

**Excessive Bioaccumulation of Organochlorine Legacy Pesticides
in Central Valley Fish**

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The State Water Resources Control Board (SWRCB) has been collecting data on the concentrations of organochlorine (OCI) legacy pesticides including DDT, dieldrin, chlordane, and toxaphene, in flesh of fish in Central Valley waterbodies since the late 1970s. During the 1990s the CVRWQCB, DeltaKeeper, and others collected additional data on OCI content of fish tissue. In 2002, we developed a comprehensive report on those data, under contract with the SWRCB through CSU Fresno Water Institute.

Lee, G. F. and Jones-Lee, A., "Organochlorine Pesticide, PCB and Dioxin/Furan Excessive Bioaccumulation Management Guidance," California Water Institute Report TP 02-06 to the California Water Resources Control Board/Central Valley Regional Water Quality Control Board, 170 pp, California State University Fresno, Fresno, CA, December (2002). [cover page attached]
[Available at: <http://www.gfredlee.com/OCITMDLRpt12-11-02.pdf>]

In preparation of that report, we generated a 6 ft by 9 ft Excel spread sheet containing the complete database for OCIs in fish tissue that existed as of about 2000. (That database is available electronically upon request – email gfredlee@aol.com.)

A set of PowerPoint slides of our presentation of the key information from that report is available at,

Lee, G. F. and Jones-Lee, A., "Excessive Bioaccumulation of Organochlorine Legacy Pesticides and PCBs in California Central Valley Fish," Made available at US EPA, California OEHHA and ATSDR 2004 National Forum on Contaminants in Fish, Report of G. Fred Lee & Associates, El Macero, CA, January (2004).
[<http://www.members.aol.com/duklee2307/OCI-slides-SanDiego.pdf>]

In the early 1990s, the USGS found legacy pesticides in agricultural runoff to SJR westside streams that have the potential to bioaccumulate to excessive concentrations in fish. Except for the recently generated Irrigated Lands Ag Waiver water quality monitoring data discussed below, there has been no follow-up work on that finding.

Several years ago, we submitted a proposal to CALFED to obtain funding to fill information gaps on current fish tissue content and on the sources of the legacy pesticides that are still bioaccumulating to excessive levels in edible fish. CALFED did not fund those studies because they addressed a "human health" issue.

Beginning in the spring of 2007, we initiated an unsupported review of OCI data collected in 2005 by the CVRWQCB (C. Foe). The CVRWQCB collected about 400 fish from Central Valley waterbodies; about half were collected in the Delta. We are now in the process of updating our 2002 report to address the current status of excessive

bioaccumulation of OCIs based on the 2005 fish tissue database. At this time we have compiled the 2005 fish tissue database from the laboratory data sheets into a draft spreadsheet, and are developing a report,

Lee, G. F., and Jones-Lee, A. "Update of Organochlorine (OCI) "Legacy" Pesticide and PCB Concentrations in Delta and the Central Valley Fish," Report of G. Fred Lee & Associates, El Macero, CA (in preparation).

to discuss the updated fish tissue database, changes in OCI concentrations in fish collected from the same areas in the 1990s. The report will also include review of the potential toxicity of the OCI tissue residue to the host fish based on the US EPA and Corps of Engineers data bases.

Because this work is not presently being funded, we are only able to work on the report as time permits. We are attempting to gain support to finalize the 2005 fish data spreadsheet and report in order that it may be completed in a timely manner. Ten thousand dollars would go a long way to enabling us to complete our report in the near future.

Our work includes information on the PCB content of fish tissue. PCBs should be included in the Legacy Pesticide Working Group review since they are more important as a cause of excessive bioaccumulation in Central Valley fish than the legacy pesticides in terms of occurrence and human health threat. PCBs are also found in excessive amounts in fish taken from waterbodies that are dominated by runoff from agricultural areas. There is need to begin to understand this situation.

A key aspect of our current review is the comparison of the current fish tissue OCI levels with the OEHHA human health screening values. Our 2002 report incorporated the 1999 OEHHA and US EPA screening values. In 2006, OEHHA proposed updated screening values which are, in general, substantially higher than the 1999 values. Their application will change the identification of areas of "excessive" bioaccumulation of the legacy pesticides in Central Valley fish. This is not true for PCBs as the 2006 proposed screening value is the same as the 1999 value. Our Stormwater Runoff Water Quality Newsletter 9-4 [available at <http://www.members.aol.com/annejlee/swnews94.pdf>] discusses the OEHHA proposed revised human health screening values for legacy pesticides and PCBs.

Review of the 2005 fish tissue data shows that if the OEHHA 2006 proposed screening values are adopted, the legacy pesticide "excessive" bioaccumulation issue will essentially disappear in many areas of the Central Valley waterbodies. This finding may, thus, lead to the possibility of de-listing several waterbodies and eliminating the requirement to development of TMDLs to control excessive OCI bioaccumulation. There are, of course, a number of issues such as the allowed cancer risk rate and the environmental justice issues of fish consumption rate that the CVRWQCB would need to address before this delisting would be possible.

As part of our report we are also reviewing the Ag waiver water column monitoring data for the Delta. We have found that the analytical methods used by the coalitions and UCD are not sufficiently sensitive to enable reliable determination of legacy pesticides at low concentrations (CTR criteria) that have the potential to bioaccumulate to excessive levels. While for most water samples the analytical result is “non-detect” (i.e., the concentration is below the analytical detection limit), some of the water samples have been found to contain sufficient DDT to bioaccumulate to excessive levels. This is a violation of the CTR criteria and CVRWQCB Basin Plan Objective.

As I have pointed out in my comments on Ag Waiver MRP, and in our 2002 report, concentrations above the CTR criteria can occur without there being excessive bioaccumulation in fish tissue. I have been involved in OCI occurrence, fate and transport issues since the 1960s. Based on our studies, as well as those of others, there are a variety of reactions in aquatic systems that make DDT and PCBs in water and sediments unavailable for bioaccumulation. For this reason, water column and sediment OCI concentrations are not reliable bases for estimating excessive bioaccumulation in fish. It is important the fish tissue concentrations be used to evaluate whether there is a real water column problem due to excessive bioaccumulation of the legacy pesticides and PCBs in fish flesh.

In 2002, we conducted a limited-scope study of the availability of OCI “legacy” pesticides and PCBs in sediments of Smith Canal. Smith Canal is a tidal canal in the city of Stockton that drains stormwater from the city; it is connected to the Delta. Fish taken from Smith Canal were found to contain excessive PCBs. Our report,

Lee, G. F., Jones-Lee, A., and Ogle, R. S., “Preliminary Assessment of the Bioaccumulation of PCBs and Organochlorine Pesticides in *Lumbriculus variegatus* from City of Stockton Smith Canal Sediments, and Toxicity of City of Stockton Smith Canal Sediments to *Hyalella azteca*,” Report to the DeltaKeeper and the Central Valley Regional Water Quality Control Board, G. Fred Lee & Associates, El Macero, CA, July (2002). [cover page attached]
[Available at <http://www.gfredlee.com/SmithCanalReport.pdf>]

discusses approaches involving US EPA recommended procedures that should be followed to determine if the OCIs in sediments are bioavailable to higher trophic-level organisms.

Our review of this Ag Waiver legacy pesticide issues identifies a number of issues that the Legacy Pesticide Working Group needs to consider. These include,

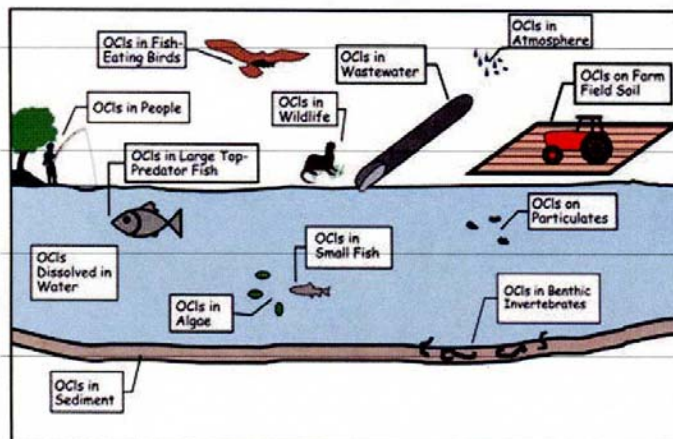
- Revising the OCI MRP to develop more appropriate monitoring data,
- Expanding the OCI monitoring to include PCBs,
- Including fish tissue OCI monitoring, and
- Providing guidance on how to investigate excessive bioaccumulation of OCI in water and fish tissue to determine the source(s) and to develop control approaches.

Question and or comments on these issues are welcome. G. Fred Lee



Report TP 02-06
**Organochlorine Pesticide, PCB and Dioxin/Furan Excessive
Bioaccumulation Management Guidance**

Conceptual Model of OCI Bioaccumulation



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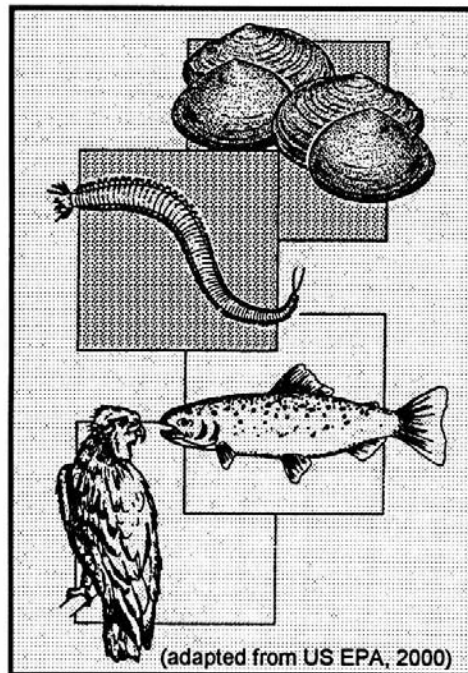
and the
State Water Resources Control Board
Sacramento, CA

December 2002

**Preliminary Assessment of the Bioaccumulation of
PCBs and Organochlorine Pesticides in *Lumbricus variegatus* from
City of Stockton Smith Canal Sediments
and
Toxicity of City of Stockton Smith Canal Sediments to *Hyaella azteca***

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**Report to the DeltaKeeper
Stockton, California
and the
Central Valley Regional Water Quality Control Board
Sacramento, California
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