



March 13, 2009

Danny McClure
Regional Water Quality Control Board
Central Valley Region
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670

Re: Comments on the January 2009 California State Water Resources Control Board Draft Staff Report proposed updates to the 2006 303(d) list regarding chlorpyrifos and diazinon in the Lower Tuolumne River.

Dear Mr. McClure:

The Modesto Irrigation District and the Turlock Irrigation District provide these comments and supporting technical memorandum (attached) on the January 2009 California State Water Resources Control Board (SWRCB) Draft Staff Report detailing proposed updates to the 2006 § 303(d) List in regard to the pesticides chlorpyrifos and diazinon in the Lower Tuolumne River. The current 2006 § 303(d) listing of water quality limited segments identifies the Lower Tuolumne River (Water Body ID CAR5355000019980817143435) as not meeting applicable water quality objectives for diazinon (Decision ID 7210) and Group A (organochlorine) pesticides (Decision ID 7211), as well as sources of unknown toxicity. Among other recommendations, the January 2009 Draft Staff Report retains the diazinon (Decision ID 7210) and includes a new designation for the Lower Tuolumne River as impaired for the pesticide chlorpyrifos (Decision ID 4914). Data and information used as the basis for these comments to the January 2009 303(d) list proposed updates are attached and include 1) an assessment of water quality objectives of the California Central Valley Region Basin Plan (Basin Plan), and 2) a review of stated criteria and guidelines used to assess the § 303(d) listing of chlorpyrifos and diazinon.

Based on the available data, there is recent (up to 2006) evidence of some exceedances of applicable water quality criteria for chlorpyrifos in the Lower Tuolumne River. Under the SWRCB Listing Policy guidelines, however, this evidence is insufficient to support the listing of the Lower Tuolumne as impaired for chlorpyrifos due to spatially unrepresentative data between upstream and downstream sampling sites and an overall insufficient sample size at the upstream site. The two sampling sites, Santa Fe Avenue and Shiloh Road, are upstream and downstream, respectively of Dry Creek (Water Body ID CAR5452000020080806143824). Considered separately, each site has different exceedance rates, with the Santa Fe site, but not the Shiloh Road site, exceeding the

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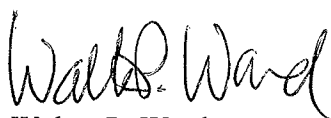
objective sufficiently often to require listing. The 2009 Draft Staff Report Fact Sheets indicate that SWRCB staff previously recommend against listing the Lower Tuolumne River for chlorpyrifos because applicable water quality standards for the pollutant are not exceeded. Based upon the limited data available upstream of Dry Creek (approximately river mile [RM] 16), this site should be sampled more extensively for chlorpyrifos to support a spatially representative dataset for the Lower Tuolumne River.

For diazinon, there is limited evidence through 2005 of periodic exceedances of water quality criteria in the Lower Tuolumne River. However, under the SWRCB (2004) Listing Policy, the most recent data collected since 2006 shows a sample exceedance frequency low enough to support delisting.

Based upon the review of the January 2009 Draft Staff Report and supporting data, we request that the Lower Tuolumne River no longer be listed as impaired for diazinon and that the Lower Tuolumne River not be listed as impaired for chlorpyrifos. Future listings, should they be required should also recognize two distinct water body segments in the Lower Tuolumne River upstream and downstream of the Dry Creek confluence.

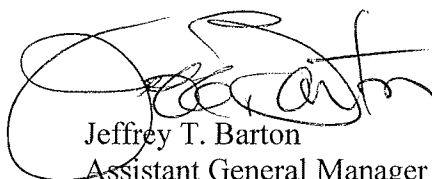
Respectfully submitted,

MODESTO IRRIGATION DISTRICT



Walter P. Ward
Assistant General Manager
Water Operations

TURLOCK IRRIGATION DISTRICT



Jeffrey T. Barton
Assistant General Manager
Civil Engineering & Water Operations

Attachment

March 13, 2009

TECHNICAL MEMORANDUM

DATE: Wednesday, March 11, 2009
TO: Tim Ford
FROM: Noah Hume, Maia Singer, Alex Wong
SUBJECT: Review of evidence supporting the listing of the Lower Tuolumne River as impaired
for chlorpyrifos and diazinon under Section 303(d) of the Clean Water Act

1 INTRODUCTION

This technical memorandum provides comments on the January 2009 California State Water Resources Control Board (SWRCB) Draft Staff Report (CVRWQCB 2009) detailing proposed updates to the 2006 303(d) list (SWRCB 2006) in regard to the pesticides chlorpyrifos and diazinon in the Lower Tuolumne River. The discussion focuses on data and information used for the assessment of water quality objectives of the California Central Valley Region Basin Plan (Basin Plan) (CVRWQCB 2007), as well as stated criteria and guidelines used to assess the listing of chlorpyrifos and diazinon. Supporting information provided in the Draft Staff Report is also reviewed, including Fact Sheets Documenting Recommended 303(d) Listing Decisions (Appendix F of CVRWQCB 2009). Fact Sheets from the 2006 and 2002 303(d) listing decisions were also reviewed (Volume IV of SWRCB 2006, and Appendix B of SWRCB 2002a) and are provided as attachments to this technical memorandum, as follows:

- Attachment A – January 2009 Draft Staff Report Fact Sheets for diazinon and chlorpyrifos in the Lower Tuolumne River.
- Attachment B – Re-compiled chlorpyrifos and diazinon data for the Lower Tuolumne River.
- Attachment C – 2002 303(d) list Fact Sheet for diazinon in the Lower Tuolumne River.

Based upon our review of the Draft Staff Report and supporting data, we recommend that the proposed 303(d) list be revised to eliminate the proposed listing for chlorpyrifos and to delist for diazinon in the lower Tuolumne River based upon a combination of spatially unrepresentative data and insufficient sample sizes or exceedances at particular locations.

1.1 Background

Section 303(d) of the federal Clean Water Act (CWA) requires states to identify waters that do not meet applicable water quality standards after the application of certain technology-based controls, and prioritize these waters for the purposes of developing Total Maximum Daily Loads (TMDLs) [40 CFR 130.7(b)(6)(i)]. The states are required to assemble and evaluate all existing and readily available water quality-related data and information to develop the CWA section 303(d) list [40 CFR 130.7(b)(5)] and to provide documentation to list or not to list a state's waters [40 CFR 130.7(b)(6)]. States are required to list any segment of a water body that is not meeting applicable water quality standards and/or is not expected to meet applicable water quality standards, even after application of technology-based effluent limitations required by CWA

sections 301(b) or 306 (40 CFR 130.2(j)). Applicable water quality standards include the designated beneficial uses, the adopted water quality objectives, and antidegradation requirements. The states are presently required to submit the CWA section 303(d) list to the U.S. Environmental Protection Agency (USEPA) for approval every two years.

The current (SWRCB 2006) 303(d) listing of impaired water bodies identifies the Lower Tuolumne River as impaired for the pesticide diazinon, as well as other impairments not discussed in this technical memorandum. In January 2009, the Central Valley Regional Water Quality Control Board (CVRWQCB) issued the Draft Staff Report on Development of the Clean Water Act Sections 305(b) and 303(d) Integrated Report (Draft Staff Report), which proposes updates to the 2006 303(d) list. The January 2009 Draft Staff Report retains the diazinon listing for the Lower Tuolumne River, and it includes a new designation for the Lower Tuolumne River as impaired for pesticide chlorpyrifos, as well as other substances not discussed in this technical memorandum (CVRWQCB 2009).

1.2 General listing policy guidelines

The Basin Plan requires that all waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life (CVRWQCB 2007). Chlorpyrifos and diazinon are considered toxic substances, and specific water quality criteria limit their concentrations in water and/or fish tissue. Individual listing criteria for each of these pesticides are provided in the sections below.

For a toxicant to be included on the 303(d) list, a minimum number of samples with analytical concentrations in excess of applicable water quality criteria must be exceeded. Table 3.1 of the Listing Policy (SWRCB 2004) provides a formulation of the acceptable number of criteria exceedances based upon the total number of samples collected using the binomial distribution at a 3% exceedance probability. For example, 4 exceedances of water quality criteria would be sufficient to list a water body if these were from a total sample size between 37–47 samples. For smaller sample sizes (i.e., 2–24 samples), a minimum of two exceedances must be detected to justify a listing.

Delisting of a toxicant is supported if the maximum number of exceedances of water quality criteria does not exceed an allowable value, which is also dependant on the total number of samples available, as detailed in Table 4.1 of the Listing Policy. For example, if 3 or fewer samples exceed the water quality criteria for a given toxicant in a total sample size between 37–47 samples, a water body qualifies for delisting. However, once a water body has been listed delisting may not be considered if there are fewer than 28 total samples available. Delisting may occur under other circumstances, such as when “the listing was based on faulty data, and it is demonstrated that the listing would not have occurred in the absence of such faulty data” (SWRCB 2004).

The discussion below centers solely upon listings in the Lower Tuolumne River related to chlorpyrifos and diazinon (CVRWQCB 2009).

1.3 Lower Tuolumne River Water body

As defined in the 303(d) list of impaired water bodies (SWRCB 2002a, SWRCB 2006, and CVRWQCB 2009), the Lower Tuolumne River extends for 54 river miles (RMs) from Don Pedro Lake downstream to the confluence with the San Joaquin River (Figure 1). Dry Creek, a major tributary to the Lower Tuolumne River, enters the river at approximately RM 16 near Modesto.

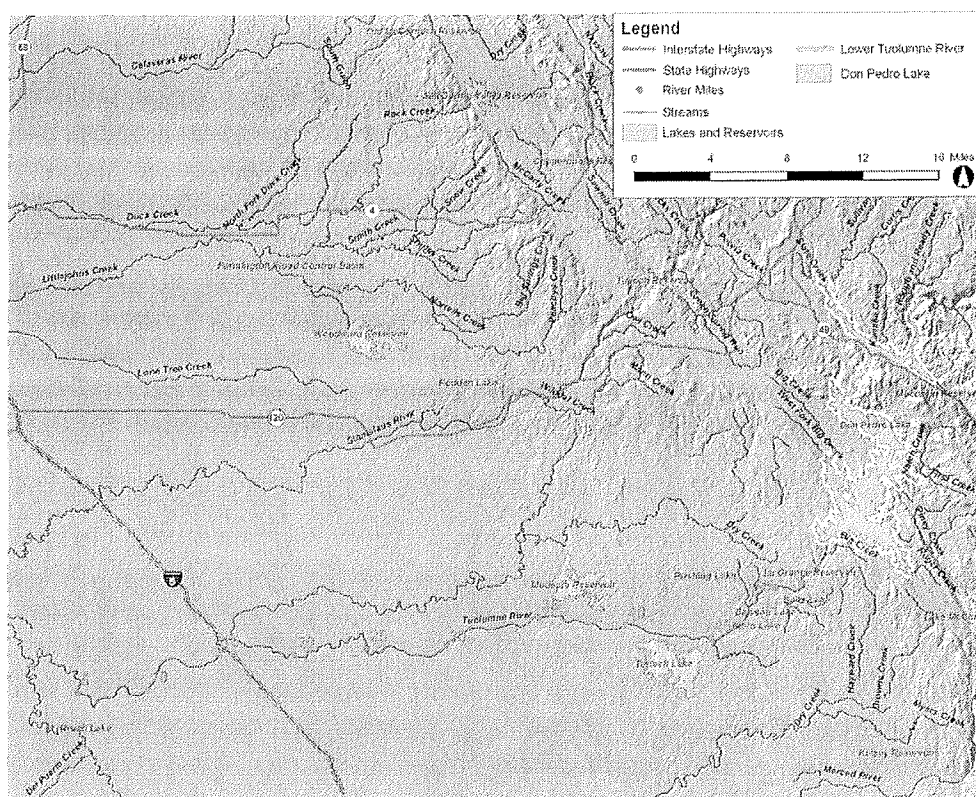


Figure 1. The Lower Tuolumne River and Don Pedro Lake

2 CHLORPYRIFOS

The January 2009 Draft Staff Report includes a new listing for the Lower Tuolumne River as impaired for chlorpyrifos (CVRWQCB 2009). The relevant Fact Sheet (Appendix F of CVRWQCB 2009) cites evidence showing that the Basin Plan warm freshwater habitat (WARM) beneficial use (CVRWQCB 2007) is impaired due to chlorpyrifos exceedances in the Lower Tuolumne River (see Attachment A). The applicable criteria cited are the California Fish and Game (CDFG) Hazard Assessment Criteria, which require that a 0.025 ug/L 1-hour average and 0.015 ug/L 4-day average concentration of chlorpyrifos not be exceeded (Siepmann and Finlayson 2000, Beaulaurier et al. 2005). As reported in the Fact Sheet, available data include 247 individual measurements collected from January 2000 through August 2006 that were used to assess compliance with the 1-hour average criterion (CDPR 2008) and 145 separate 4-day spans that were used to assess compliance with the 4-day average criterion. Four 1-hour measurements were found to exceed the 1-hour average criterion, and eleven 4-day measurements were found to exceed the 4-day average criterion. However, as summarized in Table 1, the levels of these exceedances do not meet applicable listing guidelines.

The data cited in the Fact Sheet (CDPR 2008) were re-compiled for this technical memorandum. The resulting compilation (see Attachment B) resulted in slightly reduced numbers of total measurements than reported in the Fact Sheet. These discrepancies may be due to double counting of some measurements in the Fact Sheet (a single measurement was sometimes reported in multiple lines of evidence), differences in the grouping of 4-day average time spans, and

differences in which measurements were excluded for quality control reasons. However the results of the re-compilation also indicate that there is insufficient evidence of water quality exceedances to require the listing of the Lower Tuolumne River as impaired for chlorpyrifos (Table 1). The 1-hour average criterion was exceeded only six times out of 244 samples, and 21 exceedances out of 244 samples are required for listing. Similarly, the 4-day average criterion was exceeded 11 times out of 136 samples, and 12 exceedances are required for listing.

Thus, while the Fact Sheet cites the available data as support for listing the Lower Tuolumne River as impaired for chlorpyrifos, in fact, there appear to be insufficient instances of water quality criteria exceedances to support listing guidelines. Furthermore, the Fact Sheet also states that SWRCB staff (as opposed to CVRWQCB staff) recommend that chlorpyrifos not be placed on the 303(d) list because applicable water quality standards for the pollutant are not exceeded.

Table 1. Summary of number of chlorpyrifos water quality criteria exceedances in the Lower Tuolumne River

Data compilation	Sample size	Exceedances needed to list	Exceedances	Recommended listing decision ¹
1-hour average chlorpyrifos concentration < 0.025 ug/L				
Draft Staff Report Fact Sheet recommendation, all sites (CVRWQCB 2009)	247	22	4	List
Recommendation based upon re-compiled data, all sites	244	21	6	Do not list
4-day average chlorpyrifos concentration < 0.015 ug/L				
Draft Staff Report Fact Sheet recommendation, all sites (CVRWQCB 2009)	145	13	11	List
Recommendation based upon re-compiled data, all sites	136	12	11	Do not list

¹ Draft Staff Report listing decision is from CVRWQCB (2009), while listing decision based on re-compiled data (all sites) is from this memorandum.

For this memorandum, the available chlorpyrifos data were also examined by site to determine if only certain reaches of the Lower Tuolumne River should be considered for listing. The data were collected from two sites: the Tuolumne River at Shiloh Road (~RM 3) and the Tuolumne River at Santa Fe Avenue (~RM 23). Conditions at these two sites have the potential to differ: for example, Dry Creek, a major tributary, enters the Lower Tuolumne River between the two sites, and could alter chlorpyrifos concentrations in the Lower Tuolumne River. Note that the January 2009 Draft Staff Report recommends listing Dry Creek as impaired for chlorpyrifos, along with multiple other toxicants (CVRWQCB 2009). Since available data for the Lower Tuolumne River are predominantly from the Shiloh Road site (Table 2) they are not fully spatially representative. It is therefore instructive to consider the sites separately to determine whether a dataset with more complete spatial representation would be likely to alter the listing recommendation. If the Shiloh Rd. site is considered separately, there is insufficient evidence of water quality exceedances to require listing (Table 2). At the Santa Fe Avenue site, two of 22 samples exceeded the 4-day average water quality criteria for chlorpyrifos, which is sufficient evidence to require listing if the site is considered independently. Since the results from the two sites imply differing listing decisions, the data lack adequate spatial representation to properly characterize chlorpyrifos

concentration in the reach, and more data from the Lower Tuolumne River between Don Pedro Lake and Dry Creek should be collected to inform the 2009 listing decision.

Table 2. Summary of number of chlorpyrifos water quality criteria exceedances in the Lower Tuolumne River by site

Data compilation	Sample size	Exceedances needed to list	Exceedances	Recommended listing decision ¹
1-hour average chlorpyrifos concentration < 0.025 ug/L				
Shiloh Rd. site only (~RM 3)	206	18	5	Do not list
Santa Fe Ave. site only (~RM 23)	38	4	1	Do not list
4-day average chlorpyrifos concentration < 0.015 ug/L				
Shiloh Rd. site only (~RM 3)	114	10	9	Do not list
Santa Fe Ave. site only (~RM 23)	22	2	2	List

¹Based upon available site-specific data in this memorandum rather than by water body (as in CVRWQCB 2009).

3 DIAZINON

The January 2009 Draft Staff Report recommends the continued listing of the Lower Tuolumne River as impaired for diazinon from Turlock Lake State Park to the San Joaquin River (CVRWQCB 2009). The Lower Tuolumne River was also listed as impaired for diazinon in the 2006 303(d) list (SWRCB 2006).

The relevant Fact Sheet (see Attachment A) cites evidence showing that the Basin Plan warm freshwater habitat (WARM) beneficial use (CVRWQCB) is impaired because of diazinon in the Lower Tuolumne River. The CDFG Hazard Assessment Criteria require that a 0.16 ug/L 1-hour average and 0.10 ug/L 4-day average concentration of diazinon not to be exceeded more than once every three years (Siepmann and Finlayson, 2000 and Finlayson, 2004).

The data cited in the Fact Sheet includes 241 individual measurements collected from January 2000 through August 2006 that were used to assess compliance with the 1-hour average criterion (CDPR 2008). These data include 153 separate 4-day spans that were used to assess compliance with the 4-day average criterion. Three 1-hour measurements were found to exceed the 1-hour average criterion, and one 4-day measurement was found to exceed the 4-day average criterion. Since one exceedance of the average concentration limits is permitted every three years, a single sample exceeding those average concentration limits does not necessarily prove that the criteria were exceeded. However, the data record indicates that monitoring did not occur regularly, so any one sample likely represents conditions that would recur many times within a given three year period. For example, there were 38 separate 4-day averages estimated within the three year span from 2004 through 2006, with one resulting exceedance of the 0.10 ug/L 4-day average concentration limit. Since this three year span includes 274 separate 4-day spans, it would be expected that 7 (i.e., $274 \times 1/38 = 7$) 4-day spans from 2004 to 2006 would exceed the 0.10 ug/L 4-day average concentration limit if samples were collected every day. Therefore, the single sample showing an exceedance of the 4-day average concentration limits may potentially be considered as an exceedance under the CDFG Hazard Assessment Criteria (Siepmann and Finlayson, 2000 and Finlayson, 2004).

The data cited in the Fact Sheet (CDPR 2008) were re-compiled for this technical memorandum. The resulting compilation (see Attachment B) has slightly different numbers of measurements than reported in the Fact Sheet. These discrepancies may be due to double counting of some measurements for the Fact Sheet (a single measurement was sometimes reported in multiple lines of evidence), differences in the grouping of 4-day average time spans, and differences in which measurements were excluded for quality control reasons. The results, however, are similar, as summarized in Table 3.

Overall, results indicate that the number of water quality exceedances supports delisting of the Lower Tuolumne River as impaired for diazinon (Table 3). The 1-hour average criterion was exceeded only four times out of 246 samples, and more than 20 exceedances out of 246 samples are required to meet listing guidelines. Similarly, the 4-day average criterion was exceeded one time out of 139 samples, and more than 11 exceedances are required to meet listing guidelines. Thus, while the Fact Sheet cites the available data as support for continued listing of the Lower Tuolumne River as impaired for diazinon, the observed number of exceedances of water quality criteria supports delisting (Table 3).

Table 3. Summary of number of diazinon water quality criteria exceedances in the Lower Tuolumne River

Data compilation	Sample size	Maximum allowable exceedances to support delisting	Exceedances	Recommended listing decision ¹
1-hour average diazinon concentration < 0.16 ug/L				
Draft Staff Report Fact Sheet recommendation, all sites (CVRWQCB 2009)	241	20	3	List
Recommendation based upon re-compiled data, all sites	246	20	4	Delist
4-day average diazinon concentration < 0.10 ug/L				
Draft Staff Report Fact Sheet recommendation, all sites (CVRWQCB 2009)	153	13	1	List
Recommendation based upon re-compiled data, all sites	139	11	1	Delist

¹Draft Staff Report listing decision is from CVRWQCB (2009), while listing decision based on re-compiled data (all sites) is from this memorandum.

For this memorandum, the available data were also examined by site to determine if delisting is appropriate for all reaches of the Lower Tuolumne River. The data were collected from two sites: the Tuolumne River at Shiloh Road (~RM 3) and the Tuolumne River at Santa Fe Avenue (~RM 23). As with chlorpyrifos, factors affecting diazinon conditions at these two sites have the potential to differ due to inflows from Dry Creek. Note that the January 2009 Draft Staff Report recommends listing Dry Creek as impaired for diazinon, along with multiple other toxicants (CVRWQCB 2009). Since available data for the Lower Tuolumne River are predominantly from the Shiloh Road site (Table 4) they are not fully spatially representative. It is therefore instructive to consider the sites separately to determine whether a dataset with more complete spatial representation would be likely to alter the listing recommendation. However, if these sites are

considered independently, then the number of samples that exceed water quality criteria at both sites is low enough to allow delisting of the site as impaired for diazinon (Table 4). Although 28 samples are needed to support delisting, the data presented are sufficiently spatially representative to support the delisting of the entire Lower Tuolumne River.

Table 4. Summary of number of diazinon water quality criteria exceedances in the Lower Tuolumne River by site

Data compilation	Sample size	Maximum allowable exceedances to support delisting	Exceedances	Recommended listing decision ¹
1-hour average diazinon concentration < 0.16 ug/L				
Shiloh Rd. site only (~RM 3)	208	17	4	Delist
Santa Fe Rd. site only (~RM 23)	38	3	0	Delist
4-day average diazinon concentration < 0.10 ug/L				
Shiloh Rd. site only (~RM 3)	116	9	1	Delist
Santa Fe Rd. site only (~RM 23)	23	N/A ²	0	No conclusion-sample size too small.

¹Based upon available site-specific data in this memorandum rather than by water body (as in CVRWQCB 2009).

² If there were 28 samples available (the minimum number needed to support delisting) then a maximum of two exceedances would be allowable to support delisting.

4 SUMMARY

This technical memorandum reviews the data supporting the recommendations for the Lower Tuolumne River in regard to chlorpyrifos and diazinon included in the January 2009 Draft Staff Report, which updates the 2006 303(d) list (CVRWQCB 2009). While there is recent (up to 2006) evidence of some exceedances of applicable water quality criteria for chlorpyrifos in the Lower Tuolumne River, this evidence is currently insufficient to support the listing of the Lower Tuolumne as impaired for chlorpyrifos. The dataset is both disproportionately weighted downstream (22 samples at Santa Fe Rd. vs. 114 samples at Shiloh Rd.) and under-sampled at the upstream site (22 total samples at Santa Fe Rd.). Therefore, this site should be sampled more extensively for chlorpyrifos to support a spatially representative dataset for the Lower Tuolumne River. There is limited evidence through 2005 of exceedances of water quality criteria for diazinon in the Lower Tuolumne River, but the small number of existing exceedances collected since 2006 supports delisting of the Lower Tuolumne River for diazinon. Future listings should recognize two distinct water body segments in the Lower Tuolumne River upstream and downstream of the Dry Creek confluence.

5 REFERENCES

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