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SACRAMENTO VALLEY WATER QUALITY
COALITION

Diazinon Runoff Management Plan for Orchard Growers in the Sacramento Valley:

2006 Annual Report

prepared by

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Diazinon Runoff Management Plan
For Orchard Growers
In the Sacramento Valley:

2006 Annual Report

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A INTRODUCTION

In fulfillment of the requirements set forth in the Diazinon Runoff Management Plan, the Sacramento Valley Water Quality Coalition is submitting the Annual Report summarizing the 2005-2006 monitoring objectives, location and results, outreach efforts, grower survey follow-up, and management practices effectiveness.

B BACKGROUND

The federal Clean Water Act requires each State to identify waters within its boundaries that are not currently meeting or maintaining water quality standards (33 USC 1313 (d)(1)). Water quality standards consist of the beneficial uses for which waterways are used and water quality objectives set at specified levels to maintain beneficial uses. The Sacramento and Feather Rivers were listed as impaired by diazinon in 1994 for the Sacramento and Feather Rivers by the Central Valley Regional Water Quality Control Board (Regional Board), in part due to an error in the data set used in the calculation of the water quality objective for diazinon.

Due to this listing, the Regional Board adopted a total maximum daily load (TMDL) in accordance with the federal Clean Water Act (33 USC 1313 (d)(1)). Loads established in a TMDL are required to implement the applicable water quality standards with seasonal variations and a margin of safety (Id.). In addition to adopting a TMDL, the Regional Board also prepared and adopted a Basin Plan amendment that included new water quality objectives for diazinon and an implementation plan. The Basin Plan amendment was intended to establish an orchard runoff control program that focused on protecting the Sacramento and Feather Rivers from the impacts of diazinon.

More specifically, the Regional Board adopted (and the State Water Resources Control Board and federal EPA approved) diazinon water quality objectives of 0.080 µg/L as a 1-hour average (i.e. acute objective) and 0.050 µg/L as a 4-day average (i.e. chronic objective). At the time of adoption (and subsequently), questions were raised about the validity of the objectives and the studies from which the objectives were derived. As a result of subsequent litigation, the Regional Board committed to reviewing the objectives by July 1, 2007, and potentially amending the objectives by July 1, 2008.¹ In the meantime, the Basin Plan amendment also contained requirements for an Orchard Pesticide Runoff and Diazinon Runoff Control Program. As part of the Control Program, the Regional Board is requiring dischargers of diazinon to submit a management plan that “describes actions that the discharger will take to reduce diazinon discharges and meet the applicable allocations by the required compliance date.” In lieu of

¹ The Regional Board’s adoption and the State Water Resources Control Board’s approval of the diazinon objectives were challenged in the Sacramento Superior Court by Makhteshim Agan of North America, Inc. (MANA). In its denial of MANA’s petition, the Court relied on representations made by the Regional Board’s Executive Officer, Thomas Pinkos, in an August 11, 2004 communication whereby the Regional Board committed to conducting a review of the diazinon program including recommending changes to the water quality objectives by June 20, 2007. It is understood that any amendments to the diazinon objectives would then occur prior to July 1, 2008 when compliance with the objectives as currently adopted is required by the Basin Plan.

individual plans, the Basin Plan amendment allows a discharger group or a coalition to submit management plans.

Monitoring Objectives

The purpose of the monitoring program is to determine whether numeric water quality objectives for diazinon contained in the *Basin Plan Amendment* are being met in the Sacramento and Feather Rivers. Specifically, the *Basin Plan Amendment* identifies the following goals for compliance monitoring for the TMDL:

1. Determine compliance with established water quality objectives for diazinon in the Sacramento and Feather Rivers;
2. Determine compliance with established waste load allocations and load allocations for diazinon;
3. Determine the degree of implementation of management practices to reduce off-site migration of diazinon;
4. Determine the effectiveness of management practices and strategies to reduce off-site migration of diazinon;
5. Determine whether alternatives to diazinon are causing surface water quality impacts;
6. Determine whether the discharge causes or contributes to a toxicity impairment due to additive or synergistic effects of multiple pollutants; and
7. Demonstrate that management practices are achieving the lowest pesticide levels technically and economically achievable.

Water quality monitoring results presented Section C of this report address goals 1 and 2. Adequate data are not yet available to address goals 5, and 6. Results from the Coalition Irrigated Lands Program monitoring will be used to address these goals in future reports. Goals 3, 4, and 7 are addressed in Sections D, 0, and 0 of this report.

Sampling Site Descriptions

Selection of monitoring sites for the compliance monitoring program is detailed in the *Diazinon Runoff Management Plan for Orchard Growers in the Sacramento Valley* (SVWQC 2006).

Monitoring sites for this program are consistent with those proposed in the *Basin Plan Amendment Staff Report* (CVRWQCB 2003) which identifies 6 compliance monitoring locations, and with subsequent monitoring guidance provided to the Coalition by the Regional Board (CVRWQCB letter to SVWQC, May 2, 2005), which proposed 2 additional sites. Five of these sites were selected for compliance monitoring by the Coalition. The sites for the Coalition's compliance monitoring program are Sacramento River at Colusa, Sacramento Slough, Colusa Basin Drain, Feather River at Yuba City, and Feather River at Verona. Compliance is assessed for a sixth site (Sacramento River at Verona) by mass-balance calculations with monitoring results for the other five sites. All six sites and their contributing watersheds (as defined by the *Basin Plan Amendment*) are listed in Table 1 and also illustrated in Figure 1.

Table 1. Compliance Monitoring Sites for Diazinon Runoff Management Plan

Site	Site ID	Subwatershed	Lat	Long
Sacramento River at Colusa	SRCOL	Sacramento River above Colusa	39.2142	-121.9992
Colusa Basin Drain above Knight's Landing	COLDR	Colusa Basin	38.8121	-121.7741
Sacramento Slough	SACSL	Sutter/Butte	38.7833	-121.6338
Feather River above Yuba City	FRYUB	Drainage not defined	39.1384	-121.6058
Feather River near Verona	FRVON	Feather River	38.7903	-121.6266
Sacramento River at Verona	SRVON	Sum of Sacramento River above Colusa, Colusa Basin, Sutter/Butte, and Feather River subwatersheds	38.8875	-121.6097

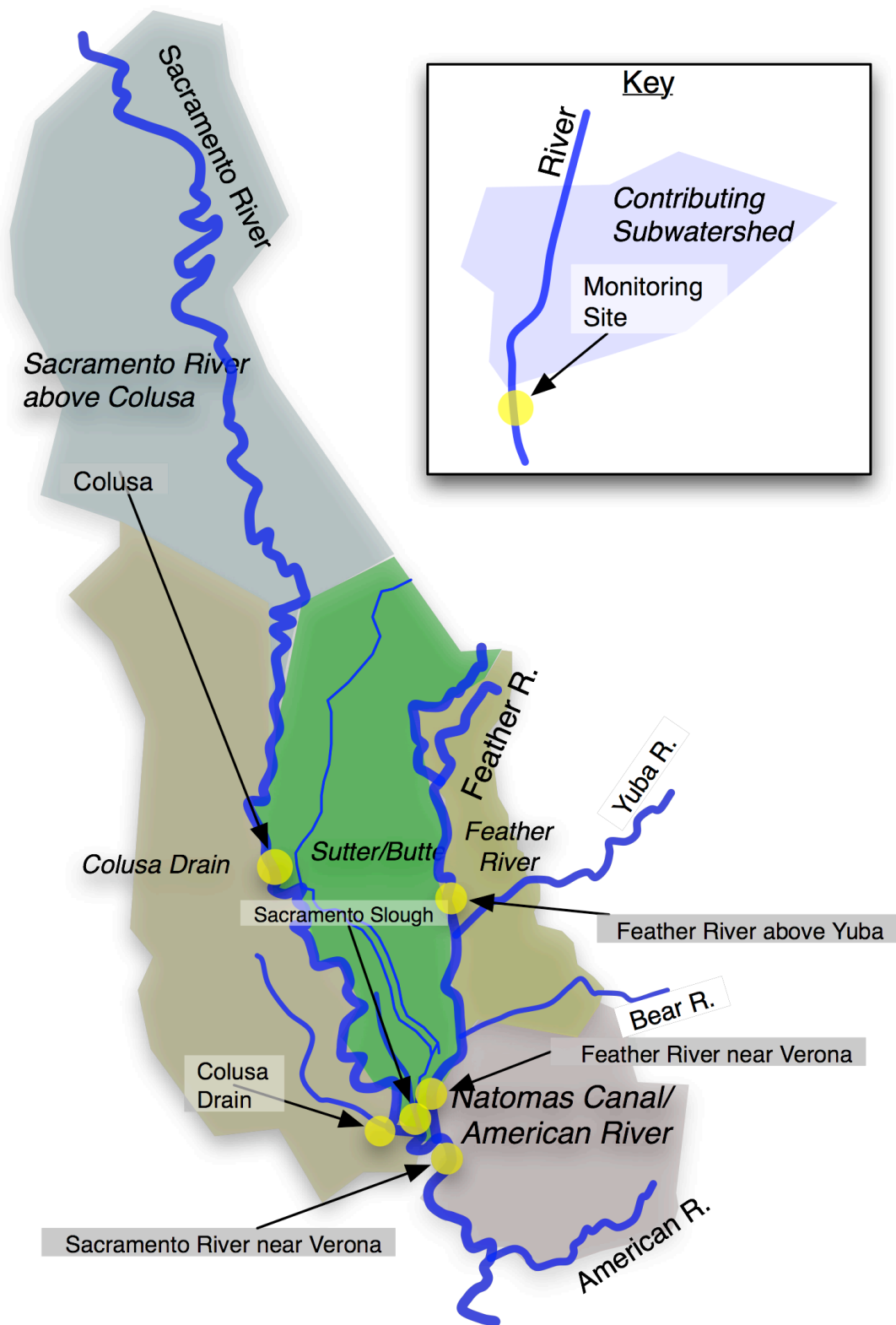


Figure 1. Compliance Monitoring Sites

Descriptions Of Sampling And Methods Used

Samples for each event were analyzed for diazinon, flow, pH, and conductivity (Table 2):

- Diazinon was analyzed in each daily sample to characterize concentrations and allow estimation of daily loads of diazinon from each subwatershed (monitoring goals 1 and 2). The analytical method used for diazinon is a modification of EPA Method 625.
- pH and conductivity were measured in the field for each sample collected and recorded on field log sheets. Flow data will be acquired from USGS or DWR flow gauging stations (Sacramento River at Colusa, and Sacramento River at Verona) or measured in the field (all other sites). These parameters are measured to allow load calculation and to evaluate the length of storm impacts for each event.

Analytical methods were selected to provide adequate sensitivity, accuracy, and precision to address the monitoring goals. Sufficient numbers of quality assurance samples were planned and analyzed to ensure validity of the data for addressing the monitoring goals.

Table 2. Constituents Monitored

Parameter	Method Detection Limit	Quantitation Limit	Reporting Unit	Composite or Grab
Diazinon	0.005	0.01	ug/L	Depth-Width Integrated Samples
Flow	NA	NA	CFS (ft ³ /sec)	Instream flow measurements or appropriate gauge data
pH	NA	0.1 ^(a)	-log[H ⁺]	Instream probe
Conductivity	NA	0.1 ^(a)	μmhos/cm	Instream probe

(a) Detection and reporting limits are not strictly defined. Value is required reporting precision.

(b) Limits are different for individual pesticides. Refer to Quantitation and Detection Limits.

C MONITORING RESULTS

Tabulated results of analyses

The results of the analyses of water quality samples collected in 2006 for the compliance monitoring program are presented in Table 3.

Table 3. Results For Field And Laboratory Analyses

Location	Date	Time	Matrix	Diazinon, µg/L	Conductivity, uS/cm	pH, - log[H ⁺]
Colusa Drain at Knights Landing	01/28/06	15:30	Sample	0.0149	602	7.28
Colusa Drain at Knights Landing	01/30/06	17:45	Sample	0.0101	640	7.5
Colusa Drain at Knights Landing	01/31/06	17:25	Sample	J 0.0066	567	7.54
Colusa Drain at Knights Landing	01/31/06	17:30	Sample ^a	J 0.0083	nm ^c	nm
Colusa Drain at Knights Landing	02/28/06	17:10	Sample	0.0932^e	449	7.69
Colusa Drain at Knights Landing	03/01/06	07:45	Sample	0.0253	460	7.75
Colusa Drain at Knights Landing	03/02/06	07:50	Blank ^b	<0.005	nm	nm
Colusa Drain at Knights Landing	03/02/06	07:55	Sample	0.081	406	7.5
Feather River at Verona	01/28/06	17:45	Sample	<0.005	85	7.21
Feather River at Verona	01/30/06	16:11	Sample	<0.005	92	7.08
Feather River at Verona	01/31/06	15:30	Sample	<0.005	72	7.4
Feather River at Verona	02/28/06	14:45	Sample	<0.005	82	7.4
Feather River at Verona	03/01/06	17:00	Sample	<0.005	85	7.62
Feather River at Verona	03/02/06	10:25	Sample	0.0052	83	7.4
Feather Rver above Yuba City	01/28/06	13:45	Sample	<0.005	87	6.96
Feather Rver above Yuba City	01/30/06	13:30	Sample	J 0.0071	82	7.62
Feather Rver above Yuba City	01/31/06	11:30	Sample	0.033	76	7.23
Feather Rver above Yuba City	02/27/06	18:00	Blank ^b	<0.005	nm	nm
Feather Rver above Yuba City	02/27/06	18:10	Sample	<0.005	84	7.11
Feather Rver above Yuba City	02/28/06	11:15	Sample	<0.005	81	7.7
Feather Rver above Yuba City	03/01/06	14:00	Sample	<0.005	90	7.17
Sacramento Slough	01/28/06	17:00	Sample	0.038	248	7.36
Sacramento Slough	01/30/06	15:32	Sample	0.0351	301	7.57
Sacramento Slough	01/31/06	14:55	Blank ^b	<0.005	nm	nm
Sacramento Slough	01/31/06	15:00	Sample	0.0243	338	7.71
Sacramento Slough	02/28/06	13:50	Sample	<0.005	246	7.82
Sacramento Slough	03/01/06	15:45	Sample	0.0216	162	7.54
Sacramento Slough	03/02/06	09:25	Sample ^d	0.0073	nm	nm
Sacramento Slough	03/02/06	09:30	Sample	0.0086	190	7.43
Sacramento River at Colusa	01/28/06	10:25	Blank ^b	<0.005	nm	nm
Sacramento River at Colusa	01/28/06	11:00	Sample	<0.005	146	6.74
Sacramento River at Colusa	01/30/06	11:20	Sample	J 0.0079	128	7.33
Sacramento River at Colusa	01/31/06	09:23	Sample	<0.005	139	7.38
Sacramento River at Colusa	02/28/06	09:00	Sample	0.0146	125	7.67
Sacramento River at Colusa	03/01/06	11:00	Sample	0.0159	90	7.76

a replicate samples, RPD = 23%

b field blank

c nm = not measured

d replicate samples, RPD = 16%

e Bold values indicate exceedance of TMDL objectives (0.05 µg/L and 0.08 µg/L)

Results Of Laboratory And Field Quality Assurance Analyses

The results of laboratory and field Quality Assurance (QA) analyses are presented in Table 4. Laboratory QA for diazinon analyses included method blanks, matrix spikes and matrix spike duplicates, and surrogate recoveries in samples matrices. All laboratory QA results met program data quality objectives. Four field blanks and two sets of field replicate samples were also collected and analyzed for the two sample events. Diazinon was below the analytical detection limit of 0.005 µg/L in all field blanks, indicating that sample contamination was not adversely affecting sample results. The relative percent difference (RPD) for the two sets of field replicate samples was 23% and 16%, and met the data quality objective for this QA analysis (<25% RPD).

Table 4. Field and Laboratory QA Results

QA Sample Type	Sample ID	Units	Diazinon	Result Qualifier	Data Quality Objective
Field Blank	COLDR-WB1-POI-002.3	µg/L	<.005	ND	<.005
Field Blank	FRYUB-WB1-POI-002.1	µg/L	<.005	ND	<.005
Field Blank	SACSL-WB1-POI-001.3	µg/L	<.005	ND	<.005
Field Blank	SRCOL-WB1-POI-001.1	µg/L	<.005	ND	<.005
Field Duplicate	COLDR-WE1-POI-001.3	µg/L	0.0066	J	NA
Field Duplicate	COLDR-WE2-POI-001.3	µg/L	0.0083	J	NA
Field Duplicate		RPD	23%		<25%
Field Duplicate	SACSL-WE2-POI-002.3	µg/L	0.0073		NA
Field Duplicate	SACSL-WE1-POI-002.3	µg/L	0.0086		NA
Field Duplicate		RPD	16%		<25%
Lab duplicate	FRVON-WE1-POI-002.2	µg/L	<.005	ND	NA
Lab duplicate		µg/L	<.005	ND	NA
Lab duplicate		RPD	0%		<25%
Lab duplicate	FRYUB-WE1-POI-001.3	µg/L	0.0325		NA
Lab duplicate		µg/L	0.033		NA
Lab duplicate		RPD	1.5%		<25%
Method Blank	34687 B1	µg/L	<.005	ND	<.005
Method Blank	34708 B1	µg/L	<.005	ND	<.005
Method Blank	36175 B1	µg/L	<.005	ND	<.005
MS/MSD	FRVON-WE1-POI-002.2	% Recovery	99		70-130
MS/MSD	FRVON-WE1-POI-002.2	% Recovery	93		70-130
MS/MSD	FRYUB-WE1-POI-001.3	% Recovery	85		70-130
MS/MSD	FRYUB-WE1-POI-001.3	% Recovery	97		70-130

Summary Of Precision And Accuracy

Based on the results of field and laboratory QA analyses, precision and accuracy met all program data quality objectives and was adequate for the monitoring compliance program.

Data interpretation

Summary Of Sampling Conditions

Weather conditions during the first sample event (January 28 – 31, 2006) were overcast with scattered showers and gusty winds throughout the duration of the sampling event. Waters were all turbid, swift and levels were high at all sampled locations. Water temperatures ranged from 9°C to 11°C, pH values were all within one pH unit of 7.00, and conductivity values ranged between 80 and 600 µS/cm. On day 3, at the Feather river at Verona site, there was a white milky sheen covering the water surface throughout the entire sampling period (approximately 45 minutes). This sheen stretched from the left bank to about mid channel during the time of sample collection.

Conditions during the second event (February 28 – March 2, 2006) were partly cloudy with scattered thundershowers and gusty winds throughout the duration of the sampling event. Significant rain showers occurred at night. Waters were all turbid, swift and extremely high in all of the rivers. On 2/28/06 at Sacramento Slough, water was flowing upstream, indicating that the slough was being filled with water from the Sacramento River. On 3/1/06 and 3/2/06, Sacramento Slough overflowed its banks by approximately 2 feet and 4 feet, respectively. Due to the absence of defined banks for measuring channel width, the tree line on each bank was used as a substitute to define channel width for flow measurements.

Assessment Of Data Quality Objectives

The data quality objectives for this monitoring effort are described in the QAPP for this program.

Completeness is defined as the percent of planned data that was successfully collected and analyzed. All planned diazinon and field-measured parameters were successfully collected and analyzed. All planned flow data were collected with the exception of one measurement for Feather River at Verona. Completeness for planned diazinon, pH, and conductivity analyses was 100%. Completeness for flow measurements was 97%.

Representativeness of the data collected was assured by selection of appropriate sampling and analytical methods. There was no deviation from the standard operating procedures specified in the QAPP, and the data are considered adequately representative for the purpose of the compliance monitoring program.

Analytical precision is assessed by analyzing laboratory-prepared matrix spike duplicates. Sampling precision is assessed by analyzing field-collected sample replicates. All replicate results were within project data quality objectives (<25% Relative Percent Difference), and precision is considered adequate for the purpose of the compliance monitoring program.

Analytical accuracy is assessed by routine calibration and analysis of laboratory-prepared matrix and by addition of surrogate organic compounds to sample matrices. All recoveries of matrix spikes and surrogate compounds were within acceptable limits, and analytical accuracy is considered adequate for the purpose of the compliance monitoring program.

Load Estimates

Mean daily flows for Sacramento River at Colusa, Sacramento River at Verona, and Colusa Basin Drain were acquired from the California Data Exchange Center (CDEC). Mean daily flows for Sacramento Slough, Feather River above Yuba City, and Feather River at Verona were set equal to instantaneous discharges measured instream at the time of sampling.

Daily diazinon loads were calculated for all compliance sites. Daily loads were calculated as:

$$Load = Q \times C \times UCF$$

Where, *Load* is the daily diazinon load in g/day,

Q = mean daily flow in CFS

C = sample diazinon concentration, in µg/L, and

UCF = a unit conversion factor of 2.4446.

Loads for Sacramento River at Verona were calculated as the sum of daily loads for Sacramento River at Colusa, Sacramento Slough, Colusa Basin Drain, and Feather River at Verona. The loads estimated for Sacramento River at Verona were also used to back-calculate estimated diazinon concentrations using the above equation for loads.

Flow data, diazinon concentrations, and calculated loads are presented in Table 5.

Table 5. Flow Data And Calculated Loads

Station ^a Code	Date	Mean daily flow	Diazinon Concentrations And Loads In Samples			Daily TMDL Loading Objectives, g/day		4-day average TMDL Loading Objectives, g/day	
			sample, ug/L	Est'd 4- day avg.	Load, g/day	Load Capacity (LC)	Load Allocation (LA)	Load Capacity (LC)	Load Allocation (LA)
COLDR	01/28/06	623	0.0149	0.0111	23	NA	1289	NA	806
COLDR	01/30/06	961	0.0101		24	NA	1317	NA	823
COLDR	01/31/06	1094	0.0066		18	NA	1384	NA	865
COLDR	01/31/06	1094	0.0083		22	NA	1384	NA	865
COLDR	02/28/06	2489	0.0932	0.0665	567	NA	1240	NA	775
COLDR	03/01/06	2787	0.0253		173	NA	1702	NA	1064
COLDR	03/02/06	2375	0.081		471	NA	1915	NA	1197
FRVON	01/28/06	13000 ^b	<.005	<.005	<159	2544	910	1590	569
FRVON	01/30/06	13067	<.005		<160	2557	930	1598	581
FRVON	01/31/06	14442	<.005		<177	2826	977	1766	610
FRVON	02/28/06	25902	<.005	<0.0051	<317	5068	876	3168	547
FRVON	03/01/06	38317	<.005		<469	7498	910	4686	751
FRVON	03/02/06	34124	0.0052		434	6677	1352	4173	845
FRYUB	01/28/06	5829	<.005	<0.0149	<71	NA	NA	NA	NA
FRYUB	01/30/06	6629	0.0071		115	NA	NA	NA	NA
FRYUB	01/31/06	8494	0.0325		675	NA	NA	NA	NA
FRYUB	02/27/06	6440	<.005	<.005	<79	NA	NA	NA	NA
FRYUB	02/28/06	16262	<.005		<199	NA	NA	NA	NA
FRYUB	03/01/06	39503	<.005		<483	NA	NA	NA	NA
SACSL	01/28/06	4876	0.038	<0.0325	453	NA	2502	NA	1564
SACSL	01/30/06	2320	0.0351		199	NA	2557	NA	1598
SACSL	01/31/06	712	0.0243		42	NA	2686	NA	1679
SACSL	02/28/06	3649	<.005	<0.0117	<45	NA	2408	NA	1505
SACSL	03/01/06	493 ^c	0.0216		26	NA	2502	NA	2065
SACSL	03/02/06	784	0.0073		14	NA	3717	NA	2323
SACSL	03/02/06	784	0.0086		17	NA	3717	NA	2323
SRCOL	01/28/06	18333	<.005	<0.0060	<224	3561	2047	2226	1279
SRCOL	01/30/06	23275	0.0079		450	4618	2092	2886	1307
SRCOL	01/31/06	24758	<.005		<303	4550	2197	2843	1373
SRCOL	02/28/06	26527	0.0146	0.0153	947	4227	1970	2642	1231
SRCOL	03/01/06	40591	0.0159		1579	8082	2047	5051	1689
SRVON	01/28/06	38746	0.0090	0.008	857 ^d	7582	NA	4739	NA
SRVON	01/30/06	39596	0.0087		841 ^d	7748	NA	4843	NA
SRVON	01/31/06	41592	0.0052		526 ^d	8139	NA	5087	NA
SRVON	02/28/06	37287	0.0195	0.018	1775 ^d	7296	NA	4560	NA
SRVON	03/01/06	51163	0.0179		2246 ^d	10012	NA	6257	NA
SRVON	03/02/06	57558	0.0178 ^e		2500 ^{d,e}	11263	NA	7039	NA

a COLDR = Colusa Basin Drain; FRVON = Feather River at Verona; FRYUB = Feather River above Yuba City;
SACSL = Sacramento Slough; SRCOL = Sacramento River at Colusa; SRVON = Sacramento River at Verona

b Flow was estimated from stage data for Feather River at Nicolaus

c Site flooded with no measurable flows, discharge estimated using 0.5 times the velocity meter reporting limit (0.3 ft/sec)

d Sacramento River at Verona Loads are calculated as the sum of loads for SRCOL, FRVON, SACSL, and COLDR.
Sacramento River at Verona concentrations are calculated as:

Load ÷ (Flow*2.446 Unit Conversion Factor)

e Load calculated using previous day's load for SRCOL

Comparison with TMDL Objectives and Discussion Of Exceedances

Compliance with Concentration-Based TMDL Objectives

Measured concentrations of diazinon were compared to the TMDL concentration objectives (0.05 µg/L as a 1-hour average, and 0.08 µg/L as a 4-day average). Concentrations were also compared to the proposed Basin Plan objective for the San Joaquin River ² (0.16 µg/L as a 1-hour average, and 0.10 µg/L as a 4-day average), and USEPA's final National Water Quality Criterion³ (0.17 µg/L as a 1-hour average and as a 4-day average). The proposed San Joaquin River objective is based on the same data set used to calculate the current TMDL objective, with corrections made to erroneous data used in the original criterion. The USEPA criterion also incorporates the data correction, and additional recently published data.

Diazinon concentrations exceeded the TMDL 1-hour concentration objective (0.08 µg/L) in two samples from the Colusa Basin Drain site during the first sample event (January 28-31, 2006). the estimated 4-average concentration for the Colusa Basin Drain site for this event also exceeded the TMDL 4-day average concentration objective (0.08 µg/L). No other locations exceeded the TMDL 1-hour or 4-day objectives during the two sample events. No samples collected at any of the 5 compliance monitoring locations exceeded the USEPA national criterion or the proposed San Joaquin River objectives.

Compliance with Load-Based TMDL Objectives

Daily diazinon loads calculated for each site were compared to the load allocations and loading capacities (Sacramento River at Colusa, and Feather River at Verona) as specified in the TMDL. Loads for the Sacramento River at Colusa and Feather River at Verona were compared to the lesser of the TMDL load capacities and TMDL load allocation for these sites. Loads for the Colusa Drain and Sacramento Slough were compared only to TMDL load allocations for these sites. All loads and load allocations were calculated as specified in the TMDL Basin Plan Amendment.

Comparisons of calculated loads to TMDL load objectives for the two 2006 dormant spray season sample events indicate that all sites were in compliance with their applicable load allocations and load capacities. Loads and applicable TMDL load allocations and capacities are presented in Table 5.

² CVRWQCB 2006. *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 Sacramento-San Joaquin Delta*. April 2006 Public Review Draft. Central Valley Region Water Quality Control Board (CVRWQCB), Rancho Cordova, California.

³ USEPA 2006. *Aquatic Life Ambient Water Quality Criteria: Diazinon. Final*. EPA-822-R-05-006. U.S. Environmental Protection Agency, Office of Water.

D OUTREACH EFFORTS

Landowner and crop advisor outreach was conducted in fall and winter 2005 prior to the dormant season sprays initiating in December 2005 and January 2006. These outreach presentations focused on the diazinon label changes and the finalized diazinon TMDL. Also included was information on available Best Management Practice options to protect surface waters from potential impacts of dormant season runoff of alternatives to diazinon, specifically pyrethroid insecticides. Presentations were given at the following events:

Date	Location/Event	Attendance
Sept. 22	Sacramento: PAPA CE meeting: growers/PCAs	150
Nov. 3	Woodland: CAPCA CE Meeting: PCAs	60
Nov. 3	Yuba City: Sutter Co. Ag Commissioner CE mtg: growers	35
Nov. 9	Yuba City: Sutter Co. Ag Commissioner CE mtg: growers	45
Nov. 17	Woodland: Western Plant Health Assn CE conference: PCAs	60
Dec. 7	Glenn: Glenn Co. Ag Commissioner CE Mtg: growers	75
Dec. 8	Colusa: Grower CE mtg: Growers, PCAs	45
Jan. 27	Woodland: Yolo County Ag Commissioner. CE Mtg: growers	75
Feb. 28	Chico: PAPA CE Meeting: PCAs/ Growers	150

In 2006, a similar outreach effort is planned with growers and PCAs with presentations planned for meetings organized by: County Agricultural Commissioners in Butte, Sutter, Colusa, Yolo and Glenn counties (the major orchard growing regions); California Association of Pest Control Advisors (CAPCA); and Subwatershed groups who are members of the Sacramento Valley Water Quality Coalition.

E GROWER SURVEY FOLLOW-UP

In July 2007, the Sacramento Valley Water Quality Coalition (Coalition) will again perform a survey of orchard growers who used diazinon as a dormant spray. This survey will include only orchard growers who used diazinon in the winters of 2005-06 and 2006-07. As with the survey performed in summer 2005, diazinon users will be identified through Pesticide Use Reports filed with County Agricultural Commissioners from seven counties: Yolo, Colusa, Glenn, Tehama, Butte, Yuba, and Sutter Counties. The Coalition will again work with County Agricultural Commissioners to follow up with individuals who do not respond to the initial survey mailing.

Of the 335 surveys mailed in 2005, 211 surveys were completed and submitted to the Coalition by August 26, 2005 with results submitted in the Diazinon Management Plan in January 2006. The Coalition worked with the County Agricultural Commissioners to identify the 124 non-respondents and to determine the reason for their failure to respond or fully complete a survey. As a result of the follow up, 11 additional surveys were completed by growers with the remaining not submitted for various reasons including the grower no longer farmed; the grower did not respond to attempts to contact them; or the grower refused to complete the survey.

F MANAGEMENT PRACTICES EFFECTIVENESS

Orchard growers are required to use a range of management practices when using diazinon as a dormant orchard spray. The basic practices are described on the Diazinon supplemental label (see Diazinon Management Plan, page 15) and are designed to mitigate off-site movement after applications are made to orchards.

Other management practices are currently being evaluated in the Sacramento Valley for their effectiveness in reducing or eliminating runoff of dormant orchard sprays. The BMP evaluations are being performed through grant funding provided by the State Water Resources Control Board. The practices include:

Orchard vegetation during winter dormant season; Project title: Implementation of Feather River TMDL for Orchards; Grant Manager; Sutter County Resource Conservation District.

One task in this project is evaluating different types of orchard floor vegetated cover and vegetated filter strips of several configurations in orchards sprayed with diazinon. Runoff from naturally occurring storm events following these applications will be monitored for flow volume and pesticide concentration, and compared to paired companion orchard sections or comparable orchards treated with the same chemical and rate but not using these BMPs. The field treatments of organophosphates (OP) using a typical dormant spray of diazinon will be applied in accordance with methods have used successfully in previous studies by Dr. Frank Zalom of U.C. Davis.

This project will also contribute to defining the problem of OP and other pesticide runoff from orchards during the dormant spray season by measuring the loads of OP pesticides and irrigation transportation sediment in surface water leaving orchards. Evaluation of the vegetated filter strips will allow a determination if their use on a broad watershed scale will effectively reduce or eliminate the movement of OP pesticides irrigation transportation sediment to surface waters. By extrapolating any reduction in runoff across the larger watershed, the project is attempting to estimate if the total reduction in load will be sufficient to achieve the proposed target loads for diazinon as required by the TMDL.

An important partner and collaborator for this project is the Sacramento Valley Water Quality Coalition (Coalition) and its member subwatersheds and membership. The project manager is a Coalition partner and this implementation project will significantly support the ongoing Coalition efforts to manage water quality in the Sacramento Valley.

Smart Sprayer Technology; Project title: Sacramento Valley Regional Pesticide BMP Implementation Program; Grant Manager: Coalition for Urban/Rural Environmental Stewardship.

One task in this project is to evaluate the effectiveness of Smart Sprayer technology in reducing ground deposition and hence orchard runoff of dormant season pesticides. Smart Sprayers have tree seeing technology that enables the sprayer to shut off nozzles if no tree or branch is adjacent to the sprayer nozzles. In-field water quality runoff studies were performed to evaluate the

efficacy of Smart Sprayer™ technology versus conventional sprayers in reducing the concentration of diazinon in surface water runoff from orchards sprayed during the winter dormant season. The runoff study was performed in winter 2005 by David Brown of CSU Chico. Preliminary results indicate a 30% reduction in ground deposition; however the draft report has not been completed to date.

Another aspect of the project is retrofitting two growers' existing orchard sprayers with the Smart Sprayer™ technology, which includes custom installation of different nozzles, valves, sonic sensors and other equipment. The grower's use of pesticides in the dormant season will be compared before and after the equipment installation. This evaluation will be performed in winter 2006-2007.

G SUMMARY

The following preliminary conclusions can be made based on the results of the first year of this multi-year effort:

- All sites were in compliance with load-based TMDL objectives, and most samples were in compliance with the concentration-based TMDL objectives for diazinon. These results indicate that the combination of changes in diazinon use patterns, changes in management practices, and modifications to labeling have been successful in reducing instream ambient diazinon concentrations and loads below historically observed levels that resulted in listing these waters as impaired.
- The recently finalized National Water Criteria for diazinon, and the proposed Basin Plan objective for the San Joaquin River have significant implications for the TMDL for diazinon for the Sacramento and Feather Rivers. These objectives may be used to modify the targets of the TMDL or potentially to re-evaluate the need to list the Sacramento and Feather Rivers as 303(d)-listed impaired water bodies. The affected water bodies already appear to comply with potential TMDL targets that would be based on these new criteria. At a minimum, future compliance would be more easily achieved. This issue is currently being considered by Regional Water Board staff responsible for implementation of the TMDL.
- There is a strong interest by landowner and crop advisor to learn more about Best Management Practices for diazinon as shown by over 700 landowners and crop advisors attending nine outreach presentations given in the fall and winter 2005 prior to the dormant season sprays initiating in December 2005 and January 2006. The outreach presentations focused on the diazinon label changes and the finalized diazinon TMDL. Also included was information on available Best Management Practice options to protect surface waters from potential impacts of dormant season runoff of alternatives to diazinon, specifically pyrethroid insecticides.
- Of the 335 surveys mailed in 2005, 211 surveys were completed and submitted to the Coalition by August 26, 2005 with results submitted in the Diazinon Management Plan in January 2006. The Coalition worked with the County Agricultural Commissioners to identify the 124 non-respondents and to determine the reason for their failure to respond or fully complete a survey. As a result of the follow up, 11 additional surveys were completed

by growers with the remaining not submitted for various reasons including the grower no longer farmed; the grower did not respond to attempts to contact them; or the grower refused to complete the survey.

- Other management practices are currently being evaluated in the Sacramento Valley for their effectiveness in reducing or eliminating runoff of dormant orchard sprays. The BMP evaluations are being performed through grant funding providing by the State Water Resources Control Board. The practices include: orchard vegetation during winter dormant season and Smart Sprayer Technology.