

Memorandum



DATE: April 29, 2011

TO: Mark Cady, Central Valley Regional
Water Quality Control Board

SUBJECT: 2010 SVWQC AMR Errata

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PURPOSE

The Sacramento Valley Water Quality Coalition (Coalition) has developed and implemented a Monitoring and Reporting Program (MRP) to meet the requirements of the Conditional Waiver for Irrigated Lands (Irrigated Lands Regulatory Program, or ILRP) and subsequent amendments to the ILRP requirements (WQO-2004-0003, SWRCB 2004, R5-2005-0833, R5-2008-0005). Each year, the Coalition documents its progress towards fulfilling the ILRP requirements in an Annual Monitoring Report (AMR). The Coalition submitted its 2010 AMR on March 1, 2011. This memorandum addresses the specific additions that have been made to the 2010 dataset, as well as required corrections to the AMR content, since the AMR submittal.

There are two reasons that corrections to the AMR are required. Environmental data for the January 2010 and March 2010 events were inadvertently omitted from the submitted dataset due to a laboratory data entry error. The specific error was a mischaracterization of environmental sample results as laboratory QA results. In addition, a revised laboratory report for the August 2010 event was submitted late to the Coalition (months after the original submittal) and was unintentionally omitted from the final AMR dataset. LWA has implemented additional data checks for the specific error types and lab report revision tracking to prevent reoccurrences of these data omissions. Additionally, the analytical laboratory from which these reports originated is no longer being used, so errors of this type should not occur in the future.

Inclusion of the previously omitted data required a number of minor changes to the text and tables of the 2010 AMR. This memorandum documents these changes and includes an attachment containing the additional data to be added to the original AMR data submittal. None of the data have been previously submitted. The revisions to the AMR consist mainly of changes in summary values (enumerating analyses and QA results) and some text documenting the initial

follow-up conducted for several additional exceedances. The major conclusions and findings of the AMR were not affected by these changes.

The remaining content of this Errata memorandum is organized as follows:

A. Errata

- a. Executive Summary
 - i. Results and Conclusions
- b. Monitoring Results
 - i. Quality Assurance Results
 - 1. Results of Field and Laboratory QC Analyses
 - 2. Summary of Precision and Accuracy
- c. Data Interpretation
 - i. Exceedances of Relevant Water Quality Objectives
 - 1. Pesticides Detected in Coalition Monitoring Pesticides Detected in Coalition Monitoring

Attachment A: SVWQC Amended Data 2010

Page numbers cited for amended text reference the pages of the AMR submitted in March 2011.

ERRATA

As a result of the omitted environmental and quality assurance data being added to the 2010 dataset, changes to the 2010 AMR were required. All modifications are presented in the following sections in redline strikeout format.

EXECUTIVE SUMMARY

Results and Conclusions

The following amended text is on page vii:

Pesticides were infrequently detected (<~~2.3~~ 3.4% of 2010 pesticide results), and when detected, rarely exceeded applicable objectives. Five registered pesticides (chlorpyrifos, dimethoate, diuron, malathion, simazine) exceeded applicable water quality objectives in a total of nine samples in 2010 Coalition monitoring.

MONITORING RESULTS

Quality Assurance Results

Results of Field and Laboratory QC Analyses

The following amended text appears on pages 24 and 25:

Method Detection Limits and Quantitation Limits

3 of ~~302~~ 310 herbicide pesticide results had QLs greater than the project DQO due to the laboratory not meeting the project DQO. The elevated QLs did not affect assessment of compliance or toxicity.

1 of ~~96~~ 108 triazine pesticide results had MDLs marginally greater than the project DQO due to the laboratory not meeting the project DQO. Assessment of compliance and toxicity potential were not affected for any results.

The following amended text appears on page 26:

Laboratory Control Spikes and Surrogates

The results of ~~25~~ 30 LCS recovery analyses for organophosphate pesticides by EPA 625 were outside the acceptable recovery DQO. A total of ~~13~~ 17 analytical results were qualified as low biased as a result of low recoveries. A total of 12 analytical results were qualified as high biased as a result of high recoveries.

The following amended text appears on page 28:

Summary of Precision and Accuracy

Based on the QC data for the monitoring discussed above, the precision and accuracy of the majority of monitoring results meet the DQOs, and there were no systematic sampling or analytical problems. These data are adequate for the purposes of the Coalition's monitoring program, and few results required qualification. Of the ~~183~~ 187 total qualified data, 2 results were qualified as *estimated* due to high variability in lab or field replicate analyses, ~~55~~ 59 results

were qualified as *high biased* or *low biased* and 6 results were potentially affected by contamination and qualified as *upper limits*. Of the results qualified as *upper limits*, one was below the QL, and none of the data qualified as *upper limits* was an exceedance. Of the ~~4,595~~ 4,807 environmental analytical results generated from October 2009 through September 2010, ~~4,486~~ 4,694 results required no qualification, resulting in ~~97.6%~~ 97.7% valid and unqualified data with no restrictions on use.

The following amended tables appear on pages 29-34:

Table 8. Summary of Field Blank Quality Control Sample Evaluations for 2010 Coalition Monitoring

Method	Analyte	DQO	Number of Analyses	Number Passing	% Success
EPA 350.2 / SM20-4500-NH3 C	Ammonia, Total as N	< PQL	3	3	100%
EPA 8321A	Carbamate Pesticides	< PQL	78	78	100%
SM20-9223	<i>E. coli</i>	< PQL	14	14	100%
EPA 354.1 / SM4500-NO2 B	Hardness	< PQL	1	1	100%
EPA 8321A/625	Herbicides	< PQL	84	84	100%
EPA 353.2	Nitrate+Nitrite, as N	< PQL	13	11	85%
EPA 625	Organophosphate Pesticides	< PQL	492 <u>221</u>	492 <u>221</u>	100%
EPA 365.2 / SM20-4500-P E	Orthophosphate/Phosphorus, as P	< PQL	17	15	88%
EPA 160.1 / SM2540C	Surrogates	< PQL	38	38	100%
SM20-9221 B/E	Total Coliforms	< PQL	1	1	100%
EPA 351.3 / SM4500-NH3 C	Total Kjeldahl Nitrogen	< PQL	3	3	100%
SM20-5310 B/ SM5310C	Total Organic Carbon	< PQL	13	13	100%
EPA 160.2 / SM2540D	Total Suspended Solids	< PQL	14	13	93%
EPA 200.8	Trace Metals	< PQL	9	8	89%
EPA 625	Triazine Pesticides	< PQL	36	36	100%
EPA 180.1	Turbidity	< PQL	14	12	86%
Totals			530 <u>559</u>	522 <u>551</u>	98.5 <u>98.6%</u>

Table 9. Summary of Field Duplicate Quality Control Sample Results for 2010 Coalition Monitoring

Method	Analyte	DQO	Number of Analyses	Number Passing	% Success
EPA 350.2 / SM20-4500-NH3 C	Ammonia, Total as N	RPD ≤25%	3	3	100%
EPA 8321A Toxicity	Carbamate Pesticides <i>Ceriodaphnia, Selenastrum</i>	RPD ≤25%	91	91	100%
SM20-9223	<i>E. coli</i>	RPD ≤25%	4	4	100%
EPA 8321A/625	Herbicides	RPD ≤25%	13	13	100%
EPA 353.2	Nitrate+Nitrite, as N	RPD ≤25%	96	96	100%
EPA 625	Organochlorine Pesticides	RPD ≤25%	13	12	92%
EPA 625	Organophosphate Pesticides	RPD ≤25%	29	29	100%
EPA 365.2 / SM20-4500-P E	Orthophosphate/Phosphorus, as P	RPD ≤25%	192 221	192 221	100%
SM20-9221 B/E	Total Coliforms	RPD ≤25%	16	16	100%
EPA 351.3 / SM4500-NH3 C	Total Kjeldahl Nitrogen	RPD ≤25%	1	1	100%
SM20-5310 B/ SM5310C	Total Organic Carbon	RPD ≤25%	3	3	100%
EPA 160.2 / SM2540D	Total Suspended Solids	RPD ≤25%	14	14	100%
EPA 200.8	Trace Metals	RPD ≤25%	12	12	100%
EPA 625	Triazine Pesticides	RPD ≤25%	6	6	100%
EPA 180.1	Turbidity	RPD ≤25%	24	24	100%
			13	12	92%
Totals			530 559	527 556	99.4 99.5%

Table 10. Summary of Method Blank Results for 2010 Coalition Monitoring

Method	Analyte	DQO	Number of Analyses	Number Passing	% Success
EPA 350.2 / SM20-4500-NH3 C	Ammonia, Total as N	< MDL	13	13	100%
EPA 8321A	Carbamate Pesticides	< MDL	91	91	100%
SM20-9223	E. coli	< MDL	40	40	100%
EPA 130.2 / SM2340B	Hardness as CaCO3	< MDL	2	2	100%
EPA 8321A/625	Herbicides	< MDL	105	105	100%
EPA 353.2	Nitrate+Nitrite, as N	< MDL	46	46	100%
EPA 625	Organochlorine Pesticides	< MDL	33	33	100%
EPA 625	Organophosphate Pesticides	< MDL	384	384	100%
EPA 365.2 / SM20-4500-P E	Orthophosphate/Phosphorus, as P	< MDL	54	54	100%
EPA 8270C	Pyrethroid Pesticides in Sediment	< MDL	44	44	100%
EPA 351.3 / SM4500-NH3 C	Total Kjeldahl Nitrogen	< MDL	13	13	100%
SM20-5310 B/ SM5310C	Total Organic Carbon	< MDL	58	58	100%
EPA 160.2 / SM2540D	Total Suspended Solids	< MDL	50	50	100%
EPA 200.8	Trace Metals	< MDL	39	39	100%
EPA 625	Triazine Pesticides	< MDL	36	36	100%
EPA 180.1	Turbidity	< MDL	48	48	100%
Totals			1056 1085	1052 1081	99.6%

Table 11. Summary of Lab Control Spike Results for 2010 Coalition Monitoring

Method	Analyte	DQO	Number of Analyses	Number Passing	% Success
EPA 350.2 / SM20-4500-NH3 C	Ammonia, Total as N	90 - 110%	13	13	100%
EPA 8321A	Carbamate Pesticides	[1]	91	91	100%
EPA 130.2 / SM2340B	Hardness as CaCO3	80 - 120%	2	2	100%
EPA 8321A/625	Herbicides	50 - 141%	123 125	109 111	89%
EPA 353.2	Nitrate+Nitrite, as N	90 - 110%	46	46	100%
EPA 625	Organochlorine Pesticides	[1]	66	65	98%
EPA 625	Organophosphate Pesticides	[1]	766 814	744 784	97 <u>96%</u>
EPA 365.2 / SM20-4500-P E	Orthophosphate/Phosphorus, as P	90 - 110%	54	54	100%
EPA 8270C	Pyrethroid Pesticides in Sediment	[1]	88	78	89%
EPA 351.3 / SM4500-NH3 C	Total Kjeldahl Nitrogen	90 - 110%	13	13	100%
SM20-5310 B/ SM5310C	Total Organic Carbon	80 - 120%	61	61	100%
EPA 160.2 / SM2540D	Total Suspended Solids	80 - 120%	49	49	100%
EPA 200.8	Trace Metals	85 - 115%	39	39	100%
EPA 625	Triazine Pesticides	80 - 120%	72	70	97%
EPA 180.1	Turbidity	90 - 110%	50	50	100%
Totals			1533 1583	1481 1526	96.6 <u>96.3%</u>

1. Data Quality Objectives for pesticide LCS recoveries vary by parameter and are based on 3x the standard deviation of the lab's actual recoveries for each parameter.

Table 12. Summary of Surrogate Recovery Results for 2010 Coalition Monitoring

Method	Analyte	DQO	Number of Analyses	Number Passing	% Success
EPA 625	Organophosphorus, Organochlorine and Triazine Pesticides	[1]	639 703	639 700	99.5 <u>99.6%</u>
Totals			639 703	639 700	99.5 <u>99.6%</u>

1. Data Quality Objectives for pesticide surrogate recoveries vary by parameter and are based on 3x the standard deviation of the lab's actual recoveries for each parameter.

Table 13. Summary of Lab Duplicate Results for 2010 Coalition Monitoring

Method	Analyte	DQO	Number of Analyses	Number Passing	% Success
EPA 8321A/625	Herbicides	RPD ≤25%	5	5	100%
EPA 625	Organochlorine Pesticides	RPD ≤25%	29	29	100%
EPA 625	Organophosphate Pesticides	RPD ≤25%	96 125	96 125	100%
SM20-5310 B/ SM5310C	Total Organic Carbon	RPD ≤25%	1	1	100%
EPA 160.2 / SM2540D	Total Suspended Solids	RPD ≤25%	8	8	100%
EPA 625	Triazine Pesticides	RPD ≤25%	24	24	100%
EPA 180.1	Turbidity	RPD ≤25%	23	23	100%
Totals			486 215	486 214	99.5%

Table 14. Summary of Matrix Spike Recovery Results for 2010 Coalition Monitoring

Method	Analyte	DQO	Number of Analyses	Number Passing	% Success
EPA 8321A	Carbamate Pesticides	[1]	182	175	96%
EPA 8321A/625	Herbicides	80 - 120%	204 206	190 192	93%
EPA 353.2	Nitrate+Nitrite, as N	90 - 110%	18	14	78%
EPA 625	Organochlorine Pesticides	80 - 110%	66	58	88%
EPA 625	Organophosphate Pesticides	[1]	620 668	537 569	87 85%
EPA 365.2 / SM20-4500-P E	Orthophosphate/Phosphorus, as P	90 - 110%	34	34	100%
EPA 8270C	Pyrethroid Pesticides in Sediment	[1]	88	48	55%
SM20-5310 B/ SM5310C	Total Organic Carbon	80 - 120%	40	40	100%
EPA 200.8	Trace Metals	85 - 115%	12	12	100%
EPA 625	Triazine Pesticides	50 - 141%	72	64	89%
Totals			4336 1386	4172 1206	87.7 87.0%

1. Data Quality Objectives for pesticide matrix spike recoveries vary by parameter and are based on 3x the standard deviation of the lab's actual recoveries for each parameter.

Table 15. Summary of Matrix Spike Duplicate Precision Results for 2010 Coalition Monitoring

Method	Analyte	DQO	Number of Pairs Analyzed	Number Passing	% Success
EPA 8321A	Carbamate Pesticides	RPD ≤20%	91	78	86%
EPA 8321A/625	Herbicides	RPD ≤20%	102 103	90 91	88%
EPA 353.2	Nitrate+Nitrite, as N	RPD ≤20%	9	9	100%
EPA 625	Organochlorine Pesticides	RPD ≤20%	33	32	97%
EPA 625	Organophosphate Pesticides	RPD ≤30%	340 334	283 306	91.6%
EPA 365.2 / SM20-4500-P E	Orthophosphate/Phosphorus, as P	RPD ≤20%	17	17	100%
8270C	Pyrethroid Pesticides in Sediment	RPD ≤30%	44	39	89%
SM20-5310 B/ SM5310C	Total Organic Carbon	RPD ≤20%	20	20	100%
EPA 200.8	Trace Metals	RPD ≤20%	6	6	100%
EPA 625	Triazine Pesticides	RPD ≤20%	36	36	100%
Totals			668 693	640 634	93.9 91.5%

DATA INTERPRETATION

Exceedances of Relevant Water Quality Objectives

The following amended text appears on page 52:

Pesticides Detected in Coalition Monitoring

There were ~~1,822~~ 2,034 individual pesticide results analyzed in water column samples collected from 14 different sites during 2010 Coalition Monitoring. Analyses were conducted for organophosphates, carbamates, organochlorines, triazines, pyrethroids, trifluralin, glyphosate, and paraquat. Within these categories, 11 different pesticides were detected in ~~26~~ 31 separate samples (out of ~~67~~ 73 samples, including field duplicates) collected for Coalition monitoring. More than ~~97~~ 96% of the results were below detection. Legacy organochlorines were not detected in any samples.

It should be noted that detected pesticides are not equivalent to exceedances. Five registered pesticides (chlorpyrifos, dimethoate, diuron, malathion, simazine) exceeded applicable water quality objectives or *Trigger Limits* in a total of ~~nine~~ 14 2010 Coalition monitoring samples (including ~~one~~ two field duplicates).

The insecticide chlorpyrifos was detected in seven samples from four different sites. Chlorpyrifos exceeded the Basin Plan Amendment objective (0.015 ug/L) in ~~three~~ four of these samples from three sites (Grand Island Drain, Shag Slough, and Willow Slough). Chlorpyrifos was applied to approximately 165 acres of apples and peaches in the Grand Island Drain drainage in the month prior to sampling. No chlorpyrifos applications were reported in the Willow Slough drainage in the month prior to sampling. It is unknown if chlorpyrifos was applied in the Shag Slough drainage in the month prior to sampling; chlorpyrifos is most commonly applied to alfalfa in May.

The insecticide diazinon was detected in ~~eight~~ nine samples from eight different sites; one of these samples was a field duplicate, and one was a lab duplicate.

The following amended text appears on page 53:

Malathion was detected in ~~two~~ six samples (including one field duplicate) from ~~two~~ five sites. Detection of malathion is an exceedance of the Basin Plan prohibition if used on crops other than rice. Toxicity was not tested at these sites for these events; ~~H~~ h however, malathion is likely to be toxic to *Ceriodaphnia* at the detected concentration (0.5252 ug/L) observed in Sycamore Slough (RARPP). The *Ceriodaphnia* two-day EC50 is 0.5 – 3.4 ug/L. There were 37 applications of malathion to approximately 2787 acres of alfalfa in the Sycamore Slough drainage in the three days before sampling. The detected concentration at Willow Slough was 0.0553 µg/L. There were no reported applications of malathion in the Willow Slough drainage in the month prior to sampling. There were 37 applications of malathion to approximately 2787 acres of alfalfa in the Sycamore Slough drainage in the three days before sampling. In addition:

- Malathion was also detected at a concentration of 0.051 µg/L at Colusa Basin Drain (COLDR) in March and pesticide use data is still in the process of being obtained. Historically, March has been the month of greatest malathion use, and nearly all of the irrigated agricultural use in the Colusa Basin Drain drainage is for alfalfa. The detected concentration is not expected to cause toxicity.
- At Gilsizer Slough (GILSL) there was a detected concentration of 0.017 µg/L in January, and there were no reported malathion applications in the month prior to sampling. The detected concentration is not expected to cause toxicity.
- The detected concentrations at Lower Snake River (LSNKR) in August were 0.053 µg/L and 0.046 µg/L in the field duplicate. There were seven applications of malathion to 270 acres of walnuts and cotton in the month prior to sampling. The detected concentration is not expected to cause toxicity.
- The detected concentration at Willow Slough was 0.0553 µg/L. There were no reported applications of malathion in the Willow Slough drainage in the month prior to sampling. The detected concentration is not expected to cause toxicity.

The following amended table begins on page 54:

Table 20. Pesticides Detected in 2010 Coalition Monitoring

Site ID	Date Sampled	Analyte	Result ⁽¹⁾ (µg/L)	Trigger Limit ⁽²⁾	Basis for Limit ⁽³⁾
WLKCH	1/21/2010	Atrazine ⁽⁵⁾	DNQ 0.0086	1	CA 1° MCL
UCBRD	1/19/2010	Benomyl/Carbendazim	= 0.42		
UCBRD	1/19/2010	Benomyl/Carbendazim ⁽⁵⁾	= 0.46		
GIDLR	1/19/2010	Chlorpyrifos	= 0.1192	0.015	BPA
RARPP	3/17/2010	Chlorpyrifos	= 0.0111	0.015	BPA
SSLIB	5/18/2010	Chlorpyrifos	= 0.0271	0.015	BPA
SSLIB	6/15/2010	Chlorpyrifos	= 0.0025	0.015	BPA
WLSPL	3/16/2010	Chlorpyrifos	= 0.1521	0.015	BPA
WLSPL	5/18/2010	Chlorpyrifos	= 0.01	0.015	BPA
WLSPL	8/17/2010	Chlorpyrifos	≡ 0.0471	0.015	BPA
COLDR	1/20/2010	Diazinon	= 0.0572	0.1	BP (chronic)
GIDLR	1/19/2010	Diazinon	= 0.0059	0.1	BP (chronic)
GILSL	1/21/2010	Diazinon	≡ 0.0628	0.1	BP (chronic)
GILSL	2/17/2010	Diazinon	= 0.0175	0.1	BP (chronic)
SSKNK	1/20/2010	Diazinon	= 0.0269	0.1	BP (chronic)
WADCN	1/21/2010	Diazinon	= 0.0747	0.1	BP (chronic)
WLSPL	1/19/2010	Diazinon	= 0.0137	0.1	BP (chronic)
SSLIB	2/16/2010	Diazinon ⁽⁵⁾	= 0.0099	0.1	BP (chronic)
RARPP	6/15/2010	Diazinon ⁽⁶⁾	= 0.0053	0.1	BP (chronic)
GIDLR	3/16/2010	Dimethoate	= 1.1871	1	BP
UCBRD	1/19/2010	Diuron	= 2.3	2	Narrative
UCBRD	1/19/2010	Diuron⁽⁵⁾	= 2.4	2	Narrative
UCBRD	2/16/2010	Diuron	DNQ 0.21	2	Narrative
UCBRD	2/16/2010	Diuron ⁽⁵⁾	DNQ 0.2	2	Narrative
WLKCH	12/17/2009	Diuron	= 0.41	2	Narrative
WLKCH	12/17/2009	Diuron ⁽⁵⁾	DNQ 0.39	2	Narrative
WLSPL	1/19/2010	Diuron	= 9.5	2	Narrative
WLSPL	2/16/2010	Diuron	= 0.4	2	Narrative
COLDR	3/22/2010	Malathion	≡ 0.051	ND⁽⁴⁾	BP
GILSL	1/21/2010	Malathion	≡ 0.017	ND⁽⁴⁾	BP
LSNKR	8/23/2010	Malathion	≡ 0.0528	ND⁽⁴⁾	BP
LSNKR	8/23/2010	Malathion	≡ 0.0459	ND⁽⁴⁾	BP
RARPP	3/17/2010	Malathion	= 0.5252	ND⁽⁴⁾	BP
WLSPL	3/16/2010	Malathion	= 0.0553	ND⁽⁴⁾	BP
UCBRD	1/19/2010	Oryzalin	= 1.4		
UCBRD	1/19/2010	Oryzalin ⁽⁵⁾	= 1.4		

Site ID	Date Sampled	Analyte	Result ⁽¹⁾ (µg/L)	Trigger Limit ⁽²⁾	Basis for Limit ⁽³⁾
WLKCH	12/17/2009	Oryzalin	= 4.9		
WLKCH	12/17/2009	Oryzalin ⁽⁵⁾	= 4.6		
WLSPL	1/19/2010	Oryzalin	= 0.43		
WLKCH	10/21/2009	Simazine	= 0.0277	4	CA 1° MCL
WLKCH	12/17/2009	Simazine	= 10.089	4	CA 1° MCL
WLKCH	1/21/2010	Simazine	= 0.4603	4	CA 1° MCL
WLKCH	1/21/2010	Simazine ⁽⁵⁾	= 0.3821	4	CA 1° MCL
WLKCH	10/21/2009	Tebuthiuron	= 0.55		
WLKCH	10/21/2009	Tebuthiuron ⁽⁵⁾	= 0.58		
WLKCH	11/17/2009	Tebuthiuron	DNQ 0.33		
WLKCH	11/17/2009	Tebuthiuron ⁽⁵⁾	DNQ 0.36		
WLKCH	12/17/2009	Terbuthylazine	= 0.0118		