

October 22, 2012

To: Peter Meertens, Central Coast Regional Water Quality Control Board

From: Linda S. Lee, Purdue University

The specific pollutants to be addressed in the proposed TMDLs are pesticides thought to be associated with water quality impairments based on their presence in water bodies, their presence in associated biota, and various laboratory-based studies assessing toxicities to different target organisms. TMDLs are proposed for water and sediment for currently applied organophosphate (OP) pesticides and synthetic pyrethroids, and water, sediment, and fish for legacy organochlorine pesticides. The report does a thorough job of detailing use and activities that may serve as a source for these pesticides in the Santa Maria Watershed. Overall, the proposed TMDLs seem reasonable and achievable towards protecting ecosystem and human health, and educating the various stakeholders involved. Below are a few comments for consideration towards improving the proposed plan.

Comment on OP pesticide evaluation.

For the OP pesticide chlorpyrifos, there is a known major metabolite (3,5,6-trichloro-2-pyridinol, TCP) with toxicity potential that was not mentioned in this report. TCP is ionizable, thus its fate is pH-dependent (Racke, 1993). Although TCP is proposed to be less toxic based on an extensive review of published ecotoxicological chlorpyrifos data (Barron and Woodburn, 1995), it has 1 to over 2 orders of magnitude greater propensity to exist in the water, thus potentially available at higher concentrations to impact aquatic biota. TCP toxicity to soil bacteria in Microtox system was shown to be higher than that of chlorpyrifos, thus some targets may be equally or more sensitive to TCP. TCP mode of toxicity appears to be distinctly different than chlorpyrifos, acute toxicity tests do show TCP to be slightly to moderately toxic to invertebrates, fish, birds, and mammals (Barron and Woodburn 1995; USEPA 2000). So TCP may or may not be a problem in the Santa Maria Watershed, but given the amount of chlorpyrifos being used in the watershed and what is being detected, it seems reasonable to monitor for TCP to determine if it is a source of impairment, especially in cases where an unidentified source of toxicity was designated and where chlorpyrifos is known to be used (refer to p. 40 of the report).

Barron M.G., and Woodburn K.B. (1995) Ecotoxicology of chlorpyrifos. *Reviews of Environmental Contamination and Toxicology*, 144, 1-93.

Racke, K.D., 1993. 131:1-154. *In* George W. Ware (ed.) *Reviews Environmental Contamination Toxicology*. Springer-Verlag New York Inc.

USEPA (2000) Human health risk assessment--Chlorpyrifos. US Environmental Protection Agency.

Comment on sediment-borne pesticides.

The report several times notes the contribution of sediment (soil) running off of irrigated land being a likely source of pesticides especially legacy pesticides, but this applies to any run off scenario including poorly managed drip irrigation. What was not clear to me in the proposed draft of TDMLs is what the current TMDL is for solids loading into the targeted water bodies and/or if this is going to be generically addressed since it is the heart of the problem for many of the highly sorbed pesticides being targeted including legacy DDT and its metabolites. A solution to minimize particle-bound pesticides (which included phosphorus as well) running off into the various water bodies would contribute generically to reducing loadings of both known and unknown compounds contributing to impaired waters.

Emphasis needs to be placed on erosion control management plans in general since I believe data shows that this is often the source of pesticides entering the water body for most of the pesticides delineated in the current proposed pesticide TMDLs. In addition, Storm water and irrigation run-off monitoring in all scenarios should also be emphasized.

Comment on aerial applications.

In terms of pesticides that are applied via spraying, it was not clear to me if the % contribution of this particular activity was assessed. The latter may not have been possible with the limited data collected, e.g., water monitoring before and after spray application activities. Is there clear documentation that the currently recommended buffer strips, when employed properly address minimizing this contribution? Is there a plant height requirement in the buffer zone and has this value been assessed. The relative need for the latter is a function of the % contribution to the load from spraying activities.

Comment on legacy organochloro-pesticides.

It is not clear if something can be or should be implemented to manage effectively or reduce existing sediment loads already present in streams and canals, or if the plan will just be to monitor, educate, and reduce additional loads.

Comment on OC-normalized sediment loadings.

Overall it appeared from what I know and what was presented in the report that organic carbon (OC) normalized TMDLs are more protective than just sediment concentrations. Numeric targets (Table 3-9) for sediments towards achieving the water quality objectives are primarily listed on an OC-normalized basis as well as loading capacities (chapter 5 of the report) except for sediment concentration-based TMDLs for DDT and derivatives (Tables 5.3 & 5.4), which are

not proposed on an OC-normalized basis unlike what is being proposed for the currently used pesticides. I may have missed the logic for this, but wanted to note the apparent inconsistency.

Comment on sources:

In a few places in the report, the % use of a specific pesticide, e.g., chlorpyrifos, was high for strawberry production, but was considered a lower risk source than other sources because irrigation in strawberries is via drip irrigation. While the latter is designed to optimize water use by plants, thus minimizing run off, this is not always achieved. I have observed constant water running off these fields, specifically in the Santa Maria watershed where much of the area is sloped. This water may run off the surface or flow to a shallow impermeable layer and exit at a lower elevation. Ideally, all this should be minimized in drip irrigation, but reality is not always so. Commercial strawberry production allows land that has little value in terms of soil fertility to be used, because the growing media is provided to the plant through raised beds and then all the nutrients and water the plants needs are provided anthropogenically. However, this scenario when not operated under strict conditions also increases risk of this source for nutrients, sediment, and pesticides into the watershed.

BMP Tracking and Assessment

It didn't appear to be that this included directly land management, but just irrigation and pesticide management (p. 105). Land management may be inherent, but should be explicitly specified where appropriate. I assume standard irrigation and sediment BMPs for irrigated agriculture when applied correctly should reduce sediment movement from farms.

Comment on Education

Stage 1 Education for Minimizing pesticides in Urban runoff (p. 107) is to develop reduce risk practice fact sheets for the general public that discusses pesticide use and water quality protection. It is not clear to me where these will be distributed or made available to optimize exposure of the information (e.g., stores selling to urban home owners at check out). This should be explicitly delineated.

General comment:

I am not trained as a toxicologist, I found the approach proposed to address compound mixtures when the mode of action is known to be similar is a reasonable first approach and is not overly burdensome. Having this in the proposed TMDLs is commendable and will set a model for future efforts in this area even with so much still unknown about mixtures.