13 October 2016

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REVIEW OF THE SAN JOAQUIN RIVER CHLORPYRIFOS AND DIAZINON 2013 - 2015 WATER YEARS ANNUAL MONITORING REPORTS– EAST SAN JOAQUIN WATER QUALITY COALITION AND WESTSIDE SAN JOAQUIN RIVER WATERSHED COALITION

Thank you for submitting the San Joaquin River Chlorpyrifos and Diazinon 2014 - 2016 Annual Monitoring Reports (AMRs) for the Total Maximum Daily Load (TMDL) compliance monitoring. The TMDL AMR is a joint effort by the East San Joaquin Water Quality Coalition (ESJWQC) and the Westside San Joaquin River Watershed Coalition (Westside Coalition) to meet the conditions of the Monitoring and Reporting Program Orders No. R5-2012-0116-R3 and R5-2014-002-R2, and the Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins for the Diazinon and Chlorpyrifos Runoff in the San Joaquin River Basin.

Central Valley Water Board staff reviewed the 2014 - 2016 TMDL AMRs for completeness and accuracy, including data collection and reporting requirements, as well as evaluation of compliance with the seven monitoring objectives outlined in the Basin Plan. Despite an exceedance of the San Joaquin River TMDL loading capacity in March 2013 at Las Palmas Avenue near Patterson, the San Joaquin River is in attainment of the chlorpyrifos water quality objective. However, continued exceedances in some tributaries of the San Joaquin River indicate that additional actions are required to meet water quality objectives. The 2017 TMDL AMR should include management practice data collected through Farm Evaluation surveys to determine the effectiveness of implemented management practices in reducing the off-site movement of diazinon and chlorpyrifos.

If you have any questions regarding the TMDL AMR review, please contact Yared Kebede at (916) 464-4828 or by email at yared.kebede@waterboards.ca.gov.

Original signed by

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Enclosure: Staff Review of 2013 - 2015 Water Years TMDL AMR
TMDL AMR Review Checklists

TO: Susan Fregien
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FROM: Yared Kebede
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DATE: 11 October 2016

SUBJECT: REVIEW OF SAN JOAQUIN RIVER CHLORPYRIFOS AND DIAZINON ANNUAL MONITORING REPORTS FOR 2013 - 2015 WATER YEARS – EAST SAN JOAQUIN WATER QUALITY COALITION AND WESTSIDE SAN JOAQUIN RIVER WATERSHED COALITION

On 1 May 2014, the Central Valley Regional Water Quality Control Board (Central Valley Water Board) received the San Joaquin River Chlorpyrifos and Diazinon 2013 water year (October 2012 - September 2013) Annual Monitoring Report for compliance with the Total Maximum Daily Load requirements (TMDL AMR). The TMDL AMRs report on the East San Joaquin Water Quality Coalition (ESJWQC) and the Westside San Joaquin River Watershed Coalition (Westside Coalition) joint monitoring program.

On1 May 2015 and 1 May 2016, the Central Valley Water Board received the Coalitions' 2015 and 2016 TMDL AMRs, covering the 2014 water year (October 2013 - September 2014) and 2015 water year (October 2014 - September 2015) reporting period, respectively.

Central Valley Water Board staff reviewed the 2014 - 2016 TMDL AMRs to determine compliance with monitoring and reporting requirements pursuant to the Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins, and the Monitoring and Reporting Program (MRP) Orders No. R5-2012-0116-R3 and R5-2014-0002-R2. In this memorandum, staff presents a combined review of the monitoring results and outcomes of actions taken to meet the seven objectives described in the Basin Plan:

1. Determine compliance with established water quality objectives and the loading capacity applicable to diazinon and chlorpyrifos in the San Joaquin River

The Basin Plan requires that the loading capacity be calculated for the six designated compliance points in order to determine compliance with the water quality objectives and the loading capacity in the San Joaquin River (Basin Plan, page IV-36.03). The Coalitions collected and analyzed water samples from the San Joaquin River, as directed by the 27 March 2012 letter by the Executive Officer. For each reporting period, the ESJWQC collected samples six times from three sites along the San Joaquin River and the Westside Coalition collected samples 12 times at three sites. This monitoring was adequate to assess compliance with the water quality objectives and

loading capacity because samples were collected at an adequate frequency at all of these sites during critical periods of pesticides loading, i.e., times of storm/irrigation runoff following periods of application.

The San Joaquin River TMDL loading capacity was exceeded in March 2013 at the Las Palmas Avenue (i.e., San Joaquin River at PID pumps) site, in the combined Turlock- Merced-Greater Orestimba Sub Area (Table 1). Diazinon concentration was below detection in all samples collected during the reporting period (2013 - 2015 WYs). Despite an exceedance of the chlorpyrifos water quality objective concentration in March 2013 samples, the San Joaquin River is in attainment of the chlorpyrifos water quality objective because this is the first exceedance since the 1 December 2010 compliance deadline; the Basin Plan states that water quality objectives for chlorpyrifos and diazinon are not to be exceeded more than once in a three year period. However, the TMDL loading capacity was not attained and according to the Basin Plan, the Coalitions must implement an improved complement of management measures to meet the loading capacity (Page IV-36.03, item 9).

Table 1: Chlorpyrifos monitoring and exceedances from April 2008 to September 2015 at the San Joaquin River at Las Palmas Avenue (i.e., San Joaquin River at PID Pumps).

San Joaquin River at PID Pumps - Chlorpyrifos, Total, µg/L

Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015												
2014												
2013			0.038									
2012												
2011												
2010					0.04		0.019		0.016			
2009							0.033			0.023		
2008								0.048				

Sample collected

Analyte detected

Exceedance Concentration Low to High

2. Determine compliance with established load allocations for diazinon and chlorpyrifos

Load allocations for diazinon and chlorpyrifos are assigned to subareas discharging into a given reach of the San Joaquin River (Basin Plan, page IV-36.03). The load allocations are established by subarea, and are calculated using the combined additive toxicity formula. Load allocations apply to the discharge point to the San Joaquin River, and not to the whole tributary stream reach (page 21, Final Staff Report[1]). Monitoring occurred at the six San Joaquin River main stem sites as well as in 37 (2013 and 2014 WYs monitoring) and 34 (2015 WY monitoring) tributary sites, which are used to characterize the discharges from the San Joaquin River subareas. Generally this monitoring was adequate to determine compliance with load allocations.

[1] Beaulaurier, D., Karkoski, J., Davis, G., McClure, D., Menconi, M., McCarthy, M. 2005. Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River basins for the Control of Diazinon and Chlorpyrifos Runoff into the Lowers San Joaquin River. California Regional Water Quality Control Board, Central Valley Region. Sacramento, CA. Final Staff Report, October 2005. <http://www.waterboards.ca.gov/rwqcb5/water_issues/tmdl/central_valley_projects/san_joaquin_op_pesticide/final_staff_report/index.shtml>

During the 2013 water year, one exceedance of the water quality objective (WQO) each for chlorpyrifos and diazinon occurred in the tributaries monitored in the ESJWQC region (106 samples analyzed). A total of 15 exceedances of chlorpyrifos and diazinon were observed in the Westside Coalition region (115 samples analyzed). Instantaneous loads are calculated and reported in Table 24 for the Westside Coalition. No chlorpyrifos exceedances were observed in the combined Merced-Turlock-Greater Orestimba sub area that coincided with the March 2013 San Joaquin River load capacity exceedance. This indicates that the sources of chlorpyrifos contributing to this exceedance must be from un-monitored discharges to this reach of the San Joaquin River. This also emphasizes the need for monitoring in the San Joaquin River itself as a downstream integrator, and a possible need for additional monitoring to determine sources.

During the 2014 water year, there were three exceedances of the chlorpyrifos Water Quality Trigger Limit (WQTL) in samples collected from ESJWQC tributaries (129 samples analyzed). A total of 14 chlorpyrifos exceedances occurred in the Westside Coalition region (125 samples analyzed). Diazinon was not detected in any sample during the 2014 water year.

During the 2015 water year, there were eight exceedances of the chlorpyrifos WQTL in samples collected from ESJWQC tributaries (117 samples analyzed). Diazinon was not detected in any sample in the ESJWQC region. A total of nine chlorpyrifos exceedances occurred in the Westside Coalition region (133 samples analyzed); a single exceedance of the diazinon WQTL occurred during the same period. Overall, the load allocation in the Westside Coalition region during the 2015 WY was higher (93%) than in the 2014 WY (89%) and 2013 WY (87%).

Given that instantaneous loads are calculated and reported only for individual tributaries and not for the entire subarea assigned a load allocation (Appendix IV), it is not easy to ascertain if the load allocation was exceeded in the combined subarea on the occasion when an exceedance occurred in one of the tributaries. Based on the monitoring results at tributary sites closest to the discharge point into the River, the load allocation was potentially exceeded in four subareas during the 2013 water year[2]:

- Load allocation in the combined Tuolumne River, Northeast Bank, and Westside Creek subareas was exceeded in January, May, June, July and September. Chlorpyrifos exceedance was observed in Ingram Creek, Blewett Drain and Dry Creek in January, July and September, respectively. Diazinon was exceeded in May at Del Puerto Creek and Westley Wasteway, and in June at Ingram Creek. Chlorpyrifos and diazinon exceedances occurred together in Hospital Creek (May, June) and Ingram Creek (May).
- The combined Bear Creek and Fresno-Chowchilla subareas appear to have exceeded the load allocation in February 2013 based on data showing a diazinon exceedance of the WQTL in the field duplicate sample collected from Miles Creek.

[2] Although a total of 5 chlorpyrifos exceedances occurred in Poso Slough (March, May, June), Los Banos Creek (June) and Salt Slough (April), no exceedances occurred at the monitoring location closest to the discharge point into the San Joaquin River (Salt Slough at Lander Avenue and Los Banos Creek at Hwy 140), indicating that the load allocation was not exceeded on those occasions. The focus plan addressing water quality in the Poso Slough, and Salt Slough subwatersheds was implemented in 2012. Additional focus plan activities in Los Banos Creek subwatershed will take place following approval of the Westside Coalition's Surface Water Quality Management Plan (SQMP).

- The load allocation was exceeded in the combined Turlock, Merced, and Greater Orestimba subareas in May 2013 based on data showing diazinon WQTL exceedances in the Marshall Road Drain, Orestimba Creek and Ramona Lake near Fig Avenue sites.
- Load allocation in combined Stevinson and Grassland subareas was exceeded in May due to diazinon exceedance in Newman Wasteway.

Focused outreach to targeted growers has taken place in the affected subwatersheds in the ESJWQC region. Additional focused outreach and education is scheduled for site subwatersheds in the ESJWQC region to address high priority management plan constituents, including diazinon and chlorpyrifos within the 10-year deadline required by the Order.
A focused watershed management plan is already taking place in the Westside Coalition region under the current management plan. The Westside Coalition revised management plan strategy is currently under staff review.

The load allocation was potentially exceeded in four of the five subareas in the 2014 water year[3]:

- The combined Tuolumne River, Northeast Bank, and Westside Creek subareas exceeded the load allocation in October, March, July and September. Chlorpyrifos exceedances were observed in the ESJWQC region at Dry Creek @ Wellsford Rd (October), Lateral 2 ½ near Keyes Rd (July), and in the Westside Coalition region at Del Puerto Creek near Cox Road (March, September).
- The combined Bear Creek and Fresno-Chowchilla subareas exceeded the load allocation in March based on data showing chlorpyrifos exceedances in the Duck Slough subwatershed.
- The combined Turlock, Merced, and Greater Orestimba subareas exceeded the load allocation in March based on data showing chlorpyrifos exceedances in the Westside Coalition region at Ramona Lake near the Fig Avenue site within the Greater Orestimba subwatershed. There was no exceedance of load allocation concentrations in the Turlock and Merced subareas in the ESJWQC region during the 2014 WY.
- The load allocation in the combined Stevinson and Grassland subareas was exceeded in March and April based on data showing chlorpyrifos exceedances in Newman Wasteway, Salt Slough and Turner Slough.

The 2016 focused outreach is currently underway in the Dry Creek @ Wellsford Rd and Duck Slough @ Gurr Rd subwatersheds in the ESJWQC region. Additional focused watershed management plan outreach will take place in the affected subwatersheds in the Westside Coalition region following approval of the Coalition's revised SQMP.

The load allocation was potentially exceeded in four of the five subareas in the 2015 water year:

- The combined Turlock, Merced, and Greater Orestimba subareas potentially exceeded the load allocation seven times between January and August in the ESJWQC Region; all of the exceedances occurred in the ESJWQC region at the Prairie Flower Drain subwatershed from March through August 2015. The ESJWQC attributed chlorpyrifos

[3] Three chlorpyrifos exceedances occurred in Poso Slough (August, September), and Salt Slough (August) subwatersheds, no exceedances occurred at the monitoring location closest to the discharge point into the San Joaquin River (Salt Slough at Lander Avenue), indicating that the load allocation was not exceeded during those months.

application by non-member dairy farmers and previous members, and lack of flow for the observed exceedances (Page 212, 2016 Annual Report). A single exceedance occurred at Highline Canal @ Hwy 99 during the January monitoring event. There was no exceedance of load allocation concentrations in the Greater Orestimba subareas in the Westside Coalition in 2015.

- The combined Bear Creek and Fresno-Chowchilla subarea exceeded the load allocation based on data showing chlorpyrifos exceedances in July at Duck Slough @ Gurr Rd.
- The combined Tuolumne River, Northeast Bank, and Westside Creek subareas appear to have exceeded the load allocation in January (Del Puerto Creek at Hwy 33, Ingram Creek at River Rd, Ramona Lake near Fig Ave and Westley Wasteway near Cox Rd), February (Del Puerto Creek near Cox Rd and Hospital Creek at River Rd), and March (Del Puerto Creek near Cox Rd, Hospital Creek at River Rd).
- The combined Stevinson and Grassland subareas appear to have exceeded the load allocation based on data showing diazinon exceedances in February at Newman Wasteway near Hills Ferry Road. The PUR data obtained from the County Agricultural Commissioner's Office indicates a single application of diazinon in the Newman Wasteway subwatershed.

The 2016 Focused Outreach is currently underway in the Prairie Flower Drain, Highline Canal and Duck Slough subwatersheds. A focused watershed management plan is taking place in the Westside Coalition region under the current management plan. The Westside Coalition will continue implementing an improved set of management practices under the revised SQMP.

3. Determine the degree of implementation of management practices to reduce off-site movement of diazinon and chlorpyrifos

Both Coalitions collect information that allows determining implementation of management practices through the Farm Evaluation surveys required of all Coalition members. Generally the information collected was adequate to determine the degree of implementation of management practices to reduce the off-site movement of diazinon and chlorpyrifos.

Information about the ESJWQC approved management plan strategy to prioritize and address site subwatersheds with pesticide and toxicity management plans within the 10-year deadline required by the Order is briefly discussed in the 2016 TMDL report. Management practices implemented in the high priority subwatersheds within the ESJWQC region are presented in Figure 8 and Table 27 (2014 TMDL), Figure 6 and Table 25 (2015 TMDL), and Figure 7 and Table 24 (2016 TMDL) indicate that the majority of parcels have at least one management practice in place to reduce the offsite movement of pesticides.

The Westside Coalition presented results of management practices inventory data in the high priority subwatersheds in Table 28 (2014 TMDL), Table 26 (2015 TMDL) and Table 25 (2016 TMDL). However, the Westside Coalition has not updated the management practice inventory data since the submittal of the 2015 TMDL report. The Westside Coalition should clearly indicate the management practices implemented to reduce the off-site movement of diazinon and chlorpyrifos in the tributary subwatesheds consistent with the management practice information presented in Table 24 of the 2016 TMDL AMR.

4. Determine the effectiveness of management practices and strategies to reduce off-site migration of diazinon and chlorpyrifos

Despite a region-wide decrease in the number of detections and exceedances, continued exceedances in some tributaries of the San Joaquin River indicate that additional actions are required to meet water quality objectives. In future TMDL AMRs, evaluation of management practice data collected through Farm Evaluation surveys should provide more information on the implementation and effectiveness of management practices in reducing the offsite movement of pesticides in the Westside Coalition region.

Management practices implemented in the ESJWQC region were not able to eliminate chlorpyrifos exceedances in the Prairie Flower Drain subwatershed (March through August 2015). As part of the 2016 focused outreach, the ESJWQC coordinated a meeting with Dairy Cares to address chlorpyrifos exceedances for both Coalition and Dairy Care members. Staff acknowledges that such a coordinated effort is effective to address chlorpyrifos exceedances caused by non-members, and to evaluate the overall effectiveness of the implemented management practices.

Page 49, Figure 9 (2014 TMDL) plots the percent of irrigation season chlorpyrifos and diazinon detections between 2005 and 2013 for all sites within the Westside Coalition boundary. In the 2015 and 2016 TMDLs, the Coalition used all monitoring data (storm and irrigation seasons) to show the number of chlorpyrifos and diazinon detections between 2005 and 2014 (Figure 7, 2015 TMDL), and between 2005 and 2015 (Figure 8, 2016 TMDL). The Westside Coalition should keep using all monitoring data to show the trend of exceedances since implementing the TMDL management plan. In addition, to be consistent with prior exceedance reporting found in the monitoring reports, the Westside Coalition should add the count of exceedances and samples as found on Table 26 (2016 TMDL) in the ESJWQC.

5. Determine whether alternatives to diazinon and chlorpyrifos are causing surface water quality impacts

The TMDL reports indicate that several potential alternatives to diazinon and chlorpyrifos have caused water quality impairments (organophosphates, carbamates, and current use organochlorines) in tributaries in the ESJWQC and Westside Coalition region. Pyrethroids were implicated to cause sediment toxicity, and impaired water quality in some samples.

According to Figure 9 of the 2016 TMDL, chlorpyrifos and diazinon applications have decreased over the last 10 years, while the use of alternative pesticides such as pyrethroids, carbamates, and neonicotinoids to different crops have increased in the last five years (Figures 9 -15, 2015 TMDL AMR). The use of chlorpyrifos in almonds, corn, grapes, and walnuts especially showed a decreasing trend in 2014 as compared to the previous year. Diacylhydrazine insecticides were used more than chlorpyrifos on almonds during the 2015 WY (Figure 10, 2016 TMDL AMR); this trend is indicative of a shift in the use of other products. Registration of chlorpyrifos as a restricted material could also contribute to a further increase in the use of alternative products.

While it is difficult to determine if any of the detected pesticides in waterways was used as an alternative to chlorpyrifos and diazinon or as part of growers' pesticide management rotation, it is apparent from Figures 9 - 15 (2015 TMDL AMR) and Figure 10 (2016 TMDL AMR) that a decline in the use of organophosphate pesticides, including diazinon and chlorpyrifos, coincides with increasing trends in the use of other groups of materials, such as diacylhydrazines, pyrethroids, carbamates, neonicotinoids, etc. Also, monitoring results show the use of these products resulted in water column and sediment toxicity (see Objective 6 below).

6. Determine whether the discharge causes or contributes to a toxicity impairment due to additive or synergistic effects of multiple pollutants

Toxicity monitoring results from the 2013 through 2015 water years included water column and sediment toxicity tests that could indicate if additive or synergistic effects of multiple pesticides may be causing or contributing to toxicity impairment in the Eastside and Westside tributaries, and at three sites on San Joaquin River monitored by the Westside Coalition. No samples from the San Joaquin River exhibited toxicity to the test organisms in the 2013 - 2015 WYs.

In the 2013 water year, two *Ceriodaphnia dubia* toxicity exceedances in the ESJWQC region were associated with organophosphate insecticides (Table 35). Toxicity Identification Evaluation (TIE) conducted on five toxic samples in the Westside Coalition region exhibited multiple pesticides including chlorpyrifos and diazinon. Chemistry analyses conducted on two sediment samples in the ESJWQC region and seven sediment samples in the Westside Coalition region indicated the presence of multiple pyrethroids, and chlorpyrifos.

In the 2014 water year, one water column sample toxic to *C. dubia* was associated with chlorpyrifos in the ESJWQC region. No *C. dubia* toxicity was observed in water column samples in the Westside Coalition region. Additional chemistry analyses conducted on three sediment samples in the ESJWQC region and seven sediment samples in the Westside Coalition region indicated the presence of multiple pyrethroid, and chlorpyrifos

In the 2015 water year, eight *C. dubia* toxicity exceedances were observed in the ESJWQC region. TIE conducted on five toxic samples indicated chlorpyrifos was responsible for most of the toxicity observed in four samples; TIE implicated malathion for the observed toxicity in the remaining sample. Five water column samples were toxic to *C. dubia* in the Westside Coalition; TIE results implicated chlorpyrifos for *C. dubia* toxicity in two samples and diazinon in one sample. Additional chemistry conducted on nine sediment samples in the Westside Coalition region and one sediment sample in the ESJWQC region indicated the presence of multiple pyrethroids, and chlorpyrifos. Overall, at least one constituent, i.e., pyrethroid or chlorpyrifos was present in sufficient quantity to have caused the toxicity by itself. Therefore, it is not possible to conclude if additive interactions among pyrethroids, and with chlorpyrifos occurred.

7. Demonstrate that management practices are achieving the lowest pesticide levels technically and economically achievable

The Coalitions track implementation and effectiveness of management practices in preventing off-site movement of pesticides through Farm Evaluation surveys reported by members, and additional information collected during focused outreach, as required. Overall, growers have been responsive and implemented additional or new management practices in the focused areas. A management practices inventory is summarized in Tables 27 and 28 (2014 TMDL AMR), Tables 25 and 26 (2015 TMDL AMR) and Table 24 and 25 (2016 TMDL AMR). The extent to which management practices are achieving the lowest achievable pesticide levels that are technically and economically feasible varies across different subwatersheds.

The management practice inventory data provided by the Westside Coalition (Table 25, 2016 TMDL AMR) should be updated to include new management practices implemented in the Coalition region since the submittal of the 2015 TMDL report. Without the implementation of additional (new) management practices, and the relatively high frequency of pesticides and toxicity problems in the Coalition region, it is difficult to determine if the Coalitions are achieving the lowest pesticide levels technically and economically feasible. Staff recommends information obtained through the Farm Evaluation survey to be included in future TMDL reports to indicate the extent to which management practices are achieving the lowest pesticides levels.

Conclusions

- Monitoring goals described in the Basin Plan are largely being achieved.
- Water quality objectives for chlorpyrifos and diazinon in the San Joaquin River are being attained.
- Continued exceedances in some tributaries indicate that additional actions are required to meet water quality objectives.
- Continue main stem monitoring as levels of concern in the San Joaquin River are not always apparent from the existing tributary monitoring.
- Management practices information obtained through the Farm Evaluation surveys should be included in the future TMDL reports.

APPENDIX I
Chlorpyrifos and Diazinon Annual Monitoring Reports Checklist

San Joaquin River Chlorpyrifos and Diazinon 2013 - 2015 Water Years Annual Monitoring Reports						
Report Submittal Date: 1 May 2014; 1 May 2015; and 1 May 2016						Review Date and Reviewer Name: 1 August 2016, Yared Kebede
Item No.	TMDL AMR Component Name		Page Number 2014 AMR	Page Number 2015 AMR	Page Number 2016 AMR	Comments
1	**Signed Transmittal Letter**	✓				
2	**Title Page**	✓				
3	**Table of Contents**	✓				
4	**Executive Summary**	✓				
5	**Introduction**	✓				
6	**Monitoring Objectives and Design**	✓	5-12	5-12	5-11	Monitoring objectives based on the Basin Plan requirements, and Coalition actions to meet the objectives are listed. Monitoring design aligns with the approved approach.
	Loading capacity: monitoring schedule and parameters at compliance points	✓	13-16; 23-24	13-16; 22-23	7-17; 21-22	The monitoring schedule fulfilled the load capacity site monitoring requirements, including location and frequency. One sample collected at San Joaquin River at Las Palmas Ave had a chlorpyrifos exceedance in March 2013. This is the first exceedance within a 3-year period. Diazinon was not detected along the SJR during the 2013 water year. No chlorpyrifos and diazinon were detected on the six compliance points in the San Joaquin River during the 2014 water year. Chlorpyrifos was detected at San Joaquin River at Las Palmas Avenue in January 2015 samples.
	Load allocations: tributary monitoring sites, parameters, schedule	✓	15-16; 34-39	15-16; 32-37	14-15; 29-35	Tributary monitoring schedule for chlorpyrifos and diazinon is summarized for areas east and west of the River.
7	**Sampling Site Descriptions and Rainfall Records for the time period covered under the AMR**	✓	13-20	13-19	12-18	In addition to the list of sampling sites, land use and top crops are summarized for the drainage areas represented by compliance points. The 2013 - 2015 water years were classified as a critically dry years. Daily rainfall records for four locations in the ESJWQC and Westside Coalition region are provided in graphic form.
8	**Location Maps(s) of sampling sites, crops, and land uses**	✓	15,16	16	15	Location maps show sampling sites, and sources of data layers are identified on maps; NAD 1983 meets datum requirements. Land use and crop information are summarized in a table. All tables should use consistent sub-area names. Table 4 in the 2015 AMR lists the full subarea name as Stevinson-Grassland, but in Table 18 the same subarea is listed as just Stevinson.
9	**Tabulated Results**	✓	Appendices II and IV	Appendices II and IV	Appendix I	A summary of chlorpyrifos and diazinon results is provided in the Appendices.
10	**Data Discussion to Illustrate Compliance**	✓	30-66	29-67	28-63	
	OBJECTIVE 1: Determine compliance with established water quality objectives and the loading capacity applicable to diazinon and chlorpyrifos in the San Joaquin River	✓	30-32	29-30	28-29	One exceedance of the loading capacity was observed in the 2013 water year. The water quality objective is still met because this is the first exceedance within a three period. However, the loading capacity is not in compliance with the TMDL for this section of the SJR. The loading capacity was met during the 2014 and 2015 water years.
	OBJECTIVE 2: Determine compliance with established load allocations for diazinon and chlorpyrifos	✓	32-40	33-36	29-35	Chlorpyrifos/diazinon exceedances occurred in four of the five subareas defined in the Basin Plan during the reporting period (2013 - 2015 WYs). There were a total of 15 exceedances of the WQO in the Westside Coalition region in the 2013 water year, and two in the ESJWQC region. A total of 14 exceedances occurred in the Westside Coalition region in the 2014 water year, and three in the ESJWQC region. A total of 10 exceedances occurred in the Westside Coalition region in the 2015 water year, and 8 in the ESJWQC region. **See memo**.

APPENDIX I
Chlorpyrifos and Diazinon Annual Monitoring Reports Checklist

Item No.	TMDL AMR Component Name		Page Number 2014 AMR	Page Number 2015 AMR	Page Number 2016 AMR	Comments
	OBJECTIVE 3: Determine the degree of implementation of management practices to reduce off-site movement of diazinon and chlorpyrifos	✓	40-47	38-44	35-41	Both Coalitions collect information from pesticide use and grower surveys that allows determining the degree of implementation of various management practices and their effect on discharges. However, additional or new management practices implemented in the Westside Coalition region should be summarized in the TMDL report. **See memo.**
	OBJECTIVE 4: Determine the effectiveness of management practices and strategies to reduce off-site migration of diazinon and chlorpyrifos	✓	47-49	45*-48*	42-45	Coalitions evaluated the reduction of off-site migration of chlorpyrifos and diazinon due to implementation of management practices. The effectiveness of the implemented management practices varies across different subwatersheds. Westside Coalition needs to include the percent of exceedances (e.g. Figure 8, 2016 AMR) to be consistent with the ESJWQC section and previous reporting formats. **See memo.**
	OBJECTIVE 5: Determine whether alternatives to diazinon and chlorpyrifos are causing surface water quality impacts	✓	49-62	48*-62	45-58	Results discussed in text indicates alternatives to diazinon and chlorpyrifos are causing water quality problems. **See memo.**
	OBJECTIVE 6: Determine whether the discharge causes or contributes to a toxicity impairment due to additive or synergistic effects of multiple pollutants	✓	62-65	63-66	58-62	Based on Tables 38 and 39 (2014 AMR), and Tables 34 and 35 (2015 AMR; 2016 AMR) evidence suggests that alternative pesticides are causing water quality impacts in the Westside area. However, there is no evidence of synergistic or additive effects causing toxicity. **See memo.**
	OBJECTIVE 7: Demonstrate that management practices are achieving the lowest pesticide levels technically and economically achievable	✓	65-66	67	63	**See memo**
11	**Electronic data submitted in a CEDEN comparable format**	✓	CD	CD	CD	ESJWQC and Westside Coalition field and lab data uploaded into a CEDEN comparable database.
12	**Sampling and analytical methods used**	✓	21-22, Appendices	20-21, Appendices	19-20	Sampling (collection containers, sample preservation, holding times, field measurements) and analytical methods are summarized. Both Coalitions use appropriate analytical methods with low detection limits.
13	**Copies of chain-of-custody forms and sample receipt documentation**	✓	Appendix I	Appendix I	CD	Copies of all COCs are included, legible and completely filled out; there were no anomalies affecting diazinon and chlorpyrifos TMDL samples during the 2013 - 2015 water years. The Coalitions refers to the Quarterly Monitoring data report submittal to meet the requirement for the 2016 AMR.
14	**Field Data Sheets, Lab Reports, Lab Raw Data**	✓	Appendix V, CD	Appendix V, CD	CD	Copies of all field data sheets completed and presented in report Appendices. All analytical reports are provided on CD, complete, and signed by authorized laboratory representative. Included are sample results with units, RLs and MDLs; sample preparation, extraction and analysis dates; results for all QC samples: field and laboratory blanks, lab control spikes, matrix spikes, field and laboratory duplicates, surrogate recoveries; and chemistry lab narrative describes all QC failures, analytical problems and anomalous occurrences. The Coalitions refers to the Quarterly Monitoring Data Report submittal to meet the requirement for the 2016 AMR.
15	**Associated laboratory and field quality control samples results**	✓	Appendix III	Appendix III	Appendix II	Chemical analyses include: field blank, field duplicate, lab blank, matrix spike and MSD, lab control spike and LCSD, surrogate recovery, and results are included in the TMDL AMR.
16	**Summary of Quality Assurance Evaluation results**	✓	27-29	26-28	23-27	Acceptance criteria for all field and laboratory QA/QC measurements are identified and in agreement with the ILRP requirements, summaries of accuracy and precision are included, field and laboratory completeness are calculated and reported, and overall Project completeness is determined. Field and laboratory completeness met or exceeded the 90% completeness goal, and >90% of samples met the holding time requirements for chemistry analyses. Data are appropriately flagged in cases where QA/QC results that did not meet acceptance criteria.
17	**Flow Monitoring Method(s)**	✓	22	21	20	Discharge method and gauge for the compliance points in the San Joaquin River are listed in the TMDL AMRs, and Coalitions' QAPP's are referenced for discharge measurements at tributaries.

APPENDIX I
Chlorpyrifos and Diazinon Annual Monitoring Reports Checklist

Item No.	TMDL AMR Component Name		Page Number			Comments
			2014 AMR	2015 AMR	2016 AMR	
18	**Monitoring Site Photos**	✓	Appendix VI	Appendix VI	CD	Monitoring site photos submitted with the Quarterly Monitoring Data Report met this requirement for the 2016 AMR.
19	**Summary of Exceedance Reports submitted during the reporting period and related pesticide use information**	✓	21-36	22-38	21-35	Summary of all Exceedance Reports submitted during the TMDL AMRs period are included and match previously reported exceedances.
20	**Actions Taken to Address Water Quality Exceedances**	X	41-47 (X)	38-44 (✓)	35-41(✓)	Actions taken to address the March 2013 SJR chlorpyrifos exceedance are not evident in the report. Coalitions actions to address exceedances and follow-up actions should be documented.
21	**Status update on preparation and implementation of all management plans and other special projects**	✓	46	43	36-37; 40	An update on status of all Management Plans and special projects that are in preparation or being implemented are provided in the ESJWQC's AMR and MPUR, and Westside Coalition's SAMR.
22	**Conclusions and Recommendations**	✓	67-68	68	64	This section should have included recommendations concerning the March SJR exceedance and any follow-up actions. More information regarding the March SJR exceedance should have been provided.

* After page 45 in the report, the numbering restarts at 53 and next pages remains the same page (53) until page 60. The checklist continues with page 46 in order to identify page numbers properly.

Symbol Key

- ✓ **Item meets requirements**
- X **Incomplete Item/Not included**
- – **Not Applicable**