

# Environmental Chemistry Quality Assurance and Data Report

for the

## Toxic Substances Monitoring Program 1996-2000



Prepared by:

David B. Crane, Kathleen Regalado, Gary Munoz, Laurie Smith, David Gilman,  
Matt Hicks,

Fish and Wildlife Water Pollution Control Laboratory

Office of Spill Prevention and Response

California Department of Fish and Game

2005 Nimbus Road

Rancho Cordova, CA 95670

And

Gary Ichikawa, Jon Goetzl, Autumn Bonnema, Wes Heim

Marine Pollution Studies Laboratory

California Department of Fish and Game

7544 Sandholdt Road

Moss Landing, CA 95039

September 2004

# **TOXIC SUBSTANCES MONITORING PROGRAM 1996-2000**

## **FIELD AND LABORATORY OPERATIONS**

### **Sample Collection**

Samples were obtained using a Smith\_Root Model VII and Model XIA Portable Electrofishers; a Smith\_Root SR\_16E electrofishing boat; variable mesh, woven, and monofilament gill nets; baited hoop nets measuring three feet in diameter with one inch square mesh; or beach seines of varying lengths, widths, and material. Collected fish were kept in clean stainless steel buckets until they could be double\_wrapped in extra\_heavy duty aluminum foil (dull side inward), labeled, and packed in an ice chest containing dry ice.

### **Laboratory Analysis**

A detailed description of procedures and techniques discussed below can be found in the Department of Fish and Game's (DFG) Laboratory Quality Assurance Program Plan (DFG 1990). The following is a summary of Quality Assurance/Quality Control (QA\QC) results provided by the Department of Fish and Game's Water Pollution Control Laboratory (WPCL) and Moss Landing Marine Laboratory (MLML) for the years 1996 through 2000. Copies of the Laboratory Quality Assurance Program Plan and QA\QC results are available upon request.

Trace elements were analyzed at the WPCL in 1996. MLML has analyzed TSMP samples for trace elements since 1997. Trace element analytical techniques for both laboratories follow are summarized below.

### **Quality Assurance Practices**

Quality control (QC) activities are routinely employed to ensure sample analysis results of high quality. Quality control activities include the tracking of accuracy and precision as performance indices, verifying instrument calibration, diluting samples which exceed the instrument's calibrated range and documenting surrogate recoveries (synthetic organic analyses).

### **Trace Elements**

In addition to routine trace element analyses, 10 percent of the samples were analyzed in duplicate to determine precision. The results of duplicate laboratory sample analyses are presented in Table 1. To ensure sample integrity, all materials contacting samples during laboratory operations were analyzed for trace element content. To evaluate accuracy, reference materials from the National Institute of Standards and Technology (NIST) and the National Research Council of Canada were analyzed (Table 2) and selected samples were fortified with target analytes (MS/MSD). Matrix spike (MS) and matrix spike duplicate (MSD) percent recoveries can be found in Table 3.

## **Synthetic Organics**

Table 4 lists the four Florisil fractions and the synthetic organic compounds found in each fraction. The synthetic organic compound reporting limits for each year can be found in Table 5. Synthetic organic surrogate compound recoveries are evaluated for acceptable recoveries prior to data processing (Table 6). Samples which have surrogate recoveries exceeding the criterion of 50% - 150% are subjected to re-analysis or re-extraction. Marginal recoveries which exceed the range of 60% - 120% are closely inspected and corrective action is taken as appropriate.

The evaluation of analytical precision and accuracy is accomplished through the use of matrix spikes (Table 7), laboratory control spikes (Table 8), field replicates (Table 9), method duplicates (Table 10), and Standard Reference Materials (SRMs) (Table 11). Matrix spikes provide a means for assessing methodological performance for analytes not found in available SRMs.

Hard copies of all chromatograms and electronic data are archived for each sample analyzed.

## **Trace Elements Analytical Techniques in Tissue - 1996 (Water Pollution Control Laboratory)**

A Varian Model Spectra 300 atomic absorption spectrophotometer was used for techniques employing conventional (flame) atomic absorption spectrophotometry (copper and zinc). A Varian Model VGA-76 Hydride Generator was used for hydride generation atomic absorption spectrophotometry (arsenic and selenium), and cold vapor technique for mercury (Adrian 1971; Uthe et al. 1974; and Evans et al. 1986). A Perkin-Elmer Model 3030 Zeeman atomic absorption spectrophotometer equipped with an HGA-600 graphite furnace and an AS-60 autosampler was used for techniques requiring a graphite furnace (cadmium, chromium, nickel, lead, and silver).

Samples were weighed into pre-cleaned 200mm x 25mm glass tubes that had been checked for trace element contamination. Concentrated nitric acid was added to each sample and then heated in an aluminum block to reflux the acid. The acid was allowed to reflux until the evolution of NO<sub>x</sub> (brown fumes) was no longer apparent (about 2 hours). The block temperature was increased to reduce the volume in the tube by evaporation. When the volume in the tube reached about 0.5 mL the tube was removed and allowed to cool. The digestate was diluted to 40.0 mL with 1% nitric acid solution, mixed on a vortex mixer and transferred to a clean polyethylene bottle.

## **Trace Elements Analytical Techniques in Tissue - 1997 (Moss Landing Marine Laboratory)**

Samples were analyzed with a Perkin-Elmer Sciex Elan 6000 Inductively-Coupled Plasma Mass Spectrophotometer, equipped with a Perkin-Elmer AS 90 Autosampler.

Three grams of fish or liver tissue was digested with 3 mL of 4:1 nitric acid:perchloric acid in a Teflon vessel. Each acidified sample vessel was placed on a warm (75°C) hotplate for 5 hours. The vessels were rotated

approximately every half hour to insure even heating. After five hours, the vessels were capped and heated at 130°C in an oven for four hours. The vessels were allowed to cool, then were uncapped and vented. Approximately 15 mL of  $10^{18}$  M-ohm water was added to each sample, mixed, and then poured into a pre-cleaned polyethylene bottle. The final solution weight was brought up to 20 g with  $10^{18}$  M-ohm water.

#### **Trace Elements Analytical Techniques in Tissue and Sediment - 1998, 1999, 2000 (Moss Landing Marine Laboratory)**

Vessels were filled with 0.75 g fish tissue or 0.50 g liver tissue. Six milliliters of nitric acid was added to each vessel. The vessels were capped and placed in the Microwave Assisted Reaction System (MARS 5) and subjected to the following temperature controlled program:

- 20 minute ramp to 195°C or 300 psi
- 15 minute hold at temperature
- 20 minute cool down cycle.

The vessels were removed from the MARS 5 once the temperature returned to approximately 70°C and were vented slowly under the hood. After the samples cooled completely, approximately 7 mL of  $10^{18}$  M-ohm water was added to each vessel. The solution was poured into pre-cleaned polyethylene bottles. The final solution weight was brought up to 20 g with  $10^{18}$  M-ohm water.

#### **Synthetic Organic Compounds Analytical Techniques in Tissues - 1996 and 1997**

Homogenized tissue samples were removed from the freezer and allowed to thaw. A 10 gram sample of the flesh-water (1:1) paste was spiked with with a mixture of 4,4'-dibromo-octafluorobiphenyl (DBOB), decachlorobiphenyl (DCB) and dibutylchlorodate (DBCE) and extracted twice with acetonitrile by shaking for two minutes on an orbital shaker at 300 rpm. The sample extracts were combined, filtered, and partitioned with petroleum ether. An aliquot of the petroleum ether extract was eluted through a Florisil<sup>R</sup> column. The Florisil<sup>R</sup> columns were eluted with petroleum ether (Fraction 1), six percent ethyl ether/petroleum ether (Fraction 2), and 15 percent ethyl ether/petroleum ether (Fraction 3). Fractions 2 and 3 were spiked with DCB and all of the fractions were concentrated to an appropriate volume in a Zymark<sup>R</sup> Turbovap concentrator prior to analysis by gas chromatography. DCB was used as a surrogate to determine analyte recovery of the F1 compounds and to determine relative retention times for all fractions. DBOB was used to check the analyte recovery of the F2 compounds but was found to elute with the F1 compounds. DBCE was used to check the analyte recovery of the F3 compounds. The percent recoveries for the surrogate compounds are listed in Table 6.

At stations where the TSMP had previously detected endosulfan, samples were analyzed for endosulfan II and endosulfan sulfate. This required an additional elution through Florisil<sup>R</sup> with 50 percent ethyl ether in petroleum ether (Fraction 4, Table 4). All other stations were initially analyzed for endosulfan I only. Fraction 4 was also spiked with DCB prior to the concentration step. Due to the high lipid content of the fraction all of the 50 percent extracts were diluted with iso-octane by a factor of ten prior to analysis by gas chromatography.

A solution containing known concentrations of target analytes were added to samples to assess accuracy and matrix effects. Percent recoveries of the target analytes are listed in Table 7.

Ten percent of the samples were analyzed in duplicate (Table 10). All materials and solutions contacting the sample were analyzed for organic contamination. To preclude errors due to contamination, a vertical solvent blank analyzed for each set of glassware before introducing a new sample.

#### **Instrument and Analytical Conditions for Chlorinated Hydrocarbons - 1996 and 1997**

The extracts were analyzed on a Varian Model 3500 gas chromatograph equipped with a Model 8035 autosampler, temperature programmable injector, and dual Ni63 electron capture detectors. Two 60m x 0.25mm i.d. columns of different polarity (DB-17 & DB-5; J&W Scientific) using a glass Y-splitter provide a two dimensional confirmation of each analyte. Analytes are quantified using external standard methodologies. Chromatographic data was acquired and processed with a Hewlett-Packard Chem-Station, version A.03.02.

#### **Procedure for Lipid Determination - 1996 and 1997**

Synthetic organic concentrations in organisms vary with lipid content so it is customary to provide lipid data when reporting tissue concentrations. A thoroughly homogenized sample weighing approximately 5 g (fresh weight) was macerated and dried with anhydrous granular sodium sulfate. The dried sample was transferred to a blender with 150 ml of petroleum ether and blended for two minutes at high speed. The liquid was vacuum-filtered into a 250 mL filter flask through a 10 cm Buchner funnel containing Whatman #1 filter paper. The sample was blended once more with an additional 150 mL of petroleum ether and filtered. The filtrate was concentrated to approximately 25 mL with heat (steam bath) and nitrogen blowdown. The remaining filtrate was then quantitatively transferred into a 50 mL pre-weighed planchet. The petroleum ether was evaporated, the planchet containing the residue was reweighed, and the percent lipid was calculated.

#### **Synthetic Organic Compounds Analytical Techniques in Tissue - 1998, 1999, 2000**

The procedure for analyzing tissue for pesticides, PCBs and lipids was modified 1998. Samples were extracted using a pressurized fluid extraction (PFE)--Dionex Accelerated Solvent Extractor Model 200.

Ten grams of homogenized tissue is mixed with approximately 7g of pre-extracted Hydromatrix® (Varian) until the mixture is free flowing.

At the same time, a 1-5 g (tissue homogenate) sample is weighed into a pre-weighed aluminum planchet and placed in a 70°C oven for 48 hours to determine moisture content.

The Hydromatrix®-tissue mixture is then poured into a 33 mL stainless steel extractor cell and packed by tamping the mixture. A solution containing pesticide and PCB surrogate compounds (DBOB, PCB congener 207, deuterated p,p'-DDD, and DBCE) is added to the cell and the cap is screwed onto the

cell. The extractor cells (maximum of 24) are placed on the ASE 200 autosampler rack and the samples are extracted with a 50/50 mixture of acetone/dichloromethane (DCM) using heat and pressure. The extracts are automatically collected in 60 mL VOA vials. The samples are extracted a second time resulting in 2 VOA vials per sample.

The two extracts are combined, dried with sodium sulfate, and evaporated to approximately 0.5mL using Kuderna-Danish (K-D) glassware equipped with 3-ball Snyder columns and micro-Snyder apparatus and diluted to five mL with DCM. The extracts are then filtered through a 0.45  $\mu$ m syringe filter into ABC Autoprep 2000 Gel Permeation Chromatograph (GPC) autosampler tubes. One milliliter each of the filtered extracts is removed and placed in a pre-weighed aluminum planchet for percent lipid determination.

The GPC autosampler tubes are then placed on the GPC autosampler for initial sample cleanup using a column containing Biobeads and DCM elution solvent.

After the GPC, the extracts are evaporated using K-D apparatus and solvent exchanged into petroleum ether. The extracts then are fractionated using a standard 4 inch x 22 mm Florisil column. The Florisil columns are eluted with petroleum ether (PE) (Fraction 1), 6% diethyl ether/PE (Fraction 2), 15% diethyl ether/PE (Fraction 3), and 50% diethyl ether/PE (Fraction 4). The fractions are then concentrated to an appropriate volume using K-D/micro K-D apparatus. Samples are analyzed on a Hewlett-Packard 6890 *plus* gas chromatograph utilizing capillary columns and electron capture detection (GC/ECD). A single 3  $\mu$ L splitless injection is directed onto two 60m x 0.25mm i.d. columns of different polarity (DB-17 & DB-5; J&W Scientific) using a glass Y-splitter to provide a two dimensional confirmation of each analyte.

Selected samples were spiked in duplicate with a solution containing known concentrations of target analytes to assess accuracy, precision and matrix effects. Percent recoveries of the target analytes from the matrix spikes for 1998 and 1999 are listed in Table 7.

Approximately 10 percent of samples were analyzed in duplicate to determine method precision. Precision results are listed in Table 10. Method blanks, representative of all materials and solutions contacting the sample, were prepared and analyzed.

#### **Polynuclear Aromatic Hydrocarbon Compounds (PAHs) Analytical Techniques in Tissue 1998, 1999, 2000**

Ten grams of tissue was spiked with a deuterated PAH surrogate solution. The sample was mixed with Hydromatrix®, placed in a stainless steel cell and extracted using PFE. The extract was solvent exchanged into methylene chloride and eluted through a gel permeation chromatograph to remove most of the lipids. The extract was further cleaned up by eluting it through a silica gel/alumina column with DCM/pentane (50:50).

Table 12 lists the PAH fresh weight detection limits for tissue. PAH surrogate recoveries are listed in Table 13. Tables 14, 15 and 16 list the matrix spike recoveries, laboratory control spikes and duplicate analysis results respectively.

# **Instrument and Analytical Conditions for Polynuclear Aromatic Hydrocarbon Compounds (PAHs)**

Sample extracts were analyzed for PAH compounds using a Varian Saturn 4D Ion Trap GC-MS. Two microliters of sample extract were injected into a J&W Scientific DB-5MS, 60 meter x 0.25 mm I.D. fused silica capillary column with a 0.25 um film thickness. The GC oven temperature was initially held at 70°C for two minutes. The temperature ramp was 15°C per minute until the oven reached 150°C. The second temperature ramp was 2°C per minute to a final temperature of 280°C and held for 5 minutes. Injector temperature was isothermal at 300°C. The GC carrier gas was helium at a linear velocity of 37 cm/sec.

**Table 1**  
 Toxic Substances Monitoring Program  
 Results of Duplicate Trace Element Analysis in Fish Tissue  
 Analyzed by Graphite Furnace/Flame Atomic Absorption at WPCL in 1996  
 (ug/g wet weight)

	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
<b>1996</b>										
185.001.W.96	<0.02	0.15	0.04	0.22	0.80	0.03	0.11	<0.1	3.0	46
185.001.W.96 dup	<0.02	0.13	0.04	0.22	0.90	0.03	0.12	<0.1	3.0	47
005.002.L.96	0.56	NA	NA	<0.02	21	NA	NA	<0.1	NA	18
005.002.L.96 dup	0.58	NA	NA	<0.02	20	NA	NA	<0.1	NA	18
010.002.F.96	NA	0.17	<0.01	NA	NA	0.53	<0.1	NA	0.23	NA
010.002.F.96 dup	NA	0.17	<0.01	NA	NA	0.53	<0.1	NA	0.27	NA
229.001.F.96	NA	0.06	<0.01	NA	NA	0.30	<0.1	NA	0.20	NA
229.001.F.96 dup	NA	0.05	<0.01	NA	NA	0.30	<0.1	NA	0.21	NA
284.001.L.96	0.07	NA	NA	<0.02	20	NA	NA	<0.1	NA	29
284.001.L.96 dup	0.10	NA	NA	<0.02	20	NA	NA	<0.1	NA	29
045.002.L.96	0.02	NA	NA	<0.02	7.0	NA	NA	<0.1	NA	24
045.002.L.96 dup	0.02	NA	NA	<0.02	7.1	NA	NA	<0.1	NA	24
015.005.F.96	NA	NA	NA	NA	NA	0.18	NA	NA	NA	NA
015.005.F.96 dup	NA	NA	NA	NA	NA	0.19	NA	NA	NA	NA

Note: Flesh tissue (F) analyzed for Cd, Ni, Hg, As, Se  
 Liver tissue (L) analyzed for Ag, Cr, Cu, Pb, Zn  
 Whole body tissue (W) analyzed for Ag, As, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn



**Table 1 continued**  
Toxic Substances Monitoring Program  
Results of Duplicate Trace Element Analysis in Fish Tissue  
Analyzed by ICP-MS at MLML (ug/g wet weight)

	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
<b>1997</b>										
007.012.F.97	0.06	<0.10	<0.01	15.5	12.5	1.14	0.64	<0.10	40.3	356
007.012.F.97 dup	0.05	0.76	<0.01	14.9	12.6	1.07	0.56	<0.10	40.8	343
185.001.W.97	0.21	10.1	7.48	20.4	69.6	0.76	<0.10	2.44	141	3730
185.001.W.97 dup	0.24	10.6	7.51	21.7	70.8	0.59	<0.10	2.46	146	3710
010.001.F.97	0.22	7.74	0.00	14.3	22.9	4.20	0.28	0.20	15.1	415
010.001.F.97 dup	0.18	7.99	0.00	13.0	23.6	4.22	0.27	0.12	15.4	422
027.001.F.97	0.10	4.25	0.01	15.7	27.3	1.37	0.56	0.17	58.2	450
027.001.F.97 dup	0.09	2.92	0.00	14.7	27.0	1.20	0.47	0.15	57.3	434
005.001.F.97	0.08	1.57	0.00	15.5	28.4	1.41	0.57	<0.10	8.36	390
005.001.F.97 dup	0.10	1.00	0.00	14.3	28.0	1.30	0.30	0.10	7.80	387
058.001.F.97	0.04	14.6	0.39	16.6	35.5	0.90	0.43	<0.10	96.4	575
058.001.F.97 dup	0.08	12.6	0.39	15.2	33.3	0.80	0.50	0.11	92.0	561
<b>1998</b>										
015.001.F.98	<0.01	0.41	<0.01	0.27	1.07	1.46	<0.10	<0.10	3.11	28.7
015.001.F.98 dup	<0.01	0.42	<0.01	0.29	1.04	1.47	<0.10	<0.10	3.02	26.5
119.001.F.98	<0.01	0.30	<0.01	0.26	0.99	0.116	<0.10	<0.10	2.72	20.8
119.001.F.98 dup	<0.01	0.28	<0.01	0.25	0.75	0.132	<0.10	<0.10	2.23	16.3
005.001.L.98	0.833	0.22	0.190	0.37	50.6	0.954	<0.10	<0.10	2.51	61.7
005.001.L.98 dup	0.815	0.18	0.174	0.37	49.6	0.889	<0.10	<0.10	2.36	56.8
284.001.F.98	0.003	0.26	<0.01	0.58	2.24	0.325	<0.10	<0.10	0.58	19.3
284.001.F.98 dup	0.002	0.19	<0.01	0.39	1.96	0.301	<0.10	<0.10	0.50	16.9
286.001.W.98	0.015	0.15	0.082	0.31	2.52	NA	0.11	0.10	2.76	101
286.001.W.98 dup	0.015	0.11	0.081	0.31	2.38	NA	0.18	0.11	2.69	97.8
<b>1999</b>										
110.001.F.99	<0.01	0.34	<0.01	0.74	1.01	0.05	0.05	<0.10	1.85	24.6
110.001.F.99 dup	<0.01	0.44	<0.01	1.03	1.02	0.06	0.06	<0.10	2.31	27.3
119.002.f.99	0.08	0.95	0.03	1.17	9.23	<0.01	1.03	0.53	3.15	102
119.002.f.99 dup	0.09	0.99	0.03	1.39	10.0	<0.01	1.14	0.75	3.59	118
013.001.F.99	<0.01	0.18	0.01	0.42	2.48	0.04	0.07	<0.10	0.90	13.7
013.001.F.99 dup	<0.01	0.20	<0.01	0.23	2.49	0.04	0.06	<0.10	0.90	13.7
148.001.F.99	<0.01	0.66	<0.01	1.07	1.17	0.21	0.09	<0.10	3.54	22.5
148.001.F.99 dup	<0.01	0.60	<0.01	0.80	1.14	0.21	0.06	<0.10	3.34	21.6
233.004.F.99	<0.01	0.69	<0.01	0.71	10.3	0.51	1.44	0.38	1.67	30.6
233.004.F.99 dup	<0.01	0.67	<0.01	0.87	1.14	0.49	0.05	<0.10	1.75	28.5
049.019.L.99	1.23	1.65	0.14	0.87	312	NA	0.38	0.03	37.8	115
049.019.L.99 dup	1.27	1.78	0.15	0.99	309	NA	0.41	0.05	38.5	112

**Table 1 continued**  
 Toxic Substances Monitoring Program  
 Results of Duplicate Trace Element Analysis in Fish Tissue  
 Analyzed by ICP-MS at MLML (ug/g wet weight)

	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
<b>2000</b>										
055.001.F.00	<0.01	0.376	<0.01	0.79	1.33	0.07	<0.1	<0.10	8.14	23.3
055.001.F.00 dup	<0.01	0.424	<0.01	0.91	1.32	0.07	<0.1	0.10	8.38	23.4
382.001.W.00	0.065	3.90	0.03	0.701	13.4	<0.01	<0.1	1.23	2.00	154
382.001.W.00 dup	0.054	3.70	0.03	0.698	12.7	<0.01	<0.1	1.50	1.99	152
383.001.W.00	0.042	6.26	0.03	0.798	10.8	<0.01	<0.1	1.06	2.02	119
383.001.W.00 dup	0.043	6.22	0.04	0.816	10.6	<0.01	<0.1	1.05	2.12	120
042.001.F.00	<0.01	0.961	<0.01	0.649	2.32	0.02	<0.1	<0.10	1.25	23.7
042.001.F.00 dup	<0.01	1.02	<0.01	0.671	2.43	0.02	<0.1	<0.10	1.28	24.6
086.002.L.00	<0.01	0.723	0.03	0.733	8.82	NA	<0.1	<0.10	3.22	80.9
086.002.L.00 dup	<0.01	0.611	0.02	0.745	8.72	NA	<0.1	<0.10	3.27	79.3
067.001.L.00	0.293	1.17	11.1	0.704	67.9	NA	0.341	<0.10	14.1	116
067.001.L.00 dup	0.287	1.10	10.7	0.529	64.6	NA	0.279	<0.10	13.3	110
049.002.F.00	NA	NA	NA	NA	NA	1.17	NA	NA	NA	NA
049.002.F.00 dup	NA	NA	NA	NA	NA	1.23	NA	NA	NA	NA
107.006.F.00	NA	NA	NA	NA	NA	0.81	NA	NA	NA	NA
107.006.F.00 dup	NA	NA	NA	NA	NA	0.80	NA	NA	NA	NA
384.006.F.00	NA	NA	NA	NA	NA	0.19	NA	NA	NA	NA
384.006.F.00 dup	NA	NA	NA	NA	NA	0.18	NA	NA	NA	NA

**Table 2**  
 Toxic Substances Monitoring Program  
 Trace Element Analysis of Reference Materials (ug/g, dry weight)  
 Analyzed by Graphite Furnace/Flame Atomic Absorption at WPCL in 1996

DOLT-2  
 Dogfish Liver  
 Certified Reference Material

Set No.	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
	0.608±0.032	16.6±1.1	20.8±0.5	0.37±0.08	25.8±1.1	2.14±0.28	0.20±0.02	0.22±0.02	6.06±0.49	85.8±2.5
1	0.541	14.5	18.8	0.345	23.9	1.93	0.221	0.261	5.73	88.7
2	NA	14.2	20.5	NA	NA	1.99	0.247	NA	5.25	87.5
3	0.487	NA	NA	0.676	25.1	1.94	NA	0.693	5.43	NA
4	NA	NA	18.3	NA	NA	1.93	0.200	NA	NA	NA
5	NA	NA	17.3	NA	NA	NA	0.152	NA	NA	NA
6	0.528	NA	NA	0.329	27.1	NA	NA	0.208	NA	86.1
7	0.476	NA	NA	0.266	24.5	NA	NA	0.255	NA	88.6

**Table 2 continued**  
 Toxic Substances Monitoring Program  
 Trace Element Analysis of Reference Materials (ug/g, dry weight)  
 Analyzed by Graphite Furnace/Flame Atomic Absorption at WPCL in 1996

DORM-2  
 Dogfish Muscle  
 Certified Reference Material

Set No.	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
	0.041±0.013	18.0±1.1	0.043±0.008	34.7±5.5	2.34±0.16	4.64±0.26	19.4±3.1	0.065±0.007	1.40±0.09	23.6±2.5
1	0.047	14.8	0.03	30.1	1.78	3.72	17.1	0.364	1.30	21.8
2	NA	16.7	NA	NA	NA	3.87	NA	NA	1.25	NA
3	NA	NA	NA	NA	NA	3.91	NA	NA	1.24	NA
4	NA	NA	0.04	NA	NA	NA	16.4	NA	NA	NA
5	NA	NA	0.03	NA	NA	NA	13.7	NA	NA	NA
6	0.040	NA	NA	29.1	2.14	NA	NA	0.114	NA	23.5
7	0.024	NA	NA	25.6	2.31	NA	NA	NA	NA	25.4

**Table 2 continued**  
 Toxic Substances Monitoring Program  
 Trace Element Analysis of Reference Materials (ug/g, dry weight)  
 Analyzed by ICP-MS at MLML

SRM 2976  
 Mussel Tissue

Set No.	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
	0.011±0.005*	13.3±1.8	0.82±0.16	0.50±0.16*	4.02±0.33	61.0±3.6	0.93±0.12*	1.19±0.18	1.80±0.15	137±13
<b>1997</b>										
1	0.015	15.1	0.84	0.25	3.80	NA	0.76	1.16	1.93	140
2	0.011	14.6	0.82	0.22	3.67	NA	0.73	1.13	1.96	134
3	0.010	14.4	0.82	0.22	3.62	NA	0.72	1.11	1.73	135
<b>1998</b>										
1	0.008	12.6	0.77	0.42	3.40	NA	1.09	1.01	1.78	123
2	0.007	12.4	0.75	0.45	3.30	NA	0.62	1.00	1.67	122
3	0.007	12.4	0.75	0.46	3.37	NA	0.66	0.98	1.67	119
4	0.011	10.7	0.70	0.58	3.23	NA	0.65	0.90	1.14	104
5	0.008	10.7	0.68	0.71	3.19	NA	0.74	0.88	1.17	104
6	0.007	10.8	0.68	0.66	3.25	NA	0.74	0.89	1.16	104
<b>2000</b>										
1	0.010	13.6	0.89	0.8	4.13	NA	0.83	1.32	3.0	137
2	0.010	13.9	0.88	0.7	4.23	NA	0.79	1.36	2.1	139
3	0.008	13.6	0.87	0.7	4.21	NA	0.79	1.32	2.2	134

\*Concentrations are reference values, not certified values; NA = not analyzed

**Table 2 continued**  
 Toxic Substances Monitoring Program  
 Trace Element Analysis of Reference Materials (ug/g, dry weight)  
 Analyzed by ICP-MS at MLML  
 DORM-1  
 Dogfish Muscle  
 Certified Reference Material

Set No.	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
	17.7±2.1	0.086±0.012	3.60±0.40	5.22±0.33	0.798±0.074	1.20±0.30	0.40±0.12	1.62±0.12	21.3±1.0
<b>1998</b>									
1	13.5	0.069	2.87	3.90	0.783	0.84	0.28	1.23	66.6
2	13.8	0.078	3.35	4.24	0.781	1.03	0.31	1.15	15.5
3	13.9	0.070	3.55	4.20	0.708	0.98	1.34	1.11	15.6
4	16.0	0.079	4.99	4.37	0.611	1.95	0.28	1.66	18.4
5	16.1	0.082	3.18	4.31	0.759	1.03	0.34	1.58	18.5
6	15.8	0.085	2.82	4.22	0.789	0.82	0.35	1.53	17.6

**Table 2 continued**  
 Toxic Substances Monitoring Program  
 Trace Element Analysis of Reference Materials (ug/g, dry weight)  
 Analyzed by ICP-MS at MLML

DORM-2  
 Dogfish Muscle  
 Certified Reference Material

Set No.	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
	0.041±0.013	18.0±1.1	0.043±0.008	34.7±5.5	2.34±0.16	4.64±0.26	19.4±3.1	0.065±0.007	1.40±0.09	23.6±2.5
<b>1999</b>										
1	0.040	17.2	0.043	35.4	2.69	5.38/5.36	18.9	0.068	1.37	22.8
2	0.032	17.3	0.051	34.2	2.42	4.67/5.51	18.3	0.037	1.38	23.9
3	0.084	17.0	0.045	35.4	2.45	5.52/5.32	18.6	0.037	1.35	22.7
4	0.041	17.9	0.058	38.8	2.49	NA	19.9	0.051	1.49	25.9
5	0.116	17.7	0.050	33.9	2.52	NA	18.1	0.079	1.42	22.2
6	0.048	17.6	0.060	41.2	3.44	NA	21.7	0.098	1.68	22.9
7	0.056	17.9	0.054	38.7	3.02	NA	20.0	0.048	1.74	23.4
8	0.038	17.8	0.044	37.5	2.47	NA	19.1	0.075	1.75	23.5
9	0.055	18.4	0.046	39.1	2.49	NA	20.2	0.067	1.84	26.3
10	0.040	18.1	0.049	39.3	3.15	NA	19.8	0.070	1.89	24.0
<b>2000</b>										
1	0.037	17.7	0.048	35.3	2.32	5.46	19.2	0.057	1.60	22.6
2	0.047	18.3	0.049	37.9	2.37	5.34	20.5	0.063	1.54	22.8
3	0.034	17.3	0.049	34.0	2.56	5.48	18.3	0.106	1.40	21.8
4	0.034	15.1	0.038	31.5	2.26	4.32	16.9	0.060	1.27	19.0
5	0.042	18.0	0.045	35.4	2.30	4.71	19.0	0.084	1.75	22.4
6	0.042	17.8	0.039	33.9	2.28	4.61	18.2	0.070	1.57	22.4

**Table 3**

Toxic Substances Monitoring Program  
 Matrix Spike/Matrix Spike Duplicate Percent Recovery of Trace Element Analyses in Fish Tissue  
 Analyzed by Graphite Furnace/Flame Atomic Absorption at WPCL in 1996

	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
<b>1996</b>										
363.001.W.96 MS	80.8	NA	90.1	100	93.8	94	112	99.5	NA	95.7
363.001.W.96 MSD	86.5	NA	93.0	107	92.2	87	105	105	NA	94.0
005.002.L.96 MS	101	NA	NA	124	96.0	NA	NA	92.2	NA	100
010.002.F.96 MS	NA	98	93.8	NA	NA	87	106	NA	98	NA
010.002.F.96 MSD	NA	97	93.8	NA	NA	93	105	NA	98	NA
229.001.F.96 MS	NA	92	77.4	NA	NA	90	82.7	NA	101	NA
229.001.F.96 MSD	97.2	92	78.5	108	NA	92	93.9	NA	102	NA
284.001.L.96 MS	97.2	NA	NA	108	100	NA	NA	91.0	NA	101
284.001.L.96 MSD	97.3	NA	NA	110	102	NA	NA	94.8	NA	100
045.002.L.96 MS	89.6	NA	NA	80.5	106	NA	NA	108	NA	99.2
045.002.L.96 MSD	90.3	NA	NA	77.5	106	NA	NA	106	NA	99.5
185.001.W.96 MS	NA	91	NA	NA	NA	83	NA	NA	108	NA
363.001.W.96 MS	NA	90	NA	NA	NA	NA	NA	NA	105	NA
363.001.W.96 MSD	NA	89	NA	NA	NA	NA	NA	NA	106	NA
026.002.F.96 MS	NA	NA	NA	NA	NA	NA	NA	NA	94	NA
026.002.F.96 MSD	NA	NA	NA	NA	NA	NA	NA	NA	97	NA
015.005.F.96 MS	NA	NA	NA	NA	NA	88	NA	NA	NA	NA
015.005.F.96 MS	NA	NA	NA	NA	NA	88	NA	NA	NA	NA

Note: Flesh tissue (F) analyzed for Cd, Ni, Hg, As, Se

Liver tissue (L) analyzed for Ag, Cr, Cu, Pb, Zn

Whole body tissue (W) analyzed for Ag, As, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn



**Table 3 continued**

Toxic Substances Monitoring Program  
 Matrix Spike/Matrix Spike Duplicate Percent Recovery of Trace Element Analyses in Fish Tissue  
 Analyzed by ICP-MS at MLML (ug/g wet weight)

	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
<b>1997</b>										
283.001.F.97 MS	69	103	94	85	85	NA	86	87	99	81
283.001.F.97 MSD	76	107	97	88	86	NA	88	90	102	83
010.001.F.97 MS	112	102	98	76	80	92.3	88	90	96	NS
010.001.F.97 MSD	105	102	83	74	82	98.0	86	86	95	NS
233.001.F.97 MS	75	109	100	89	90	91.7	89	94	102	84
233.001.F.97 MSD	76	110	98	88	90	103	90	92	102	85
<b>1998</b>										
148.001.F.98 MS	90	85	82	79	81	NA	83	82	82	75
148.001.F.98 MSD	88	89	85	87	89	NA	96	86	83	76
171.002.W.98 MS	72	93	85	89	83	NA	85	85	87	72
171.002.W.98 MSD	91	94	88	92	77	NA	86	86	87	71
<b>1999</b>										
013.001.F.99 MS	102	99	101	118	122	98.2	109	108	92	*
013.001.F.99 MSD	100	100	105	121	121	81.6	109	109	91	*
042.003.F.99 MS	98	97	99	106	101	NA	103	103	93	92
042.003.F.99 MSD	99	98	96	105	101	NA	104	104	94	93
233.003.F.99 MS	106	104	108	127	112	NA	119	115	98	113
233.003.F.99 MSD	106	103	107	128	113	NA	117	115	96	114
024.001.F.99 MS	102	96	99	116	101	NA	107	105	92	96
024.001.F.99 MSD	99	95	100	115	102	NA	108	106	89	97
110.001.F.99 MS	NA	NA	NA	NA	NA	102	NA	NA	NA	NA
110.001.F.99 MSD	NA	NA	NA	NA	NA	99.4	NA	NA	NA	NA
119.002.f.99 MS	NA	NA	NA	NA	NA	110	NA	NA	NA	NA
119.002.f.99 MSD	NA	NA	NA	NA	NA	106	NA	NA	NA	NA
049.007.F.99 MS	NA	NA	NA	NA	NA	110	NA	NA	NA	NA
049.007.F.99 MSD	NA	NA	NA	NA	NA	100	NA	NA	NA	NA
148.001.F.99 MS	NA	NA	NA	NA	NA	104	NA	NA	NA	NA
148.001.F.99 MSD	NA	NA	NA	NA	NA	100	NA	NA	NA	NA
233.004.F.99 MS	NA	NA	NA	NA	NA	109	NA	NA	NA	NA
233.004.F.99 MSD	NA	NA	NA	NA	NA	112	NA	NA	NA	NA

\* Sample contaminated      NS = not spiked

**Table 3 continued**

## Toxic Substances Monitoring Program

Matrix Spike/Matrix Spike Duplicate Percent Recovery of Trace Element Analyses in Fish Tissue

Analyzed by ICP-MS at MLML (ug/g wet weight)

	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
<b>2000</b>										
086.002.F.00 MS	80	97	114	114	117	116	116	159	103	102
086.002.F.00 MSD	77	97	112	109	115	122	129	26	101	102
186.001.W.00 MS	80	97	101	116	114	117	152	65	106	103
186.001.W.00 MSD	81	100	101	113	118	114	87	29	103	104
383.001.W.00 MS	78	78	104	114	111	NA	96	44	104	98
383.001.W.00 MSD	75	78	105	112	111	NA	90	45	105	96
042.001.F.00 MS	83	109	109	118	112	111	73	37	102	96
042.001.F.00 MSD	74	108	113	116	112	115	67	69	103	98
086.002.L.00 MS	79	NA	NA	111	118	NA	NA	106	NA	97
086.002.L.00 MSD	78	NA	NA	109	118	NA	NA	133	NA	97
067.001.L.00 MS	*	NA	NA	94	109	NA	NA	156	NA	94
067.001.L.00 MSD	*	NA	NA	105	113	NA	NA	114	NA	96
049.002.F.00 MS	NA	NA	NA	NA	NA	101	NA	NA	NA	NA
049.002.F.00 MSD	NA	NA	NA	NA	NA	103	NA	NA	NA	NA
107.006.F.00 MS	NA	NA	NA	NA	NA	93.4	NA	NA	NA	NA
107.006.F.00 MSD	NA	NA	NA	NA	NA	100	NA	NA	NA	NA
107.006.F.00 MS	NA	NA	NA	NA	NA	96.5	NA	NA	NA	NA
107.006.F.00 MSD	NA	NA	NA	NA	NA	98.3	NA	NA	NA	NA

\* Sample contaminated

**TABLE 4**

Toxic Substances Monitoring Program  
Distribution of Synthetic Organic Compounds Among  
Four Fractions of a Standard Florisil<sup>R</sup> Column

(0%) Fraction 1	(6%) Fraction 2	(15%) Fraction 3
HCH, alpha*	HCH, alpha*	dacthal
aldrin	HCH, beta	diazinon
chlordene, alpha	HCH, gamma	dichlorobenzophenone, p,p'
chlordene, gamma	HCH, delta	dieldrin
DDE, o,p'	cis-chlordane	endosulfan I
DDE, p,p'	trans-chlordane	endrin
DDMU, p,p'*	chlorpyrifos	oxadiazon
DDT, o,p'	DDD, o,p'	parathion, ethyl
DDT, p,p'*	DDD, p,p'	parathion, methyl
heptachlor	DDMU p,p'*	tetradifon (tedion)
hexachlorobenzene	DDT, p,p'*	
trans-nonachlor	ethion	
PCB 1248	heptachlor epoxide	
PCB 1254	methoxychlor	
PCB 1260	cis-nonachlor	
	oxychlordane	(50%) Fraction 4
	toxaphene	
		endosulfan II
		endosulfan sulfate

\* Found in both 0% and 6% fractions.

**TABLE 5**

Toxic Substances Monitoring Program  
Synthetic Organic Compounds  
Reporting Limits in Tissue and Sediment

Compound	Detection Limit	Detection Limit
	1996 and 1997 (ng/g, ppb wet weight)	1998, 1999, 2000 (ng/g, ppb wet weight)
aldrin	5	1
chlordane, cis	5	2
chlordane, trans	5	2
chlordene, alpha	5	1
chlordene, gamma	5	1
chlorpyrifos	10	2
dacthal	5	2
DDD, o, 'p	10	2
DDD, p, p'	10	2
DDE, o, p'	10	2
DDE, p, p'	5	2
DDMU, p, p'	15	3
DDT, o, p'	10	3
DDT, p, p'	10	5
diazinon	50	20
dieldrin	5	2
endosulfan I	5	2
endosulfan II	70	10
endosulfan sulfate	85	10
endrin	15	2
ethion	20	6
HCH, alpha	2	1
HCH, beta	10	2
HCH, gamma	2	1
HCH, delta	5	2
heptachlor	5	2
heptachlor epoxide	5	1
hexachlorobenzene	2	0.3
methoxychlor	15	5
nonachlor, cis	5	2
nonachlor, trans	5	1
oxadiazon	5	3
oxychlordane	5	1
parathion, ethyl	10	2
parathion, methyl	10	4
PCB 1248	50	25
PCB 1254	50	10
PCB 1260	50	10
tetradifon (Tedion)	10	2
toxaphene	100	20

**Table 6**

Toxic Substances Monitoring Program  
Percent Recovery of Synthetic Organic Surrogate Compounds for 1996

Station Number	Station Name	DBOB	DCB	DBCE
114.11.13	Russian River/Johnsons Beach	49.5	91.2	82.8
114.11.13	Russian River/Johnsons Beach	51.7	94.9	71.9
114.11.05	Russian River/Duncans Mills	59.3	96.5	92.2
114.21.10	Laguna de Santa Rosa/Stony Point	50.7	96.6	83.3
114.22.90	Santa Rosa Creek/Willowside Road	54.9	96.2	86.7
114.23.00	Mark West Creek	53.9	99.8	93.5
114.24.09	Dry Creek/d/s Lake Sonoma	53.3	96.8	85.5
206.40.08	Sonoma Creek	49.7	105	87.7
207.23.15	Hill Slough/u/s McCoy Ditch	51.6	96.5	92.2
207.23.15	Hill Slough/u/s McCoy Ditch	48.7	95.0	95.0
207.23.15	Hill Slough/u/s McCoy Ditch	48.6	95.3	94.4
207.23.15	Hill Slough/u/s McCoy Ditch	43.9	94.6	88.2
207.23.15	Hill Slough/u/s McCoy Ditch	48.0	89.5	80.4
309.10.15	Blanco Drain/Hitchcock Road	58.1	99.6	83.3
403.11.03	Oxnard Drainage Ditch 2	50.1	98.4	78.9
403.11.03	Oxnard Drainage Ditch 2	49.7	95.6	84.9
403.11.04	Revolon Slough	48.9	92.1	74.9
403.11.91	Mugu Lagoon	54.5	99.1	80.4
403.12.06	Calleguas Creek	52.5	95.0	85.7
403.12.06	Calleguas Creek	53.7	90.7	75.6
404.21.00	Malibu Lagoon	49.6	92.5	75.7
632.10.12	Carson River/E.F./Markleeville	55.7	103	78.1
635.20.04	Donner Lake	54.8	102	80.2
715.40.08	Palo Verde Outfall	56.1	99.1	84.3
715.40.08	Palo Verde Outfall	55.4	88.1	93.2
719.47.00	Coachella Valley Stormwater Ch.	52.1	101	97.8
719.47.00	Coachella Valley Stormwater Ch.	51.0	94.1	92.7
723.10.01	Alamo River/Calipatria	51.1	93.3	83.3
723.10.01	Alamo River/Calipatria	55.7	92.3	80.3
723.10.02	New River/Westmorland	55.9	95.3	96.0
723.10.28	Peach Drain	47.6	92.8	85.9
723.10.45	Fig Lake	55.4	89.3	94.3
723.10.45	Fig Lake	49.2	91.2	89.7
723.10.45	Fig Lake	65.6	103	97.7
723.10.92	Pumice Drain	45.5	86.4	77.6
728.00.92	Salton Sea/North	52.3	91.0	87.1
728.00.92	Salton Sea/North	52.1	88.2	82.6
801.11.07	San Diego Creek/Michelson Drive	58.3	89.8	81.2
801.11.07	San Diego Creek/Michelson Drive	53.5	90.2	80.3
801.11.96	Peters Canyon Channel	53.1	90.7	75.0
801.11.96	Peters Canyon Channel	49.1	94.1	78.9
801.25.00	Santa Ana River/Prado Dam	49.3	93.7	85.6
DBOB = 4,4'-dibromo-octafluorobiphenyl		DBCE = dibutylchloredate		
DCB = decachlorobiphenyl				

**Table 6 Continued**

Toxic Substances Monitoring Program  
Percent Recovery of Synthetic Organic Surrogate Compounds for 1997

Station Number	Station Name	DBOB	PCB 207	p,p' DDD*	DBCE
105.11.08	Klamath River/Klamath Glen	74.5	101	103	98.6
106.12.03	Trinity River/Willow Creek	67.9	99.6	103	90.3
108.10.00	Big Lagoon	74.1	109	108	92.8
111.12.01	Eel River/Scotia	79.0	113	110	101
114.11.05	Russian River/Duncans Mills	75.8	105	107	114
114.11.23	Russian River/Wohler Bridge	78.9	117	110	105
114.21.10	Laguna de Santa Rosa/Stony Pt.	74.0	106	111	116
114.23.00	Mark West Creek	73.4	107	101	95.8
114.24.17	Lake Sonoma/Up.Warm Spr Arm	79.2	116	103	120
114.24.12	Lake Sonoma	82.4	115	110	119
315.31.00	Devereaux Slough	77.0	104	102	114
403.11.02	Rio de Santa Clara/Ox. Drain	62.2	104	145	109
403.11.02	Rio de Santa Clara/Ox. Drain	62.5	103	147	111
403.11.04	Revolon Slough	66.8	105	Interference	97.7
403.11.91	Mugu Lagoon	68.7	105	103	107
403.12.06	Calleguas Creek	65.5	108	Interference	103
404.21.07	Malibou Lake	66.0	107	97.4	106
404.26.01	Sherwood Lake	85.7	141	131	155
405.23.08	Big Tujunga Wash	59.4	104	107	99.3
405.12.90	Harbor Park Lake	59.8	90.3	97.2	111
405.12.90	Harbor Park Lake	62.9	98.9	103	91.5
405.15.91	San Gabriel River/Coyote Creek	67.4	103	96.9	109
405.21.17	Lake Balboa	69.3	85.9	87.5	110
634.10.06	Saxon Cr below Meyrs Landfill	75.6	109	104	118
719.47.00	Coachella Val Stormwater Ch	80.6	113	102	114
723.10.01	Alamo River/Calipatria	85.7	116	160	102
723.10.02	New River/Westmorland	80.0	112	131	108
723.10.58	New River/Internat'l Bndry	79.3	110	111	98.7
728.00.90	Salton Sea/South	77.2	107	105	107
728.00.92	Salton Sea/North	75.5	107	108	91.6
801.11.99	Up. Newport Bay/Newport Dunes	82.1	108	107	113
801.11.89	Lower Newport Bay/Rhine Ch.	66.5	100	90.9	112
801.11.07	San Diego Creek/Michelson Drive	74.8	101	111	92.0
801.11.05	Delhi Channel	71.7	102	140	106
801.11.09	San Diego Crk/Barranca Prkway	62.4	103	87.2	69.6
801.11.96	Peters Canyon Channel	77.1	112	146	96.3
801.11.96	Peters Canyon Channel	73.5	109	129	89.2
801.11.96	Peters Canyon Channel	74.4	107	136	93.3
902.11.01	Santa Margarita Riv/Stuart Mesa Rd	78.5	112	116	106
906.40.01	Rose Crk/d/s Mission Bay Dr	80.5	110	113	108
906.40.01	Rose Crk/d/s Mission Bay Dr	85.4	119	104	106
907.11.03	San Diego River/u/s Taylor St	79.6	109	102	111
909.12.03	Sweetwater River/Hwy 805	75.4	106	104	96.0
910.20.05	Otay Riv/Apache Service Pond	80.6	107	105	118
911.11.04	Tijuana River/Dairy Mart Road	75.8	109	110	102

**Table 6 Continued**

Toxic Substances Monitoring Program  
Percent Recovery of Synthetic Organic Surrogate Compounds for 1998

Station Number	Station Name	DBOB	PCB 207	p,p' DDD*	DBCE
309.10.04	Old Salinas R/Monterey Dunes Way Brg	84.7	92.0	111.0	61.7
309.10.18	Salinas River/Mouth	72.7	82.3	89.8	63.2
309.10.93	Salinas River/Davis Road	73.2	82.5	76.9	67.8
309.10.95	Tembladero Sl/Castroville	77.1	87.0	97.7	83.6
402.20.12	Ventura River/Ojai	78.8	92.2	93.6	73.7
402.10.06	Ventura River/u/s OVSD Discharge	85.6	95.7	93.3	54.7
403.12.07	Conejo Creek	74.0	78.6	111.0	94.6
403.12.07	Conejo Creek	78.7	81.8	126	91.4
510.00.30	Sacramento River/Hood	66.9	73.4	75.2	81.1
510.00.30	Sacramento River/Hood	81.1	87.4	80.1	68.7
510.00.30	Sacramento River/Hood	85.8	92.2	78.2	55.5
510.00.30	Sacramento River/Hood	70.5	79.6	81.4	68.6
535.30.02	Tuolumne River/Shilo Road	71.4	78.1	79.0	47.4
535.30.02	Tuolumne River/Shilo Road	70.1	74.7	89.0	54.1
535.70.03	Merced Rvr/Hatfield St. Rec	68.4	76.8	80.1	66.1
535.70.03	Merced Rvr/Hatfield St. Rec	73.5	77.6	90.8	57.4
535.70.03	Merced Rvr/Hatfield St. Rec	75.0	76.6	98.3	62.2
535.70.03	Merced Rvr/Hatfield St. Rec	77.1	83.5	91.9	61.3
541.00.31	Old River/CV Pumps	85.3	93.0	97.5	83.7
541.10.90	San Joaquin River/Vernalis	80.1	87.1	90.9	66.8
541.10.90	San Joaquin River/Vernalis	80.5	93.0	96.0	54.7
541.10.92	San Joaquin River/Crows Land.	73.0	84.7	87.2	67.5
541.20.16	Mud Slough	86.0	92.0	100.0	55.1
634.10.02	Heavenly Valley Creek	76.5	81.7	89.3	75.1
715.40.08	Palo Verde Outfall Drain	79.3	90.0	86.7	83.9
723.10.01	Alamo River/Calipatria	73.5	87.3	92.1	70.4
723.10.02	New River/Westmorland	70.1	80.5	77.1	76.9
728.00.90	Salton Sea/South	77.4	87.5	86.0	77.9
728.00.92	Salton Sea/North	71.3	78.7	98.0	66.0
801.11.05	Delhi Channel	73.2	96.1	81.1	76.7
801.11.07	San Diego Cr/Michelson Drive	87.1	94.3	91.6	68.3
801.11.09	San Diego Cr/Barranca Parkway	83.5	92.3	101.0	75.1
801.11.99	Up. Newport Bay/Newport Dunes	65.4	81.4	93.7	71.2
902.22.02	Sandia Canyon Creek	79.8	90.1	88.0	74.5
907.11.09	San Diego Riv/d/s Alvarado Cr	77.6	87.8	89.9	85.4

**Table 6 Continued**

Toxic Substances Monitoring Program  
Percent Recovery of Synthetic Organic Surrogate Compounds for 1999

Station Number	Station Name	DBOB	PCB 207	p,p' DDD*	DBCE
111.63.14	Lake Pillsbury	71.8	104.0	96.1	75.0
111.63.12	Lake Pillsbury/Horsepasture Gulch	70.9	102.0	104.0	79.3
206.60.11	San Pablo Reservoir	64.3	87.6	89.1	56.8
206.60.11	San Pablo Reservoir	72.3	99.7	81.7	60.3
206.60.11	San Pablo Reservoir	72.3	101.0	97.3	76.0
206.60.11	San Pablo Reservoir	72.1	108.0	109.0	87.0
206.60.11	San Pablo Reservoir	73.3	117.0	86.6	95.4
206.60.11	San Pablo Reservoir	65.5	96.0	99.5	89.0
206.60.11	San Pablo Reservoir	67.8	105.0	94.0	64.8
206.60.11	San Pablo Reservoir	78.1	103.0	103.0	85.9
206.60.11	San Pablo Reservoir	66.4	92.7	96.5	55.0
206.60.11	San Pablo Reservoir	65.0	98.2	100.0	54.1
206.60.11	San Pablo Reservoir	70.6	93.0	100.0	65.7
305.10.90	Pajaro River/Pajaro	78.5	99.5	99.1	73.6
305.10.90	Pajaro River/Pajaro	77.1	99.5	81.1	76.8
309.10.00	Salinas River Lagoon	89.6	112.0	96.4	75.9
315.34.00	Carpinteria Marsh	66.4	78.3	69.3	58.3
402.10.06	Ventura River/u/s OVTP	66.5	90.1	84.5	52.2
402.10.05	Ventura River/d/s OVTP	93.4	100.0	92.6	99.8
403.11.00	Santa Clara River Estuary	76.2	96.0	86.2	63.2
403.12.06	Calleguas Creek	78.6	99.2	143.0	90.6
404.21.04	Malibu Creek/u/s Tapia Park	75.6	93.6	88.7	80.9
404.21.05	Malibu Creek/u/s Tapia Discharge	83.0	105.0	82.2	70.8
405.12.03	Los Angeles River	72.8	103.0	84.8	64.7
405.15.04	San Gabriel River	66.5	86.2	82.1	67.1
405.21.06	Los Angeles River/Los Feliz Road	83.3	114.0	95.2	56.0
634.10.00	Upper Truckee River/d/s Hwy 50	83.4	103.0	96.9	96.5
634.10.90	Tahoe Keys/Sailing Lagoon Marina	66.0	104.0	92.7	99.1
634.10.91	Tahoe Keys/Sailing Lagoon	67.8	104.0	96.0	106.0
637.20.25	Susan River/d/s Piute Creek	70.0	87.5	82.5	69.7
637.20.26	Gold Run Creek	79.8	105.0	83.2	56.1
637.20.31	Susan River/u/s Susanville	88.5	124.0	102.0	70.7
715.50.90	Colorado River/u/s Imperial Dam	62.1	96.2	92.9	83.7
723.10.02	New River/Westmorland	69.5	93.9	91.4	73.0
728.00.90	Salton Sea/South	74.3	94.4	83.2	64.2
801.11.05	Delhi Channel	68.9	92.1	86.2	73.7
801.11.07	San Diego Creek/Michelson Drive	77.1	104.0	92.9	55.0
801.11.07	San Diego Creek/Michelson Drive	79.7	107.0	86.0	53.6
801.11.09	San Diego Creek/Barranca Parkway	80.9	104.0	2.3	66.1
801.11.89	Lower Newport Bay/Rhine Channel	75.2	100.0	88.1	70.2
801.11.99	Upper Newport Bay/Newport Dunes	73.6	97.0	79.4	74.1
902.11.01	Santa Margarita River/Stuart Mesa Road	73.4	89.4	85.9	81.4
902.32.00	Murrietta Creek/u/s Temecula Creek	78.8	90.3	89.0	78.2
904.21.02	Buena Vista Lagoon	77.6	110.0	107.0	75.1
904.61.07	Escondido Creek/Elfin Forest Park	79.8	95.3	87.8	92.6
907.11.03	San Diego River/u/s Taylor Street	76.5	99.3	92.7	78.3



**Table 6 Continued**

Toxic Substances Monitoring Program  
Percent Recovery of Synthetic Organic Surrogate Compounds for  
1999 - Continued

Station Number	Station Name	DBOB	PCB 207	p,p' DDD*	DBCE
114.21.10	Laguna de Santa Rosa/Stony Point	59.9	71.3	90.2	89.0
114.23.00	Mark West Creek	72.5	84.7	81.7	79.2
206.60.11	San Pablo Reservoir	60.6	93.9	92.1	64.4
206.60.11	San Pablo Reservoir	66.5	106.0	94.4	62.8
304.10.00	Waddell Creek Lagoon	77.2	82.7	91.4	103.0
307.00.01	Carmel Lagoon	77.5	84.6	106.0	60.1
308.00.90	Big Sur River Lagoon	79.3	86.0	81.1	82.6
310.12.00	Arroyo de la Cruz	62.8	80.3	89.5	70.0
310.13.00	San Simeon Creek Lagoon	70.6	81.5	79.0	75.5
310.13.90	Pico Creek Lagoon	64.9	74.3	88.0	74.9
310.14.00	Santa Rosa Creek Lagoon	72.9	83.5	87.8	82.6
310.24.00	San Luis Obispo Creek Lagoon	65.9	80.9	63.5	69.4
310.31.00	Arroyo Grande Creek Lagoon	65.2	83.8	87.9	83.2
312.10.00	Santa Maria River/Mouth	65.0	85.4	93.5	86.6
314.10.00	Santa Ynez River Lagoon	71.8	91.2	97.7	86.5
403.64.03	Arroyo Conejo/d/s Forks	68.0	89.9	77.2	69.9
403.67.08	Arroyo Simi/Medara Road	80.1	104.0	81.6	35.7
404.21.07	Malibou Lake	55.6	73.1	75.8	60.1
404.25.01	Westlake Lake	60.9	84.3	90.5	98.9
405.52.01	Puddingstone Reservoir	64.3	77.4	84.2	84.9
601.00.94	Lee Vining Creek	63.6	75.3	95.4	84.2
634.10.92	Tallac Lagoon	57.2	71.6	94.6	85.2
635.20.11	Trout Creek/d/s Golf Course	81.6	105.0	100.0	92.2
715.40.08	Palo Verde Outfall Drain	69.4	92.8	92.2	71.3
719.47.00	Coachella Valley Stormwater Channel	71.5	86.5	91.6	67.1
723.10.12	Wiest Lake	68.0	105.0	96.9	101.0
723.10.21	Holtville Main Drain	63.6	77.8	92.9	57.3
723.10.30	Central Drain	63.1	82.3	66.5	55.5
723.10.31	South Central Drain	65.4	96.0	98.3	71.2
801.11.96	Peters Canyon Channel	70.3	88.7	110.0	112.0
801.11.96	Peters Canyon Channel	75.3	89.8	105.0	89.7
902.22.03	Rainbow Creek	58.2	82.6	80.3	85.9
904.10.06	Loma Alta Creek/College Blvd.	62.9	78.6	77.0	73.8
904.31.01	Agua Hedionda Creek/El Camino Real	57.4	76.8	77.7	66.2
904.51.03	San Marcos Creek	73.1	98.2	111.0	105.0

**Table 6 Continued**

Toxic Substances Monitoring Program  
Percent Recovery of Synthetic Organic Surrogate Compounds for 2000

Station Number	Station Name	DBOB	PCB 207	p,p' DDD*	DBCE
204.20.06	Lake Chabot/Alameda County	76.0	110	110	129
204.20.06	Lake Chabot/Alameda County	73.9	118	101	116
204.20.06	Lake Chabot/Alameda County	71.0	112	105	119
204.20.06	Lake Chabot/Alameda County	65.8	106	121	114
204.20.06	Lake Chabot/Alameda County	69.3	115	110	106
204.20.06	Lake Chabot/Alameda County	67.8	108	111	106
402.10.05	Ventura River/d/s OVTP	95.8	121	123	98.4
402.10.06	Ventura River/u/s OVSD Discharge	84.4	97.9	114	114
402.20.02	Casitas Lake	86.4	105	119	105
403.11.00	Santa Clara River Estuary	91.7	111	113	95.5
403.11.00	Santa Clara River Estuary	88.7	108	111	106
403.12.06	Calleguas Creek	84.5	105	104	84.1
403.64.03	Arroyo Conejo/d/s Forks	79.6	96.6	110	115
403.64.05	Arroyo Conejo/u/s HCTP	97.0	113	106	94.6
403.64.05	Arroyo Conejo/u/s HCTP	88.7	113	107	110
404.21.04	Malibu Creek/Tapia Park	86.5	100	109	110
404.21.05	Malibu Creek/u/s Tapia Discharge	83.3	103	117	99.8
404.21.07	Malibu Lake	79.7	103	118	106
405.15.04	San Gabriel River	94.4	115	109	110
405.21.06	Los Angeles River/Los Feliz Road	95.6	115	124	105
405.41.04	San Jose Creek	94.2	111	119	114
801.11.05	Delhi Channel	106	106	106	93
801.11.05	Delhi Channel	93.4	94.8	105	109
801.11.05	Delhi Channel	103	105	105	98.1
801.11.07	San Diego Cr/Michelson Drive	108	109	99.5	88.5
801.11.09	San Diego Creek/Barranca Parkway	100	98.7	98.1	104
801.11.96	Peters Canyon Channel	92.5	115	110	112
801.11.96	Peters Canyon Channel	91.2	93.8	104	93.6
801.11.99	Upper Newport Bay/Newport Dunes	106	106	101	91.9
801.71.07	Big Bear Lake/Dam	96.6	114	90.4	107
801.71.07	Big Bear Lake/Dam	99.8	101	111	124
801.71.10	Big Bear Lake	100	102	108	112
801.71.10	Big Bear Lake	98.7	102	92.2	96.4
801.71.12	Big Bear Lake/Rathbone Creek	98.1	102	90.8	106
801.71.12	Big Bear Lake/Rathbone Creek	98.5	102	102	110
802.31.00	Lake Elsinore	91.2	110	104	112
901.20.02	San Juan Creek/Camino Capistrano	115	116	99.8	103
901.20.02	San Juan Creek/Camino Capistrano	101	103	108	85.5
905.11.00	San Dieguito Lagoon	103	112	115	118
906.50.00	Tecolote Creek Estuary	114	115	113	102
907.11.00	Famosa Slough	97.3	108	85.7	117
908.22.01	Chollas Creek/Main Street	112	113	116	103
908.31.00	7 <sup>th</sup> Street Channel/Trolley Crossing	100	101	101	106
908.32.01	Paradise Creek Marsh	100	104	109	107
909.12.00	F-G Street Salt Marsh/Chula Vista	97.8	100	113	113
909.12.01	Sweetwater Marsh	102	106	103	107

**Table 6 Continued**

Toxic Substances Monitoring Program  
Percent Recovery of Synthetic Organic Surrogate Compounds for  
2000 - Continued

Station Number	Station Name	DBOB	PCB 207	p,p' DDD*	DBCE
114.21.04	Laguna de Santa Rosa/Occidental Pond	61.6	102	129	103
114.21.04	Laguna de Santa Rosa/Occidental Pond	63.4	102	128	111
114.21.04	Laguna de Santa Rosa/Occidental Pond	59.4	108	116	115
204.20.06	Lake Chabot/Alameda County	57.2	103	122	135
204.20.06	Lake Chabot/Alameda County	59.9	109	109	133
204.20.06	Lake Chabot/Alameda County	63.2	113	116	114
204.30.26	Del Valle Reservoir	72.0	113	110	116
204.30.26	Del Valle Reservoir	74.6	115	123	121
205.50.10	Stevens Creek Reservoir	72.3	109	113	110
205.50.10	Stevens Creek Reservoir	74.7	120	112	107
205.50.10	Stevens Creek Reservoir	72.9	117	112	101
313.00.00	San Antonio Creek Lagoon	76.0	118	105	111
314.10.00	Santa Ynez River Lagoon	75.2	118	112	97.1
314.52.04	Lake Cachuma/Santa Ynez Point	65.9	114	106	97.2
315.31.91	Atascadero Creek	70.3	117	108	104
315.32.01	Mission Creek/Highway 101	66.2	112	109	118
315.34.00	Carpinteria Marsh	74.0	115	97.8	101
545.20.90	San Joaquin River/Hwy 99	66.7	115	121	101
545.20.90	San Joaquin River/Hwy 99	66.3	116	113	99.5
545.20.90	San Joaquin River/Hwy 99	66.8	116	117	117
551.60.03	Kings River/Hwy 99	61.3	110	118	129
551.60.03	Kings River/Hwy 99	63.7	112	122	118
715.40.08	Palo Verde Outfall Drain	64.5	112	112	103
719.47.00	Coachella Valley Stormwater Channel	65.1	122	132	124
723.10.01	Alamo River/Calipatria	68.7	122	125	111
723.10.47	Alamo River/International Boundary	65.9	113	114	123
723.10.21	Holtville Main Drain	69.8	116	117	116
723.10.30	Central Drain	66.2	120	123	124
723.10.31	South Central Drain	72.8	121	138	130
723.10.32	Barbara Worth Drain	63.5	117	123	113
723.10.32	Barbara Worth Drain	59.0	113	133	107
723.10.48	Greeson Drain	57.9	114	107	116
728.00.90	Salton Sea/South	66.5	125	128	95.9
728.00.90	Salton Sea/South	63.0	115	116	93.0
728.00.90	Salton Sea/South	45.6	74.4	72.4	74.5

TABLE 7

Toxic Substances Monitoring Program  
Results of Matrix Spike Analyses: 1996 and 1997  
Synthetic Organic Compounds Fish Tissue

Station Name	1996		1997	
	Carson River/ E. F. Markleeville		Lake Sonoma/Upper Warm Springs Arm	
Station Number	632.10.12		114.24.17	
Compound	% Recovery		% Recovery	
	MS	MSD	MS	MSD
aldrin	62.5	66.1	64.0	56.7
chlordane, cis	82.6	72.6	81.1	78.0
chlordane, trans	84.8	83.8	81.7	78.8
chlordene, alpha	66.2	73.0	71.4	62.2
chlordene, gamma	67.1	75.0	76.4	65.3
chlorpyrifos	52.9	66.3	63.6	60.6
dacthal	51.3	56.2	71.8	71.3
DCBP, p,p'	110	110	NA	NA
DDD, o,p'	93.0	98.1	103	99.4
DDD, p,p'	97.6	96.5	103	98.5
DDE, o,p'	76.6	82.6	83.7	68.1
DDE, p,p'	76.6	81.0	89.5	73.6
DDMU, p,p'	72.2	81.4	86.2	80.0
DDT, o,p'	80.9	86.3	93.8	79.7
DDT, p,p'	89.8	85.8	104	99.5
diazinon	45.1	39.2	45.3	41.8
dieldrin	86.6	94.5	83.7	81.4
endosulfan I	71.9	72.4	86.1	82.1
endosulfan II	100	102	NA	NA
endosulfan sulfate	91.7	83.4	NA	NA
endrin	82.8	91.4	68.7	69.5
ethion	63.2	69.4	48.7	48.8
HCH, alpha	56.4	62.0	57.2	51.8
HCH, beta	64.2	66.7	65.8	64.1
HCH, delta	86.0	91.0	70.3	69.1
HCH, gamma	64.9	66.1	70.3	67.6
heptachlor	55.0	66.4	52.4	48.4
heptachlor epoxide	84.8	85.6	95.4	91.1
hexachlorobenzene	62.3	66.4	68.3	59.4
methoxychlor	102	110	107	102
nonachlor, cis	94.3	98.5	91.7	88.2
nonachlor, trans	78.1	83.3	87.5	70.7
oxadiazon	68.3	78.0	86.1	88.5
oxychlordane	73.9	75.6	85.8	81.0
parathion, ethyl	50.6	51.2	42.5	40.4
parathion, methyl	40.4	40.1	38.3	40.2
tedion	95.1	99.6	130	130

**TABLE 7 Continued**  
 Toxic Substances Monitoring Program  
 Results of Matrix Spike Analyses: 1998 Synthetic Organic Compounds - Fish Tissue

Station Name	Sacramento River /Hood		American River Trout Hatchery		American River Trout Hatchery		American River Trout Hatchery	
Station Number	510.00.30							
Compound	% Recovery		% Recovery		% Recovery		% Recovery	
	MS	MSD	MS	MSD	MS	MSD	MS	MSD
aldrin	108	105	111	121	121	121	130	125
chlordan, cis	81.1	77.0	94.8	89.8	103	104	99.7	98.7
chlordan, trans	93.6	95.6	92.6	98.5	97.0	97.8	97.3	95.5
chlordan, alpha	88.5	91.3	83.4	92.0	96.3	99.5	103	98.8
chlordan, gamma	85.9	87.9	93.0	102	94.3	96.9	103	98.2
chlorpyrifos	70.6	70.4	82.7	75.8	75.7	78.1	85.3	83.3
dacthal	*	*	*	*	*	*	*	*
DCBP, p,p'	108	102	78.3	90.2	58.8	55.0	51.6	49.4
DDD, o,p'	112	108	99.2	103	103	102	102	102
DDD, p,p'	122	116	100	98.7	92.7	94.6	92.5	93.7
DDE, o,p'	101	101	93.5	102	102	104	107	104
DDE, p,p'	*	*	91.4	98.6	100	114	116	112
DDMU, p,p'	96.5	99.6	94.9	96.1	99.7	101	103	104
DDT, o,p'	92.7	102	105	106	107	105	106	107
DDT, p,p'	67.6	83.0	96.1	95.3	96.3	96.1	95.1	99.2
diazinon	56.9	49.0	40.9	47.1	25.8	37.8	39.6	43.6
dieldrin	115	117	*	*	*	*	95.5	110
endosulfan I	84.4	76.7	101	127	83.6	81.4	103	92.7
endosulfan II	52.0	53.9	66.7	59.1	55.5	54.8	66.5	59.9
endosulfan sulfate	55.5	81.6	79.9	80.0	75.2	69.7	75.2	96.7
endrin	123	123	83.6	82.4	114	113	82.9	112
ethion	50.8	40.4	66.1	52.8	132	114	83.4	61.7
HCH, alpha	80.9	80.8	73.9	81.2	82.9	81.0	80.6	80.4
HCH, beta	70.3	70.4	63.9	65.3	71.5	69.9	68.9	68.7
HCH, delta	**	**	**	**	**	**	**	**
HCH, gamma	95.4	98.0	89.7	97.1	104	100	100	98.8
heptachlor	55.6	64.1	32.9	19.8	64.1	72.7	85.2	83.9
heptachlor epoxide	92.9	86.4	87.4	93.8	83.7	83.2	83.5	89.1
hexachlorobenzene	92.2	93.0	91.4	105	9639	9632	109	108
methoxychlor	95.2	102	99.1	93.9	102	85.4	94.3	99.3
nonachlor, cis	90.9	97.6	97.9	98.8	99.7	97.6	97.2	98.1
nonachlor, trans	100	109	90.6	97.3	96.2	101	105	107
oxadiazon	*	*	122	98.9	105	106	77.2	89.6
oxychlordan	95.1	95.5	98.0	104	102	102	102	103
parathion, ethyl	55.4	49.1	121	96.3	78.5	65.1	59.0	60.3
parathion, methyl	63.7	75.1	69.5	59.0	68.4	76.7	58.1	73.4
tedion	98.2	120	84.9	55.8	107	109	94.2	96.8

\* % recovery was not calculated due to a high concentration of target analyte in the unspiked sample. \*\* Not recovered

**TABLE 7 Continued**  
 Toxic Substances Monitoring Program  
 Results of Matrix Spike Analyses: 1999 Synthetic Organic Compounds - Fish Tissue

Station Name	Lake Pillsbury/ Horsepasture Gulch		Lower Newport/ Rhine Channel		Holtville Main Drain		Gold Run Creek	
Station Number	111.63.12		801.11.89		723.10.21		637.20.26	
	% Recovery		% Recovery		% Recovery		% Recovery	
Compound	MS	MSD	MS	MSD	MS	MSD	MS	MSD
aldrin	122	105	121	128	114	118	97.7	106
chlordane, cis	99.8	99.9	99.0	96.2	*	*	102	104
chlordane, trans	83.9	81.5	93.5	89.7	83.9	81.5	103	104
chlordene, alpha	95.9	78.6	87.2	90.7	108	109	70.9	77.4
chlordene, gamma	92.2	94.9	92.5	85.9	112	113	59.6	66.6
chlorpyrifos	68.1	60.8	61.0	62.1	104	99.9	42.1	47.5
dacthal	93.2	98.9	92.0	92.5	*	*	128	170
DCBP, p,p'	84.3	88.6	85.4	80.0	61.8	58.1	99.1	112
DDD, o,p'	97.9	98.7	97.7	96.4	111	108	105	106
DDD, p,p'	98.2	99.2	102	104	103	79.5	115	118
DDE, o,p'	87.4	92.3	88.8	82.3	134	120	85.8	93.9
DDE, p,p'	106	96.1	*	*	*	*	96.3	102
DDMU, p,p'	94.4	92.5	93.0	94.0	111	105	99.2	99.9
DDT, o,p'	82.9	85.3	91.2	94.5	118	111	83.5	90.2
DDT, p,p'	99.7	97.9	94.9	95.7	135	117	89.3	87.4
diazinon	54.5	55.4	67.1	64.7	95.8	88.1	101	133
dieldrin	105	106	100	98.8	*	*	146	170
endosulfan I	79.2	88.7	85.8	77.9	*	*	126	148
endrin	93.9	109	104	102	*	*	143	168
ethion	56.9	74.5	10.7	44.1	78.3	72.7	120	123
HCH, alpha	85.3	85.5	87.3	83.8	99.2	102	90.3	92.1
HCH, beta	67.1	67.4	67.3	65.3	72.7	74.8	71.6	72.3
HCH, delta	**	**	**	**	32.6	36.3	**	**
HCH, gamma	101	102	103	98.1	110	112	104	106
heptachlor	52.1	35.3	54.2	42.2	114	94.8	**	**
heptachlor epoxide	87.7	84.8	89.6	84.2	88.2	87.5	62.6	67.6
hexachlorobenzene	106	103	108	109	91.8	84.4	102	100
methoxychlor	105	103	95.0	100	116	116	93.3	92.4
nonachlor, cis	95.5	95.9	95.4	95.9	83.2	78.6	98.0	98.9
nonachlor, trans	99.2	94.0	95.6	98.4	134	122	99.2	101
oxadiazon	80.6	78.6	77.8	73.2	115	111	127	150
oxychlordane	96.7	97.6	96.6	96.6	106	108	99.0	103
parathion, ethyl	55.1	55.4	57.8	59.8	84.7	83.4	97.6	126
parathion, methyl	69.4	72.0	62.1	61.2	87.3	84.0	111	120
tedion	92.1	95.1	92.2	91.4	72.3	81.2	86.7	99.3

\* % recovery was not calculated due to a high concentration of target analyte in the unspiked sample.

\*\* Not recovered

**TABLE 7 Continued**  
 Toxic Substances Monitoring Program  
 Results of Matrix Spike Analyses: 2000 Synthetic Organic Compounds - Fish Tissue

Compound	Big Bear Lake/Dam		Lake Chabot/ Alameda County		Lake Chabot/ Alameda County		San Joaquin River/Hwy 99	
	801.71.07		204.20.06		204.20.06		204.20.90	
	% Recovery		% Recovery		% Recovery		% Recovery	
	MS	MSD	MS	MSD	MS	MSD	MS	MSD
aldrin	114	114	105	103	98.4	98.0	111	114
chlordane, cis	96.4	98.3	42.4	111	98.6	89.8	92.4	96.0
chlordane, trans	96.9	98.6	95.6	126	109	100	99.2	103
chlordene, alpha	86.5	87.3	84.4	86.5	83.6	84.2	86.1	93.3
chlordene, gamma	79.7	79.1	91.7	88.4	87.1	85.9	98.3	96.6
chlorpyrifos	53.8	54.9	57.9	69.6	62.8	63.4	52.9	54.0
dacthal	78.6	75.0	80.1	80.6	77.3	82.4	89.9	86.1
DCBP, p,p'	83.7	91.9	82.7	85.4	84.0	91.8	98.6	94.9
DDD, o,p'	95.3	97.9	93.2	113	109	104	97.1	99.7
DDD, p,p'	102	104	92.5	130	103	89.8	97.9	101
DDE, o,p'	76.8	77.2	94.0	90.7	90.2	89.0	95.9	98.5
DDE, p,p'	106	107	*	*	101	90.3	*	*
DDMU, p,p'	96.1	97.2	92.0	91.3	112	111	102	106
DDT, o,p'	64.9	66.8	103	102	89.4	90.2	90.3	97.2
DDT, p,p'	92.3	96.6	83.3	88.0	95.3	92.6	90.5	97.6
diazinon	62.2	60.5	50.9	57.3	45.2	51.8	60.7	59.0
dielddrin	88.2	86.1	108	103	80.7	94.7	88.3	87.3
endosulfan I	83.5	80.5	56.0	63.7	55.6	67.2	75.5	82.3
endrin	89.3	87.5	83.0	82.6	79.9	87.0	90.7	91.0
ethion	60.4	56.7	24.0	35.1	37.1	35.4	23.7	27.0
HCH, alpha	108	107	84.7	94.9	97.5	91.4	84.3	89.5
HCH, beta	96.9	97.2	92.6	105	102	99.0	91.2	94.0
HCH, delta	**	**	**	**	**	**	**	**
HCH, gamma	92.1	91.0	71.1	80.8	84.0	81.2	74.7	77.5
heptachlor	23.1	25.6	18.1	41.6	40.9	41.0	25.0	36.6
heptachlor epoxide	95.8	98.3	106	95.9	83.2	83.5	86.0	88.6
hexachlorobenzene	91.9	93.6	149	149	135	138	161	162
methoxychlor	102	104	85.6	90.6	104	101	94.6	96.6
nonachlor, cis	96.1	97.3	98.9	143	108	94.8	99.8	104
nonachlor, trans	92.5	93.6	107	93.6	89.9	84.2	98.4	108
oxadiazon	88.0	87.7	84.7	81.1	77.1	84.3	90.0	86.9
oxychlordane	95.8	97.4	95.0	111	108	101	102	108
parathion, ethyl	58.0	55.9	60.6	61.5	53.8	58.6	59.7	59.3
parathion, methyl	67.4	65.2	72.9	70.2	65.1	73.0	62.1	60.4
tedion	94.5	91.5	94.8	95.0	92.5	101	93.7	101

\* % recovery was not calculated due to a high concentration of target analyte in the unspiked sample.

\*\* Not recovered

TABLE 8

Toxic Substances Monitoring Program  
Results of Laboratory Control Spike (LCS) Analyses: 1998 Synthetic Organic Compounds

Compound	LCS Bench Sheet 61 % Recovery	LCS Bench Sheet 62 % Recovery	LCS Bench Sheet 63 % Recovery	LCS Bench Sheet 64 % Recovery
aldrin	96.1	90.1	121	113
chlordane, cis	97.7	96.6	104	95.4
chlordane, trans	95.7	93.3	97.2	92.6
chlordene, alpha	91.8	73.6	96.8	91.5
chlordene, gamma	90.8	93.8	97.1	90.2
chlorpyrifos	48.1	65.7	70.8	68.9
dacthal	71.6	96.8	96.7	97.8
DCBP, p,p'	98.4	73.3	67.9	70.0
DDD, o,p'	99.9	99.2	102	99.6
DDD, p,p'	103	102	94.1	100
DDE, o,p'	100	91.5	104	100
DDE, p,p'	112	99.0	112	107
DDMU, p,p'	91.7	93.3	97.0	97.4
DDT, o,p'	103	102	105	102
DDT, p,p'	97.7	95.3	94.6	94.9
diazinon	43.7	70.2	23.2	55.6
dieldrin	83.5	96.4	90.4	91.7
endosulfan I	72.3	87.4	86.2	86.9
endosulfan II	96.8	108	99.8	99.7
endosulfan sulfate	87.1	102	84.4	84.6
endrin	87.1	104	94.1	98.7
ethion	15.1	126	119	35.6
HCH, alpha	76.4	72.8	78.9	77.7
HCH, beta	65.2	64.0	69.8	66.9
HCH, delta	*	25.7	30.8	11.4
HCH, gamma	93.4	90.6	98.8	94.9
heptachlor	37.6	13.5	68.6	73.9
heptachlor epoxide	90.2	86.1	83.0	89.8
hexachlorobenzene	98.5	93.2	95.0	110
methoxychlor	104	106	92.5	98.2
nonachlor, cis	97.4	97.4	98.5	96.3
nonachlor, trans	97.0	90.4	100	98.0
oxadiazon	82.7	99.4	94.1	96.9
oxychlordane	95.7	94.4	98.9	98.7
parathion, ethyl	42.6	74.0	57.5	65.3
parathion, methyl	51.0	76.9	55.2	68.6
tedion	106	112	97.1	105

\* Not recovered



**TABLE 8 Continued**

Toxic Substances Monitoring Program					
Results of Laboratory Control Spike (LCS) Analyses: 1999 Synthetic Organic Compounds					
Compound	LCS BS 98 % Recovery	LCS BS 99 % Recovery	LCS BS 100 % Recovery	LCS BS 109 % Recovery	LCS BS 120 % Recovery
aldrin	99.6	100	127	94.9	110
chlordane, cis	101	95.8	92.9	96.8	105
chlordane, trans	98.4	95.2	86.3	96.2	106
chlordene, alpha	80.9	84.6	110	76.9	70.2
chlordene, gamma	91.2	87.8	115	71.2	105
chlorpyrifos	57.0	59.3	77.3	74.3	20.0
dacthal	98.4	91.0	111	91.0	104
DCBP, p,p'	85.6	80.9	58.9	80.4	95.0
DDD, o,p'	100	98.5	97.5	97.0	108
DDD, p,p'	99.0	98.0	103	107	117
DDE, o,p'	120	89.0	121	76.0	95.2
DDE, p,p'	96.0	102	122	98.5	107
DDMU, p,p'	92.3	90.5	95.5	86.3	97.3
DDT, o,p'	112	89.5	110	71.0	86.6
DDT, p,p'	101	95.2	110	90.5	87.5
diazinon	66.7	51.5	54.7	60.5	75.3
dieldrin	95.4	93.2	85.8	96.6	109
endosulfan I	82.7	71.4	12.8	81.6	91.5
endrin	99.2	91.8	56.4	110	114
ethion	61.2	34.8	48.6	54.4	118
HCH, alpha	87.4	78.6	98.0	78.2	90.4
HCH, beta	68.8	65.5	67.9	67.1	73.2
HCH, delta	*	*	*	*	*
HCH, gamma	103	94.0	98.0	94.8	106
heptachlor	18.8	49.9	113	53.9	1.9
heptachlor epoxide	93.8	82.6	82.0	87.1	20.4
hexachlorobenzene	101	106	90.0	123	118
methoxychlor	106	102	106	102	94.4
nonachlor, cis	97.5	95.0	85.7	92.3	100
nonachlor, trans	92.4	95.7	119	88.3	102
oxadiazon	94.7	91.3	96.7	94.7	105
oxychlordane	98.5	93.3	95.1	92.6	100
parathion, ethyl	54.5	49.6	65.0	46.2	68.5
parathion, methyl	53.7	50.5	65.7	46.1	63.5
tedion	94.2	96.1	101	93.0	98.2

\* Not recovered

**TABLE 8 Continued**

Toxic Substances Monitoring Program					
Results of Laboratory Control Spike (LCS) Analyses: 2000 Synthetic Organic Compounds					
Compound	LCS BS 145 % Recovery	LCS BS 165 % Recovery	LCS BS 166 % Recovery	LCS BS 164 % Recovery	LCS BS 174 % Recovery
aldrin	110	107	104	108	116
chlordane, cis	95.7	88.9	91.2	90.7	102
chlordane, trans	95.7	98.6	100	96.8	105
chlordene, alpha	84.9	89.2	86.2	83.5	88.6
chlordene, gamma	76.4	91.2	90.2	86.9	94.1
chlorpyrifos	54.6	57.7	52.2	45.6	46.1
dacthal	81.5	93.0	90.6	88.7	103
DCBP, p,p'	98.8	101	96.4	98.8	108
DDD, o,p'	96.1	97.2	96.1	97.2	103
DDD, p,p'	102	95.8	93.9	93.6	100
DDE, o,p'	76.8	94.0	92.4	82.0	82.1
DDE, p,p'	103	106	107	112	121
DDMU, p,p'	95.0	99.9	100	101	109
DDT, o,p'	92.8	92.3	92.8	89.4	83.9
DDT, p,p'	92.5	94.4	92.6	92.1	94.1
diazinon	61.3	48.0	53.5	65.2	61.1
dieldrin	91.4	85.7	83.9	82.0	90.9
endosulfan I	80.3	67.2	64.0	74.9	80.6
endrin	92.2	85.0	81.0	80.4	93.0
ethion	57.6	29.5	19.9	39.1	49.3
HCH, alpha	104	89.6	84.6	83.1	87.8
HCH, beta	95.4	93.1	91.4	90.1	101
HCH, delta	*	*	*	*	*
HCH, gamma	89.0	76.3	74.0	70.2	78.6
heptachlor	24.4	50.5	37.1	22.7	14.2
heptachlor epoxide	95.3	90.6	87.0	93.4	95.4
hexachlorobenzene	86.1	137	149	143	90.6
methoxychlor	104	100	95.9	96.2	98.0
nonachlor, cis	95.5	95.3	96.9	93.1	101
nonachlor, trans	91.9	92.4	89.6	89.5	97.5
oxadiazon	93.5	88.2	85.8	84.2	91.5
oxychlordane	94.2	94.8	97.9	93.8	102
parathion, ethyl	48.2	50.4	47.8	54.5	60.6
parathion, methyl	57.0	54.1	48.8	55.5	64.4
tedion	91.5	95.4	90.1	92.0	90.3

\* Not recovered

**TABLE 9**

Toxic Substances Monitoring Program  
Results of Field Replicate Sample Analysis  
1996 Synthetic Organic Compounds Quality Control - Fish Tissue  
(ng/g wet weight)

Station Name	San Diego Creek/ Michelson Drive		Salton Sea/ North		Hill Slough u/s/ McCoy Ditch	
Station Number	801.11.07		728.00.92		207.23.15	
REPLICATE	1	2	1	2	1	2
<u>Compound</u>						
aldrin						
chlordane, cis	7.43	8.54				
chlordane, trans						
chlordene, alpha						
chlordene, gamma						
chlorpyrifos	16.0	18.9				
dacthal	49.8	49.3				
DDD, o,p'						
DDD, p,p'	48.1	55.4				
DDE, o,p'						
DDE, p,p'	295	327	18.5	12.1	36.5	35.6
DDMU, p,p'						
DDT, o,p'						
DDT, p,p'						
diazinon						
dieldrin	11.8	11.1				
endosulfan I						
endosulfan II						
endosulfan sulfate						
endrin						
ethion						
HCH, alpha						
HCH, beta						
HCH, delta						
HCH, gamma						
heptachlor						
heptachlor epoxide						
hexachlorobenzene						
methoxychlor						
nonachlor, cis	4.74	5.69				
nonachlor, trans	9.45	10.9				
oxadiazon	105	110			7.80	8.56
oxychlordane						
parathion, ethyl						
parathion, methyl						
tedion						
toxaphene	160	195				
PCB 1254	99.9	110				
Percent moisture	71.2	71.6	78.2	77.3	78.0	79.1
Percent lipid	7.44	7.35	0.425	0.785	0.560	0.448

**TABLE 9 Continued**

Toxic Substances Monitoring Program  
Results of Field Replicate Sample Analysis  
1997 Synthetic Organic Compounds Quality Control  
Fish Tissue  
(ng/g wet weight)

Station Name	Peters Canyon Channel		Rose Creek/d/s Mission Bay Dr	
Station Number	801.11.96		906.40.01	
REPLICATE	1	2	1	2
<b>Compound</b>				
aldrin				
chlordane, cis	9.37	10.8		
chlordane, trans	5.91	6.94		
chlordene, alpha				
chlordene, gamma				
chlorpyrifos	70.6	83.3		
dacthal				
DDD, o,p'				
DDD, p,p'	46.5	53.9		
DDE, o,p'				
DDE, p,p'	745	794	8.73	8.61
DDMU, p,p'	35.4	36.8		
DDT, o,p'	21.6	24.2		
DDT, p,p'	38.0	52.0		
diazinon				
dieldrin	9.57	11.1	5.79	5.83
endosulfan I				
endosulfan II				
endosulfan sulfate				
endrin				
ethion				
HCH, alpha				
HCH, beta				
HCH, delta				
HCH, gamma				
heptachlor				
heptachlor epoxide				
hexachlorobenzene				
methoxychlor	11.6	13.5		
nonachlor, cis	4.36	4.97		
nonachlor, trans	11.4	12.9	11.2	11.2
oxadiazon	41.7	48.4	68.0	67.2
oxychlordane			5.53	5.17
parathion, ethyl				
parathion, methyl				
tedion				
toxaphene				
Percent moisture	75.0	75.1	77.4	77.2
Percent lipid	lost	4.29	3.14	3.17

**TABLE 9 Continued**

Toxic Substances Monitoring Program  
Results of Field Replicate Sample Analysis  
1998 Synthetic Organic Compounds Quality Control  
Fish Tissue  
(ng/g wet weight)

Station Name	DeLuz Creek		Conejo Creek	
Station Number	902.21.01		403.12.07	
REPLICATE	1	2	1	2
<u>Compound</u>				
aldrin				
chlordane, cis			3.87	4.75
chlordane, trans			2.70	3.14
chlordene, alpha				
chlordene, gamma				
chlorpyrifos			4.18	4.19
dacthal			11.6	11.4
DCBP, p,p'				
DDD, o,p'			8.32	8.12
DDD, p,p'			34.6	33.9
DDE, o,p'			9.67	10.2
DDE, p,p'	2.59	2.80	844	932
DDMU, p,p'				
DDT, o,p'				
DDT, p,p'			94.0	100
diazinon				
dieldrin			16.4	17.2
endosulfan I				
endosulfan II				
endosulfan sulfate				
endrin				
ethion				
HCH, alpha				
HCH, beta				
HCH, delta				
HCH, gamma			3.97	3.99
heptachlor				
heptachlor epoxide			1.05	1.10
hexachlorobenzene			0.661	0.749
methoxychlor				
nonachlor, cis			6.30	1.09
nonachlor, trans			19.3	21.1
oxadiazon			4.92	5.20
oxychlordane			9.90	10.5
parathion, ethyl				
parathion, methyl				
tedion				
toxaphene			819	874
PCB 1254			20.3	22.0
Percent moisture	81.5	79.9	74.7	74.8
Percent lipid	0.492	0.562	4.41	4.53

**TABLE 9 Continued**

Toxic Substances Monitoring Program  
Results of Field Replicate Sample Analysis  
1999 Synthetic Organic Compounds Quality Control - Fish Tissue  
(ng/g wet weight)

Station Name	Pajaro River/ Pajaro		Peters Canyon Channel Michelson Dr.		San Diego Cr/ Channel	
Station Number	305.10.90		801.11.96		801.11.07	
REPLICATE	1	2	1	2	1	2
Compound						
aldrin						
chlordane, cis			3.34	3.23	3.72	4.91
chlordane, trans			2.85	2.60	2.89	3.58
chlordene, alpha						
chlordene, gamma						
chlorpyrifos			5.15	4.16	2.93	3.37
dacthal	2.89	3.07				
DDD, o,p'	3.43	3.28	5.82	5.82	2.10	2.66
DDD, p,p'	14.8	14.7	25.8	24.4	18.4	21.6
DDE, o,p'			2.82	2.67		
DDE, p,p'	100	97.4	516	503	116	126
DDMU, p,p'	7.32	7.24	11.4	10.9	5.55	6.41
DDT, o,p'			3.07	2.28		
DDT, p,p'						
Diazinon					58.3	61.1
dieldrin	15.2	15.0	3.42	3.33	5.38	6.41
endosulfan I						
endosulfan II						
endosulfan sulfat						
endrin						
ethion						
HCH, alpha						
HCH, beta						
HCH, delta						
HCH, gamma						
heptachlor						
heptachlor epoxide						
hexachlorobenzene	0.359	0.366	0.614	0.579	1.12	1.26
methoxychlor						
nonachlor, cis			3.20	2.90	2.21	2.45
nonachlor, trans	2.5	2.4	9.75	9.09	5.24	6.11
oxadiazon	4.88	2.57	62.7	59.6	130	164
oxychlordane	1.23	1.21	1.54	1.43	2.34	2.86
parathion, ethyl	4.65	3.05				
parathion, methyl						
tedion						
toxaphene	61.2	61.2	80.5	72.0	54.1	67.0
PCB 1254						
Percent moisture	77.7	78.2	78.4	78.6	76.0	76.0
Percent lipid	3.87	3.74	2.37	2.40	5.52	6.55

**TABLE 9 Continued**

Toxic Substances Monitoring Program  
Results of Field Replicate Sample Analysis  
2000 Synthetic Organic Compounds Quality Control - Fish Tissue  
(ng/g wet weight)

Station Name	Santa Clara River Estuary		Salton Sea/South		Barbara Worth Drain	
Station Number	403.11.00		728.00.90		723.10.32	
REPLICATE	1	2	1	2	1	2
<u>Compound</u>						
aldrin						
chlordane, cis					2.54	<2.0
chlordane, trans					2.16	2.03
chlordene, alpha						
chlordene, gamma						
chlorpyrifos						
dacthal					2.74	2.51
DDD, o,p'					8.38	7.28
DDD, p,p'					27.1	24.3
DDE, o,p'					18.3	17.4
DDE, p,p'	17.0	18.3	12.3	18.1	2000	1800
DDMU, p,p'					15.4	14.4
DDT, o,p'					4.08	3.98
DDT, p,p'					36.0	37.3
diazinon						
dieldrin					64.7	63.0
endosulfan I						
endosulfan						
endosulfan sulfate						
endrin						
ethion						
HCH, alpha						
HCH, beta						
HCH, delta						
HCH, gamma						
heptachlor						
heptachlor epoxide						
hexachlorobenzene					0.312	<0.3
methoxychlor						
nonachlor, cis					8.06	7.41
nonachlor, trans					30.6	28.2
oxadiazon						
oxychlordane					11.6	10.6
parathion, ethyl						
parathion, methyl						
tedion						
toxaphene	24.9	27.9			517	443
PCB 1254						
Percent moisture	78.3	78.4	77.4	77.1	75.8	76.4
Percent lipid	6.71	5.54	0.669	1.04	3.10	3.01

**TABLE 10**

Toxic Substances Monitoring Program  
Results of Duplicate Sample Analysis  
1996 Synthetic Organic Compounds Quality Control  
Fish Tissue  
(ng/g wet weight)

Station Name	Alamo River/ Calipatria		Peters Canyon Channel	
Station Number	723.10.01		801.11.96	
REPLICATE	1	2	1	2
<u>Compound</u>				
aldrin				
chlordane, cis			14.7	12.7
chlordane, trans			5.22	4.55
chlordene, alpha				
chlordene, gamma				
chlorpyrifos	65.6	62.3	63.2	57.2
dacthal	1100	1100	31.4	30.4
DDD, o,p'	19.8	23.0		
DDD, p,p'	47.2	49.6	50.8	44.3
DDE, o,p'	9.86	10.8		
DDE, p,p'	1770	1830	430	390
DDMU, p,p'	19.8	21.8		
DDT, o,p'				
DDT, p,p'	20.0	22.7	20.7	19.9
diazinon				
dieldrin	18.8	19.4	18.3	17.3
endosulfan I	45.4	48.9		
endosulfan II				
endosulfan sulfate				
endrin				
ethion				
HCH, alpha				
HCH, beta				
HCH, delta				
HCH, gamma				
heptachlor				
heptachlor epoxide				
hexachlorobenzene				
methoxychlor				
nonachlor, cis			6.01	6.22
nonachlor, trans	5.75	6.76	13.5	12.1
oxadiazon			54.3	51.5
oxychlordane				
parathion, ethyl				
parathion, methyl				
tedion				
toxaphene	730	790	350	340
PCB 1254				
Percent moisture	79.0	79.8	74.2	73.7
Percent lipid	1.17	1.11	7.42	6.62



**TABLE 10 Continued**

Toxic Substances Monitoring Program  
Results of Duplicate Sample Analysis  
1997 Synthetic Organic Compounds Quality Control  
Fish Tissue  
(ng/g wet weight)

Station Name	Peters Canyon Channel		New River/ Westmorland	
Station Number	801.11.96		723.10.02	
REPLICATE	1	2	1	2
<u>Compound</u>				
aldrin				
chlordane, cis	9.37	9.74	8.61	7.26
chlordane, trans	5.91	5.97	6.66	5.59
chlordene, alpha				
chlordene, gamma				
chlorpyrifos	70.5	76.9	62.5	56.4
dacthal				
DDD, o,p'				
DDD, p,p'	46.5	47.6	31.9	30.0
DDE, o,p'				
DDE, p,p'	745	803	453	433
DDMU, p,p'	35.4	37.4	12.0	11.0
DDT, o,p'	21.6	21.8		
DDT, p,p'	38.0	35.8		
diazinon				
dieldrin	9.57	10.0	16.7	16.9
endosulfan I			8.01	12.3
endosulfan II				
endosulfan sulfate				
endrin				
ethion				
HCH, alpha				
HCH, beta				
HCH, delta				
HCH, gamma				
heptachlor				
heptachlor epoxide				
hexachlorobenzene			3.84	3.80
methoxychlor	11.6	11.9		
nonachlor, cis				
nonachlor, trans	11.4	11.7	9.0	9.0
oxadiazon	41.7	44.4		
oxychlordane				
parathion, ethyl				
parathion, methyl				
tedion				
toxaphene				
PCB 1254				
Percent moisture	75.0	75.6	79.2	79.6

**TABLE 10 Continued**

Toxic Substances Monitoring Program  
Results of Duplicate Sample Analysis  
1997 Synthetic Organic Compounds Quality Control  
Fish Tissue  
(ng/g wet weight)

Station Name	Harbor Park Lake		Russian River/ Duncans Mills	
Station Number	405.12.90		114.11.05	
REPLICATE	1	2	1	2
Compound				
aldrin				
chlordan, cis				
chlordan, trans				
chlordene, alpha				
chlordene, gamma				
chlorpyrifos				
dacthal				
DDD, o,p'				
DDD, p,p'				
DDE, o,p'				
DDE, p,p'	14.4	14.3	4.95	5.43
DDMU, p,p'				
DDT, o,p'				
DDT, p,p'				
diazinon				
dielrin				
endosulfan I				
endosulfan II				
endosulfan sulfate				
endrin				
ethion				
HCH, alpha				
HCH, beta				
HCH, delta				
HCH, gamma				
heptachlor				
heptachlor epoxide				
hexachlorobenzene				
methoxychlor				
nonachlor, cis				
nonachlor, trans	6.33	6.38		
oxadiazon				
oxychlordan				
parathion, ethyl				
parathion, methyl				
tedion				
toxaphene				
PCB 1254				
Percent moisture	78.3	78.9	79.7	79.7
Percent lipid	0.665	0.618	0.582	0.941

**TABLE 10 Continued**

Toxic Substances Monitoring Program  
Results of Duplicate Sample Analysis  
1998 Synthetic Organic Compounds Quality Control  
Fish Tissue  
(ng/g wet weight)

Station Name	Tuolumne River/ Shilo Road		Merced River/ Hatfield St.	
Station Number	535.30.02		535.70.03	
REPLICATE	1	2	1	2
<u>Compound</u>				
aldrin				
chlordane, cis				
chlordane, trans				
chlordene, alpha				
chlordene, gamma				
chlorpyrifos			7.70	9.64
dacthal			3.05	8.61
DCBP, p,p'			15.8	13.1
DDD, o,p'			4.20	4.21
DDD, p,p'			19.8	19.1
DDE, o,p'			3.73	3.57
DDE, p,p'	14.6	18.5	476	430
DDMU, p,p'			5.13	5.51
DDT, o,p'			4.10	3.49
DDT, p,p'			30.2	30.8
diazinon				
dieldrin			9.92	13.0
endosulfan I				
endosulfan II				
endosulfan sulfate				
endrin				
ethion				
HCH, alpha				
HCH, beta				
HCH, delta				
HCH, gamma				
heptachlor				
heptachlor epoxide				
hexachlorobenzene			0.785	0.659
methoxychlor				
nonachlor, cis			3.77	3.64
nonachlor, trans			11.9	12.1
oxadiazon				
oxychlordane				
parathion, ethyl				
parathion, methyl				
tedion				
toxaphene			103	66.6
PCB 1254			27.0	38.8
Percent moisture	78.4	78.7	68.8	69.3
Percent lipid	0.499	0.600	7.97	7.17

**TABLE 10 Continued**

Toxic Substances Monitoring Program  
Results of Duplicate Sample Analysis  
1998 Synthetic Organic Compounds Quality Control  
Fish Tissue  
(ng/g wet weight)

Station Name	Laguna de Santa Rosa/ Occidental Road		Deluz Creek	
Station Number	114.21.03		902.21.01	
REPLICATE	1	2	1	2
<u>Compound</u>				
aldrin				
chlordane, cis	2.45	2.11		
chlordane, trans				
chlordene, alpha				
chlordene, gamma				
chlorpyrifos				
dacthal				
DCBP, p,p'				
DDD, o,p'	2.57	2.18		
DDD, p,p'	5.80	4.99		
DDE, o,p'				
DDE, p,p'	32.8	29.1	2.79	2.74
DDMU, p,p'				
DDT, o,p'				
DDT, p,p'				
diazinon				
dieldrin				
endosulfan I				
endosulfan II				
endosulfan sulfate				
endrin				
ethion				
HCH, alpha				
HCH, beta				
HCH, delta				
HCH, gamma				
heptachlor				
heptachlor epoxide				
hexachlorobenzene				
methoxychlor				
nonachlor, cis				
nonachlor, trans	2.57	2.24		
oxadiazon				
oxychlordane				
parathion, ethyl				
parathion, methyl				
tedion				
toxaphene				
Percent moisture	79.1	80.6	81.7	81.4
Percent lipid	2.28	1.92	0.515	0.513

**TABLE 10 Continued**

Toxic Substances Monitoring Program  
Results of Duplicate Sample Analysis  
1999 Synthetic Organic Compounds Quality Control - Fish Tissue  
(ng/g wet weight)

Station Name	Upper Newport Bay/ Newport Dunes		Puddingstone Reservoir		Malibou Lake	
Station Number	801.11.99		405.52.01		404.21.07	
REPLICATE	1	2	1	2	1	2
<u>Compound</u>						
aldrin						
chlordane, cis						
chlordane, trans						
chlordene, alpha						
chlordene, gamma						
chlorpyrifos						
dacthal						
DDD, o,p'						
DDD, p,p'	6.04	6.65				
DDE, o,p'						
DDE, p,p'	54.5	58.6	10.7	10.0	5.74	4.40
DDMU, p,p'	3.35	3.52				
DDT, o,p'						
DDT, p,p'						
diazinon						
dieldrin						
endosulfan I						
endosulfan II						
endosulfan sulfate						
endrin						
ethion						
HCH, alpha						
HCH, beta						
HCH, delta						
HCH, gamma						
heptachlor						
heptachlor epoxide						
hexachlorobenzene						
methoxychlor						
nonachlor, cis						
nonachlor, trans	1.94	2.09	2.84	2.35	2.17	2.14
oxadiazon						
oxychlordane						
parathion, ethyl						
parathion, methyl						
tedion						
toxaphene						
PCB 1254						
Percent moisture	77.8	76.7	78.3	78.4	79.4	79.6
Percent lipid	0.742	0.758	0.662	0.693	0.374	0.308

**TABLE 10 Continued**

Toxic Substances Monitoring Program  
Results of Duplicate Sample Analysis  
1999 Synthetic Organic Compounds Quality Control  
Fish Tissue  
(ng/g wet weight)

Station Name	Tahoe Keys/ Sailing Lagoon		San Pablo Reservoir	
Station Number	634.10.91		206.60.11	
REPLICATE	1	2	1	2
<u>Compound</u>				
aldrin				
chlordane, cis			32.8	32.8
chlordane, trans			15.1	15.5
chlordene, alpha			1.70	1.30
chlordene, gamma			2.3	1.7
chlorpyrifos				
dacthal	2.02	1.23	3.0	2.9
DCBP, p,p'				
DDD, o,p'				
DDD, p,p'			15.4	15.2
DDE, o,p'				
DDE, p,p'			70.8	62.3
DDMU, p,p'			3.3	2.9
DDT, o,p'				
DDT, p,p'				
diazinon				
dielrin			111	156
endosulfan I				
endosulfan II				
endosulfan sulfate				
endrin				
ethion				
HCH, alpha				
HCH, beta				
HCH, delta				
HCH, gamma				
heptachlor				
heptachlor epoxide			4.1	4.6
hexachlorobenzene	0.38	0.39		
methoxychlor				
nonachlor, cis			14.8	14.5
nonachlor, trans			34.0	30.8
oxadiazon			89.1	78.6
oxychlordane			4.31	4.43
parathion, ethyl				
parathion, methyl				
tedion				
toxaphene			33.5	36.5
PCB 1254				
Percent moisture	78.7	78.2	67.2	NA
Percent lipid	1.18	1.26	13.5	13.0

**TABLE 10 Continued**

Toxic Substances Monitoring Program  
Results of Duplicate Sample Analysis  
2000 Synthetic Organic Compounds Quality Control - Fish Tissue  
(ng/g wet weight)

Station Name	Ventura River/d/s OVTP		Big Bear Lake/ Dam		Lake Chabot/ Alameda County	
Station Number	402.10.05		801.71.07		204.20.06	
REPLICATE	1	2	1	2	1	2
<u>Compound</u>						
aldrin						
chlordane, cis	2.50	2.47	10.5	10.9	3.93	3.62
chlordane, trans			4.20	4.43	2.22	2.02
chlordene, alpha						
chlordene, gamma						
chlorpyrifos						
dacthal						
DDD, o,p'			2.03	2.10		
DDD, p,p'			20.1	21.8	4.97	5.23
DDE, o,p'						
DDE, p,p'	11.0	11.9	66.0	75.9	12.2	13.3
DDMU, p,p'			4.89	5.82		
DDT, o,p'						
DDT, p,p'						
diazinon						
dieldrin	3.88	3.22			3.60	3.81
endosulfan I						
endosulfan II						
endosulfan sulfate						
endrin						
ethion						
HCH, alpha						
HCH, beta						
HCH, delta						
HCH, gamma						
heptachlor						
heptachlor epoxide	<RL	1.05				
hexachlorobenzene	0.764	0.714	1.07	1.13	0.415	0.429
methoxychlor						
nonachlor, cis			6.98	7.38		
nonachlor, trans	2.80	3.06	10.1	10.8	2.46	2.46
oxadiazon					6.34	6.71
oxychlordane	1.65	1.67				
parathion, ethyl						
parathion, methyl						
tedion						
toxaphene						
PCB 1248						
PCB 1254	11.0	12.0	140	155	15	16
PCB 1260			178	193		
Percent moisture	74.0	74.1	70.4	70.6	76.8	77.0
Percent lipid	7.92	8.10	10.4	10.7	4.91	5.23

**TABLE 10 Continued**

Toxic Substances Monitoring Program  
Results of Duplicate Sample Analysis  
2000 Synthetic Organic Compounds Quality Control - Fish Tissue  
(ng/g wet weight)

Station Name	Lake Chabot/ Alameda County		San Joaquin River/ Hwy 99		Salina River/ Bradley Rd.	
Station Number	204.20.06		545.20.90		309.81.09	
REPLICATE	1	2	1	2	1	2
<u>Compound</u>						
aldrin						
chlordane, cis	26.6	26.8				
chlordane, trans	11.7	11.7				
chlordene, alpha						
chlordene, gamma	1.23	1.12				
chlorpyrifos						
dacthal						
DDD, o,p'	12.0	11.5				
DDD, p,p'	47.7	48.2				
DDE, o,p'						
DDE, p,p'	107	104	8.76	13.4	23.5	24.2
DDMU, p,p'	22.5	21.8				
DDT, o,p'						
DDT, p,p'						
diazinon						
dieldrin	13.7	14.3				
endosulfan I						
endosulfan II						
endosulfan sulfate						
endrin						
ethion						
HCH, alpha						
HCH, beta						
HCH, delta						
HCH, gamma						
heptachlor						
heptachlor epoxide	1.65	1.94				
hexachlorobenzene	1.10	1.18				
methoxychlor						
nonachlor, cis	20.8	21.1				
nonachlor, trans	30.5	29.1	<1.0	1.14		
oxadiazon	12.8	13.2				
oxychlordane	2.79	2.78				
parathion, ethyl						
parathion, methyl						
tedion						
toxaphene						
PCB 1248	26	26				
PCB 1254	260	290				
PCB 1260	120	120				
Percent moisture	71.4	71.2	77.9	77.9	94.0	94.0
Percent lipid	10.8	11.3	0.655	1.05	0.524	
	0.523					



**TABLE 11**

Toxic Substances Monitoring Program  
 Standard Reference Material 1588a - Organics in Cod Liver Oil  
 1998 Synthetic Organic Compounds Quality Control  
 (ng/g ppb)

Analyte	Certified Concentration	Acceptable Range*	Bench Sheet 61	Bench Sheet 62	Bench Sheet 63	Bench Sheet 64
chlordanes, cis	167 ± 5.0	113-224	111	126	117	108
DDD, o,p'	36.3 ± 1.4	24.4-49.0	29.2	43.7	45.8	31.5
DDD, p,p'	254 ± 11	170-344	176	188	167	164
DDE, o,p'	22.0 ± 1.0	14.7-29.9	17.2	21.2	11.9	20.1
DDE, p,p'	651 ± 11	448-861	623	581	570	578
DDT, o,p'	156 ± 4.4	106-208	179	157	144	174
DDT, p,p'	524 ± 12	375-666	582	470	444	486
dieldrin	156 ± 4.5	106-208	189	223	211	189
HCH, alpha	85.3 ± 3.4	57.3-115	53.3	55.6	57.7	62.4
HCH, gamma	29.9 ± 1.7	16.2-34.6	13.0	13.4	13.8	14.2
heptachlor epoxide	31.6 ± 1.5	21.1-34.6	21.3	13.9	13.9	13.6
hexachlorobenzene	158 ± 5.0	107-212	130	127	108	136
nonachlor, trans	215 ± 7.9	145-289	262	234	228	262

\*70-130% of the 95% Confidence Interval is the acceptable concentration range used at WPCL

**TABLE 11**

Toxic Substances Monitoring Program  
 Standard Reference Material 2974 - Organics in Mussel Tissue  
 1999 Synthetic Organic Compounds Quality Control  
 (ng/g ppb)

Analyte	Certified Concentration	Acceptable Range*	Bench Sheet 98	Bench Sheet 99	Bench Sheet 100	Bench Sheet 109	Bench Sheet120
chlordanes, cis	17.2 ± 2.9	10.0-20.1	13.1	12.5	8.45	12.0	13.2
chlordanes, trans	16.6 ± 1.8	10.4-23.9	11.0	11.1	8.59	10.3	11.4
DDD, p,p'	43.0 ± 6.4	25.6-64.2	30.6	30.0	38.0	31.2	36.7
DDE, p,p'	51.2 ± 5.7	31.9-74.0	38.1	40.8	39.4	34.4	40.4
DDT, p,p'	3.91 ± 0.6	2.3-5.9	<5.0	<5.0	<5.0	<5.0	<5.0
nonachlor, cis	6.84 ± 0.92	4.1-10.1	4.12	3.96	4.31	3.83	4.57
nonachlor, trans	18.0 ± 3.6	10.1-28.1	12.0	12.9	14.0	10.6	12.9

\*70-130% of the 95% Confidence Interval is the acceptable concentration range used at WPCL

**TABLE 11**

Toxic Substances Monitoring Program  
Standard Reference Material 2974 - Organics in Mussel Tissue  
2000 Synthetic Organic Compounds Quality Control  
(ng/g ppb)

Analyte	Certified Concentration	Acceptable Range*	Bench Sheet 144	Bench Sheet 145
chlordanes, cis	17.2 ± 2.9	10.0-20.1	12.7	12.8
chlordanes, trans	16.6 ± 1.8	10.4-23.9	11.3	11.4
DDD, p,p'	43.0 ± 6.4	25.6-64.2	33.9	33.2
DDE, p,p'	51.2 ± 5.7	31.9-74.0	41.6	39.6
DDT, p,p'	3.91 ± 0.6	2.3-5.9	<5.0	<5.0
nonachlor, cis	6.84 ± 0.92	4.1-10.1	4.65	3.62
nonachlor, trans	18.0 ± 3.6	10.1-28.1	12.5	11.1

\*70-130% of the 95% Confidence Interval is the acceptable concentration range used at WPCL

Toxic Substances Monitoring Program  
Standard Reference Material 2978 - Organics in Mussel Tissue  
2000 Synthetic Organic Compounds Quality Control  
(ng/g ppb)

Analyte	Certified Concentration	Acceptable Range*	Bench Sheet 164	Bench Sheet 165
chlordanes, cis	15.6 ± 0.83	10.3-21.3	13.6	15.5
chlordanes, trans	11.4 ± 0.56	7.57-15.5	10.7	10.2
DDD, o,p'	10.5 ± 1.0	6.65-15.0	14.6	14.8
DDD, p,p'	38.8 ± 2.3	25.6-53.4	41.5	42.5
DDE, o,p'	4.41 ± 0.56	2.70-6.46	3.52	4.17
DDE, p,p'	37.5 ± 1.5	25.2-50.7	42.1	40.3
DDT, o,p'	9.2 ± 1.6	5.32-14.0	2.19	2.56
DDT, p,p'	3.84 ± 0.28	2.49-5.36	7.55	7.32
dieldrin	6.3 ± 0.67	3.94-9.06	4.55	4.95
nonachlor, cis	8.23 ± 0.56	5.37-11.4	6.44	5.16
nonachlor, trans	11.5 ± 1.0	7.35-16.2	11.5	10.8
oxychlordanes	2.13 ± 0.27	1.30-3.12	ND	ND

\*70-130% of the 95% Confidence Interval is the acceptable concentration range used at WPCL

**TABLE 12**

Toxic Substances Monitoring Program  
Polynuclear Aromatic Hydrocarbons (PAHs)  
Fresh Weight Reporting Limits in Tissue

Compound	(ng/g, ppb)
naphthalene	25
1-methylnaphthalene	10
2-methylnaphthalene	15
biphenyl	15
2,6-dimethylnaphthalene	10
acenaphthylene	10
acenaphthene	10
2,3,5-trimethylnaphthalene	10
fluorene	10
phenanthrene	10
anthracene	10
1-methylphenanthrene	10
fluoranthene	10
pyrene	10
benz[a]anthracene	10
chrysene	10
benzo[b]fluoranthene	10
benzo[k]fluoranthene	10
benzo[e]pyrene	10
benzo[a]pyrene	10
perylene	10
indeno[1,2,3-cd]pyrene	10
dibenz[a,h]anthracene	10
benzo[ghi]perylene	10

**TABLE 13**

Toxic Substances Monitoring Program  
Percent Recovery of Deuterated PAH Surrogate Compounds - 1998

Station Number	Station Name	d8- NPH	d10- BPH	d10- ACE	d10- PYR	d12- BAA	d12- BEP	d12- PER	d12- BGP
309.10.18	Salinas Riv/mouth	40	41	43	48	57	58	58	57
309.10.18	Salinas Riv/mouth-dup	62	62	62	62	63	58	58	57
309.10.93	Salinas Riv/Davis Rd.	58	59	60	59	63	56	56	55
309.10.04	Old Salinas R/Monterey Dunes Way Brg	41	41	43	46	46	47	45	49
309.10.95	Temblader Sl/Castorville	56	49	48	49	65	64	65	66

d8-NPH = naphthalene-d8

d10-BPH = biphenyl-d10

d10-ACE = acenaphthene-d10

d10-PYR = pyrene-d10

DUP = Duplicate analysis.

d12-BAA = benzo[a]anthracene-d12

d12-BEP = benzo[e]pyrene-d12

d12-PER = perylene-d12

d12-BGP = benzo[g,h,i]perylene-d12

**TABLE 13 Continued**

Toxic Substances Monitoring Program  
Percent Recovery of Deuterated PAH Surrogate Compounds - 1999

Station Number	Station Name	d8-NPH	d10-BPH	d10-ACE	d8-DBP	d10-PYR	d12-BAA	d12-BEP	d12-PER	d12-BGP
305.10.06	Pajaro River/Pajaro	90.3	106	126	112	130	132	130	125	93.6
305.10.06	Pajaro River/Pajaro	51.4	112	127	141	155	173	161	160	123
310.12.00	Arroyo de la Cruz	31.1	61.9	108	110	117	94.1	140	161	88.1
310.14.00	Santa Rosa Creek Lagoon	81.0	119	161	181	158	135	160	159	88.5
310.24.00	San Luis Obispo Crk Lagoon	148	170	172	212	197	200	232	236	171
312.10.00	Santa Maria River/Mouth	87.5	136	150	165	166	184	189	202	144
634.10.90	Tahoe Keys/Sailing Lag. Mar.	51.0	74.7	90.5	111	120	104	117	108	54.2
634.10.91	Tahoe Keys/Sailing Lagoon	64.5	88.0	119	118	112	92.7	98.9	79.4	30.9
634.10.92	Tallac Lagoon	72.1	102	112	114	137	146	150	142	106
715.40.08	Palo Verde Outfall Drain	12.9	28.5	56.8	88.8	126	149	115	120	58.5
715.50.90	Colorado River/u/s Imp. Dam	77.2	84.8	102	112	126	144	136	142	91.6
719.47.00	Coachella Valley StormwaterCh	55.6	87.5	108	116	128	134	138	149	117
723.10.02	New River/Westmorland	124	139	132	150	176	195	171	138	118
723.10.02	New River/Westmorland dup	83.0	95.9	115	106	114	96.9	124	76.4	81.3
723.10.12	Wiest Lake	35.4	56.9	94.1	92.6	106	105	118	137	84.8
723.10.21	Holtville Main Drain	51.9	65.3	92.8	100	106	85.7	120	127	58.4
723.10.30	Central Drain	60.5	77.3	114	112	121	128	137	119	122
723.10.31	South Central Drain	103	121	138	167	170	157	180	185	132
728.00.90	Salton Sea/South	75.0	89.4	114	110	139	160	159	159	138
d8-NPH = naphthalene-d8		d12-BAA = benzo[a]anthracene-d12								
d10-BPH = biphenyl-d10		d12-BEP = benzo[e]pyrene-d12								
d10-ACE = acenaphthene-d10		d12-PER = perylene-d12								
d8-DBP = dibenzothiophene-d8		d12-BGP = benzo[g,h,i]perylene-d12								
d10-PYR = pyrene-d10										
DUP = Duplicate analysis.										

**TABLE 13 Continued**

Toxic Substances Monitoring Program  
Percent Recovery of Deuterated PAH Surrogate Compounds - 2000

Station Number	Station Name	d8- NPH	d10- BPH	d10- ACE	d8- DBP	d10- PYR	d12- BAA	d12- BEP	d12- PER	d12- BGP
551.60.03	Kings River/Hwy 99	95	103	129	112	126	138	123	142	79
551.60.03	Kings River/Hwy 99	88	94	115	107	122	137	126	153	87
715.40.08	Palo Verde Outfall Drain	93	101	127	111	123	138	120	147	80
719.47.00	Coachella Val. Stormwater Ch.	85	92	115	104	118	142	101	116	41
723.10.01	Alamo River/Calipatria	87	99	127	116	137	142	133	119	60
723.10.47	Alamo R/International Boundary	93	99	127	112	128	145	131	153	94
723.10.21	Holtville Main Drain	110	117	146	129	142	150	136	137	69
723.10.32	Barbara Worth Drain	89	98	126	118	134	154	136	165	67
723.10.32	Barbara Worth Drain	91	96	121	107	124	128	121	143	70
723.10.48	Greeson Drain	95	101	130	116	129	184	137	166	82
728.00.90	Salton Sea/South	72	77	98	92	108	116	96	111	46
d8-NPH = naphthalene-d8		d12-BAA = benzo[a]anthracene-d12								
d10-BPH = biphenyl-d10		d12-BEP = benzo[e]pyrene-d12								
d10-ACE = acenaphthene-d10		d12-PER = perylene-d12								
d8-DBP = dibenzothiophene-d8		d12-BGP = benzo[g,h,i]perylene-d12								
d10-PYR = pyrene-d10										
DUP = Duplicate analysis.										

**TABLE 14**

Toxic Substances Monitoring Program  
Results of Matrix Spike Analyses: 1998, 1999 and 2000  
Polynuclear Aromatic Hydrocarbons (PAHs)

Station Name  Station Number  Compound	1998 American River Hatchery		1999 Colorado River/u/s Imperial Dam 715.50.90		2000 Holtville Main Drain 723.10.21	
	Percent Recovery		Percent Recovery		Percent Recovery	
	MS	MSD	MS	MSD	MS	MSD
naphthalene	106	107	150	117	114	111
1-methylnaphthalene	114	112	153	114	114	112
2-methylnaphthalene	105	99	134	122	119	117
biphenyl	109	111	126	99	101	100
2,6-dimethylnaphthalene	102	88	108	88	93	94
acenaphthylene	102	82	140	113	108	108
acenaphthene	107	88	66	76	90	89
2,3,5-trimethylnaphthalene	123	102	128	92	84	82
fluorene	120	99	82	90	91	89
phenanthrene	113	87	131	119	101	103
anthracene	95	112	118	104	89	91
1-methylphenanthrene	116	107	133	135	98	102
fluoranthene	103	115	139	136	116	119
pyrene	101	118	125	124	102	101
benz[a]anthracene	104	116	137	129	101	104
chrysene	113	122	123	123	99	89
benzo[b]fluoranthene	118	128	122	120	NR	NR
benzo[k]fluoranthene	113	117	119	122	NR	NR
benzo[e]pyrene	109	118	87	87	83	82
benzo[a]pyrene	82	92	89	86	72	67
perylene	89	94	84	86	74	73
indeno[1,2,3-cd]pyrene	100	103	90	72	NR	NR
dibenz[a,h]anthracene	122	124	88	77	NR	NR
benzo[ghi]perylene	113	114	94	99	86	86
naphthalene-d8	53	51	27	42	93	85
biphenyl-d10	54	50	46	60	99	91
acenaphthene-d10	56	60	88	87	123	113
dibenzothiophene-d8	NA	NA	105	95	108	96
pyrene-d10	61	66	122	110	116	107
benz[a]anthracene-d12	70	67	117	98	126	106
benz[e]pyrene-d12	64	64	143	121	118	102
perylene-d12	67	59	154	130	120	106
benzo(g,h,i)perylene-d12	60	60	105	76	73	56



**TABLE 15**

Toxic Substances Monitoring Program  
Results of Laboratory Control Spike Analyzes (LCS): 1998, 1999 and 2000  
Polynuclear Aromatic Hydrocarbons (PAHs)

	1998	1999	2000
Compound			
naphthalene	109	148	100
1-methylnaphthalene	115	122	96
2-methylnaphthalene	106	112	96
biphenyl	110	125	93
2,6-dimethylnaphthalene	108	96	86
acenaphthylene	107	105	101
acenaphthene	108	70	102
2,3,5-trimethylnaphthalene	115	86	96
fluorene	120	79	104
phenanthrene	122	118	103
anthracene	97	70	96
1-methylphenanthrene	129	111	101
fluoranthene	117	113	115
pyrene	120	133	111
benz[a]anthracene	112	137	119
chrysene	114	156	107
benzo[b]fluoranthene	106	135	NR
benzo[k]fluoranthene	104	146	NR
benzo[e]pyrene	104	91	81
benzo[a]pyrene	78	47	75
perylene	82	93	84
indeno[1,2,3-cd]pyrene	99	90	NR
dibenz[a,h]anthracene	104	105	NR
benzo[ghi]perylene	110	103	46
naphthalene-d8	58	76	89
biphenyl-d10	57	86	94
acenaphthene-d10	57	117	116
dibenzothiophene-d8	NA	100	101
pyrene-d10	62	94	110
benz[a]anthracene-d12	65	75	119
benzo[e]pyrene-d12	68	111	100
perylene-d12	64	80	110
benzo(g,h,i)perylene-d12	58	68	53

**TABLE 16**

Toxic Substances Monitoring Program  
 Results of Duplicate Sample Analysis: 1998, 1999, and 2000  
 Polynuclear Aromatic Hydrocarbons Quality Control  
 (ng/g dry weight)

Station Name	1998 Blanco Drain/ Hitchcock Road		1999 New River/ Westmorland		2000 Kings River/ Hwy 99	
Station Number	309.10.15		723.10.02		551.60.03	
REPLICATE	1	2	1	2	1	2
Compound						
Naphthalene	<25	<25	36	62	<25	<25
1-methylnaphthalene	<15	<15	36	63	<15	<15
2-methylnaphthalene	<10	<10	28	56	<10	<10
biphenyl	<15	<15	<15	17	<15	<15
2,6-dimethylnaphthalene	<10	<10	16	29	<10	<10
acenaphthylene	<10	<10	<10	<10	<10	<10
acenaphthene	<10	<10	<10	12	<10	<10
2,3,5-trimethylnaphthalene	<10	<10	25	35	<10	<10
fluorene	<10	<10	12	23	<10	<10
phenanthrene	<10	<10	<10	23	<10	<10
anthracene	<10	<10	<10	<10	<10	<10
1-methylphenanthrene	<10	<10	<10	<10	<10	<10
fluoranthene	<10	<10	<10	<10	<10	<10
pyrene	<10	<10	<10	<10	<10	<10
benz[a]anthracene	<10	<10	<10	<10	<10	<10
chrysene	<10	<10	<10	<10	<10	<10
benzo[b]fluoranthene	<10	<10	<10	<10	<10	<10
benzo[k]fluoranthene	<10	<10	<10	<10	<10	<10
benzo[e]pyrene	<10	<10	<10	<10	<10	<10
benzo[a]pyrene	<10	<10	<10	<10	<10	<10
perylene	<10	<10	<10	<10	<10	<10
indeno[1,2,3-cd]pyrene	<10	<10	<10	<10	<10	<10
dibenz[a,h]anthracene	<10	<10	<10	<10	<10	<10
benzo[ghi]perylene	<10	<10	<10	<10	<10	<10