provide better methods and detection limits. We would like to request the use of 2005 archival tissue samples to determine whether AXYS Analytical (AXYS) can obtain better results than our current tissue laboratory, California Department of Fish and Game (CDFG). Based on AXYS reported method detection limits and their performance in a NIST intercomparison exercises, we believe that they may be able to report compounds at levels that are one to two orders of magnitude lower than the CDFG reporting limits.

We propose using archival tissue material from seven of the 11 stations in the Bay to conduct an intercomparison between AXYS and CDFG. AXYS will analyze the samples for PCBs, PBDEs, PAHs, and pesticides and the results will be compared to the previous results from CDFG to determine whether switching laboratories is appropriate. Assuming that the comparison indicates that AXYS has lower detection limits, we will propose the 2006 tissue samples will be analyzed by AXYS. RMP staff will provide the TRC with the results of this intercomparison and obtain approval from the TRC prior to changing laboratories. The cost to conduct the analyses of these samples for organics (PBDEs, PCBs, PAHs, and pesticides) is approximately $22,000. At present, we have unallocated subcontractor funds from 2006 which could be used to cover this expense (assuming SC approval).

Background

The 2004 and 2005 bivalve data had a substantial number of nondetects for organics. For 2004, 10 of 13 PBDEs, 21 of 48 PCBs, and 26 of 29 OC pesticides were below the detection limits. Similarly, in 2005, 9 of the 13 BDEs, 18 of the 40 PCBs, 23 of 29 pesticides were below the detection limits.

Based on the reported method detection limits from AXYS Analytical, we believe that we can do much better. A comparison of the detection limits from AXYS to CDFG indicates that they are able to report concentrations several magnitudes lower than those reported by CDFG (see Table 1). It should be noted that the CDFG detection limits are averages from 2004 and 2005 for all components of analysis including extraction where as AXYS detection limits are based on instrument response of calibration standards (i.e., it is not representative of extraction of compound). Nonetheless, the results suggest that we could expect at least an order of magnitude improvement.

Table 1 Comparison of Detection Limits

	MDLs	
analyte	**CDFG (µg kg^{-1})**	**AXYS (ng kg^{-1})**
PBDE 47	3.90	6.8
PBDE 99	3.93	3.8
PBDE 100	3.13	1.1
PBDE 153	3.70	0.6
PBDE 154	3.28	0.5
PCB 052	1.00	0.73
PCB 095	1.00	1.44
PCB 099	1.00	0.53
PCB 101	1.00	0.58
PCB 110	1.00	0.39
PCB 118	1.00	0.42
PCB 138	1.00	2.13
PCB 149	1.00	0.30
PCB 153	1.00	0.42
PCB 180	1.00	0.77
PCB 187	1.00	0.20

In addition, AXYS Analytical routinely participates in the National Institute for Standards and Technology's (NIST) intercomparison exercises. Based on the NIST intercomparison exercise for mussel tissue (Schantz et. al 2006), AXYS' performance for analyzing mussel tissues for PCBs and PBDEs were generally within 25 percent of the expected analytical value.

References:

Schantz, M., Kucklick, J., Parris, R., Poster, D and S. Wise. 2006. NIST Intercomparison Program for Organic Contaminants in the Marine Environment: Description and Results of the 2005 Organic Intercomparison Exercises. September. NISTIR 7340.