BASIN PLAN AMENDMENTS TO CONTROL DISCHARGES OF DIAZINON AND CHLORPYRIFOS INTO THE SACRAMENTO AND FEATHER RIVERS

Public Workshop
2 April 2007

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- **Joe Karkoski, Chief, Pesticide TMDL Unit**

Meeting Agenda

- Introduction/Agenda Review
- Status
- Background
- Amendment Elements
- Q&A
- Adjourn

Where are we in the process?

Initial CEQA Scoping Meeting	May 2006
Second CEQA Scoping Meeting	February 2007
Staff Report Released	March 2007
Public Workshop to discuss Staff Report	April 2, 2007
Staff Report Comments Due	April 18, 2007
Hearing before Central Valley Water Board	May 3 or 4, 2007
State Board Approval	Late 2007
Office of Administrative Law Approval	Mid 2008
USEPA Approval	Late 2008

Historical Information

- Regional Board resolution R5-2003-0148 approved a Basin Plan Amendment establishing a TMDL and implementation plans for diazinon in the Sacramento and Feather Rivers.
- The amendment established water quality objectives for diazinon in the Sacramento and Feather Rivers of 0.080 µg/L (one hour maximum) and 0.050 µg/L (four day average).

Historical Information

- Compliance date: June 30, 2008.
- The amendment included the requirement to review the diazinon allocations and the implementation provisions in the Basin Plan by June 30, 2007 and every 5 years thereafter.

Historical Information

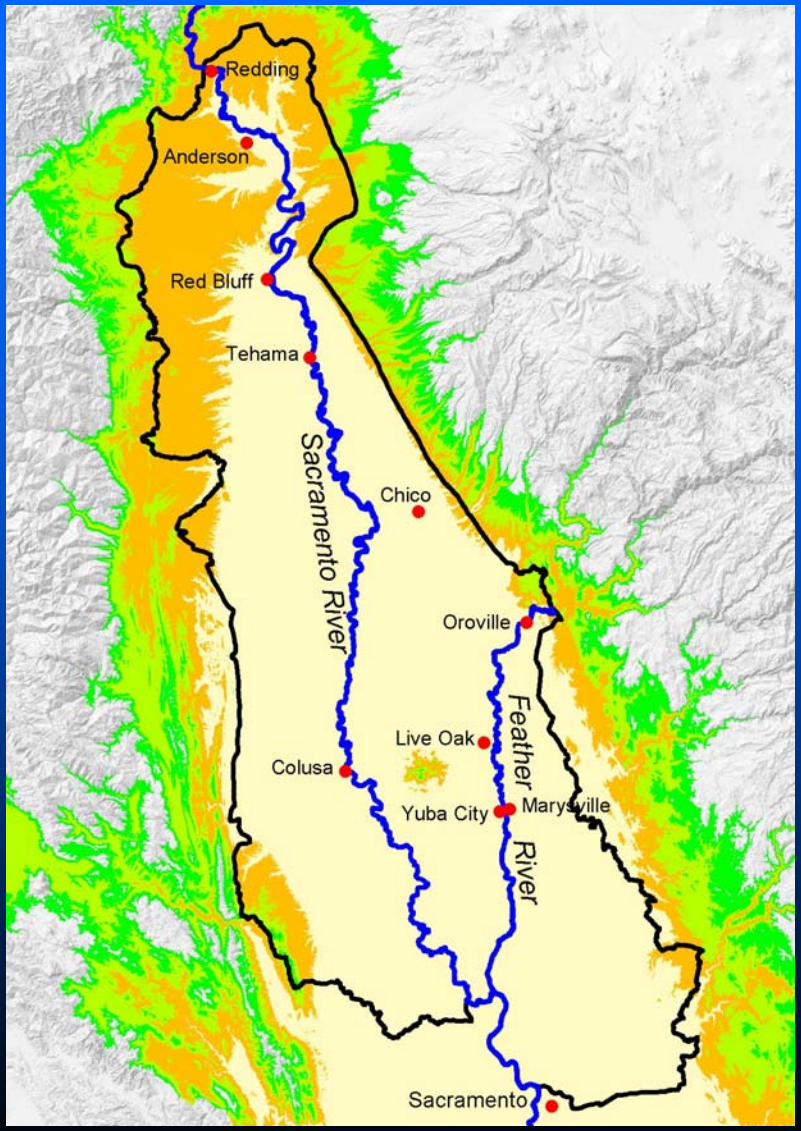
- A review of the water quality objectives is also required by the Sacramento Superior Court as a result of the case *Makhteshim Agan of North America v State Water Resources Control Board; Regional Water Quality Control Board-Central Valley Region*, Sac. Cty. Sup. Ct. - Case No. 04CS00871).

Historical Information

- State Board Resolution 2006-0079 approved the 2006 303(d) List of Impaired Waters
  - Sacramento River between Knights Landing and the Delta listed as impaired for diazinon
  - Feather River from Lake Oroville Dam to the Confluence with the Sacramento River listed as Impaired for Chlorpyrifos and Diazinon

Scope of Basin Plan Amendment

- Review and revise existing diazinon water quality objectives, load allocations and implementation plans.
- Establish new chlorpyrifos water quality objectives, load allocations and implementation plans



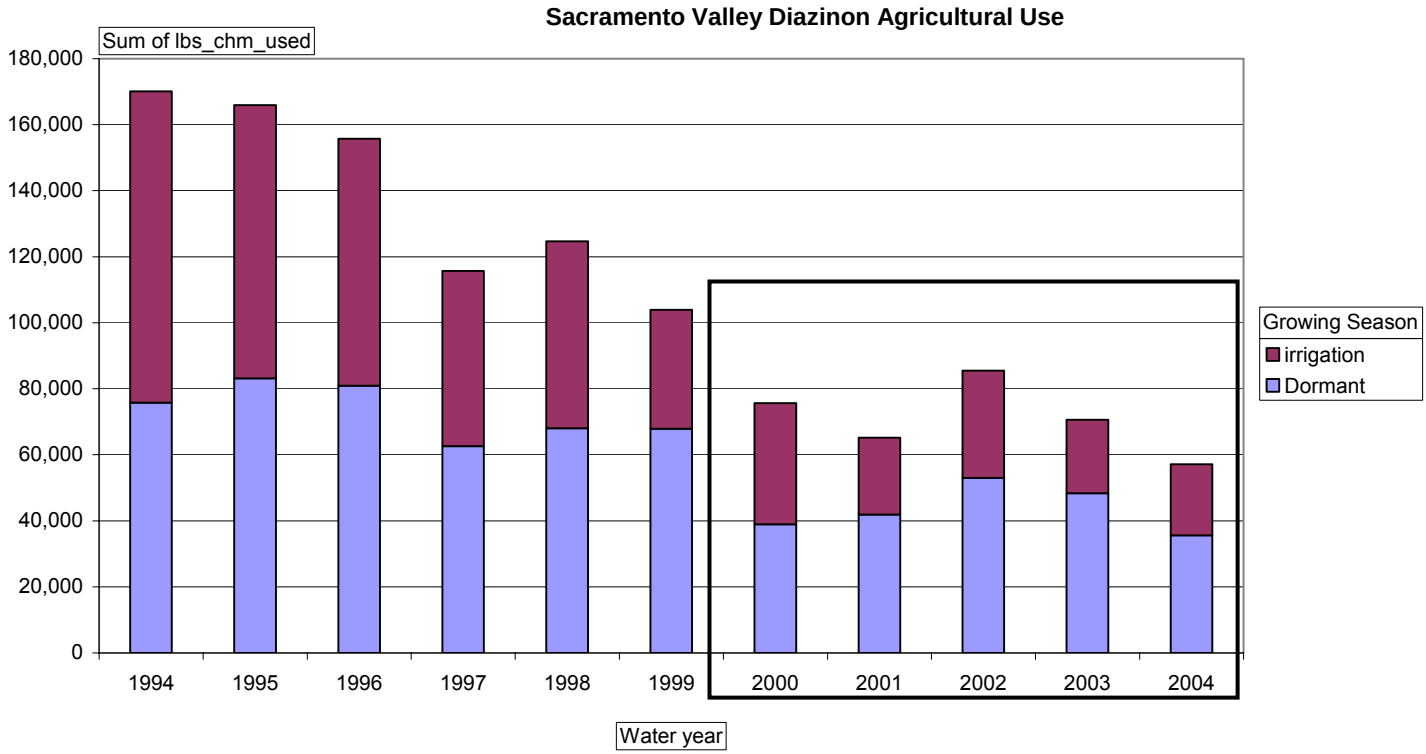
Project Area

- Main stems of the Sacramento and Feather Rivers below the major reservoirs.

Recent Use Trends - Diazinon

- Diazinon Use Trends – Changes Since Last Basin Plan Amendment.
  - Sale of diazinon for non-agricultural use has been phased out by the EPA.
  - Agricultural Diazinon use continues to be reduced.
    - » Total diazinon use continues historical reduction trend
    - » Dormant spray use trend is less clear
    - » No change in principal crops diazinon is used on

Recent Use Trends – Diazinon



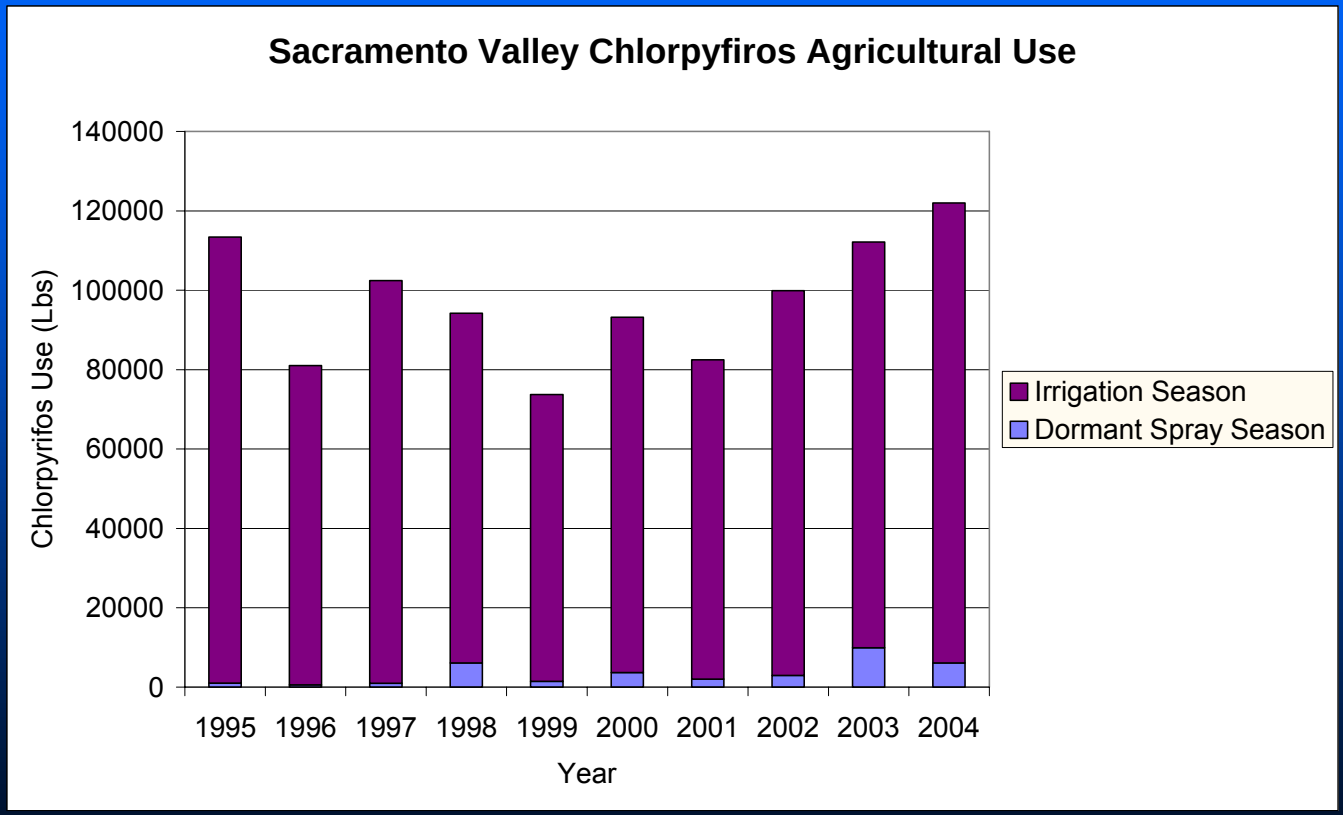
Average Diazinon Use by Crop and Spray Season 2002-2004

Dormant Season (Dec-Feb)			Irrigation Season (Mar-Nov)		
Crop	**Lbs Applied**	**% Of Dormant Season Use**	**Crop**	**Lbs Applied**	**% Of Irrigation Season Use**
Plum (Fresh and Dried)	18,093	43%	Plum (Fresh and Dried)	7,058	38%
Peach	13,565	32%	Walnut	5,202	28%
Almond	9,329	22%	Tomato	4,869	26%
Total of Uses Shown	40,987	97%	Total of Uses Shown	17,129	92%
Dormant Season Use	42,230 lbs		Irrigation Season Use	18,617 lbs	
% of Annual Use	69%		% of Annual Use	31%	

Recent Use Trends – Chlorpyrifos

- Chlorpyrifos Use Trends – Similar to Delta and San Joaquin River
  - Sale of chlorpyrifos for most non-agricultural use has been phased out by the EPA.
  - Agricultural Chlorpyrifos Use is increasing.
  - Chlorpyrifos use is predominantly in the irrigation season.

Recent Use Trends – Chlorpyrifos



Average Chlorpyrifos Use by Crop and Spray Season 2002-2004

Dormant Season (Dec-Feb)			Irrigation Season (Mar-Nov)		
Crop	**Lbs Applied**	**% Of Dormant Season Use**	**Crop**	**Lbs Applied**	**% Of Irrigation Season Use**
Plum (Fresh and Dried)	2,425	49%	Walnuts	65,802	68%
Peach	2,269	46%	Almonds	19,550	20%
			Alfalfa	6,940	7%
			Cotton	1,855	2%
Total Of Uses Shown	4,694	95%	Total Of Uses Shown	94,147	97%
Total Dormant Season Use	4,922		Total Irrigation Season Use	97,022	
% Of Annual Average	5%		% Of Annual Average	95%	

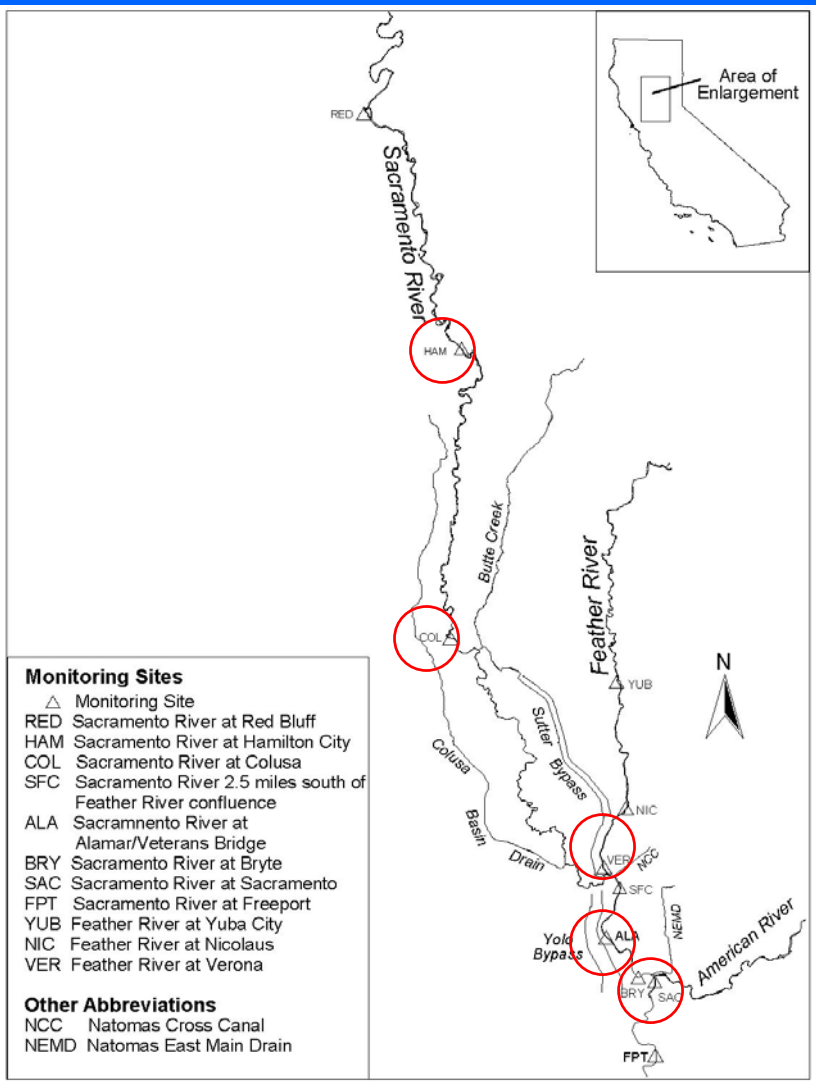
Recent Regulatory Trends - Diazinon

- Change in Diazinon Labeling
  - Supplemental label requiring additional BMPs has been prepared by Makhteshim Agan and approved by the EPA. BMP include:
    - » Buffer Strips and Set Backs
    - » Awareness of Weather Conditions
    - » Demonstration of Need
    - » Operational Requirements
    - » Worker Awareness

Recent Regulatory Trends

- DPR Dormant Spray Regulations
  - Places restrictions on the use of dormant insecticides including diazinon, chlorpyrifos and others
  - Requires the use of best management practices to prevent contamination of nearby surface waters.

Current Environmental Conditions


Area of Enlargement
Sacramento River
RED
HAM
COL
Butte Creek
Feather River
YUB
NIC
VER
SFC
ALA
BRY
SAC
FPT
Sutter Bypass
Colusa Basin Drain
NCC
NEMD
Yolo Bypass
American River
N
Monitoring Sites
△ Monitoring Site
RED Sacramento River at Red Bluff
HAM Sacramento River at Hamilton City
COL Sacramento River at Colusa
SFC Sacramento River 2.5 miles south of Feather River confluence
ALA Sacramnento River at Alamar/Veterans Bridge
BRY Sacramento River at Bryte
SAC Sacramento River at Sacramento
FPT Sacramento River at Freeport
YUB Feather River at Yuba City
NIC Feather River at Nicolaus
VER Feather River at Verona
Other Abbreviations
NCC Natomas Cross Canal
NEMD Natomas East Main Drain

Recent Concentration Trends

Diazinon exceedances at various stations in the Sacramento and Feather Rivers, 2000 to 2006.		Number of Exceedances			
		Existing		Proposed	
Location	Max (ng/L)	4-Day (50 ng/L)	1-Hr (80 ng/L)	4-Day (100 ng/L)	1-Hr (160 ng/L)
Feather River at Yuba City	20	0	0	0	0
Feather River Near its Outlet	110	0	1	0	0
Sacramento River at Hamilton	28	0	0	0	0
Sacramento River at Colusa	160	0	**2**	0	0
Sacramento River at Alamar	220	1	**2**	0	1
Sacramento River at Sacramento	96	**3**	1	0	0

Recent Concentration Trends

Chlorpyrifos exceedances at various stations in the Sacramento and Feather Rivers, 2000 to 2006.		Number of Exceedances	
Location	Max (ng/L)	4-Day (15 ng/L)	1-Hr (25 ng/L)
Feather River at Yuba City	0	0	0
Feather River Near its Outlet	51	1	1
Sacramento River at Hamilton	29	1	1
Sacramento River at Colusa	5	0	0
Sacramento River at Alamar	35	0	1
Sacramento River at Sacramento	30	0	1

2001-2006 Loading Capacity Exceedances (Based on 1-hr Objective)

Location	Date	Hour	Chlorpyrifos (ng/L)	Diazinon (ng/L)	S-Combined (exceedance in bold)
Feather River Near Outlet	1/28/2004	12	14	**110**	**1.25**
	7/28/2004	3	**54**	0	**2.04**
Sac R at Alamar	1/28/2004	17	25	27	**1.17**
	2/4/2004	14	0	**220**	**1.38**
	2/19/2004	13	**35**	37	**1.63**
Sac R at Colusa	2/3/2004	13	5	**140**	**1.08**
Sac R at Hamilton City	7/27/2004	3	**29**	0	**1.16**
Sac R at Sacramento	2/20/2004	9	**30**	39	**1.44**

2001-2006 Loading Capacity Exceedances (Based on 4-Day Objective)

Location	Date	Chlorpyrifos (ng/L)	Diazinon (ng/L)	# of Days [a]	4-Day Average S [a]
Feather R Nr Outlet	1/28/2004	14	**110**	1	N/A (b)
	1/29/2004	8	40	2	N/A (b)
	1/30/2004	7	29	3	**1.24**
	7/28/2004	**51**	0	1	**3.40**
Sac R at Hamilton	7/27/2004	**29**	0	1	**1.93**
Sac R At Alamar	1/28/2004	**25**	27	1	**1.94**
	2/20/2004	7	35	4	**1.05**
	2/21/2004	6	25	4	**1.20**
	2/22/2004	0	18	4	**1.09**
Sac R at Sacramento	2/20/2004	**30**	39	4	0.94 (b)
	2/21/2004	5.5	19	4	**1.06**
	2/22/2004	0	18	4	**1.01**

(a) Where 4-days of data are not available, the Average S is based on the number of days of data that are available.

(b) 4-day Average is not calculated until the third of the three days in this data set.

Load Allocation Trends for Selected Tributaries 2001-2006

Location	Data Date Range	Loading Allocation (Additive – S)	
		4-Day	1-Hour
Yuba River	2001-2004	0	0
Bear River	2000-2001	0	1
Big Chico Creek	2000-2003	0	0
Colusa Basin Drain	2001-2005	**3**	**4**
Sacramento Slough	2001-2006	**5**	1
American River at Discovery Park	2001-2003	0	0

Questions?

Amendment Elements

Relationship to Other Regional Board Efforts

- 2005 San Joaquin River and 2006 Delta Basin Plan Amendments
  - Cover same pesticides in different watersheds
  - Utilize same scientific approach
- Central Valley Pesticide Basin Plan Amendment
  - Both Programs will cover diazinon and chlorpyrifos in the Sacramento Valley
  - Includes development of new criteria derivation methodology
  - Central Valley timeline will not allow for completion by the court mandated date
    - » The litigant has been contacted and would like changes considered as soon as possible.

Common Elements with Previous Board Actions

- San Joaquin River, and Delta
  - Water quality objectives for diazinon and chlorpyrifos
  - TMDL elements - loading capacity and allocations
  - Use additivity formula in Basin Plan to establish loading capacity
  - Prohibition as backstop
  - Policies regarding alternative pesticides
  - Submittal of management plans
  - Monitoring goals

Diazinon Water Quality Objective Alternatives

- No Change (0.08µg/L 1-hour, 0.05µg/L 4-day)
- No Diazinon
- Criteria Derived using EPA 1985 Methodology
  - As Derived by EPA (0.17µg/L acute and chronic)
  - **As Derived by CDFG and confirmed by Central Valley Water Board (0.16µg/L 1-hour, 0.10µg/L 4-day)**

Chlorpyrifos Water Quality Objective Alternatives

- No Change – Narrative
  - Recalculated CDFG criteria
  - 1/10 lowest LC50 (Basin Plan)
- No Chlorpyrifos
- Criteria Derived using EPA 1985 Methodology
  - As Derived by EPA (0.083µg/L 1-hour, 0.041µg/L 4-day)
  - **As Derived by CDFG and verify by the Central Valley Water Board (0.025µg/L 1-hour, 0.015µg/L 4-day)**

WQO Screening Evaluation Alternatives

- Novartis PERA – Found during previous Basin Plan Amendments to be inconsistent with CWA legal Mandate
- Canadian and Australian Criteria – Found to be infeasible during previous Basin Plan Amendments due to a lack of technical information
- UC Davis Criteria – Methodology is still undergoing review, so Chlorpyrifos criteria is still preliminary

Recommended Water Quality Objectives

- Adopt numeric Water Quality Objectives for both diazinon and chlorpyrifos
  - Appropriate chlorpyrifos criteria are available
  - Clarity, Basis for TMDL Loading Capacity and Allocations
- Recalculated CDFG criteria for both Diazinon and Chlorpyrifos
  - USEPA method
  - More stringent criteria for inclusion of studies
  - Chlorpyrifos criteria – more recent toxicity studies for sensitive species
  - Diazinon – additional chronic studies of sensitive species

Loading Capacity

- Concentration Based Loading Capacity
  - Maximum allowable concentration is required to be equal to or lower than the water quality objective
- Mass Based Loading Capacity
  - Variable – maximum allowable load varies based on the flow within and/or into a waterbody
  - Fixed – Maximum allowable load is based on design flows from historical data

Concentration Based Capacity

- Capacity is set at Water Quality Objective
- Does not change with flow or require monitoring flows
- Establishes a clear predictable compliance target
- Minimizes uncertainty
  - Straightforward Monitoring
  - Inherently accounts for Seasonal Differences
- Uses existing Basin Plan additivity equation for cumulative impacts of pesticides with similar modes of action

Additivity Equation

$$S = \frac{C_D}{WQO_D} + \frac{C_C}{WQO_C} \leq 1$$

where

C_D = diazinon concentration in the receiving water.

C_C = chlorpyrifos concentration in the receiving water.

WQO_D = acute or chronic diazinon water quality objective or criterion.

WQO_C = acute or chronic chlorpyrifos water quality objective or criterion.

Load Allocation Alternatives

- Allocation based on loading rates or pesticide use
- No Change – Allocation based on land use
- Use current allocation strategy but update for recent changes in land use.
- **Change allocation strategy to concentration based similar to Delta and San Joaquin Objectives.**
  - **Capacity and Allocations are set equal to Water Quality Objective.**

Allocations Equal to Capacity

- Concentration from each watershed must be equal to loading capacity
- Straightforward Definition
- Seasonal Variations are taken into account
- Stable Target despite changing land use
- Easier to monitor – no flow, land use or pesticide use data required
- Does not penalize responsible growers

Implementation Alternatives

- No Change – Flexible Framework with Conditional Prohibition of Waste Discharge if diazinon objectives are not met.
- Add Chlorpyrifos to flexible framework, retain conditional prohibition
- Add Chlorpyrifos to flexible framework but remove conditional prohibition
- Specific Implementation Mechanism

Inclusion of Chlorpyrifos Into Flexible Framework

- Existing flexible framework, including prohibition would be amended to explicitly include chlorpyrifos
- Maintains flexibility of Waver, WDR and/or Prohibition
- Consistent with All Policies
- Prohibition would not apply if WQO are being met or if discharges are covered by a waiver or WDR.
- Maintains enforcement tools provided by prohibition

Compliance Deadlines

- **Short Term (Upon EPA Approval ~2008)**
  - **Feasible – Previous exceedances were prior to Label Change and Dormant Spray Regulations**
  - **Minimizes impact on Beneficial Uses**
  - **Supports achieving Delta objectives**
- Medium Term (2012)
  - Feasible
  - Increased impact on Beneficial Uses
  - Supports achieving Delta objectives
- Long Term (2015)
  - Feasible
  - Maximum impact on Beneficial Uses
  - Does not support achieving Delta objectives

Monitoring

- No Change – General direction on required monitoring applied only to dormant season diazinon
- Updated program to include Chlorpyrifos and retain program flexibility
- Identify Specific Monitoring Requirements

Monitoring Recommendation

- Recommends updating flexible program to include chlorpyrifos
- Similar to Delta and SJR
- Additive toxicity
- Alternate products
- Representative monitoring

Cost Analysis – Management Cost

- No additional management costs anticipated for point sources (urban use cancellations)
- No additional management costs anticipated for non point sources (currently appear to be in compliance with proposed objective)
- Worst case Scenario assumes all growers must implement additional management measures
  - Per acre costs based on previous detailed cost analyses in Delta updated for inflation
  - Applied to acreage treated in the Sacramento Feather River
  - Assumes all growers must implement new measures
- Cost Range $0 to $6.2 Million

Cost Analysis – Monitoring Costs

- Estimate provided both for coalition based and individual monitoring efforts
- Monitoring Costs based on previous Delta analysis with updates for inflation
- Assumes 1 additional Storm driven sampling period and period samples during irrigation season
- Cost Ranges from 0.3 million (coalition based) to 1.5 million (individual monitoring)

Peer Review

- Staff report is based on science that has already been peer reviewed (e.g. 2003 Sacramento and Feather River, 2005 San Joaquin River, 2006 Delta)
- Proposed amendment is simply a new application of earlier adequately peer reviewed work products
- The proposed alternative does not depart from the scientific approach of previous basin plan amendments
- The staff report has fulfilled the requirements of HSC 57004 and does not require additional peer review.

Suggested Comment Format.

- Please format comments to provide the following information.

1. Comment Number
2. One sentence description of the topic upon which the comment is directed,
3. Supporting argument
4. **Specific recommendation.**
5. Supporting arguments should include citations, where appropriate.

Questions?