STAFF REPORT

Rice Pesticide Program, Management Practices for the 2006 Rice Season

Each year, the California Rice Commission (CRC) submits an annual report detailing monitoring and implementation of management practices required as part of the Rice Pesticides Program (RPP). The CRC is a commodity group representing Californian rice growers. Rice growers plant in mid-April through early May and maintain flooded fields throughout the summer months. Pesticides are used on most fields for insect and weed control. Water quality concerns arise when pesticides applied directly into standing water in the field leave the field in tailwater.

In the early 1980's, the Rice Pesticide Program was established to address impacts to beneficial uses attributed to rice pesticides, including fish kills in agricultural drains and taste complaints in the City of Sacramento drinking water supply. In 1990, the Central Valley Regional Water Quality Control Board (hereafter the Water Board) amended the Basin Plan[1] to prohibit discharge of water containing five rice pesticides (thiobencarb, molinate, malathion, carbofuran and methyl parathion) unless dischargers follow Water Board-approved management practices.

On 30 December 2005 the CRC submitted their annual report titled *Rice Pesticides Program 2005 Annual Report*. The report provides a summary of 2005 Program activities including monitoring and enforcement components. The executive summary of their annual report is provided in **Attachment A**. Following the report submittal, the CRC, Regional Board staff, and Department of Pesticide Regulation (DPR) met and collaboratively proposed 2006 Program recommendations, as detailed in **Attachment B**. The consensus document recommends continuation of the current Program based on the trend of reduced thiobencarb detections.

Historical Perspective

The Water Board formalized the Rice Pesticide Program in 1990 by amending the Basin Plan to include an implementation program for the control of rice field discharges containing molinate, thiobencarb, methyl parathion, carbofuran, and malathion. The Basin Plan prohibits discharges of water containing the five pesticides unless dischargers follow Board-approved management practices.

The Water Board uses the performance goals shown in **Table 1** to evaluate the management practices. The performance goals apply to all waters designated as freshwater habitat. As stated in the Basin Plan, to obtain approval, proposed management practices must be expected to help meet these performance goals. Water Board approval

[1] 4th Edition of the CVRWQCB Water Quality Control Plan

of management practices is also dependent on compliance of discharges containing thiobencarb with the water quality objective[2] of 1.0 µg/l in water designated as municipal or domestic supply (i.e. the Sacramento River)[3].

Table 1. Performance Goals[4] for Management Practices

Chemical	*Performance Goal µg/l (daily maxima)*	*Product Name*	*Activity*
Molinate	10.0	Ordram®	Herbicide
Thiobencarb	1.5	Abolish® (liquid) Bolero® (granular)	Herbicide
Malathion	0.1	--	Insecticide
Methyl parathion	0.13	--	Insecticide
Carbofuran	No longer used on rice in California[5]		

Management practices are presented in detail as part of the CRC report. Most of these practices have been in place for years and have been shown to be effective in reducing discharges. This staff report provides a review of the Program results in 2005 and focuses on issues of concern. The executive summary of the CRC annual report (**Attachment A**) provides an overview of the Program results.

The Program includes monitoring, compliance and enforcement components. The County Agricultural Commissioners (CACs) implement the Program, including issuance of restricted materials permits for thiobencarb and molinate. Growers submit a Notice of Intent (NOI) at least 24 hours prior to application and report Notice of Application (NOA) within 24 hours of application allowing CACs the opportunity to observe applications and to track water holding times and other required management practices.

The core of the program consists of water management practices that require farmers to hold pesticide-laden water on the field until pesticides degrade to a level protective of aquatic life. Water holding times are stipulated in the permits issued by the CACs. Hold times are currently 28 days for molinate, 30 days for granular thiobencarb, 19 days for liquid thiobencarb, 24 days for methyl parathion and 4 days for malathion. Malathion holding times are not enforced through use permits since it is not classified as a restricted material. Shorter holding periods are allowed in closed water management systems, areas with reduced water availability, fields in the San Joaquin Valley and hydrologically isolated fields.

Sacramento Valley rice fields discharge into major agricultural drains flowing into the Sacramento River. The Colusa Basin Drain serves as a major western tributary while Butte Slough drains from the east. The Program historically has sampled several

[2] The CA secondary MCL is 1.0 µg/l.
[3] The Colusa Basin Drain and Butte Slough are not designated as municipal or domestic supply waters.
[4] These performance goals apply to freshwater habitat and are protective of fisheries.
[5] Carbofuran was one of the chemicals addressed by the control Program but use of the product on rice was banned by the US Environmental Protection Agency (US EPA) in 1999 with use of existing stock concluding in 2000.

locations over a 10 to 14-week period each year to evaluate compliance with performance goals.

The 2005 CRC monitoring program was funded and administered by the CRC, with sampling conducted by a consultant and primary sample analysis conducted by pesticide registrants.

For the 2005 rice season, the CRC monitored five sites, as shown in **Figure 1** and described in **Table 2**, for eleven weeks from 26 April to 5 July. The Cities of Sacramento and West Sacramento also monitored for seven weeks, from 29 April until 19 June[6] for thiobencarb and molinate at their drinking water intakes on the Sacramento River. The City of West Sacramento intake is located on the Sacramento River upstream of the American River confluence. The City of Sacramento intake is located on the Sacramento River 0.3 km south of the American River confluence.

[6] The City of West Sacramento ended monitoring on 15 June.

Figure 1. Rice Pesticide Program 2005 Monitoring Sites

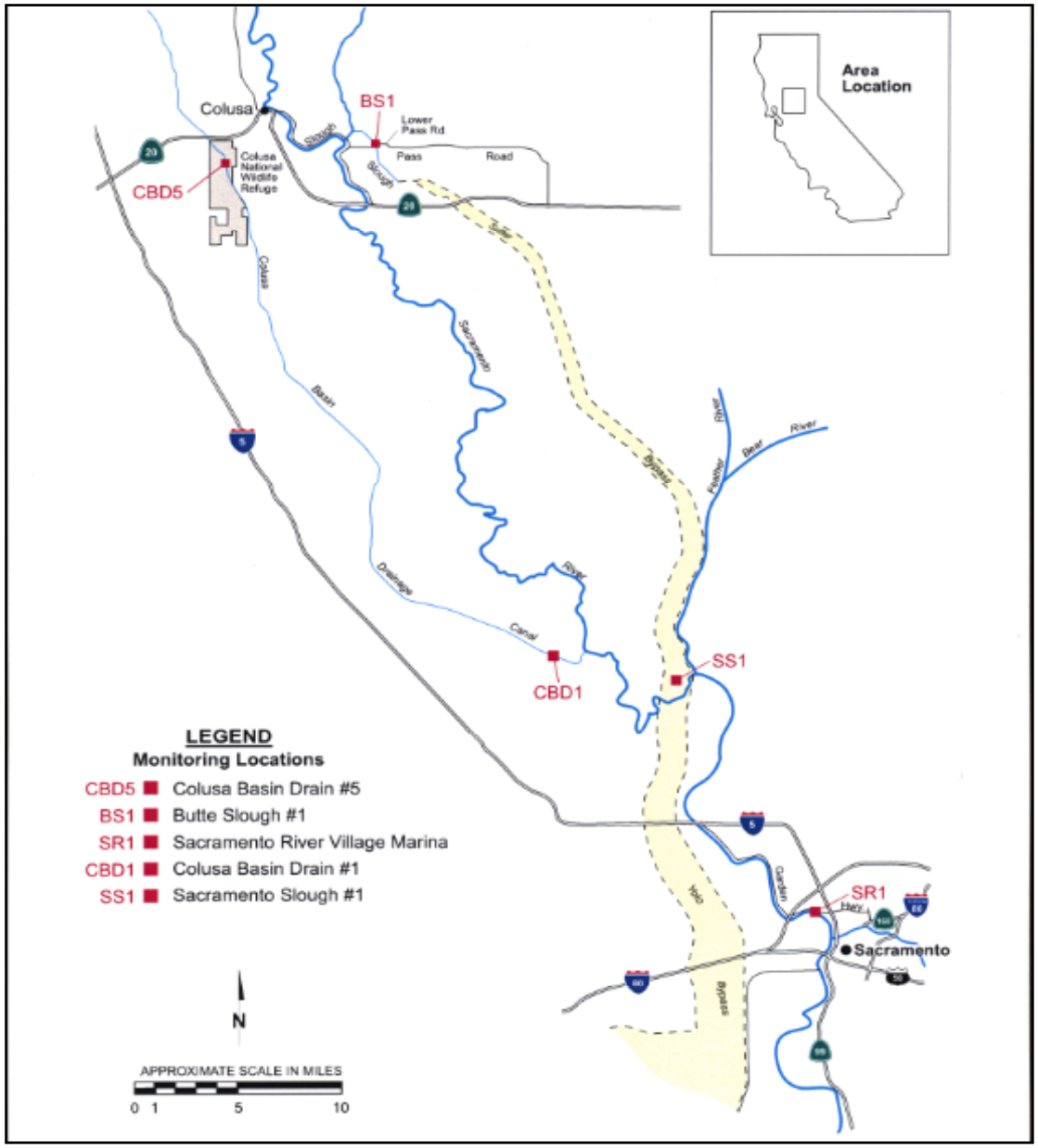


Table 2. RPP Monitoring Sites

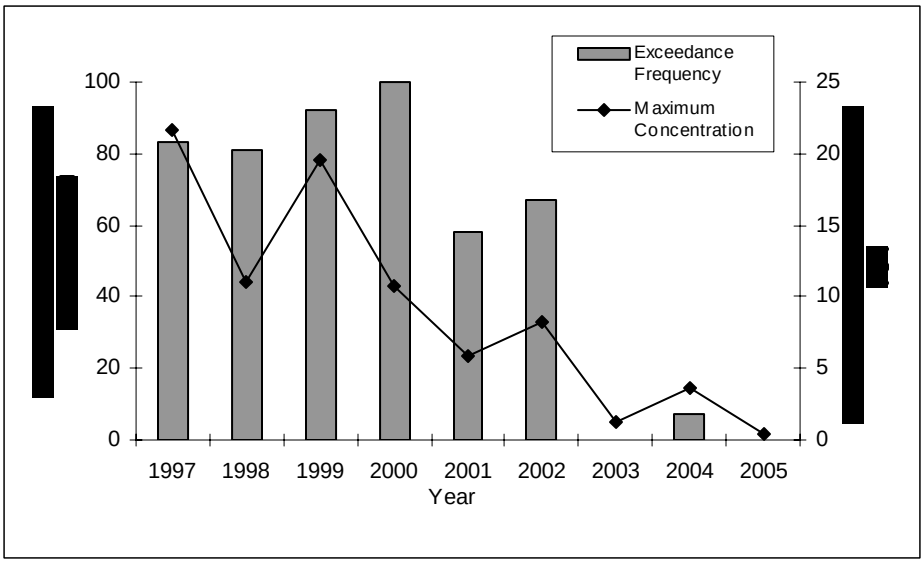
Abbreviation	Name	Type
CBD5	Colusa Basin Drain (CBD) at Hwy 20 (Colusa County)	Ag drain
CBD1	CBD at Road 99E (Yolo County)	Ag drain
BS1	Butte Slough at Lower Pass Rd (Sutter County)	Ag drain
SS1	Sacramento Slough at DWR gauging station (Sutter County)	Ag drain
SR1	Sacramento River at Village Marina (Sacramento County)	River
Municipal Intake Sites		
SSR	City of Sacramento Intake, Sacramento River 0.3 km downstream of the American River (Sacramento County)	River
WSR	City of West Sacramento Intake at Bryte Bend (Yolo County)	River

Overall, the Program has proved to be highly successful in reducing the threat to aquatic life posed by rice field discharges. The Program has resulted in significant reductions in rice pesticide concentrations in waterways through the modification of management practices.

Thiobencarb

Thiobencarb is an herbicide used to control annual grasses including watergrass. Though monitored at five sites, looking closely at one monitoring site CBD5 helps illustrate the trend in pesticide concentration seen in recent years. The frequency of detection above the 1.5-µg/l performance goal and maximum thiobencarb concentrations at CBD5 over the last nine years are shown in **Graph 1**. There has been a dramatic reduction in both peak thiobencarb levels and exceedance of the performance goal in recent years. In 2005 there were no exceedances of the performance goal. The peak detection of 0.45 µg/l on 21 June was less than one third of the performance goal. Typically the highest detections occur in mid to late May, corresponding with peak applications of the product. In 2005, cool wet weather in May delayed planting and pesticide application, thus explaining the later peak observed.

Graph 1. Annual exceedances of thiobencarb water quality performance goal and maximum concentrations at CBD5



In addition to the monitoring conducted by the CRC, downstream municipalities also monitor thiobencarb at their drinking water intakes. During years with high thiobencarb detections, the Cities have received customer complaints regarding an off taste in their drinking water. **Table 3** summarizes the City of Sacramento and the City of West Sacramento's monitoring results. Monitoring at Sacramento's intake generally detects lower thiobencarb concentrations than those observed at West Sacramento's intake, most likely due to the location of the intake below the addition of the American River, which is essentially free of rice drainage.

From 1997 until 2002, City of Sacramento monitoring revealed a general trend of increasing thiobencarb concentrations, as shown in **Table 3**. From 2003 through 2005, thiobencarb levels have been much lower, most likely due to new permit conditions added in an extensive effort to address thiobencarb.

Table 3. Thiobencarb detections at the City of Sacramento (1994-2005) and City of West Sacramento (2001-2005) Intakes

Year	Municipality	Number of Detections[7]	Peak Concentration (µg/l)
1994 - 1997	Sacramento	0	--
1998	Sacramento	1	0.14
1999	Sacramento	5	0.34
2000	Sacramento	6	0.28
2001	Sacramento	4	0.38
	West Sacramento	4	0.59
2002	Sacramento	8	0.91
	West Sacramento	8	1.60
2003	Sacramento	0	--
	West Sacramento	3	0.16
2004	Sacramento	0	--
	West Sacramento	0	--
2005	Sacramento	0	--
	West Sacramento	1	0.11

Molinate Phase-out

Molinate is an herbicide used to control watergrass in rice production. Molinate was one of the primary triggers for the formation of the Rice Pesticide Program after it was identified as a primary cause of fish kills in the early 1980s. Though the Program has been highly successful in reducing molinate in discharges to levels that do not threaten fish, until recently molinate concentrations continued to routinely exceed the Board's performance goal at several monitoring locations. The occurrence of these violations near the time of application pointed to drift and seepage as likely contributing factors. Storm-event related discharges might also contribute to molinate peaks in years when storms occur near the time of peak pesticide application, such as the 2002 rice season.

The US EPA periodically reassesses the registration status of pesticides. On 2 April 2003, the US EPA announced availability of a risk assessment for molinate[8]. The risk assessment found that molinate may pose a risk concern to worker safety and mammalian reproduction. The EPA also stated that chronic exposure to molinate may pose a risk to freshwater invertebrates in agricultural drains and small rivers.

On 7 April 2004, the US EPA published a federal register notice[9] issuing a cancellation order at the request of the pesticide registrants. The cancellation includes a multi-year

[7] Limit of Detection is 0.10 ppb, except 2001: 0.2 µg/l
[8] US EPA Federal Register 2 April 2002. *Molinate; Availability of Risk Assessment.*
[9] US EPA Federal Register 7 April 2004. Molinate: *Cancellation Order*.

phase out as follows: In 2006, registrants may distribute no more than the 2002 sales level of the molinate active ingredient while 2007 sales may not exceed 75% of this amount. In 2008, registrants may not sell or distribute more than 50% of the 2002 levels. No sales or distribution of molinate products is to occur after June 30, 2008, except for using up existing stocks. The registrant is required to report sales to the US EPA during the phase-out and non-compliance results in immediate cancellation.

Contributing Factors to Continued Detections of Rice Pesticides

In the early years of the Rice Pesticide Program, tailwater was the main source of rice pesticides. As management practices evolved to include longer holding times, drift and seepage emerged as primary contributors of pesticide residues in surface water. Storm events can also play a role in thiobencarb and molinate spikes, as was observed in 2002.

Application Drift

The majority of rice pesticides are applied by air. The Program first officially recognized aerial drift as a problem in 1991[10]. By 1994, the Board approved a DPR implementation program to control drift[11]. Drift prevention requirements now stipulated in the approved management practices include buffer zones, nozzle specifications and limits on wind speeds.

Following DPR acknowledgment in 1998 that drift and seepage appear to be the most significant sources of pesticides in rice drainage[12], the Board asked DPR to provide additional information on new control measures for drift. DPR responded that they were waiting for US EPA policy prior to making any changes regarding drift. Based on recent discussions with DPR staff, no policy has been adopted to date.

Seepage

Seepage occurs when water moves laterally off rice fields through levees or borders into an area outside of the field boundaries, after which there is the potential for the pesticide-laden discharge to enter waterways. In 2001, the Board stated that "discharge of seepage water from treated rice fields to surface water during the pesticide holding periods described in the DPR Program is not an approved management practice if such seepage contains malathion, methyl parathion, molinate or thiobencarb"[13].

The Program has acknowledged the potential contribution of pesticides via seepage for over a decade. In 1993, DPR proposed to investigate the potential for rice pesticide movement through levees[14]. In 1998 DPR acknowledged that seepage appears to be,

[10] CVRWQCB *Resolution No.92-041* February 1992
[11] CVRWQCB *Resolution No. 93-035* February 1993 and *Resolution No.94-083* May 1994
[12] CVRWQCB *Resolution 98-024* January 1998
[13] CVRWQCB *Resolution No.5-01-074* 16 March 2001
[14] CVRWQCB *Resolution 93-035* February 1993

along with drift, the most significant sources of pesticides in rice drainage[15]. The Board then asked DPR to provide the specific steps and implementation dates for the measures they are taking to address seepage[16]. In response, in 2000 DPR monitored the concentrations of thiobencarb and molinate in seepage water at one site in both Glenn and Colusa counties[17].

The Program has used educational outreach in an attempt to voluntarily reduce field seepage. CACs provide growers with two handouts that detail voluntary actions that can be taken to address seepage: *Closed Rice Water Management Systems* (USDA/UCCE[18]) and *Seepage Water Management-Voluntary Guidelines for Good Stewardship in Rice Production* (UCD[19], DPR and UCCE).

Starting in 2001, the Program required growers to compact levees to prevent seepage and CACs to conduct seepage inspections. When the Board approved the Program for the 2002 and 2003 seasons, the Resolutions[20] requested for DPR to continue seepage inspections and to report back on repeat violators and actions taken to address the occurrence. In a April 2002 letter[21] to the CACs, DPR requests the CACs to take enforcement action on repeat violators. In subsequent years approval the Board has continued to request information on repeat violators, though none have been identified to date. The CACs continue to conduct seepage inspections and take enforcement action as necessary, which is summarized by the CRC in their annual report.

Storm Events

Weather can have a significant impact on the performance of the rice pesticides control effort. Warm dry seasons may result in lower pesticide concentrations due to higher degradation rates during the water hold. Wet cold years may see the opposite effect.[22] During large storms, farmers may encounter problems maintaining their water holds because the extra water threatens the levees in the fields. When this happens, farmers may apply to their CAC for an emergency release. Some growers may also illegally release treated water as a result of storm events.

In 2005 conditions were warm from February to late April causing growers to anticipate an early spring. During the prime planting and pesticide application time, weather turned cold and wet. From the end of April until early July there were four dates with rainfall exceeding 0.2 inches: May 4, May 8, May 18, June 8 and June 16th.

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[15] CVRWQCB *Resolution 98-024* January 1998
[16] CVRWQCB *Resolution 98-024* January 1998
[17] DPR Memorandum *Results of Thiobencarb Monitoring at Seepage Sites in Colusa and Glenn Counties 7* December 2000.
[18] United States Department of Agriculture and University of California Cooperative Extension
[19] University of California Davis
[20] CVRWQCB *Resolution No.R5-2002-0080* April 2002 , CVRWQCB *Resolution No.R5-2003-0036* March 2003
[21] DPR letter *Rice Pesticides Program for 2002 (to CACs)* 2 April 2002
[22] DPR *Information on Rice Pesticides Submitted to the California Regional Water Quality Control Board Central Valley Region* 31 December 1996

The 2005 season can be compared with 2002 when storms also posed a problem. In late May 2002 several days of stormy weather occurred near the time of peak thiobencarb application, after which downstream municipal water intakes observed high thiobencarb concentrations. Since it was near the time of peak application, contributions by drift and seepage were also likely.

Emergency Releases

Emergency releases are only granted to growers who can demonstrate need due to events outside of their control. Causative factors necessitating early release may be storm event related reasons (i.e. rainfall, high winds) or other factors such as salinity. Releases are restricted to molinate treated field that have been held a minimum of 11 days and thiobencarb fields held at least 19 days. Tailwater may only be released in the amount needed to mitigate the documented problem and prevent loss of the crop. Beginning in 1994, if a grower has repeat violations of water holds they must make improvements in their water holding capabilities. This may include installation of pumps for tailwater re-circulation or the use of fallow land for spillage.

In 2005 there were 8 emergency releases granted out of the 13 requests made. In comparison, following the storms of 2002, 33 emergency releases were granted. Past rice seasons with May storms resulted in greater numbers of emergency releases, such as 1998 (103 fields)[23], 1996 (80 fields)[24] and 1993 (164 fields)[25].

Closed System Releases

Historically one of the means by which thiobencarb was controlled was to encourage the establishment of closed systems. This could be done at either a district or farm level. Though this approach was adopted by several farmers and districts in the 1980's and was encouraged by USDA grant funding, today only one closed system remains. Reclamation District 1000 (RD1000) and the Natomas Central Mutual Water District (NCMWD) operate the remaining closed system.

History of the RD1000/NCMWD Closed System
RD1000/ NCMWD started the process to become a closed system in response to concerns about rice pesticides molinate and thiobencarb. Department of Fish and Game (DFG), Sacramento and Sutter counties were involved in setting up the closed system. The closed system was finalized in an agreement with the counties in 1983. There are currently about 32,400 acres (approximately 17,000 acres of which is rice) that are shareholders in NCMWD while about 55,000 acres drain in the RD1000 area.

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[23] DPR *Information on Rice Pesticides Submitted to California Regional Water Quality Control Board Central Valley Region* 31 December 1998.
[24] DPR *Information on Rice Pesticides Submitted to California Regional Water Quality Control Board Central Valley Region* 31 December 1996.
[25] DPR *Information on Rice Pesticides Submitted to California Regional Water Quality Control Board Central Valley Region* 8 March 1994.

Closed systems have modified water-holding requirements. A rice grower in a closed system who applies thiobencarb must hold the treated water on the field for six days. Once released from the individual field, the closed system must hold the water for an additional 26 days to constituent the full hold time of 30 days. As growers do not apply thiobencarb at exactly the same time, a closed system typically does not release for much (or all) of the rice growing season.

Within the closed system, drainage comes from a variety of sources. Agriculture including rice production is one source. Though rice production typically generates some drainage, this year was unusual as there was more use of a pesticide called Clincher. Clincher is applied by ground on drawn-down fields. Thus growers were taking more water off of their fields to use this product. Another source of drainage is the City of Sacramento. When development was planned for the Natomas area, an arrangement was made between the City and RD 1000. The City is allowed to dispose of their residential/urban drainage into the RD 1000 system. They have several detention basins and numerous pumps that were designed to have a rate of discharge no faster than the agricultural rate of runoff. The drainage comes from residential sources (such as homes, lawns and streets) and industrial sources (such as businesses and construction activities).

Recent Closed System Releases

Over the last fifteen years, the closed system has had several close calls when a release was avoided only through pumping onto fallow land. As development of the Natomas area has increased, this approach is no longer feasible. During a storm of 2002, RD1000/NCMWD released a total of 1443.8 acre-feet of water from their closed tailwater recovery system into the Sacramento River[26]. At the time of the discharge, 4,218 acres of the 36,000 acres of farmed land in the district was under treatment with thiobencarb (Bolero®). When the CAC authorized RD1000/NCMWD to pump, NMWD was notified that they needed to collect water quality samples. They attempted to have the City of Sacramento run the samples but were unsuccessful and the samples were discarded. To correct this type of loss of important data in the future, in 2003 the Board began a requirement that the CRC conduct monitoring of a closed system if it releases thiobencarb-laden discharge during a storm event. The Board also required establishment of a work group to address storm event related discharges.

2005 Closed System Release

Following an 8 June rain event, the closed system determined that their pumps were in jeopardy of being submerged and requested an emergency release. There were two release points used during the 11 June event. Pump 8 near Northgate Blvd (which discharges into Steelhead Creek, a tributary to the to the American River, released for 47.8 hours for a total of 501.9 acre-feet of water. The second release location was at Pump 4, which releases into the Cross Canal. Pump 4 is located about 3 miles upstream of the Sacramento River. The discharge enters the Cross Canal but is picked up by a

[26] Sacramento CAC Staff letter *Rice water drainage early release* 5 June 2002.

NMWD pump within ¼ mile. Pump 4 was on for 8.7 hours and released 49.6 acre-feet of water.

When the District determined that a closed system release was going to occur, the CRC implemented their Storm Event Work Group (SEWG) Communication Plan. The SEWG consists of representatives of the CRC, DPR, Water Board staff, University of California Davis (UCD), CACs, and the closed system NCMWC and RD1000. The Sacramento CAC contacted the CRC on 10 June notifying them that RD1000 requested an emergency release. Though the CAC could not authorize an emergency release since the Program emergency release provisions are specific to growers, the CRC, their consultant, the Sacramento CAC biologist and RD1000 were present on 11 June when sampling was conducted at the two release locations. The City of Sacramento also monitored several days later at a location downstream of the release area (at the Discovery Boat Dock). Monitoring results will be discussed later in this report, however to summarize here pesticide levels detected in the Sacramento River by the Cities monitoring were quite low, much below the water quality objective.

One week later RD1000 notified the CAC that they anticipated another release and though this release did not result in water actually leaving the system, monitoring was conducted by the CRC. As there was no release, monitoring results reflect what was in the closed system at the time of the release. The release was anticipated because NCMWD had a power failure at their pumps for several hours, so they were unable to circulate water to some parts of their system. When Sacramento County was contacted they did not give permission to pump, as it was the second time a release was needed in such a short period. Sutter County contacted all the growers to let them know that they would need to consider themselves an open system (and thus obey the normal water hold requirements) if the District released. NCMWD also contacted all 50 growers in the District to notify them to not let any thiobencarb treated water release from their fields.

In regards to pesticide use trends in the RD1000 area, neither Sacramento County nor Sutter County staff reported use of molinate in the closed system this year. In Sacramento County, thiobencarb, which has a six-day hold in a closed system, was used on approximately 3,000 acres from about mid May to early June. Sutter County reported about 400 to 500 acres treated with thiobencarb, occurring in late May to early June.

The closed system release was most likely attributable to increased runoff from both urban and agricultural lands caused by the 8 June the rain event. 2005 was an unusual season due to cool temperatures (reduced evaporation) as well as May rainfall. Farmers lowered field levels so that their rice did not drown. Additionally there was increased use of rice pesticide cyhalofop butyl (Clincher). To use this product growers first must drain their fields increasing water into the system.

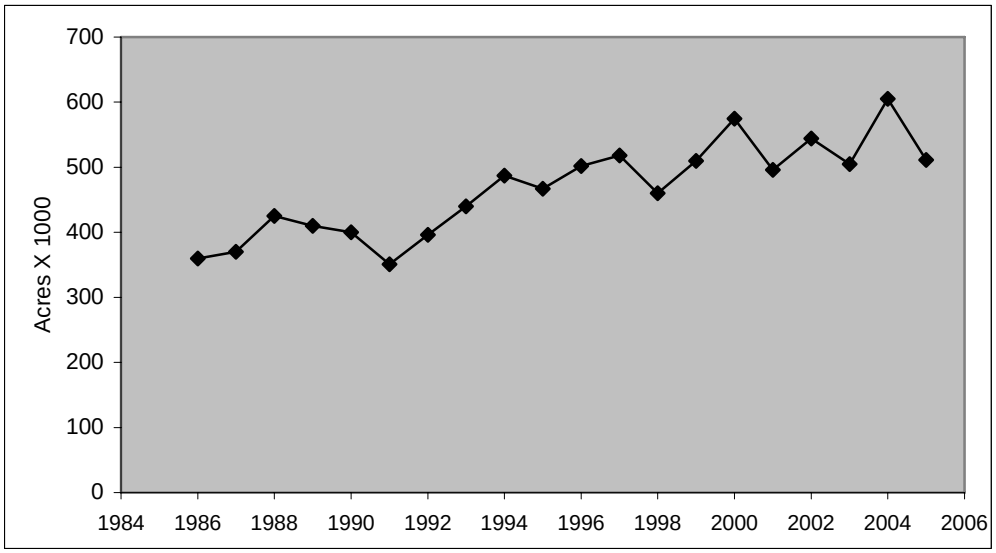
CRC 2005 Annual Report

In the fall of 2002, DPR advised the Water Board and rice industry that it would change their role in the Program from the primary responsible party to that of a co-regulator with the Water Board. DPR continues to provide enforcement data and pesticide use data to the CRC for inclusion in the annual report. They also fund and provide guidance to the CACs on management practices including an annual memo outlining the Board-approved conditions for the coming season.

During the 2003 rice season, the CRC assumed full responsibility for the Program, including monitoring, submittal of the annual report to the Water Board and proposing management practices for the next rice season. The CRC's 2005 report includes data that is used to evaluate compliance with the performance goals and to determine if any programmatic changes should be considered.

Trends in Pesticide Use
In 2005, rice acreage in the Sacramento Valley totaled 511,000 acres[27] (**Graph 2**). The decrease of 94,000 acres from the previous year is attributed to lower rice prices and cool wet weather during planting followed by extreme summer temperatures, which caused rice to topple and yield to suffer.

Graph 2. Total Rice Acreage in the Sacramento Valley 1986 – 2005.



Trends in Pesticide Use - **Graph 3** shows the number of acres treated with thiobencarb and molinate over the last five years. Thiobencarb and molinate saw a sustained high level of use from 1997 to 2002. In the last three years however, use of both products

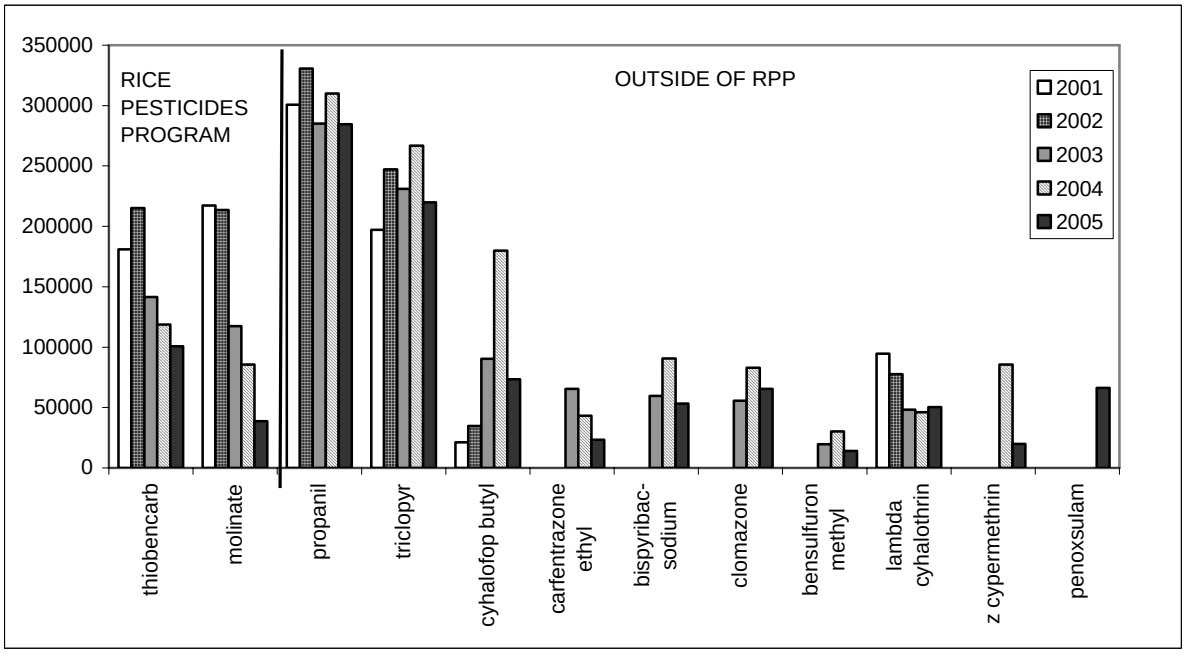
[27] U.S. Dept. of Agriculture National Agricultural Statistics Service

declined. Molinate in particular has seen a dramatic decrease in use, likely due to the upcoming phase-out of the product in several years. Though not shown in the graph because the acres treated were very low, methyl parathion and malathion both saw use on rice in 2005. 301 acres were treated with malathion in the Sacramento Valley. In comparison, last year no acres were treated, 214 acres were treated in 2003 and 147 acres in 2002. Additionally, methyl parathion, which has not had reported use since 2000, was used on 82 acres in 2005.

As shown in **Graph 3**, in recent years a number of new rice pesticides have emerged. These new pesticides and other constituents of concern in rice field drainage are being addressed by a rice-specific Monitoring and Reporting Program issued to the CRC under the Irrigated Lands Waiver[28]. Use of new herbicides that control watergrass (such as cyhalofop-butyl, clomazone and bispyribac-sodium) is expected to continue to rise as molinate is phased out over the next two years.

During 2005, the general trend was a decline in use of most rice herbicides, due to decreased acreage, unfavorable weather conditions and low rice prices. Use of insecticides, including RPP pesticides malathion and methyl parathion, increased due to an infestation of Yellowstripe Armyworm. Additionally, a new herbicide penoxsulum (Granite™) saw use on 66,206 acres.

Graph 3. Rice pesticides[29] treated by chemical: 2001-2005.

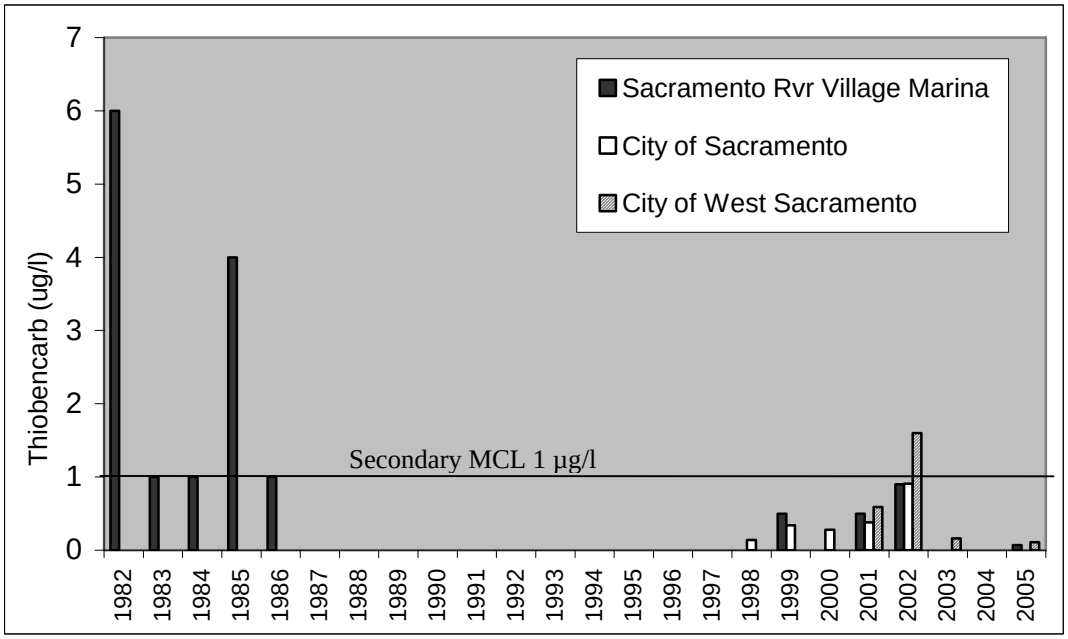


[28] 18 Nov 2004. Central Valley Regional Water Quality Control Board. *Monitoring and Reporting Program Order No. R5-2004-0839 for the California Rice Commission under Resolution No. R5-2003-0105 Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands.*
[29] Limited to pesticides presented in CRC Annual Report (2005) applied to greater than 10,000 acres.

Monitoring Data

Thiobencarb –Thiobencarb levels monitored in 2005 remained below the primary MCL of 70 µg/l, the secondary MCL of 1.0 µg/l and the performance goal of 1.5 µg/l. There were sixty six detections of thiobencarb among the five sampling sites. The peak detection was 0.67 µg/l at CBD1 on 14 June, which was less than half of the performance goal.

Graph 4. Historical trend of peak thiobencarb concentrations in the Sacramento River from 1982-2005[30]



Graph 4 shows the historical trend of peak thiobencarb concentrations detected at monitoring sites on the Sacramento River. In 2005, thiobencarb was detected at very low levels at the City of West Sacramento (0.11 µg/l) and the SR1 monitoring site (0.07 µg/l)[31]. In comparison, in 2004 thiobencarb was not detected in the Sacramento River at any of the three monitoring sites. Though there were detections in 2005 they were much lower than the 1 µg/l secondary MCL, which is protective of the taste of drinking water.

Molinate – Molinate levels did not meet or exceed the 10 µg/l performance goal in 2005 at any of the five sites monitored**.** There were nineteen detections[32] total for the five sample sites with a peak of 3.60 µg/l at BS1 on 7 June. The City of West Sacramento had four detections with a peak concentration of 0.16 µg/l while the City of Sacramento's had a single detection of 0.10 µg/l, much lower than the primary MCL of 20.0 µg/l.

[30] Select data obtained from DPR *Information on Rice Pesticides Submitted to California Regional Water Quality Control Board Central Valley Region* 31 December 1998.
[31] The CRC Annual Report reports the 0.07 ppb value however report also notes that their laboratories detection limits for thiobencarb are <0.1 ppb (APPL) and <0.5 ppb (Valent).
[32] CRC *2005 Annual Report* Total of days detected even if at secondary laboratory.

Closed System Monitoring – CRC and the City of Sacramento conducted monitoring related to the RD1000/NCMWD closed system release in mid June. On 11 June the CRC detected 17.2 µg/l of thiobencarb at Pump 4 drain but no thiobencarb was detected at Pump 8. Molinate was non-detect at both sites. On 15 June the City of Sacramento monitored at the Discovery Boat Dock on the Sacramento River[33] and detected 0.28 µg/l of molinate and 0.30 µg/l of thiobencarb. On 18 June 18 the district anticipated an emergency release, which did not occur. The CRC sampled within the closed system and detected 0.89 µg/l thiobencarb at Pump 4 drain and 1.84 µg/l at Pump 8.

Other Constituents - Methyl parathion, malathion and carbofuran were not sampled during the 2004 rice season due to minimal to no use of the products.

Toxicity Testing – Prior to the 2003 rice season, the CRC proposed and was granted permission to conduct toxicity testing on a triennial vs. annual basis, due to many years of toxicity testing without hits pointing to Rice Pesticides Program pesticides. 2005 marked the first year of required testing under the triennial cycle. Toxicity testing was conducted weekly at CBD5 from April 26 through June 14. Acute toxicity tests were conducted on neonate cladocerans (*Ceriodaphnia dubia)* exposed to sample water for 96 hours. No significant toxicity (currently defined by the Program as <70% survival) was detected for any of the seven sampling events. Due to a contractor error, no sample was collected on May 3rd. The CRC also reported control failure (5% survival) for the 26 April event. For the next round of toxicity sampling, staff recommends that whenever toxicity controls fail (such as on 26 April) that the test is re-run and if a contractor misses a sampling date that an extra week of sampling be added so that the total number of samples (8) be met.

Quality Assurance Project Plan (QAPP) – As required in their 2005 season approval, the CRC has submitted a draft updated QAPP, which is currently under review by the WaterBoard Quality Assurance Officer. Previously the CRC operated under the 2002 DPR Rice Pesticide Program Monitoring Protocol Study #206 (March 18 2002) and associated Laboratory Project Plan and Protocol. Though the procedures used by the CRC were essentially the same as those historically used by DPR, staff saw a need for the CRC to compile their own QAPP documents to specifically reference CRC contacts and to revise the format and content to be more consistent with current Regional Board QAPP standards. QAPP approval is anticipated prior to beginning of 2006 sampling.

Compliance and Enforcement

Emergency Releases – There were 13 emergency release inquires in 2005 resulting in 8 fields authorized to release. Of the 13 fields, 7 were inquires for release of molinate and 6 were for release of thiobencarb. Of the 8 fields authorized, 6 were molinate treated and 2 were thiobencarb treated fields. Agricultural Commissioners generally grant emergency releases from fields prior to the end of the standard holding time only if necessary to prevent levees from being washed out or crops from being damaged.

[33] Sample location was on the outer left bank of the Sacramento River, just north of the confluence with the American River.

Compliance and *Application Inspections* – The CACs inspected molinate and thiobencarb fields for a variety of situations including application of the product, mixing/loading of the product, emergency release inquires, actual emergency releases, seepage and water holding requirements. CACs inspected 104 molinate treated fields and 71 thiobencarb treated fields during application. This was a dramatic increase over2004, when only 32 molinate and 46 thiobencarb fields were inspected[34]. There were two enforcement actions taken in regards to each molinate and thiobencarb related to application and mixing/loading of the product. Inspections were also conducted to confirm that the water holds were being followed. 1,723 fields were inspected consisting of 441 Ordram® 15G treated fields, 4 Ordram® 8E fields, and 1,198 Bolero® 15G fields and 80 Abolish™ 8EC treated fields.

Seepage – In 2005, CACs observed seepage of less than 5 gallons per minute (gpm) in 35 thiobencarb treated fields. No Agricultural Civil Penalty (ACP) was issued. The percent of thiobencarb sites found to have seepage in 2005 (3%) was similar to previous years, as shown in **Table 5**. Unlike 2004, DPR for 2005 gave the CAC's a form, which included reporting of molinate seepage inspection results. There were 28 incidents of seepage in molinate treated fields, with 27 fields having less than 1 gpm. One molinate treated field was found to have more than 5 gpm and was issued an ACP. The percentage of molinate treated fields with seepage (6.4%) was similar to the other two years reported (2.6% in 2001 and 7.2% in 2003).

Table 5. Seepage Inspections 2001 – 2005

Year	Total Sites Inspected	Thiobencarb Treated Fields			Molinate Treated Fields		
		Sites Inspected	Sites with Seepage	%	Sites Inspected	Sites with Seepage	%
2001	2,129	527	14	2.7	1602	41	2.6
2002	1,956	N/A	15	--	N/A	43	--
2003	1,973	1,122	29	2.6	851	61	7.2
2004	N/A	935	4	0.4	N/A	N/A	--
2005	1,602	1,166[35]	35	3.0	436[36]	28	6.4

Staff encourages DPR and the CRC to continue to emphasize seepage reporting. CACs are encouraged to follow the example of Glenn County where pre-application seepage inspections are conducted and if discovered, a restricted use permit was not issued to these growers. The CRC's annual report should discuss each incident of seepage individually, including the rate of seepage, the amount of seepage, and a detailed account of the action taken to address the seepage. This will likely mean that the CRC will need to contact the individual CACs involved, to gather information above what may be provided by DPR. We continue to request that DPR and the CACs notify the Board

[34] CRC compiled data from DPR's Enforcement Action Tracking System Database.
[35] Determined by information in Table 12 of the CRC's *2005 Annual Report*. Total Seepage determined as total of No. Sites w/ No Seepage, No. Sites w/Less Than 5 GPM and No. Sites w/ More Than 5 GPM.
[36] Determined by information in Table 12 of the CRC's *2005 Annual Report*. Total Seepage determined as total of No. Sites w/ No Seepage, No. Sites w/Less Than 5 GPM and No. Sites w/ More Than 5 GPM.

within 30 days of any repeat seepage incidents so that enforcement may be explored since the Water Board has the regulatory option of issuance of Cleanup and Abatement Orders to individual dischargers that do not comply with approved management practices.

Program Issues

Transition of Program Responsibility

Initially when responsibility for preparing the annual report shifted from DPR to the CRC, there was not yet a routine process in place for effective transmittal of enforcement data collected by the CACs/DPR to the Rice Commission. During the 2004 season, the CACs conducted and documented seepage inspections and enforcement activities related to the Program but this data was not provided by DPR to the CRC in time for the CRC to submit their report to the Water Board by the December deadline. Staff discussed this issue with both DPR and CRC and the 2005 resolution asked DPR to provide CRC with the data by December 1st. DPR followed up by requesting that CACs[37] use a form to track seepage and water holding inspections. In the letter, the CACs were also asked to provide enforcement action reporting in timely manner through the year. Recent discussion with the CRC confirm that DPR provided all the necessary information prior to the December 1st due date. The effective transmittal of information seen in 2005 demonstrates the successful transition of program responsibility.

Monitoring Sites

For several years the RPP has included monitoring of five sites within the Sacramento Valley- four located in agricultural drains and one on the Sacramento River. When the RPP began, numerous sites were monitored throughout the Sacramento Valley and Delta region to get a better understanding of the scope of impact of the rice pesticides. The Sacramento Slough 1 (SS1) site was one of these historic sites. Though dropped from the monitoring program for many years, it was added back in several years ago to better identify sources that may have been contributing to increased thiobencarb detections. The SS1 site is located on a muddy bank of the Slough and is accessed through landowner permission down a private farm road. Site access has degraded in recent years as the road has deteriorated. Additionally, sampling can be precarious from the steep, slippery, mud bank. Thus Staff encouraged the CRC to select an alternative site on the Sacramento Slough for future sampling. There is a disadvantage of changing sites, in that any new site would be located upstream of the RD1000 pumps. This means that the amount of drainage captured would be reduced when the pumps are on. When RD1000 is not running its pumps however, any upstream site would be essentially the same as SS1. The CRC has proposed and Staff is supportive of changing the site to Sacramento Slough Bridge (SSB) located on the Sacramento Slough near the Karnak Pump Station.

Closed System Release

[37] 27 September 2005 DPR Letter to CACs. *Data Reporting Guidelines for the 2005 Rice Pesticide Program*.

The 2005 season provided the opportunity to test Board requirements set in place following the 2002 thiobencarb MCL exceedance to address storm water discharges. A highlight of the 2005 season was the successful implementation of the he Storm Event Work Group communications plan. The CRC, CACs, RD1000/NCMWD, the City of Sacramento and Regional Board staff communicated effectively during the storm event. Monitoring was conducted in a timely manner to assess the impact of the closed system release and a follow-up meeting was held to discuss the incident.

The water quality impact of the closed system release was likely minimal, as Plant 8 had no detectable levels of thiobencarb at the time of initiation of pumping. The Plant 4 release did have detectable level of thiobencarb however the water was pumped back out of the Cross Canal into RD1000. The City monitoring at the American River found low levels of both molinate and thiobencarb but they were below performance goals and MCLs. In a meeting held after the releases, all parties agreed that the procedure that RD1000/NMWD followed as well as the efforts of the CRC were appropriate for the situation.

Since water quality impact was minimal and the Communications Plan was followed, Staff does not see the need for additional conditions in regards to the closed system at this time. If, in the future, a pattern of releases becomes apparent further action should be considered.

At a recent thiobencarb stewardship meeting, a RD1000 representative announced that RD1000 might not remain a closed system for the 2006 season. Weather it does or not will be dependent on if growers in the lower part of the system decide to farm rice. If they do not, water will not be supplied to this area and the circulation of water necessary to maintain a closed system will not be possible. The closed system is run per agreements with Sacramento and Sutter counties. Staff contacted the Sacramento CAC who confirmed that if the system is not closed, all rice pesticide permits will be conditioned with the longer (standard) hold times. As many growers in the RD1000 area have been under shorter holds for many years, Staff suggests that the CRC consider directing some of their additional enforcement funding towards water hold compliance inspections in this area.

Discussion

In 2005, the Water Board approved management practices based on 2003 conditions aimed at halting escalating thiobencarb levels and prevention of future water quality objective exceedances. During the 2005 season, the CRC complied with the conditions including successful implementation of the Communication Plan. The CRC also have scheduled their Mandatory Bolero/Abolish Stewardship meetings for four days in February. New for 2006, the mandatory meetings will be held in conjunction with Valent (the thiobencarb pesticide registrant). This should improve outreach, as these meeting will be held at two additional locations in the Sacramento Valley, which will increase

accessibility. The CRC have also committed to continue their efforts as in previous years, including monitoring and funding of additional enforcement efforts.

As to what lies ahead for the 2006 season, many factors influence a given rice season's monitoring results. In other years, the total amount of rice grown (and thus pesticides used) may be a primary factor. In discussions with Rice Commission staff, they anticipate rice acreage to remain about the same, with up to a 10% increase possible due to increased rice prices in 2005.

When the CRC took over responsibility for the Program in 2003, they revived the Rice Working Group to help build consensus on management practices recommendations for the next rice season. CRC has convened a subset of this group with representation by the Water Board, DPR, University of California Cooperative Extension (UCCE), CACs and the Industry. The group met on 12 January 2006 to discuss the annual report and to formulate group Program recommendations for the 2006 season. The recommendations uphold the 2005 conditions with small revisions as detailed in **Attachment B**. Based on 2005 results, there is nothing to suggest that continuation of the current conditions cannot accomplish a meaningful measure of protection against future water quality objective exceedances.

Recommendations

The Water Board may decide one of several alternative actions: no action, which would retain a conditional prohibition of discharges containing the five rice pesticides for the 2006 season; approval of program with the CRC's proposed conditions, which would entail a program very similar to that of the past three seasons; or approval subject to new or additional conditions.

The CRC submitted their annual report as required in December 2005. On 12 January, Water Board, DPR, UCCE and CAC representatives met with the CRC and agreed upon proposed management practices that uphold the existing conditions. Recommendations were submitted to the Water Board on 27 January 2006 (**Attachment B**). Staff recommends approval of the program for the 2006 season with the conditions as proposed by the CRC.

February 2006
AES/RJS

Attachment A: Executive Summary of CRC 2005 Annual Report
Attachment B: CRC Memo Dated 27 January 2006. Rice Pesticides Program - 2006 Consensus Recommendations.