



CENTRAL VALLEY REGIONAL
WATER QUALITY CONTROL BOARD

AMENDMENTS TO THE WATER QUALITY CONTROL
PLAN FOR THE SACRAMENTO AND
SAN JOAQUIN RIVER BASINS

FOR

THE CONTROL OF DIAZINON AND CHLORPYRIFOS
DISCHARGES

MARCH 2013 DRAFT STAFF REPORT

APPENDIX B

COST CALCULATIONS



CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

This appendix contains additional tables showing calculations used to determine the potential cost of implementing the proposed Basin Plan Amendment, including implementation of management practices and monitoring and planning alternatives. The overall description of cost calculations is contained in section 9.

Table B-1 Total Estimated Cost for Agriculture

| | Low Cost (\$/yr) | High Cost (\$/yr) |
|---|-------------------------|--------------------------|
| Dormant Season Practices (see Table 9.10) | (217,120) | 5,291,728 |
| Irrigation Season Practices (See Table 9.9) | 5,187,900 | 16,326,618 |
| Total Management Practice Cost | 4,970,780 | 21,618,346 |
| Monitoring, Planning and Reporting Cost (see Table B-2) | 1,489,002 | 4,366,000 |
| Total Estimated Cost to Agriculture | 6,459,782 | 25,984,346 |

Table B-2 Monitoring and Planning Costs – Watershed Groups

| | |
|--|---------------------|
| Number of Diazinon and Chlorpyrifos Samples (See table D-5) | 882 |
| Total # of samples including 30% QA/QC Samples | 1,147 |
| Cost per Sample | \$ 200 |
| Total Analytical Costs for Diazinon and Chlorpyrifos | \$ 229,320 |
| Number of Toxicity Samples | 96 |
| Total Cost of Toxicity Analyses (assumes \$1,000 per sample average cost) | \$ 96,000 |
| Number of Full Pesticide Scan Samples | 96 |
| Total Cost of Full Pesticide Scan Samples (assumes \$1,000 per sample average cost) | \$ 96,000 |
| Number of Sediment Toxicity and Pesticide Samples | 45 |
| Total Cost of Sediment Toxicity and Pesticide Samples (assumes \$1500 per sample) | \$ 67,500 |
| Total Cost of Additional Analysis for Toxicity and Potential Replacement Pesticides | \$ 259,500 |
| Number of Person-days for sample collection. Assumes 2 person crew can cover 6 sites. | 294 |
| Sample collection preparation as a percent of Person-days for sampling. | 25% |
| Total Person-days for Sample Collection & Preparation | 368 |
| Cost per Person-day | \$ 150 |
| Sampling personnel cost | \$ 55,200 |
| Travel Costs (assumes each person day involves 300 miles of driving at \$0.51 per mile) | \$ 44,982 |
| Equipment/Supplies | \$ 20,000 |
| Monitoring Plan & Quality Assurance Plan (Assumes 1 person month @ \$10,000 per person month) | \$ 10,000 |
| Monitoring Program Coordination (Assumes 1 year at 50% time at \$10,000 per person month) | \$ 60,000 |
| Annual Monitoring Reports | \$ 30,000 |
| Monitoring Planning, Coordination and Reporting Cost Per Coalition Area | \$ 100,000 |
| Number of Coalitions | 4 |
| Total Monitoring Planning, Coordination and Reporting | \$ 400,000 |
| Total Monitoring Cost | \$ 1,009,002 |
| Planning and Evaluation Cost | |
| Implementation Plan (Assumes 3 person months @ \$10,000 per person month) | \$ 30,000 |
| Implementation Plan Coordination, Delta Watershed - Wide (assumes 12 months at 50% time at \$10,000 per person month) | \$ 60,000 |
| Annual Implementation Report, Including Practices Effectiveness Evaluation (Assumes 3 months at \$10,000 per person month) | \$ 30,000 |
| Total Planning and Evaluation Cost per Coalition Area | \$ 120,000 |
| Total Planning and Evaluation Cost | \$ 480,000 |
| Total Cost for Monitoring, Planning, and Evaluation | \$ 1,489,002 |
| Approx. Number of Growers Applying Diazinon or Chlorpyrifos | 2400 |
| Approx. Cost per Grower | \$ 620 |

Table B-3 Monitoring and Planning Costs – Individual Discharger

| | |
|---|--------------------|
| Number of Tailwater Samples Collected Per Pesticide Application Site | 1 |
| % QA/QC Samples | 30% |
| Total # of samples per site | 2 |
| Cost per Sample | \$200 |
| Total analytical costs | \$400 |
| Cost for sampling collection and flow estimate (incl preparation and shipping). Assumes 2 hrs per sample @ \$40/hr. | \$80 |
| Travel Costs (50 mi per trip/ \$0.51 per mile.) | \$26 |
| Bottles and Supplies (\$5/sample) | \$10 |
| Cost Per Water Quality Monitoring Event per pesticide application site | \$516 |
| Water Quality Monitoring Planning and Reporting Costs | |
| Monitoring and Quality Assurance Plan. Assumes 8 hours time @ \$40/hr | \$320 |
| Annual Monitoring Report (assume 8 hrs time @ \$40/hr) | \$320 |
| Total Water Quality Monitoring Planning and Reporting | \$640 |
| Planning and Evaluation Cost | |
| Implementation Plan (Assumes 4 hours @ \$40 per person hour) | \$160 |
| Annual Implementation Plan Report Including Effectiveness Evaluation (Assumes 4 hours @ \$40 per person hour) | \$160 |
| Total Planning and Evaluation Cost | \$320 |
| Total annual cost for basin-wide monitoring, planning, and evaluation | |
| Costs Totaled Per Grower (total water quality monitoring planning and reporting, and total planning and evaluation costs, does not include monitoring cost) | \$960 |
| Number of Growers | 2400 |
| Total Costs for planning and reporting (per grower cost*number of growers) | \$2,304,000 |
| Cost Per Water Quality Monitoring Event | \$516 |
| Number of Water Quality Monitoring Events (assumes 1 per pesticide application for approximately half of the ~8000 applications per year) | 4000 |
| Total Water Quality Monitoring Cost | 2,062,000 |
| Basin-wide Cost (total sampling cost + Total planning and reporting cost) | \$4,366,000 |
| Total Monitoring and Planning Cost Per Grower | \$1,819 |

**Table B-4 Monitoring and Planning Costs
Hybrid - Watershed Approach with Individual Discharge Monitoring**

| | |
|---|---------------------|
| Number of Tailwater Samples Collected (assumes 1 per pesticide application for approximately half of the ~8000 applications per year) | 4000 |
| % QA/QC Samples | 30% |
| Total # of samples | 5200 |
| Cost per Sample | \$ 200 |
| Total analytical costs for Diazinon and Chlorpyrifos | \$ 1,040,000 |
| Total Cost of Additional Analysis for Toxicity and Potential Replacement Pesticides (from Watershed Monitoring Table D-2) | \$259,500 |
| Cost for sampling collection and flow estimate (incl preparation and shipping). Assumes 2 hrs per sample @ \$40/hr. | \$ 320,000 |
| Travel Costs (50 mi per trip/ \$0.51 per mile.) | \$102,000 |
| Bottles and Supplies (\$5/sample) | \$ 26,000 |
| Monitoring Plan & Quality Assurance Plan (Assumes 1 person month @ \$10,000 per person month) | \$ 10,000 |
| Monitoring Program Coordination (Assumes 1 year at 50% time at \$10,000 per person month) | \$ 60,000 |
| Annual Monitoring Reports | \$ 30,000 |
| Total Monitoring planning cost per coalition area | \$ 100,000 |
| Number of Coalitions | 4 |
| Total monitoring planning cost | 400,000 |
| Total Monitoring Cost | 2,147,500 |
| Planning and Evaluation Cost | |
| Implementation Plan (Assumes 3 person months @ \$10,000 per person month) | \$ 30,000 |
| Implementation Plan Coordination, Watershed - Wide (assumes 12 mos at 50% time at \$10,000 per person month) | \$ 60,000 |
| Annual Implementation Report, Including Practices Effectiveness Evaluation (Assumes 3 months at \$10,000 per person month) | \$ 30,000 |
| Total planning cost per coalition area | \$ 120,000 |
| Number of Coalition Areas | 4 |
| Total Planning and Evaluation Cost | \$ 480,000 |
| Total annual cost for basin-wide monitoring, planning, and evaluation | |
| Total Cost (total monitoring cost + total planning and evaluation cost) | \$2,627,500 |
| Total Number of Growers | 2400 |
| Cost per grower | \$1,095 |

Table B- 5 Estimation of Annual Number of Samples for Watershed-Based Compliance Monitoring

| Waterbody Segment | Storm samples | | | Irrigation season samples | | | Total number of water samples | | | Sediment |
|---|---------------------------|----------|---------------------|---------------------------|----------|---------------------|-------------------------------|----------|----------------------|-----------------------------|
| | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scan | Diazinon and Chlorpyrifos | toxicity | Full Pesticide Scan | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scans | Toxicity and pesticide scan |
| San Joaquin River Watershed | | | | | | | | | | |
| Ash Slough (Madera County) | 0 | 0 | 0 | 10 | | | 10 | 0 | 0 | 0 |
| Berenda Creek | 0 | 0 | 0 | 10 | | | 10 | 0 | 0 | 0 |
| Berenda Slough | 0 | 0 | 0 | 10 | | | 10 | 0 | 0 | 0 |
| Deadman Creek (Merced County) | 0 | 0 | 0 | 10 | | | 10 | 0 | 0 | 0 |
| Del Puerto Creek at Vineyard Road | 2 | 0 | 0 | 10 | 0 | 0 | 12 | 0 | 0 | 0 |
| Dry Creek (tributary to Tuolumne River at Modesto, E Stanislaus County) | 4 | 2 | 2 | 10 | 3 | 3 | 14 | 5 | 5 | 3 |
| Duck Creek (San Joaquin County) | 0 | 0 | 0 | 10 | | | 10 | 0 | 0 | 0 |

| Waterbody Segment | Storm samples | | | Irrigation season samples | | | Total number of water samples | | | Sediment |
|---|---------------------------|----------|---------------------|---------------------------|----------|---------------------|-------------------------------|----------|----------------------|-----------------------------|
| | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scan | Diazinon and Chlorpyrifos | toxicity | Full Pesticide Scan | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scans | Toxicity and pesticide scan |
| Duck Slough (Merced County) | 0 | 0 | 0 | 10 | | | 10 | 0 | 0 | 0 |
| Harding Drain | 0 | 0 | 0 | 10 | | | 10 | 0 | 0 | 0 |
| Highline Canal | 0 | 0 | 0 | 10 | | | 10 | 0 | 0 | 0 |
| Ingram Creek downstream of confluence with hospital creek | 4 | 0 | 0 | 10 | 3 | 3 | 14 | 3 | 3 | 3 |
| Merced River | 8 | 2 | 2 | 10 | 3 | 3 | 18 | 5 | 5 | 3 |
| Mustang Creek (Merced County) | 4 | 0 | 0 | 10 | | | 14 | 0 | 0 | 0 |
| Newman Wasteway | 0 | 0 | 0 | 10 | | | 10 | 0 | 0 | 0 |
| Orestimba Creek | 4 | 2 | 2 | 10 | 3 | 3 | 14 | 5 | 5 | 3 |
| Salt Slough | 4 | 2 | 2 | 10 | 3 | 3 | 14 | 5 | 5 | 3 |
| San Joaquin River (Bear Creek to Mud Slough) | 12 | 0 | 0 | 10 | | | 22 | 0 | 0 | 0 |

| Waterbody Segment | Storm samples | | | Irrigation season samples | | | Total number of water samples | | | Sediment |
|--|---------------------------|----------|---------------------|---------------------------|----------|---------------------|-------------------------------|----------|----------------------|-----------------------------|
| | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scan | Diazinon and Chlorpyrifos | toxicity | Full Pesticide Scan | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scans | Toxicity and pesticide scan |
| San Joaquin River (Mendota Pool to Bear Creek) | 12 | 0 | 0 | 10 | | | 22 | 0 | 0 | 0 |
| San Joaquin River (Merced River to Tuolumne River) | 12 | 0 | 0 | 10 | | | 22 | 0 | 0 | 0 |
| San Joaquin River (Mud Slough to Merced River) | 8 | 0 | 0 | 10 | | | 18 | 0 | 0 | 0 |
| San Joaquin River (Stanislaus River to Delta) | 12 | 3 | 3 | 10 | 3 | 3 | 22 | 6 | 6 | 3 |
| San Joaquin River (Tuolumne River to Stanislaus River) | 12 | 3 | 3 | 10 | 3 | 3 | 22 | 6 | 6 | 3 |
| Stanislaus River | 8 | 0 | 0 | 10 | 0 | 0 | 18 | 0 | 0 | 0 |
| Tuolumne River | 8 | 2 | 2 | 10 | 3 | 3 | 18 | 5 | 5 | 3 |

| Waterbody Segment | Storm samples | | | Irrigation season samples | | | Total number of water samples | | | Sediment |
|--|---------------------------|----------|---------------------|---------------------------|----------|---------------------|-------------------------------|----------|----------------------|-----------------------------|
| | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scan | Diazinon and Chlorpyrifos | toxicity | Full Pesticide Scan | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scans | Toxicity and pesticide scan |
| Westley Wasteway (Stanislaus County) | 4 | 0 | 0 | 10 | | | 14 | 0 | 0 | 0 |
| Sacramento River Watershed | | | | | | | | | | |
| Bear River, Lower (below Camp Far West Reservoir) | 4 | 0 | 0 | 10 | | | 14 | 0 | 0 | 0 |
| Butte Slough | 4 | 0 | 0 | 10 | | | 14 | 0 | 0 | 0 |
| Colusa Basin Drain | 6 | 3 | 3 | 0 | 3 | 3 | 6 | 6 | 6 | 3 |
| Coon Creek, Lower (Sutter County) | 0 | 0 | 0 | 10 | | | 10 | 0 | 0 | 0 |
| Feather River nr. Verona (or Nicolaus during high flows) | 0 | 0 | 0 | 10 | 3 | 3 | 10 | 3 | 3 | 3 |
| Gilsizer Slough | 4 | 0 | 0 | 0 | | | 4 | 0 | 0 | 0 |
| Jack Slough | 4 | 0 | 0 | 0 | | | 4 | 0 | 0 | 0 |

| Waterbody Segment | Storm samples | | | Irrigation season samples | | | Total number of water samples | | | Sediment |
|---|---------------------------|----------|---------------------|---------------------------|----------|---------------------|-------------------------------|----------|----------------------|-----------------------------|
| | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scan | Diazinon and Chlorpyrifos | toxicity | Full Pesticide Scan | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scans | Toxicity and pesticide scan |
| Live Oak Slough | 4 | 0 | 0 | 0 | | | 4 | 0 | 0 | 0 |
| Main Drainage Canal (Butte County) | 4 | 0 | 0 | 0 | | | 4 | 0 | 0 | 0 |
| Morrison Slough | 6 | 0 | 0 | 0 | | | 6 | 0 | 0 | 0 |
| Sacramento Slough near Karnak | 0 | 0 | 0 | 10 | | | 10 | 0 | 0 | 0 |
| Spring Creek (Colusa County) | 6 | 0 | 0 | 10 | | | 16 | 0 | 0 | 0 |
| Stony Creek | 0 | 0 | 0 | 10 | | | 10 | 0 | 0 | 0 |
| Wadsworth Canal | 6 | 0 | 0 | 10 | | | 16 | 0 | 0 | 0 |
| Yankee Slough (Placer and Sutter Counties) | 0 | 0 | 0 | 10 | | | 10 | 0 | 0 | 0 |
| Delta Watershed | | | | | | | | | | |
| Bear Creek (San Joaquin and Calaveras Counties) | 6 | 0 | 0 | | | | 6 | 0 | 0 | 0 |

| Waterbody Segment | Storm samples | | | Irrigation season samples | | | Total number of water samples | | | Sediment |
|--|---------------------------|----------|---------------------|---------------------------|----------|---------------------|-------------------------------|----------|----------------------|-----------------------------|
| | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scan | Diazinon and Chlorpyrifos | toxicity | Full Pesticide Scan | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scans | Toxicity and pesticide scan |
| Cache Slough | 12 | 3 | 3 | 10 | 3 | 3 | 22 | 6 | 6 | 3 |
| Calaveras River (downstream of Stockton Diverting Canal) | 6 | 0 | 0 | 10 | | | 16 | 0 | 0 | 0 |
| Delta Island Drains (6 drains) | 18 | 0 | 0 | 60 | 3 | 3 | 78 | 3 | 3 | 0 |
| Duck Slough | 0 | 0 | 0 | 10 | | 0 | 10 | 0 | 0 | 0 |
| Five Mile Slough | 6 | 0 | 0 | | | | 6 | 0 | 0 | 0 |
| French Camp Slough | 6 | 0 | 0 | 10 | 3 | 3 | 16 | 3 | 3 | 3 |
| Grant Line Canal | 6 | 3 | 3 | 10 | 3 | 3 | 16 | 6 | 6 | 3 |

| Waterbody Segment | Storm samples | | | Irrigation season samples | | | Total number of water samples | | | Sediment |
|---|---------------------------|----------|---------------------|---------------------------|----------|---------------------|-------------------------------|----------|----------------------|-----------------------------|
| | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scan | Diazinon and Chlorpyrifos | toxicity | Full Pesticide Scan | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scans | Toxicity and pesticide scan |
| Lone Tree Creek | 0 | 0 | 0 | 10 | 3 | 3 | 10 | 3 | 3 | 0 |
| Marsh Creek | 6 | 0 | 0 | 10 | | | 16 | 0 | 0 | 0 |
| Mokelumne River (Camanche Reservoir to Delta) | 6 | 0 | 0 | 10 | 3 | 3 | 16 | 3 | 3 | 0 |
| Mormon Slough (from Stockton Diverting Canal to Bellota Weir – Calaveras River) | 0 | 0 | 0 | 10 | | | 10 | 0 | 0 | 0 |
| Mosher Slough | 6 | 0 | 0 | | | | 6 | 0 | 0 | 0 |
| Old River (SJR to Delta Mendota Canal) | 12 | 0 | 0 | | | | 12 | 0 | 0 | 0 |
| Paradise Cut | 12 | 3 | 3 | 10 | 3 | 3 | 22 | 6 | 6 | 3 |
| Pixley Slough (San Joaquin County) | 6 | 0 | 0 | 10 | | | 16 | 0 | 0 | 0 |

| Waterbody Segment | Storm samples | | | Irrigation season samples | | | Total number of water samples | | | Sediment |
|--|---------------------------|----------|---------------------|---------------------------|----------|---------------------|-------------------------------|-----------|----------------------|-----------------------------|
| | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scan | Diazinon and Chlorpyrifos | toxicity | Full Pesticide Scan | Diazinon and Chlorpyrifos | Toxicity | Full pesticide scans | Toxicity and pesticide scan |
| Sacramento River at Rio Vista | 12 | 3 | 3 | 10 | 3 | 3 | 22 | 6 | 6 | 0 |
| San Joaquin River at Jersey Point | 8 | 2 | 2 | 10 | 3 | 3 | 18 | 5 | 5 | 0 |
| Sand Creek (tributary to Marsh Creek, Contra Costa County) | 0 | 0 | 0 | 10 | | | 10 | 0 | 0 | 0 |
| Ulatis Creek | 12 | 3 | 3 | 10 | 3 | 3 | 22 | 6 | 6 | 3 |
| Walthall Slough @ Woodward Ave | 0 | 0 | 0 | | | | 0 | 0 | 0 | 0 |
| Winters Canal (Yolo County) | 4 | 0 | 0 | 0 | | | 4 | 0 | 0 | 0 |
| Yolo bypass (toe drain) | 12 | 0 | 0 | 10 | 0 | 0 | 22 | 0 | 0 | 0 |
| Grand Total | | | | | | | 882 | 96 | 96 | 45 |