

California Department of Food and Agriculture  
Center for Analytical Chemistry  
Environmental Analysis Section  
3292 Meadowview Road  
Sacramento, CA 95832

EMON-SM-05-003  
Revision:  
Revision Date:  
Original Date: 1/26/06  
Page 1 of 20

### **Title: Analysis of Pyrethroids in Sediment Water**

1. Scope:

This section method (SM) documents selective pyrethroids analysis in sediment water and is followed by all authorized Environmental Analysis personnel.

2. Principle:

The SM describes the method for determination of resmethrin, bifenthrin, fenpropathrin, lambda cyhalothrin epimer, lambda cyhalothrin, permethin cis, permethrin trans, cyfluthrin, cypermethrin, fenvalerate/ esfenvalerate and deltamethrin in sediment water. The pyrethroids are extracted from the sediment water using liquid-liquid extraction with hexane. The extracts are concentrated and then cleaned up with florisil before being analyzed with a gas chromatography equipped with electron capture detector. Two columns of different polarity were used for confirmation of the analytes. The MSD is used for the analysis of resmethrin. Further confirmation was obtained using the msd in cases where the concentration was high enough. The MSD is unable to see all the compounds at the 15 ppt reporting limits.

3. Safety:

3.1 All general laboratory safety rules for sample preparation and analysis shall be followed.

3.2 Hexane is a flammable and toxic solvent; it should be handled with care in a ventilated area.

4. Interferences:

4.1 Glassware cleaning is extremely critical. It was determined that glassware needed to be rinsed with hexane prior to use. The glassware cleaning procedure was tested by analyzing solvent blanks prior to sample extraction.

4.2 The electron capture detector (ECD) is not truly an element specific detector, it will also respond to compounds containing S, NO<sub>2</sub> or conjugated C=O functional groups.

5. Apparatus and Equipment:

5.1 Rotary Evaporator (Buchi/Brinkman or equivalent)

California Department of Food and Agriculture  
 Center for Analytical Chemistry  
 Environmental Analysis Section  
 3292 Meadowview Road  
 Sacramento, CA 95832

EMON-SM-05-003  
 Revision:  
 Revision Date:  
 Original Date: 1/26/06  
 Page 2 of 20

- 5.2 Nitrogen evaporator (Meyer N-EVAP Organomation Model #112 or equivalent)
- 5.3 Balance, (Mettler PC 4400 or equivalent)
- 5.4 Vortex-vibrating mixer
- 5.5 Gas Chromatograph (GC) equipped with <sup>63</sup>Ni ECD detectors
- 5.6 Gas Chromatograph equipped with a mass selective detector (MSD)

6. Reagents and Supplies:

- 6.1 Bifenthrin CAS#42576-02-3
- 6.2 Fenpropathrin CAS#39515-41-8
- 6.3 Lambda cyhalothrin epimer CAS# unknown
- 6.4 Lambda cyhalothrin CAS#91465-08-06
- 6.5 Permethrin cis CAS#54774-45-7
- 6.6 Permethrin trans CAS#51877-74-8
- 6.7 Cyfluthrin CAS#68369-37-5
- 6.8 Cypermethrin CAS#52315-07-8
- 6.9 Fenvalerate CAS#51630-58-1
- 6.10 Deltamethrin CAS#52918-63-5
- 6.11 Resmethrin CAS#10453-86-8
- 6.12 Hexanes, nanograde or equivalent pesticide grade
- 6.13 Diethylether, nanograde or equivalent pesticide grade
- 6.14 Separatory funnel, 2 L
- 6.15 Boiling flask, 500 mL
- 6.16 Sodium Sulfate, ACS grade
- 6.17 Funnels, short stem, 60°, 10 mm diameter
- 6.18 Glass wool, Pyrex® fiberglass slivers 8 microns
- 6.19 Beaker, 1 L
- 6.20 Florisil SPE cartridge, 2 grams with 20 mL reservoir
- 6.21 Volumetric Pipette, 1 mL
- 6.22 Test tube, 50 mL
- 6.23 Test tube, 15 mL
- 6.24 Disposable Pasteur pipettes, and other laboratory ware as needed
- 6.25 Recommended analytical columns:

**For ECD** 5% (Phenyl)-methylpolysiloxane (HP-5MS or equivalent) fused silica column, 30 m x 0.25 mm id x 0.25 um film thickness.

DB608, (Specifically designed for the analysis of chlorinated pesticides and PCBs) 30 m x 0.25 mm id x 0.25 um film thickness

California Department of Food and Agriculture  
Center for Analytical Chemistry  
Environmental Analysis Section  
3292 Meadowview Road  
Sacramento, CA 95832

EMON-SM-05-003  
Revision:  
Revision Date:  
Original Date: 1/26/06  
Page 3 of 20

**For MSD** 5% (Phenyl)-methylpolysiloxane (HP-5MS or equivalent) fused silica column, 30 m x 0.25 mm id x 0.25 um film thickness.

7. Standards Preparation:

- 7.1 The individual pyrethroid stock standards of 1.0 mg/mL were obtained from the CDFA/CAC Standards Repository. The standards were diluted to 10 ng/μL with hexanes for identification purposes.

A combination standard of 10 μg/mL was prepared from individual mg/mL standards with acetone to be used for fortification. Another 10 μg/mL combination standard was prepared in hexanes and was diluted to the following concentrations: 0.005, 0.01, 0.025, 0.05, 0.1, 0.2 0.5 ng/μL in hexanes for instrument calibration.

- 7.2 Keep all standards in the designated refrigerator for storage.

- 7.3 The expiration date of each standard is six months from the preparation date.

8. Sample Preservation and Storage:

Store all samples waiting for extraction in a separate refrigerator (32-40 °F)

9. Test Sample Preparation:

9.1 Background Preparation

The Department of Pesticide Regulation (DPR) provided the sediment water for background to be used in method validation and QC. The sediment water was prepared by adding 5 g of soil to approximately a liter of American river water.

9.2 Spike

Take a liter of background from refrigerator and allow it to come to room temperature. Fortify at a level requested by client. After fortification mix well and process same as samples.

California Department of Food and Agriculture  
Center for Analytical Chemistry  
Environmental Analysis Section  
3292 Meadowview Road  
Sacramento, CA 95832

EMON-SM-05-003  
Revision:  
Revision Date:  
Original Date: 1/26/06  
Page 4 of 20

### 9.3 Test Sample Extraction

- 9.3.1 Remove water samples from refrigerator and allow samples to come to room temperature before weighing them. Record weight.
- 9.3.2 Transfer the water sample to a 2 L separatory funnel leaving as much of the sediment as possible in the sample bottle.
- 9.3.3 Add 60 mL of hexanes to the sample bottle and manually shake for 30 seconds.
- 9.3.4 Transfer hexane and sediment into the separatory funnel and shake for 2 min, venting frequently.
- 9.3.5 Allow the layers to separate, drain the lower aqueous layer into a 1L beaker. Pour the hexane layer through a funnel containing a plug of glass wool and approximately 40 g sodium sulfate into a 500 mL boiling flask. (sodium sulfate had been pre-rinsed with hexane before use)
- 9.3.6 Transfer the water from the beaker into the separatory funnel and repeat steps 9.3.3 – 9.3.6 two more times shaking for 1 min. Combine the extracts in the same boiling flask. Record sample bottle weight.
- 9.3.7 Rotary evaporate to ~ 5 mL under vacuum at approximately 17-22 inch Hg in a water bath at 44-47° C.
- 9.3.8 Transfer the extract to a 15 mL test tube. Rinse flask 3 times with approximately 2 mL of hexane and transfer each rinsate to the same test tube.
- 9.3.9 Place the test tube on a nitrogen evaporator under a gentle stream of nitrogen with water bath set at 40-45° C and concentrate to ~ 2 mL final volume.

#### Cleanup

- 9.3.10 Condition a 2 g florisil SPE cartridge with 10 mL of 15% diethylether in hexane followed by 20 mL hexane. Do not allow cartridges to go to dryness.

California Department of Food and Agriculture  
Center for Analytical Chemistry  
Environmental Analysis Section  
3292 Meadowview Road  
Sacramento, CA 95832

EMON-SM-05-003  
Revision:  
Revision Date:  
Original Date: 1/26/06  
Page 5 of 20

- 9.3.11 Carefully load the sample extract onto the conditioned florisil SPE cartridge. Rinse the tube that previously contained the extract twice with 2 mL hexane. Add rinses to florisil cartridge.
- 9.3.12 Elute the pesticides from the cartridge with 30 mL of 15% diethylether in hexane and collect in a 50 mL tube.
- 9.3.13 Evaporate the sample eluants to dryness under a gentle stream of nitrogen in a 40-45° C water bath.
- 9.3.14 Pipet 1mL of hexane into the test tube and vortex well. Vial extract into 3 autosampler vials with inserts.

## 10. Instrument Calibration:

- 10.1 The calibration standard curve consists of a minimum of three levels. The recommended concentrations levels of standards are 0.005, 0.01, 0.025, 0.05, 0.1, 0.2, or 0.5 ng/μL.
- 10.2 The calibration curves for the ECD are obtained using piecewise. The MSD used linear regression with a correlation coefficient (r) equal to or greater than 0.995.

## 11. Analysis:

### 11.1 Injection Scheme

The instrument may need to be conditioned with a matrix blank or old sample before running the following sequence of Standard Curve, Hexane, Matrix Blank, Matrix Spike, Test Samples (maximum of 10 – 12) and Standard Curve.

### 11.2 GC-ECD Instrumentation

- 11.2.1 Analyze the pyrethroids extracts by a gas chromatograph equipped with dual electron capture detectors (ECD).
- 11.2.2 Recommended instrument parameters: Injector 225 °C; detector 300 °C; Initial column temperature 100 °C, hold 0 min., ramp at 10 °C/min to 230 °C and hold for 5 min, ramp at 2° C/min to final temperature of 280° for 7 min.; injection volume 2 μL. Flow rates of the Helium carrier gas

California Department of Food and Agriculture  
 Center for Analytical Chemistry  
 Environmental Analysis Section  
 3292 Meadowview Road  
 Sacramento, CA 95832

EMON-SM-05-003  
 Revision:  
 Revision Date:  
 Original Date: 1/26/06  
 Page 6 of 20

were 3.8 mL/min. and 1.8 mL/min. for the HP-5MS and the DB-608 columns, respectively.

### 11.3 GD-MSD Instrumentation

#### 11.3.1 Analyze resmethrin by mass selective detector

11.3.2 Recommended instrument parameters: Injector 250 °C, msd transfer line heater 280 °C; initial column temperature 70 °C, hold 1 min., ramp at 22 °C/min. to final temperature of 280 °C and hold for 9 min.; injection volume 2 µL. Flow rate of Helium carrier gas was 1.0 mL/min.

#### Ions Selected for SIM Acquisition:

|                      |                                           |
|----------------------|-------------------------------------------|
| Resmethrin           | 123, 143, 171, 338 start time 6.00 min    |
| Bifenthrin           | 165, 166, 181, 183 start time 11.00 min.  |
| Fenpropathrin        | 97.0, 181, 265, 349 start time 11.55 min. |
| λ Cyhalothrin epimer | 181, 197, 208, 449 start time 11.95 min.  |
| λ Cyhalothrin        | 181, 197, 208, 449 start time 11.95 min.  |
| Permethrin cis       | 163, 165, 183, 184 start time 12.70 min.  |
| Permethrin trans     | 163, 165, 183, 184 start time 12.70 min.  |
| Cyfluthrin           | 163, 165, 206, 226 start time 13.20 min.  |
| Cypermethrin         | 163, 165, 181, 209 start time 13.70 min.  |
| Fenvalerate          | 167, 181, 225, 419 start time 14.80 min.  |
| Deltamethrin         | 181, 209, 251, 253 start time 16.00 min.  |

## 12. Quality Control:

### 12.1 Method Detection Limits (MDL)

Method Detection Limit (MDL) refers to the lowest concentration of the analyte that a method can detect reliably. To determine the MDL, 7 sediment water samples are spiked at 10 ppt except resmethrin, which was spiked at 20 ppt and processed through the entire method along with a blank. The standard deviation derived from the spiked sample recoveries was used to calculate the MDL for each analyte using the following equation:

$$\text{MDL} = tS$$

California Department of Food and Agriculture  
Center for Analytical Chemistry  
Environmental Analysis Section  
3292 Meadowview Road  
Sacramento, CA 95832

EMON-SM-05-003  
Revision:  
Revision Date:  
Original Date: 1/26/06  
Page 7 of 20

Where  $t$  is the Student  $t$  test value for the 99% confidence level with  $n-1$  degrees of freedom and  $S$  denotes the standard deviation obtained from  $n$  replicate analyses. For the  $n=7$  replicates used to determine the MDL,  $t=3.143$ . The results for the standard deviations and MDL are in Appendix 1.

## 12.2 Reporting Limit (RL)

Reporting limit (RL) refers to a level at which reliable quantitative results may be obtained. The MDL is used as a guide to determine the RL. The reporting limit for bifenthrin is 5 ppt and for all other compounds it is 15 ppt. This reporting limit is conservatively set at 15 ppt for most of the compounds after taking into account the matrix effect and various sample backgrounds that could be encountered.

## 12.3 Method Validation

The method validation consisted of five sample sets. Each set included four levels of fortification (20, 50, 250 and 1000 ppt,) and a method blank. All spikes and method blanks were processed through the entire analytical method. Recoveries for the pyrethroids are tabulated in Appendix 2.

## 12.4 Control Charts and Limits

Control charts were generated using the data from the method validation for each analyte. The upper and lower warning and control limits are set at  $\pm 2$  and 3 standard deviations of the % recovery, respectively, shown in Appendix 2.

## 12.5 Acceptance Criteria

12.5.1 Each set of samples will have a matrix blank and a spiked matrix sample.

12.5.2 The retention time should be within  $\pm 2$  per cent of that of the standards.

12.5.3 The recoveries of the matrix spikes shall be within the control limits.

12.5.4 The sample shall be diluted if results exceed the calibration curve.

California Department of Food and Agriculture  
Center for Analytical Chemistry  
Environmental Analysis Section  
3292 Meadowview Road  
Sacramento, CA 95832

EMON-SM-05-003  
Revision:  
Revision Date:  
Original Date: 1/26/06  
Page 8 of 20

### 13. Calculations:

Cyfluthrin, cypermethrin and fenvalerate are expressed as the sum of their isomers. Therefore, the total residues should be calculated using the sum of their peak responses.

Quantitation is based on external standard (ESTD) calculation using either the peak area or height. The ECD software uses a piecewise fit, with all levels weighted equally. The MSD uses linear regression fit, with all levels weighted equally. Alternatively, at chemist discretion, concentrations may be calculated using the response factor for the standard whose value is closest to the level in the sample.

$$\text{ppt} = \frac{(\text{sample peak area or ht}) \times (\text{std conc}) \times (\text{std vol. injected}) \times (\text{final vol of sample})(1000)(1000)}{(\text{std. peak area or ht}) \times (\text{sample vol injected}) \times (\text{sample wt (g)})}$$

### 14. Reporting Procedure:

14.1 The ECD HP-5ms is used as the primary column for reporting results for the pyrethroids. Resmethrin results are reported from the MSD since it doesn't chromatograph well on the ECD. In some cases, however, certain analytes may have coeluting peaks associated with them and it may be necessary to use the DB608 column instead of the HP-5ms.

14.2 Sample results are reported in accordance with the client's analytical laboratory specification sheets.

### 15. Discussion:

15.1 The fenvalerate standard is a ratio of approximately 60% fenvalerate and 40% esfenvalerate. The compound of interest is the esfenvalerate, but it was found from other studies that esfenvalerate in sample matrix degraded to fenvalerate over time. So the total of fenvalerate/esfenvalerate was calculated and reported. Deltamethrin was reported as deltamethrin/tralomethrin since deltamethrin and tralomethrin are indistinguishable by GC and GCMS methods.

15.2 Since the electron capture detector (ECD) is not truly and element specific detector, the MSD was used for further confirmation where concentrations were high enough. Further work is needed to confirm at the RL of 15 ppt level for

California Department of Food and Agriculture  
Center for Analytical Chemistry  
Environmental Analysis Section  
3292 Meadowview Road  
Sacramento, CA 95832

EMON-SM-05-003  
Revision:  
Revision Date:  
Original Date: 1/26/06  
Page 9 of 20

fenpropathrin, cyfluthrin, cypermethrin, fenvalerate/esfenvalerate and deltamethrin.

- 15.3 A storage stability study was done with this project. The storage stability study consisted of a 100 ppt spike concentrate and 3 replicates over 28 day period. Fifteen bottles containing background water with sediment added were spiked and stored in the refrigerator until analyzed on 0, 4, 7, 14, and 28 days. Along with the storage spikes a blank and method control spike were extracted. This same procedure was repeated again, but this time 900 mL of sediment water was spiked and 10 mL of hexane was added to each bottle as a keeper. The amount spiked was kept the same making the level 111 ppt. The study showed rapid degradation for resmethrin, deltamethrin, and permethrin trans by day 4. The other compounds show gradual degradation. The bottles where the keeper was added showed little or no degradation for all the compounds up to day 28. A previous storage study was done analyzing bifenthrin, lambda cyhalothrin, permethrin, cyfluthrin, cypermethrin and fenvalerate/esfenvalerate. The results from that study showed degradation for permethrin and lambda cyhalothrin by day 3. No keeper was added in that study. Results from the current storage study are presented in Appendix 3.
- 15.4 The sample matrix may require that the liner be changed more frequently and the column trimmed to maintain sensitivity.
- 15.5 This method was adapted from the methods listed in the references below.
16. References:
- 16.1 J. You, D.P. Weston, M. J. Lydy, *A Sonication Extraction Method for the Analysis of Prethroid, Organophosphate, and Organochlorine Pesticides from Sediment by Gas Chromatography with Electron-Capture Detection*, Archives Environmental Contamination and Toxicology 47, 141-147 (2004)
- 16.2 J. You, M. J. Lydy, *Evaluation of Desulfuration Methods for Pyrethroid, Organophosphate, and Organochloride Pesticides in Sediment with High Sulfur Content*, Archives Environmental Contamination and Toxicology 47, 148 -153 (2004)

California Department of Food and Agriculture  
Center for Analytical Chemistry  
Environmental Analysis Section  
3292 Meadowview Road  
Sacramento, CA 95832

EMON-SM-05-003  
Revision:  
Revision Date:  
Original Date: 1/26/06  
Page 10 of 20

16.3 J. White, H. Feng, Determination of Pyrethroids in Sediment Water,  
EMON-SM-52-7.1, 2004, California Department of Food and Agriculture, Center  
for Analytical Chemistry, Environmental Monitoring Laboratory, 3292 Meadowview  
Road, Sacramento, California 95832

California Department of Food and Agriculture  
 Center for Analytical Chemistry  
 Environmental Analysis Section  
 3292 Meadowview Road  
 Sacramento, CA 95832

EMON-SM-05-003  
 Revision:  
 Revision Date:  
 Original Date: 1/26/06  
 Page 11 of 20

## Appendix 1

### The determination of Method Detection Limit (MDL) and Reporting Limit (RL)

Spike level is 10 ppt for all compounds except Resmethrin, which is 20 ppt

|           | Bifenthrin      | Fenopropathrin  | Lambda<br>cyhalothrin<br>epimer | Lambda cyhalothrin | Permethrin cis  | Permethrin trans |
|-----------|-----------------|-----------------|---------------------------------|--------------------|-----------------|------------------|
|           | ppt             | ppt             | ppt                             | ppt                | ppt             | ppt              |
| blk sed   | n/d             | n/d             | n/d                             | n/d                | n/d             | n/d              |
| spk1      | 8.78            | 9.94            | 9.50                            | 9.73               | 9.44            | 8.16             |
| spk2      | 9.39            | 10.9            | 10.3                            | 10.5               | 10.5            | 8.83             |
| spk 3     | 8.61            | 10.6            | 9.61                            | 9.79               | 12.1            | 12.2             |
| spk 4     | 7.95            | 9.95            | 9.85                            | 9.91               | 12.5            | 14.6             |
| spk 5     | 9.54            | 11.2            | 10.2                            | 10.6               | 10.8            | 12.4             |
| spk 6     | 9.06            | 10.7            | 10.1                            | 10.4               | 9.89            | 8.62             |
| spk 7     | 9.39            | 10.9            | 10.4                            | 10.4               | 10.4            | 9.61             |
| Std dev   | 0.561           | 0.484           | 0.348                           | 0.366              | 1.12            | 2.44             |
| MDL       | 1.76            | 1.52            | 1.09                            | 1.15               | 3.52            | 7.68             |
| <b>RL</b> | <b>5.00 ppt</b> | <b>15.0 ppt</b> | <b>15.0 ppt</b>                 | <b>15.0 ppt</b>    | <b>15.0 ppt</b> | <b>15.0ppt</b>   |

|           | Cyfluthrin      | Cypermethrin    | Fenvalerate/Esfenvalerate | Deltramethrin   | Resmethrin      |
|-----------|-----------------|-----------------|---------------------------|-----------------|-----------------|
|           | ppt             | ppt             | ppt                       | ppt             | ppt             |
| blk sed   | n/d             | n/d             | n/d                       | n/d             | n/d             |
| spk1      | 11.1            | 10.7            | 11.5                      | 8.60            | 16.7            |
| spk2      | 11.7            | 11.7            | 12.5                      | 8.83            | 15.9            |
| spk 3     | 11.1            | 10.5            | 11.6                      | 7.92            | 16.1            |
| spk 4     | 10.7            | 10.4            | 12.1                      | 7.65            | 16.4            |
| spk 5     | 11.6            | 11.0            | 12.8                      | 9.04            | 16.7            |
| spk 6     | 11.6            | 11.2            | 12.7                      | 8.81            | 17.6            |
| spk 7     | 12.4            | 11.8            | 12.8                      | 9.26            | 13.7            |
| Std dev   | 0.551           | 0.556           | 0.558                     | 0.590           | 1.22            |
| MDL       | 1.73            | 1.75            | 1.75                      | 1.86            | 3.82            |
| <b>RL</b> | <b>15.0 ppt</b> | <b>15.0 ppt</b> | <b>15.0 ppt</b>           | <b>15.0 ppt</b> | <b>15.0 ppt</b> |

California Department of Food and Agriculture  
 Center for Analytical Chemistry  
 Environmental Analysis Section  
 3292 Meadowview Road  
 Sacramento, CA 95832

EMON-SM-05-003  
 Revision:  
 Revision Date:  
 Original Date: 1/26/06  
 Page 12 of 20

## Appendix 2

### Method Validation Data and Control Limits

|                      | <b>Bifenthrin</b> | <b>Fenpropathrin</b> | <b>λ<br/>Cyhalothrin<br/>epimer</b> | <b>λ<br/>Cyhalothrin</b> | <b>Permethrin<br/>cis</b> | <b>Permethrin<br/>trans</b> |
|----------------------|-------------------|----------------------|-------------------------------------|--------------------------|---------------------------|-----------------------------|
| Spike Level<br>(ppt) | Recovery(%)       | Recovery(%)          | Recovery(%)                         | Recovery(%)              | Recovery(%)               | Recovery(%)                 |
| 20                   | 80.5              | 93.0                 | 92.0                                | 90.5                     | 86.5                      | 90.0                        |
|                      | 86.0              | 92.0                 | 90.5                                | 88.0                     | 89.0                      | 90.5                        |
|                      | 86.5              | 104                  | 100                                 | 103                      | 103                       | 104                         |
|                      | 83.0              | 101                  | 97.5                                | 101                      | 96.0                      | 105                         |
|                      | 78.0              | 92.5                 | 91.5                                | 94.0                     | 88.5                      | 91.0                        |
| 50                   | 82.8              | 96.2                 | 97.2                                | 95.4                     | 94.4                      | 91.2                        |
|                      | 82.2              | 97.6                 | 91.2                                | 90.6                     | 87.6                      | 90.2                        |
|                      | 97.2              | 113                  | 112                                 | 112                      | 113                       | 118                         |
|                      | 72.2              | 100                  | 93.0                                | 94.6                     | 88.2                      | 93.6                        |
|                      | 93.4              | 108                  | 106                                 | 109                      | 106                       | 111                         |
| 250                  | 87.2              | 99.2                 | 96.4                                | 94.4                     | 93.2                      | 94.0                        |
|                      | 74.4              | 91.6                 | 84.8                                | 85.2                     | 84.8                      | 85.6                        |
|                      | 94.0              | 110                  | 106                                 | 105                      | 108                       | 115                         |
|                      | 94.8              | 99.2                 | 99.6                                | 98.4                     | 102                       | 105                         |
|                      | 79.6              | 94.8                 | 89.6                                | 89.9                     | 90.0                      | 91.2                        |
| 1000                 | 76.2              | 86.4                 | 82.9                                | 81.9                     | 78.8                      | 80.2                        |
|                      | 78.9              | 98.9                 | 88.8                                | 90.3                     | 88.4                      | 90.1                        |
|                      | 94.1              | 109                  | 109                                 | 106                      | 105                       | 111                         |
|                      | 96.3              | 105                  | 102                                 | 102                      | 104                       | 105                         |
|                      | 82.1              | 94.7                 | 91.7                                | 89.9                     | 89.8                      | 90.5                        |
| Mean                 | 85.0              | 99.3                 | 96.1                                | 95.9                     | 94.8                      | 97.6                        |
| SD                   | 7.71              | 7.07                 | 7.95                                | 8.20                     | 9.25                      | 10.9                        |
| UCL                  | 108               | 121                  | 120                                 | 121                      | 123                       | 130                         |
| UWL                  | 100               | 113                  | 112                                 | 112                      | 113                       | 119                         |
| LWL                  | 69.6              | 85.2                 | 80.2                                | 79.5                     | 76.3                      | 75.8                        |
| LCL                  | 61.8              | 78.1                 | 72.2                                | 70.9                     | 67.1                      | 65.7                        |

California Department of Food and Agriculture  
 Center for Analytical Chemistry  
 Environmental Analysis Section  
 3292 Meadowview Road  
 Sacramento, CA 95832

EMON-SM-05-003  
 Revision:  
 Revision Date:  
 Original Date: 1/26/06  
 Page 13 of 20

### Appendix 2 (cont..)

|                      | <b>Cyfluthrin</b> | <b>Cypermethrin</b> | <b>Fenvalerate/<br/>Esfenvalerate</b> | <b>Deltamethrin</b> | <b>Resmethrin</b> |
|----------------------|-------------------|---------------------|---------------------------------------|---------------------|-------------------|
| Spike Level<br>(ppt) | Recovery(%)       | Recovery(%)         | Recovery(%)                           | Recovery(%)         | Recovery(%)       |
| 20.0                 | 92.0              | 92.0                | 92.0                                  | 89.0                | 76.0              |
|                      | 87.0              | 87.0                | 86.5                                  | 81.5                | 97.0              |
|                      | 112               | 117                 | 116                                   | 111                 | 85.0              |
|                      | 103               | 96.0                | 109                                   | 103                 | 116               |
|                      | 92.0              | 90.5                | 98.5                                  | 103                 | 89.5              |
| 50                   | 97.2              | 97.2                | 88.6                                  | 96.8                | 89.6              |
|                      | 90.6              | 90.6                | 89.0                                  | 79.6                | 96.0              |
|                      | 125               | 127                 | 110                                   | 118                 | 98.2              |
|                      | 103               | 95.0                | 87.8                                  | 100                 | 93.8              |
|                      | 115               | 117                 | 116                                   | 123                 | 97.6              |
| 250                  | 90.8              | 90.8                | 89.6                                  | 86.0                | 98.8              |
|                      | 82.8              | 82.8                | 79.2                                  | 70.0                | 75.6              |
|                      | 115               | 122                 | 122                                   | 120                 | 93.2              |
|                      | 108               | 110                 | 111                                   | 103                 | 109               |
|                      | 93.2              | 90.8                | 93.6                                  | 88.4                | 104               |
| 1000                 | 79.7              | 79.7                | 79.8                                  | 75.5                | 62.8              |
|                      | 88.7              | 88.7                | 87.1                                  | 84.8                | 82.6              |
|                      | 111               | 122                 | 115                                   | 105                 | 97.0              |
|                      | 107               | 110                 | 107                                   | 101                 | 95.1              |
|                      | 92.9              | 82.9                | 85.4                                  | 89.4                | 99.1              |
| Mean                 | 99.6              | 99.5                | 98.2                                  | 96.4                | 92.8              |
| SD                   | 12.3              | 14.9                | 13.6                                  | 14.9                | 12.1              |
| UCL                  | 136               | 144                 | 139                                   | 141                 | 129               |
| UWL                  | 124               | 129.3               | 125                                   | 126                 | 117               |
| LWL                  | 75.0              | 69.7                | 71.0                                  | 66.6                | 68.6              |
| LCL                  | 63.6              | 54.7                | 57.3                                  | 51.6                | 56.6              |

California Department of Food and Agriculture  
 Center for Analytical Chemistry  
 Environmental Analysis Section  
 3292 Meadowview Road  
 Sacramento, CA 95832

EMON-SM-05-003  
 Revision:  
 Revision Date:  
 Original Date: 1/26/06  
 Page 14 of 20

### Appendix 3

#### Storage Stability Project

**Matrix: American River Water with 5 g sediment added**

**Spike Level:100ppt**

**Keeper: 10 mL hexane**

##### Bifenthrin

| spk  | day 0 |      | day 4 |      | day 7 |      | day 14 |      | day 28 |      |
|------|-------|------|-------|------|-------|------|--------|------|--------|------|
|      | ppt   | %    | ppt   | %    | ppt   | %    | ppt    | %    | ppt    | %    |
| 1    | 92.4  | 92.4 | 76.2  | 76.2 | 67.3  | 67.3 | 63.1   | 63.1 | 51.5   | 51.5 |
| 2    | 77.4  | 77.4 | 80.4  | 80.4 | 69.0  | 69.0 | 65.0   | 65.0 | 54.7   | 54.7 |
| 3    | 90.3  | 90.3 | 76.2  | 76.2 | 62.4  | 62.4 | 54.9   | 54.9 | 58.3   | 58.3 |
| Mean |       | 86.7 |       | 77.6 |       | 66.2 |        | 61.0 |        | 54.8 |

##### Bifenthrin with Keeper

| spk  | day 0 |        | day 4 |       | day 7 |       | day 14 |       | day 28 |       |
|------|-------|--------|-------|-------|-------|-------|--------|-------|--------|-------|
|      | ppt   | %      | ppt   | %     | ppt   | %     | ppt    | %     | ppt    | %     |
| 1    | 105   | 94.60% | 96.5  | 86.9% | 93.4  | 84.1% | 88.4   | 79.6% | 87.2   | 78.6% |
| 2    | 104   | 93.70% | 95.6  | 86.1% | 89.4  | 80.5% | 75.0   | 67.6% | 98.0   | 88.3% |
| 3    | 108   | 97.30% | 99.9  | 90.0% | 80.4  | 72.4% | 87.5   | 78.8% | 92.6   | 83.4% |
| Mean |       | 95.20% |       | 87.7% |       | 79.0% |        | 75.3% |        | 83.4% |

##### Fenpropathrin

| spk  | day 0 |      | day 4 |      | day 7 |      | day 14 |      | day 28 |      |
|------|-------|------|-------|------|-------|------|--------|------|--------|------|
|      | ppt   | %    | ppt   | %    | ppt   | %    | ppt    | %    | ppt    | %    |
| 1    | 99.1  | 99.1 | 92.6  | 92.6 | 84.1  | 84.1 | 73.0   | 73.0 | 74.9   | 74.9 |
| 2    | 94.5  | 94.5 | 99.4  | 99.4 | 85.7  | 85.7 | 88.4   | 88.4 | 78.9   | 78.9 |
| 3    | 103   | 103  | 97.9  | 97.9 | 88.4  | 88.4 | 65.0   | 65.0 | 79.0   | 79.0 |
| Mean |       | 98.9 |       | 96.6 |       | 86.1 |        | 75.5 |        | 77.6 |

##### Fenpropathrin with Keeper

| spk  | day 0 |        | day 4 |        | day 7 |       | day 14 |       | day 28 |       |
|------|-------|--------|-------|--------|-------|-------|--------|-------|--------|-------|
|      | ppt   | %      | ppt   | %      | ppt   | %     | ppt    | %     | ppt    | %     |
| 1    | 111   | 100%   | 109   | 98.2%  | 107   | 96.4% | 103    | 92.8% | 102    | 91.9% |
| 2    | 109   | 98.2%  | 111   | 100%   | 109   | 98.2% | 90.9   | 81.9% | 106    | 95.5% |
| 3    | 117   | 105%   | 113   | 102%   | 105   | 94.6% | 107    | 96.4% | 110    | 99.1% |
| Mean |       | 101.1% |       | 100.1% |       | 96.4% |        | 90.4% |        | 95.5% |

California Department of Food and Agriculture  
 Center for Analytical Chemistry  
 Environmental Analysis Section  
 3292 Meadowview Road  
 Sacramento, CA 95832

EMON-SM-05-003  
 Revision:  
 Revision Date:  
 Original Date: 1/26/06  
 Page 15 of 20

**Lambda Cyhalothrin Epimer**

| spk  | day 0 |      | day 4 |      | day 7 |      | day 14 |      | day 28 |      |
|------|-------|------|-------|------|-------|------|--------|------|--------|------|
|      | ppt   | %    | ppt   | %    | ppt   | %    | ppt    | %    | ppt    | %    |
| 1    | 100   | 100  | 86.8  | 86.8 | 73.7  | 73.7 | 70.8   | 70.8 | 52.9   | 52.9 |
| 2    | 93.3  | 93.3 | 90.1  | 90.1 | 75.5  | 75.5 | 71.7   | 71.7 | 56.1   | 56.1 |
| 3    | 101   | 101  | 85.1  | 85.1 | 71.8  | 71.8 | 61.6   | 61.6 | 53.5   | 53.5 |
| Mean |       | 98.1 |       | 87.3 |       | 73.7 |        | 68.0 |        | 54.2 |

**Lambda Cyhalothrin Epimer with Keeper**

| spk  | day 0 |        | day 4 |       | day 7 |       | day 14 |       | day 28 |       |
|------|-------|--------|-------|-------|-------|-------|--------|-------|--------|-------|
|      | ppt   | %      | ppt   | %     | ppt   | %     | ppt    | %     | ppt    | %     |
| 1    | 114   | 103%   | 104   | 93.7% | 102   | 91.9% | 97.0   | 87.4% | 94.9   | 85.5% |
| 2    | 111   | 100%   | 105   | 94.6% | 99.6  | 89.7% | 86.2   | 77.7% | 105    | 94.6% |
| 3    | 118   | 106%   | 108   | 97.3% | 92.0  | 82.9% | 94.7   | 85.3% | 99.8   | 89.9% |
| Mean |       | 103.0% |       | 95.2% |       | 88.2% |        | 83.5% |        | 90.0% |

**Lambda Cyhalothrin**

| spk  | day 0 |      | day 4 |      | day 7 |      | day 14 |      | day 28 |      |
|------|-------|------|-------|------|-------|------|--------|------|--------|------|
|      | ppt   | %    | ppt   | %    | ppt   | %    | ppt    | %    | ppt    | %    |
| 1    | 99.6  | 99.6 | 82.1  | 82.1 | 74.0  | 74.0 | 70.1   | 70.1 | 50.8   | 50.8 |
| 2    | 90.3  | 90.3 | 85.3  | 85.3 | 76.8  | 76.8 | 70.9   | 70.9 | 54.4   | 54.4 |
| 3    | 100   | 100  | 83.1  | 83.1 | 73.2  | 73.2 | 62.1   | 62.1 | 53.2   | 53.2 |
| Mean |       | 96.6 |       | 83.5 |       | 74.7 |        | 67.7 |        | 52.8 |

**Lambda Cyhalothrin with Keeper**

| spk  | day 0 |        | day 4 |       | day 7 |       | day 14 |       | day 28 |       |
|------|-------|--------|-------|-------|-------|-------|--------|-------|--------|-------|
|      | ppt   | %      | ppt   | %     | ppt   | %     | ppt    | %     | ppt    | %     |
| 1    | 111   | 100%   | 102   | 91.9% | 100   | 90.1% | 92.2   | 83.1% | 91.8   | 82.7% |
| 2    | 111   | 100%   | 100   | 90.1% | 97.5  | 87.8% | 84.2   | 75.9% | 101    | 91.0% |
| 3    | 115   | 104%   | 104   | 93.7% | 93.1  | 83.9% | 91.5   | 82.4% | 96.2   | 86.7% |
| Mean |       | 101.3% |       | 91.9% |       | 87.3% |        | 80.5% |        | 86.8% |

**Permethrin cis**

| spk  | day 0 |      | day 4 |      | day 7 |      | day 14 |      | day 28 |      |
|------|-------|------|-------|------|-------|------|--------|------|--------|------|
|      | ppt   | %    | ppt   | %    | ppt   | %    | ppt    | %    | ppt    | %    |
| 1    | 98.8  | 98.8 | 82.0  | 82.0 | 69.2  | 69.2 | 67     | 67   | 42.2   | 42.2 |
| 2    | 91.4  | 91.4 | 80.3  | 80.3 | 72.4  | 72.4 | 65.6   | 65.6 | 48.3   | 48.3 |
| 3    | 100   | 100  | 79.3  | 79.3 | 69.5  | 69.5 | 57.7   | 57.7 | 38.3   | 38.3 |
| Mean |       | 96.6 |       | 80.5 |       | 70.4 |        | 63.4 |        | 42.9 |

California Department of Food and Agriculture  
 Center for Analytical Chemistry  
 Environmental Analysis Section  
 3292 Meadowview Road  
 Sacramento, CA 95832

EMON-SM-05-003  
 Revision:  
 Revision Date:  
 Original Date: 1/26/06  
 Page 16 of 20

**Permethrin cis with Keeper**

| spk  | day 0 |        | day 4 |       | day 7 |       | day 14 |       | day 28 |       |
|------|-------|--------|-------|-------|-------|-------|--------|-------|--------|-------|
|      | ppt   | %      | ppt   | %     | ppt   | %     | ppt    | %     | ppt    | %     |
| 1    | 110   | 99.1%  | 99.5  | 89.6% | 105   | 94.6% | 96.3   | 86.8% | 95.7   | 86.2% |
| 2    | 111   | 100%   | 102   | 91.9% | 100   | 90.1% | 88.4   | 79.6% | 106    | 95.5% |
| 3    | 113   | 102%   | 103   | 92.8% | 93.8  | 84.5% | 93.7   | 84.4% | 102    | 91.9% |
| Mean |       | 100.3% |       | 91.4% |       | 89.7% |        | 83.6% |        | 91.2% |

**Permethrin trans**

| spk  | day 0 |       | day 4 |      | day 7 |      | day 14 |      | day 28 |      |
|------|-------|-------|-------|------|-------|------|--------|------|--------|------|
|      | ppt   | %     | ppt   | %    | ppt   | %    | ppt    | %    | ppt    | %    |
| 1    | 107   | 107   | 66.0  | 66.0 | 47.9  | 47.9 | 37.9   | 37.9 | 9.53   | 9.53 |
| 2    | 100   | 100   | 65.7  | 65.7 | 47.3  | 47.3 | 34.4   | 34.4 | 22.4   | 22.4 |
| 3    | 106   | 106   | 64.3  | 64.3 | 50.8  | 50.8 | 30.3   | 30.3 | 11.9   | 11.9 |
| Mean |       | 104.3 |       | 65.3 |       | 48.7 |        | 34.2 |        | 14.6 |

**Permethrin trans with Keeper**

| spk  | day 0 |        | day 4 |       | day 7 |       | day 14 |       | day 28 |       |
|------|-------|--------|-------|-------|-------|-------|--------|-------|--------|-------|
|      | ppt   | %      | ppt   | %     | ppt   | %     | ppt    | %     | ppt    | %     |
| 1    | 120   | 108%   | 101.1 | 91.0% | 108   | 97.3% | 96.9   | 87.3% | 99.5   | 89.6% |
| 2    | 118   | 106%   | 105   | 94.6% | 102   | 91.9% | 90.2   | 81.3% | 110    | 99.1% |
| 3    | 123   | 111%   | 106   | 95.5% | 97.0  | 87.4% | 98.7   | 88.9% | 103    | 92.8% |
| Mean |       | 108.3% |       | 93.7% |       | 92.2% |        | 85.8% |        | 93.8% |

**Cyfluthrin**

| spk  | day 0 |       | day 4 |      | day 7 |      | day 14 |      | day 28 |      |
|------|-------|-------|-------|------|-------|------|--------|------|--------|------|
|      | ppt   | %     | ppt   | %    | ppt   | %    | ppt    | %    | ppt    | %    |
| 1    | 103   | 103   | 79.5  | 79.5 | 65.3  | 65.3 | 62.3   | 62.3 | 41.3   | 41.3 |
| 2    | 97.9  | 97.9  | 80.4  | 80.4 | 68.1  | 68.1 | 60.2   | 60.2 | 45.1   | 45.1 |
| 3    | 106   | 106   | 77.6  | 77.6 | 68.6  | 68.6 | 54.3   | 54.3 | 41.8   | 41.8 |
| Mean |       | 102.3 |       | 79.2 |       | 67.3 |        | 58.9 |        | 42.7 |

**Cyfluthrin with Keeper**

| spk  | day 0 |        | day 4 |       | day 7 |       | day 14 |       | day 28 |       |
|------|-------|--------|-------|-------|-------|-------|--------|-------|--------|-------|
|      | ppt   | %      | ppt   | %     | ppt   | %     | ppt    | %     | ppt    | %     |
| 1    | 113   | 102%   | 96.1  | 86.6% | 105   | 94.6% | 92.0   | 82.9% | 91.6   | 82.5% |
| 2    | 115   | 104%   | 96.3  | 86.8% | 98.6  | 88.8% | 84.7   | 76.3% | 99.1   | 89.3% |
| 3    | 121   | 109%   | 93.9  | 84.6% | 93.6  | 84.3% | 84.7   | 76.3% | 97.8   | 88.1% |
| Mean |       | 105.0% |       | 86.0% |       | 89.2% |        | 78.5% |        | 86.6% |

California Department of Food and Agriculture  
 Center for Analytical Chemistry  
 Environmental Analysis Section  
 3292 Meadowview Road  
 Sacramento, CA 95832

EMON-SM-05-003  
 Revision:  
 Revision Date:  
 Original Date: 1/26/06  
 Page 17 of 20

**Cypermethrin**

| spk  | day 0 |       | day 4 |      | day 7 |      | day 14 |      | day 28 |      |
|------|-------|-------|-------|------|-------|------|--------|------|--------|------|
|      | ppt   | %     | ppt   | %    | ppt   | %    | ppt    | %    | ppt    | %    |
| 1    | 103   | 103   | 80.5  | 80.5 | 66.9  | 66.9 | 65.2   | 65.2 | 44.7   | 44.7 |
| 2    | 96.8  | 96.8  | 74.0  | 74.0 | 64.7  | 64.7 | 62.7   | 62.7 | 48.5   | 48.5 |
| 3    | 104   | 104   | 77.3  | 77.3 | 62.6  | 62.6 | 55.3   | 55.3 | 41.3   | 41.3 |
| Mean |       | 101.3 |       | 77.3 |       | 64.7 |        | 61.1 |        | 44.8 |

**Cypermethrin with Keeper**

| spk  | day 0 |        | day 4 |       | day 7 |       | day 14 |       | day 28 |       |
|------|-------|--------|-------|-------|-------|-------|--------|-------|--------|-------|
|      | ppt   | %      | ppt   | %     | ppt   | %     | ppt    | %     | ppt    | %     |
| 1    | 115   | 104%   | 88.6  | 79.8% | 105   | 94.6% | 90.4   | 81.4% | 83.9   | 75.6% |
| 2    | 115   | 104%   | 91.0  | 82.0% | 98.9  | 89.1% | 83.5   | 75.2% | 95.5   | 86.0% |
| 3    | 121   | 109%   | 91.0  | 82.0% | 93.6  | 84.3% | 83.5   | 75.2% | 94.8   | 85.4% |
| Mean |       | 105.7% |       | 81.3% |       | 89.3% |        | 77.3% |        | 82.3% |

**Fenvalerate / Esf**

| spk  | day 0 |       | day 4 |      | day 7 |      | day 14 |      | day 28 |      |
|------|-------|-------|-------|------|-------|------|--------|------|--------|------|
|      | ppt   | %     | ppt   | %    | ppt   | %    | ppt    | %    | ppt    | %    |
| 1    | 106   | 106   | 79.0  | 79.0 | 66.8  | 66.8 | 68.9   | 68.9 | 51.7   | 51.7 |
| 2    | 99.8  | 99.8  | 78.6  | 78.6 | 70.8  | 70.8 | 65.8   | 65.8 | 26.6   | 26.6 |
| 3    | 107   | 107   | 75.7  | 75.7 | 67.3  | 67.3 | 58.8   | 58.8 | 55.2   | 55.2 |
| Mean |       | 104.3 |       | 77.8 |       | 68.3 |        | 64.5 |        | 44.5 |

**Fenvalerate / Esf with Keeper**

| spk  | day 0 |        | day 4 |       | day 7 |       | day 14 |       | day 28 |       |
|------|-------|--------|-------|-------|-------|-------|--------|-------|--------|-------|
|      | ppt   | %      | ppt   | %     | ppt   | %     | ppt    | %     | ppt    | %     |
| 1    | 121   | 109%   | 93.5  | 84.2% | 105   | 94.6% | 91.0   | 82.0% | 86.9   | 78.3% |
| 2    | 120   | 108%   | 84.7  | 76.3% | 97.9  | 88.2% | 83.6   | 75.3% | 93.1   | 83.9% |
| 3    | 124   | 112%   | 86.7  | 78.1% | 92.1  | 83.0% | 83.6   | 75.3% | 91.4   | 82.3% |
| Mean |       | 109.7% |       | 79.5% |       | 88.6% |        | 77.5% |        | 81.5% |

California Department of Food and Agriculture  
 Center for Analytical Chemistry  
 Environmental Analysis Section  
 3292 Meadowview Road  
 Sacramento, CA 95832

EMON-SM-05-003  
 Revision:  
 Revision Date:  
 Original Date: 1/26/06  
 Page 18 of 20

**Deltamethrin**

| spk  | day 0 |      | day 4 |      | day 7 |      | day 14 |      | day 28 |      |
|------|-------|------|-------|------|-------|------|--------|------|--------|------|
|      | ppt   | %    | ppt   | %    | ppt   | %    | ppt    | %    | ppt    | %    |
| 1    | 96.8  | 96.8 | 60.6  | 60.6 | 47.8  | 47.8 | 47.9   | 47.9 | 31.6   | 31.6 |
| 2    | 88.7  | 88.7 | 60.9  | 60.9 | 56.7  | 56.7 | 46.8   | 46.8 | 32.5   | 32.5 |
| 3    | 95.1  | 95.1 | 56.8  | 56.8 | 49.3  | 49.3 | 35.1   | 35.1 | 34.0   | 34.0 |
| Mean |       | 93.5 |       | 59.4 |       | 51.3 |        | 43.3 |        | 32.7 |

**Deltamethrin with Keeper**

| spk  | day 0 |       | day 4 |       | day 7 |       | day 14 |       | day 28 |       |
|------|-------|-------|-------|-------|-------|-------|--------|-------|--------|-------|
|      | ppt   | %     | ppt   | %     | ppt   | %     | ppt    | %     | ppt    | %     |
| 1    | 106   | 95.5% | 78.1  | 70.4% | 86.5  | 77.9% | 75.0   | 67.6% | 74.1   | 66.8% |
| 2    | 110   | 99.1% | 68.0  | 61.3% | 83.8  | 75.5% | 67.2   | 60.5% | 78.6   | 70.8% |
| 3    | 113   | 102%  | 72.5  | 65.3% | 77.7  | 70.0% | 75.9   | 68.4% | 78.1   | 70.4% |
| Mean |       | 98.9% |       | 65.7% |       | 74.5% |        | 65.5% |        | 69.3% |

**Resmethrin**

| spk  | day 0 |      | day 4 |      | day 7 |      | day 14 |      | day 28 |      |
|------|-------|------|-------|------|-------|------|--------|------|--------|------|
|      | ppt   | %    | ppt   | %    | ppt   | %    | ppt    | %    | ppt    | %    |
| 1    | 91.2  | 91.2 | 52.0  | 52.0 | 58.3  | 58.3 | 47.0   | 47.0 | 27.6   | 27.6 |
| 2    | 92.9  | 92.9 | 42.7  | 42.7 | 60.5  | 60.5 | 45.4   | 45.4 | 37.0   | 37.0 |
| 3    | 90.8  | 90.8 | 57.2  | 57.2 | 51.9  | 51.9 | 42.9   | 42.9 | 26.3   | 26.3 |
| Mean |       | 91.6 |       | 50.6 |       | 56.9 |        | 45.1 |        | 30.3 |

**Resmethrin with Keeper**

| spk  | day 0 |        | day 4 |       | day 7 |       | day 14 |       | day 28 |       |
|------|-------|--------|-------|-------|-------|-------|--------|-------|--------|-------|
|      | ppt   | %      | ppt   | %     | ppt   | %     | ppt    | %     | ppt    | %     |
| 1    | 117   | 105%   | 86.6  | 78.0% | 104   | 93.7% | 98.8   | 89.0% | 98.8   | 89.0% |
| 2    | 109   | 98.2%  | 85.0  | 76.6% | 96.8  | 87.2% | 95.9   | 86.4% | 88.7   | 79.9% |
| 3    | 115   | 104%   | 90.1  | 81.2% | 98.9  | 89.1% | 98.6   | 88.8% | 98.5   | 88.7% |
| Mean |       | 102.4% |       | 78.6% |       | 90.0% |        | 88.1% |        | 85.9% |

California Department of Food and Agriculture  
Center for Analytical Chemistry  
Environmental Analysis Section  
3292 Meadowview Road  
Sacramento, CA 95832

EMON-SM-05-003  
Revision:  
Revision Date:  
Original Date: 1/26/06  
Page 19 of 20

**Written By:**

\_\_\_\_\_  
Jane White  
Chemist

\_\_\_\_\_  
Date

**Approved By:**

\_\_\_\_\_  
Steve Siegal  
Supervising Chemist

\_\_\_\_\_  
Date

**Approved By:**

\_\_\_\_\_  
Elaine Wong  
Program Supervisor

\_\_\_\_\_  
Date

**Approved By:**

\_\_\_\_\_  
Balvinder Sehkon  
Quality Assurance Officer

\_\_\_\_\_  
Date

