

## **Appendix D. Data Quality Assurance Reports**

### **D-1. Total Mercury**

The mercury results from forty-six fish samples were carried through a Tier III data validation as representative of the whole group used in the study. The samples had been analyzed by ERI in Connecticut. A Standard Reference material tissue sample was analyzed in duplicate in conjunction with the samples. Recoveries of 94% and 84% were acceptable.

Preservation and holding time criteria were met. Duplicate precision and lab fortified blank recovery met acceptance criteria. There was low level blank contamination typical of this type of analysis. One matrix spike recovery was slightly below the lower acceptance limit resulting in the estimation (J) of five other samples in this group.

Forty-one mercury results were reported as acceptable. They ranged from 0.17 to 0.74ppm (mg/kg) with a laboratory reporting limit of 0.008 ppm. The laboratory did achieve the Project Quantitation Limit of 0.04 ppm.

The laboratory performed extra QC measures not required by the QAPP. They analyzed post digestion spike and post digestion dilution samples. The QC results for all these samples were within acceptable limits.

The quality of the mercury data is quite acceptable for this project.

US EPA Approval Signature

Date

Ms. Christine Clark  
Regional Sample Control Center  
U.S. EPA Region I  
11 Technology Drive  
North Chelmsford, Massachusetts 01863

March 29, 2002  
Revised: May 17, 2002

RE: TO No. 9, Task No. 2, TDF No. 206F  
Connecticut River Fish Tissue Study  
Environmental Research Institute (ERI), UCONN  
Inorganic Analyses

Mercury: 46/ Fish Tissue/ CT1-SMB-FC01 to -FC05, CT2-SMB-FC01 to -FC05,  
CT3-SB-FI01 to -FI04, CT3-SMB-FC01 to -FC05, CT4-  
SMB-FC01 to -FC05, CT5-SMB-FC01 to -FC05, CT6-  
SMB-FC01 to -FC05, CT7-SMB-FC01 to -FC05, CT-BT-  
FC01 to FC05, CT8-WS-FC01, CT8-WS-FC02

8/Aqueous Equipment Blanks/ Rinsate Blk (Phase I) (8/7/00), Rinsate Blk (Phase II)  
(8/7/00), Phase I (Blank) (10/23/00), Phase II (Blank)  
(10/23/00), Phase I Blank (11/1/00), Phase II Blank  
(11/1/00), Rinsate Blk (Phase I) (11/20/00), Rinsate Blk  
(Phase II) (11/20/00)

1/Tissue SRM/ DOLT-2, *Squalus acanthius* liver tissue obtained from the  
National Research Council of Canada, Ottawa, Ontario,  
Canada K1A 0R6

Dear Ms. Clark:

A modified Tier III data validation was performed on the inorganic analytical data for 46 tissue samples and 8 equipment blanks collected from the Connecticut River by the following state agencies: CTDEP, MADEP, NHDES with USFWS, and VTDEC for the NEIWPC and the U.S. EPA. The samples were analyzed according to EPA Method 245.6. The samples were validated according to EPA Method 245.6 and criteria in the Connecticut River Fish Tissue Study Quality Assurance Project Plan (QAPP), April 6, 2000; defaulting next to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996 criteria, then to Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses, February 1989 criteria, and finally to EPA Region I's Environmental Services Assistance Team Inorganic Data Validation SOP ESAT-01-0081 (1/31/01). The data were evaluated based on the following parameters:

	●	Overall Evaluation of Data and Potential Usability Issues
	●	Data Completeness (CSF Audit - Tier I)
*	●	Preservation and Technical Holding Times
	●	PE Samples/Accuracy Check
	●	Calibration Verification
	●	Laboratory and Field Blank Analysis
N/A	●	ICP Interference Check Sample Results
	●	Matrix Spike Recoveries/Laboratory Fortified Matrix
*	●	Laboratory and Field Duplicates
*	●	Laboratory Fortified Blank Results
N/A	●	Furnace Atomic Absorption Results
N/A	●	Serial Dilution Results
	●	Compound Quantitation and Reported Quantitation Limits
	●	System Performance

\* - All criteria were met for this parameter.

N/A - Not Applicable

**The following information was used to generate the Data Validation Memorandum attachments:**

Table I: Recommendation Summary Table - summarizes validation recommendations

Table II: Overall Evaluation of Data - summarizes Site DQOs and potential usability issues

Data Summary Tables - summarize accepted, qualified, and rejected data

**Overall Evaluation of Data and Potential Usability Issues**

The following is a summary of the site DQOs:

- To perform a watershed-wide fish tissue monitoring program which will document current conditions with regard to contaminant concentrations of representative fish species from the mainstem of the Connecticut River. This information will enable states to revise human health risk assessments and will provide a basis for trend analysis when subsequent sampling is performed by monitoring teams.

A modified Tier III data validation was performed on the inorganic analytical data. Raw run data for the analyses were available for all samples with the exception of four rinse blanks. The four rinse blanks, sampled on 8/7/00 and 11/20/00, were not validated. Additionally, no laboratory benchsheets and logbook pages were available for validation.

A Standard Reference Material sample (DOLT-2, *Squalus acanthius* liver tissue) was obtained from the National Research Council of Canada, Ottawa, Ontario, Canada K1A 0R6. The

laboratory analyzed this sample in duplicate and reported % recoveries for Mercury at 93.7% and 84.4%, respectively. These recoveries were within the established limits of 75 to 125%.

Data validation identified minor data quality problems which did not significantly impact the usability of the data. See discussion below for details. The reported results are usable for site objectives.

### **Data Completeness**

The following data or information in the data package had discrepancies and/or was missing:

1. For chain-of-custody #1-10957 and #1-10958, the station location is listed as CT-2 for the following samples: CT3-SB-FI01 to -FI04, and CT3-SB-OI01 to -OI04. The Field Sampler was asked to verify the station locations for these samples.
2. For chain-of-custody #1-10693, samples CT3-SMB-FC04 to -FC05, the Field Sampler was asked to verify the date sampled.
3. The RPD values reported on the Quality Control Summary Sheets for nearly all Laboratory Duplicates were incorrect. However, it is noted that the formula for the Laboratory Duplicate listed in Section 11.9 of the Quality Assurance Project Report is correct. The laboratory was asked to determine where the error occurred and submit corrected data sheets.
4. The data sheet for ERI sample numbers 0011038-001 to -006, has a sample receipt date of 11/20/00. The chain-of-custody indicates that samples were relinquished to FedEx on 11/20/00, 2pm. The laboratory was asked to verify sample receipt date.
5. The data sheet for ERI sample numbers 0007095-1 to -020 has the Date Samples Collected as 7/6-7/26/00. The correct collection date is 7/26/00 only. The laboratory was asked to submit a corrected data sheet.
6. The data sheet for ERI sample numbers 0007071-1 to -028 has the Date Samples Collected as 7/14-7/17/00. The correct collection date should also include 7/19/00. The laboratory was asked to submit a corrected data sheet.
7. Dilution factors and %Lipids were not reported for any samples. The laboratory was asked to submit this information or indicate where it can be found.
8. Although %recovery information was submitted for the standard reference material analysis results, true and observed concentrations were not reported. The laboratory was asked to provide true concentrations and observed concentrations for each of the SRM

analyses.

Items 1 and 2 were requested from the sampler via the EPA Task Order Project Officer (TOPO) on July 19, 2001. Items 3 through 5 were requested from the laboratory via the TOPO on July 25, 2001. Items 6 through 8 were requested from the laboratory via the TOPO on February 1, 2002.

Items 1 and 2 were adequately addressed on 7/24/01 and 7/25/01, respectively. Items 3 through 6 were adequately addressed on 2/5/02. Item 7 was adequately addressed on 3/11/02. Item 8 was adequately addressed on 5/14/02.

**PE Samples/Accuracy Check**

A Standard Reference Material sample (DOLT-2, *Squalus acanthius* liver tissue) was obtained from the National Research Council of Canada, Ottawa, Ontario, Canada K1A OR6. The sample was analyzed in duplicate on November 11, 2000. The laboratory reported % recoveries for Mercury at 93.7% and 84.4%, respectively. These values are within the established QC limits (75-125%) and are acceptable.

**Calibration Verification**

The laboratory calibration standards did not undergo digestion procedures prior to analysis as mentioned in the ERI QA report. Digestion is required for the calibration standards according to EPA method 245.6. However, the PE sample was digested and the results were within acceptable limits as mentioned above. Also, Laboratory Fortified Blank (LFB) and Laboratory Fortified Matrix (LFM) samples were digested and analyzed along with the field samples. These LFB and LFM samples were all within acceptable limits except for one LFM sample discussed on the next page. Therefore, no qualification is needed due to the non-digested calibration standards.

**Laboratory and Field Blank Analysis**

Blank contamination conditions and actions are as follows:

Sample Conc. > IDL and < Action Level	Sample Conc. > Action Level	Negative Blank Contamination, Blank Conc. >2x(IDL)	
Report Sample Conc. with a "U"	A	Report Sample Conc. < A.L. with a "J"	UJ (NDs)
Use Professional Judgement			

All of the blanks associated with this sample group were checked for possible sources of

contamination. The following table summarizes the highest concentration that was detected in any blank for each analyte, with the associated action levels and affected samples:

#### Laboratory Blanks

Analyte	Type of Blank	Blank Conc. mg/kg (wet wt)	Action Level mg/kg (wet wt)	Samples Affected
Mercury	LRB (11/1/00)	0.0107	0.054	CT-BT-FC01 to CT-BT-FC05

LRB - laboratory reagent blank

Blank actions are based on Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996 criteria and Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses, February 1989 criteria. Blank action levels are calculated as 5 times the highest concentration of the contaminant determined in any blank. The positive sample results that are less than the blank action level are reported as non-detects (U) at the reported concentration on the Data Summary Table.

#### Matrix Spike/Laboratory Fortified Matrix

MS/LFM recovery conditions and actions are as follows:

Criteria %R:	<30%	30% - 65%	>135%
Positive Sample Results	J	J	J
Non-detected Results	R	UJ	A

For sample CT7-SMB-FC02, mercury did not meet the matrix spike recovery (%R) criteria of 65-135% as specified in the Connecticut River Fish Tissue Study Quality Assurance Project Plan (QAPP), April 6, 2000. The result, actions, and affected samples were as follows:

CT7-SMB-FC02						
Analyte	Spike Sample Result ug/L	Sample Result ug/L	Recovery %	Action		Samples Affected
				Positive Detects	NDs	
Mercury	10.87 (*)	7.79 (0.68 mg/kg wet wt)	61.5	J	UJ	CT7-SMB-FC01 to CT7-SMB-FC05

\* The spike sample result could not be reported in mg/kg, wet weight since the amount of sample used was not available.

Professional judgement was used to qualify only the associated samples as listed above. The positive mercury results for samples CT7-SMB-FC01 to CT7-SMB-FC05 were estimated (J).

### **Compound Quantitation and Reported Quantitation Limits**

The results were reported on a dry weight basis by the laboratory. Since the laboratory provided % solids data, the data validator recalculated the results on a wet weight basis on the Data Summary Table.

### **System Performance**

No trends were noted with the Mercury analysis.

The laboratory performed additional Quality Control measures, post digestion spike samples and post digestion dilution samples, with each sample batch which were not required by the method or the QAPP. All these results for the QC measures were within laboratory control limits.

Very truly yours,

LOCKHEED MARTIN  
ENVIRONMENTAL

Leslie Chan  
Scientist

Louis Macri  
Team Manager

Attachments: Table I: Recommendation Summary Table  
Table II: Overall Evaluation of Data  
Data Summary Table  
Data Validation Worksheets  
Support Documentation  
Analytical Method  
Communications/Phone Logs

**Connecticut River Fish Tissue Study**

**TABLE I: RECOMMENDATION SUMMARY TABLE  
Tissue Samples**

Element	Qualifier
Mercury	J <sup>1,2</sup>

- J<sup>1</sup> - The detection limit was raised (U) to the reported sample concentrations for mercury in samples CT-BT-FC01 to CT-BT-FC05 due to blank contamination.
- J<sup>2</sup> - The mercury result for samples CT7-SMB-FC01 to CT7-SMB-FC05 was estimated (J) due to MS/LFM recovery exceeding criteria.

**Overall Evaluation of Data - Data Validation Memorandum - Table II**

INORGANICS					
DQO (list all DQOs)	Sampling* and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability	Potential Usability Issues
		Analytical Error	Sampling Error		
To perform a watershed-wide fish tissue monitoring program which will document current conditions with regard to contaminant concentrations of representative fish species from the mainstem of the Connecticut River. This information will enable states to revise human health risk assessments and will provide a basis for trend analysis when subsequent sampling is performed by monitoring teams.	Yes, Sampling Method appropriate for all samples.  Yes, Analytical Method appropriate for all samples.	Refer to qualification in R/S Key on Table I.  J <sup>1,2</sup>	Refer to qualification in R/S Key on Table I.  None	**	A Standard Reference Material sample (DOLT-2, <i>Squalus acanthius</i> liver tissue) was obtained from the National Research Council of Canada, Ottawa, Ontario, Canada K1A 0R6. The laboratory analyzed this sample in duplicate and reported % recoveries for Mercury at 93.7% and 84.4%, respectively. These recoveries were within the established limits of 75 to 125%.  Data validation identified minor data quality problems which did not significantly impact the usability of the data. The reported results are usable for site objectives.

\* The evaluation of "sampling error" cannot be completely assessed in the data validation.

\*\* Sampling variability is not assessed in data validation.

Validator: \_\_\_\_\_

Date: \_\_\_\_\_

## **D-2. Dioxins and Furans**

ERI subcontracted out 12 fish tissue samples to AXYS Analytical Services for dioxin/furan analysis. AXYS is a very reliable laboratory that has a solid track record with EPA. These samples were carried through a Tier II data validation. These were the only samples analyzed for dioxins and furans.

The following QC checks were performed and found to be acceptable: sample preservation and holding times, initial and continuing calibrations, peak resolution, instrument sensitivity, matrix spike and duplicate recovery, and internal standard recoveries.

The laboratory analyzed a Standard Reference Material for this project, but the data was lost due to a computer failure. Fortunately, the lab had PE samples which had been analyzed during the same time frame as the fish samples.

Low levels of dioxin/furans were found and ranged from 0.11 to 3.8 ppt (ng/kg) with a reporting limit of 0.10 ppt. The laboratory did achieve the Project Quantitation Limit of 1.0 ppt.

Even though some of the results are close to the detection limit we believe that the analytical method in the hands of this lab gave us reliable results.

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US EPA Approval Signature

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Date

August 2, 2002

B-02-08-Y-5

Revised: August 20, 2002

Ms. Christine Clark  
Regional Sample Control Custodian  
Office of Environmental Measurement and Evaluation  
U.S. EPA Region I  
11 Technology Drive  
North Chelmsford, MA 01863

Re: TO No. 09, Task No. 2, TDF No. 0523  
Case No. Lower Connecticut River Fish Study  
AXYS Analytical Services LTD - Sidney, BC, Canada  
Lower Connecticut River

Dioxin/Furan: 12/Fish Tissue/CT1-SMB-FC02, CT1-WS-FC01, CT1-YP-FC05, CT4-SMB-FC04, CT4-WS-FC03, CT4-YP-FC03, CT5-SMB-FC01, CT5-WS-FC05, CT5-YP-FC03, CT7-SMB-FC02, CT7-WS-FC03, CT7-YP-FC04

Dear Ms. Clark:

A modified Tier II data validation was performed on the Dioxin/Furan analytical data for 12 fish tissue samples collected from the Connecticut River by the following state agencies: CTDEP, MADEP, NHDES with USFWS, and VTDEC for NEIWPC and the U.S. EPA. The samples were prepared by the U.S. EPA's New England Regional Laboratory and sent to the Environmental Research Institute of the University of Connecticut in Storrs, CT. ERI contracted AXYS for the analytical work. The samples were analyzed according to EPA Method 8290A Rev. 1, January 1998 and criteria in the Connecticut River Fish Tissue Study Quality Assurance Project Plan (QAPP), April 6, 2000 by AXYS Analytical Services LTD. The samples were validated using first the criteria in Connecticut River QAPP referenced above as well as additional criteria in EPA Method 8290A Rev. 1, January 1998, defaulting next to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996 criteria, and to EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (01/31/01). The data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness (CSF Audit - Tier I)
- \* • Preservation and Technical Holding Times
- NR • PE Samples/Accuracy Check
- \* • Window Defining Mix
- \* • Initial and Continuing Calibrations

- \* ● Chromatographic Resolution
- \* ● Instrument Sensitivity Check
- Blanks
- \* ● Matrix Spike/Matrix Spike Duplicate
- NR ● Laboratory and Field Duplicates
- \* ● Internal/Clean-up Standards
- \* ● Sample Analysis and Identification
- Sample Quantitation
- \* ● Estimated Detection Limits (EDL) and Estimated Maximum Possible Concentration (EMPC)
- 2378-TCDD Toxicity Equivalents (TE) and Isomer Specificity
- \* ● Required Sample Reruns and Second Column Confirmation
- System Performance

\* - All criteria were met for this parameter.

NR - Not Reported by the Laboratory

NA - Not analyzed by the laboratory

**The following information was used to generate the Data Validation Memorandum attachments:**

Table I: Recommendation Summary Table - summarizes validation recommendations

Table II: Overall Evaluation of Data - summarizes site objectives and potential usability issues

Data Summary Tables - summarize accepted, qualified, and rejected data

**Overall Evaluation of Data and Potential Usability Issues**

The following is a summary of the site investigation/assessment objectives:

- To perform a watershed-wide fish tissue monitoring program which will document current conditions with regard to contaminant concentrations of representative fish species from the mainstem of the Connecticut River. This information will enable states to revise human health risk assessments and will provide a basis for trend analysis when subsequent sampling is performed by monitoring teams.

The laboratory stated that the SRM data was lost due to computer disk failure. However, the laboratory did analyze a water and a soil Pre-award DLM01.3 PE sample for Dioxin and Furan Analysis by EPA Method 1613B in the same time frame as the fish tissue analysis. The laboratory scored 100% for the two PE samples, demonstrating good accuracy.

The laboratory did not analyze a duplicate sample from this batch of field samples. The laboratory was contacted and asked to provide the duplicate analyzed in the overall batch. The duplicate sample analyzed had acceptable precision. The laboratory demonstrated good duplicate precision. The results can be found in Attachment A.

The initial and continuing calibrations were run at the proper intervals and met method criteria.

The method and instrument blanks had low level contamination. This contamination problem does not have an impact on the usability of the data. Contaminants were found in both the blank and the field samples. When the analyte concentrations in the field samples were less than the corresponding blank action level, the field sample results reported by the laboratory are qualified as non-detected (U) on the Data Summary Table. See Table I for a summary of the qualifiers applied due to blank contamination.

Data validation indicated minor data quality problems which do not significantly impact the usability of the data. See the discussion below for details. The reported results are usable for the site objectives.

### **Data Completeness (CSF Audit - Tier I)**

The following data or information in the data package had discrepancies and/or were missing:

1. AXYS was asked to submit the sample log-in, extraction, and run logs for this project.
2. The sample receipt dates on the Form Is do not match the C-O-Cs. AXYS was asked to reconcile this discrepancy and submit corrected forms.
3. ERI was asked to provide the date received on the C-O-Cs for sampling dates 8/23/00, 9/11/00, 10/23/00, and 11/1/00.
4. AXYS was asked to submit the duplicate analysis if a sample was analyzed in duplicate.
5. ERI was asked to submit % solids and % lipid determinations.

Items 1 thru 5 were requested via the TOPO on July 10, 2002. Items 1 and 2 were received via the TOPO on July 23, 2002. Items 1 and 2 were adequately addressed.

For item 3, Environmental Research Institute stated that the data gap is documented and no further would be taken.

For item 4, AXYS did send duplicate sample data on July 29, 2002. The laboratory did not analyze a duplicate sample from this batch of field samples. The laboratory was contacted and asked to provide the duplicate analyzed in the overall batch. The duplicate sample analyzed had acceptable precision. The laboratory demonstrated good duplicate precision. The results can be found in Attachment A.

For item 5, AXYS did not perform % solid or % lipid determinations. The % lipids were reported from ERI's (primary laboratory) percent lipid determinations.

**Blanks**

All of the blanks associated with this SDG were evaluated for possible sources of contamination. The following table summarizes the highest concentration of contamination that was detected in the blanks. The table lists the action levels and the samples affected:

Congener	Type of Blank	Blank Concentration ng/Kg	Action Level ng/Kg	Samples Affected
OCDD	Instrument Blank (04/03/01)	0.26	2.6	CT1-WS-FC01, CT1-YP-FC05, CT4-SMB-FC04, CT4-WS-FC03, CT4-YP-FC03, CT5-SMB-FC01, CT5-WS-FC05, CT5-YP-FC03, CT7-SMB-FC02, CT7-WS-FC03, CT7-YP-FC04
123478-HxCDF	Instrument Blank (04/03/01)	0.12	0.60	CT4-WS-FC03, CT5-SMB-FC01, CT5-WS-FC05
OCDF	Instrument Blank (04/03/01)	0.16	1.6	CT4-WS-FC03
Total HxCDF	Instrument Blank (04/03/01)	0.12	1.2	CT1-WS-FC01, CT4-WS-FC03, CT5-SMB-FC01, CT5-WS-FC05, CT7-WS-FC03

Blank actions are based on Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996 and EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (01/31/01) criteria. Blank action levels are calculated as ten times the highest concentration of the contaminant determined in any blank for common contaminants (OCDD/OCDF and Total Homologues) and five times the highest concentration for all other analytes. The positive sample results that are less than the blank action level are reported as non-detects (U) at the reported concentration on the Data Summary Table.

**Sample Quantitation**

Concentrations quantitated below the lowest calibration standard are flagged (J) on the Data Summary Tables. Quantitation is not accurate when the reported results are below the lowest calibration standard.

**2378-TCDD Toxicity Equivalents (TE) and Isomer Specificity**

All TE values reported on the Data Summary Tables have been calculated by the ESAT data validator using the validated data discussed above in this report. As a result, the TE values in the Data Summary Table differ slightly from the values reported by the laboratory. The validated data accounts for blank contamination. The TE calculations include the reported EMPC values.

Ms. Christine Clark

August 2, 2002

B-02-08-Y-5

Revised: August 20, 2002

The Fish TEF values used by ESAT are the ones published in Environmental Health Perspectives, volume 106, Number 12, December 1998, "Toxic Equivalency factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife."

**System Performance**

No trends noted.

Very truly yours,

LOCKHEED ENVIRONMENTAL

Janine Bartels  
Principal Scientist

Louis Macri  
ESAT Program Manager

cc: Anna Krasko, EPA Project (DV Memorandum, Data Summary Table)

Attachments: Table I: Recommendation Summary Table  
Table II: Overall Evaluation of Data  
Data Summary Tables  
Data Validation Worksheets  
Analytical Method  
Communication/Phone Logs  
DQO Summary Form

Table I  
 Recommendation Summary Table for Dioxins/Furans  
 Lower Connecticut River Fish Study

Sample Nos.	CT1-SMB-FC02	CT1-WS-FC01	CT1-YP-FC05	CT4-SMB-FC04	CT4-WS-FC03	CT4-YP-FC03	CT5-SMB-FC01
Compound							
2378-TCDD	A	A	A	A	A	A	A
12378-PeCDD	A	A	A	A	A	A	A
123478-HxCDD	A	A	A	A	A	A	A
123678-HxCDD	A	A	A	A	A	A	A
123789-HxCDD	A	A	A	A	A	A	A
1234678-HpCDD	A	A	A	A	A	A	A
OCDD	J <sup>1</sup>						
2378-TCDF	A	A	A	A	A	A	A
12378-PeCDF	A	A	A	A	A	A	A
23478-PeCDF	A	A	A	A	A	A	A
123478-HxCDF	A	A	A	A	J <sup>1</sup>	A	J <sup>1</sup>
123678-HxCDF	A	A	A	A	A	A	A
123789-HxCDF	A	A	A	A	A	A	A
234678-HxCDF	A	A	A	A	A	A	A
1234678-HpCDF	A	A	A	A	A	A	A
1234789-HpCDF	A	A	A	A	A	A	A
OCDF	A	A	A	A	J <sup>1</sup>	A	A

Table I  
 Recommendation Summary Table for Dioxins/Furans  
 Lower Connecticut River Fish Study

Sample Nos.	CT5-WS-FC05	CT5-YP-FC03	CT7-SMB-FC02	CT7-WS-FC03	CT7-YP-FC04
Compound					
2378-TCDD	A	A	A	A	A
12378-PeCDD	A	A	A	A	A
123478-HxCDD	A	A	A	A	A
123678-HxCDD	A	A	A	A	A
123789-HxCDD	A	A	A	A	A
1234678-HpCDD	A	A	A	A	A
OCDD	J <sup>1</sup>				
2378-TCDF	A	A	A	A	A
12378-PeCDF	A	A	A	A	A
23478-PeCDF	A	A	A	A	A
123478-HxCDF	J <sup>1</sup>	A	A	A	A
123678-HxCDF	A	A	A	A	A
123789-HxCDF	A	A	A	A	A
234678-HxCDF	A	A	A	A	A
1234678-HpCDF	A	A	A	A	A
1234789-HpCDF	A	A	A	A	A
OCDF	A	A	A	A	A

Table I  
Recommendation Summary Table for Dioxins/Furans

- A - Accept results.
- J<sup>1</sup> - Method blank contamination; positive sample results less than the blank action level are reported as non-detects (U) at the concentration reported.

EPA-NE - Data Validation Worksheet

**Overall Evaluation of Data - Data Validation Memorandum - Table II**

DIOXIN/FURAN ANALYSIS					
DQO (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability	Potential Usability Issues
		Analytical Error	Sampling Error*		
<p>To perform a watershed-wide fish tissue monitoring program which will document current conditions with regard to contaminant concentrations of representative fish species from the mainstem of the Connecticut River. This information will enable states to revise human health risk assessments and will provide a basis for trend analysis when subsequent sampling is performed by monitoring teams.</p>	<p>Yes, Sampling Method appropriate for all samples</p> <p>Yes, Analytical Method appropriate for all samples.</p>	<p>Refer to qualification in R/S Key on Table I:</p> <p>J<sup>1</sup></p>	<p>Refer to qualification in R/S Key on Table I:</p> <p>NA</p>	<p>**</p>	<p>The laboratory stated that the SRM data was lost due to computer disk failure and the laboratory. However, the laboratory did analyze a water and a soil Pre-award DLM01.3 PE sample for Dioxin and Furan Analysis by EPA Method 1613B in the same time frame as the fish tissue analysis. The laboratory scored 100% for the two PE samples, demonstrating good accuracy.</p> <p>The laboratory did not analyze a duplicate sample from this batch of field samples. The laboratory was contacted and asked to provide the duplicate analyzed in the overall batch. The duplicate sample analyzed had acceptable precision. The laboratory demonstrated good duplicate precision. The results can be found in Attachment A.</p> <p>The initial and continuing calibrations were run at the proper intervals and met method criteria.</p> <p>The method and instrument blanks had low level contamination. This contamination problem does not have an impact on the usability of the data. Contaminants were found in both the blank and the field samples. When the analyte concentrations in the field samples were less than the corresponding blank action level, the field sample results reported by the laboratory are qualified as non-detected (U) on the Data Summary Table. See Table I for a summary of the qualifiers applied due to blank contamination.</p> <p>Data validation indicated minor data quality problems which do not significantly impact the usability of the data. See the discussion below for details. The reported results are usable for the site objectives.</p>

\* The evaluation of "sampling error" cannot be completely assessed in the data validation.

\*\* Sampling variability is not assessed in data validation.

Validator: \_\_\_\_\_

Date: \_\_\_\_\_

### **D-3. "Dioxin-like" Coplanar PCBs**

The data for 15 fish tissue samples analyzed for the 12 coplanar PCBs was available for review from ERI. These results were carried through a Tier II data validation.

The following QC check were performed and found to be within acceptable limits: preservation and holding times, initial and continuing calibration, chromatographic resolution check, and blank runs.

Eleven samples had acceptable surrogate recoveries; four of the samples had slightly high surrogate recoveries and were estimated. The laboratory did not have a Standard Reference Material sample or a matrix spike for this set of samples. As a consequence all the results are estimated. But given the acceptable values for the other QC parameters, it was decided that these estimated results could be used for screening level comparisons in the Study.

The results ranged from 0.39 to 43 ppb (ng/g or ug/kg) well above the ~ 0.35 ppb detection limit reported by the laboratory. The laboratory did achieve the Project Quantitation Limit of 2 ppb.

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US EPA Approval Signature

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Date

November 28, 2003

Revised: December 26, 2003

Ms. Christine Clark  
Regional Sample Control Custodian  
Office of Environmental Measurement and Evaluation  
U.S. EPA Region I  
11 Technology Drive  
North Chelmsford, MA 01863

Re: TO No. 17, Task No. 2, TDF No. 1076  
Case No. Connecticut River Fish Study - Co-planar PCBs  
Environmental Research Institute - Storrs, CT.  
Connecticut River

Co-Planar PCB Congeners: 15/Fish Tissue/CT3-SB-FI01, CT3-SB-FI02, CT3-SB-FI03,  
CT3-SB-FI04, CT3-SB-OI01, CT5-YP-OC01,  
CT5-YP-OC02, CT5-YP-OC03, CT5-YP-  
OC04, CT5-YP-OC05, CT6-SMB-FC01, CT6-  
SMB-FC02, CT6-SMB-FC03, CT6-SMB-FC04,  
CT6-SMB-FC05

Dear Ms. Clark:

A modified Tier II data validation was performed on the co-planar PCB congeners analytical data for 15 fish tissue samples collected from the Connecticut River by the following state agencies: CTDEP, MADEP, NHDES with USFWS, and VTDEC for NEIWPC and the U.S. EPA. The samples were prepared by the U.S. EPA's New England Regional Laboratory and sent to the Environmental Research Institute of the University of Connecticut in Storrs, CT. The samples were analyzed according to the NOAA Technical Memorandum NOS ORCA 130 (modified method), March 1998 and criteria in the Connecticut River Fish Tissue Study Quality Assurance Project Plan (QAPP), April 6, 2000. The samples were validated using first the criteria in the Connecticut River QAPP referenced above, as well as additional criteria in NOAA Technical Memorandum NOS ORCA 130 (modified method), March 1998, defaulting next to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996 criteria, and finally to EPA Region I's Environmental Services Assistance Team Toxic PCB and Total Homologue Data Validation SOP ESAT-01-0008 Draft (12/20/02). The data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- \* ● Preservation and Technical Holding Times
- NR ● PE Samples/Accuracy Check

- \* ● Initial and Continuing Calibrations
- \* ● Chromatographic Resolution
- \* ● Blanks
- NR ● Matrix Spike/Matrix Spike Duplicate
- NR ● Laboratory and Field Duplicates
- Surrogate Standards
- \* ● Sample Analysis and Identification
- Sample Quantitation
- 2378-TCDD Toxicity Equivalents (TE) and Isomer Specificity
- \* ● Required Sample Reruns
- System Performance

\* - All criteria were met for this parameter.

NR - Not Reported by the Laboratory, but were required in the QAPP.

The following information was used to generate the Data Validation Memorandum attachments:

Table I: Recommendation Summary Table - summarizes validation recommendations

Table II: Overall Evaluation of Data - summarizes site objectives and potential usability issues

Data Summary Tables - summarize accepted, qualified, and rejected data

#### Overall Evaluation of Data and Potential Usability Issues

The following is a summary of the site investigation/assessment objectives:

- To perform a watershed-wide fish tissue monitoring program which will document current conditions with regard to contaminant concentrations of representative fish species from the mainstem of the Connecticut River. This information will enable states to revise human health risk assessments and will provide a basis for trend analysis when subsequent sampling is performed by monitoring teams.

The laboratory did not analyze a SRM, MS/MSD, or a duplicate sample, the accuracy and precision of the results could not conclusively be demonstrated. Therefore, all the results are estimated (J). The reported results are usable for screening purposes only. Screening data can be thought of as a qualitative indication of the presence of the analytes of concern. Screening data gives an indication of where future work needs to be directed.

The initial and continuing calibrations were run at the proper intervals and met method criteria.

#### Data Completeness

The laboratory submitted the results for all the co-planar PCB analyses in a report entitled "Data Report - Connecticut River Fish Tissue Study" March 30, 2001. They also supplied the Quantitation Reports, chromatograms, and surrogate recoveries for the fifteen tissue samples in this validation. The co-planar congeners requiring manual integration were marked with an "M" on the Quantitation Reports. However, the laboratory did not provide example chromatograms showing how the manual integrations were performed.

The following discrepancies and/or missing information were noted in the material supplied by the laboratory:

1. The laboratory was asked to submit the final Form Is for all of the co-planer PCBs and associated blanks. The following information is needed on the Form Is:
  - Extraction and analysis date(s)
  - Sample wet weight
  - GPC TED factor
  - Volume taken
  - Total volume
  - Dilution factors
2. The laboratory was asked to submit the % lipids for samples CT3-SB-OI01 and CT5-YP-OC01.
3. The laboratory was asked to submit the surrogate % recoveries.

Items 1 thru 3 were requested via the TOPO in August 2003 and were received via the TOPO in September, October, and November 2003. All items are adequately addressed except for item 2.

For item 2, the laboratory was unable to locate the % lipids results for sample CT5-YP-OC01.

#### Surrogate Standards

The following table summarizes the surrogate standards with recoveries which do not meet the acceptance criterion of 30-130% specified in Connecticut River Fish Tissue Study Quality Assurance Project Plan (QAPP), April 6, 2000:

Surrogate Standard	% Recovery	Action		Affected Samples
		Positive Detects	NDs	
OCN	138	J	UJ	CT5 YP OC04

Surrogate Standard	% Recovery	Action		Affected Samples
		Positive Detects	NDs	
OCN	137	J	UJ	CT6 SMB FC01
OCN	138	J	UJ	CT6 SMB FC02
OCN	162	J	UJ	CT6 SMB FC05

### OCN - Octachloronaphthalene

The corresponding non-labeled congeners are estimated as shown in the table because surrogate standard recoveries are outside criterion.

### Sample Quantitation

The laboratory originally reported concentrations for positive detects with a percent difference less than 25% between the two analytical columns with concentrations higher than the 10 ng/ml (in solution) method detection limit. However, the laboratory did not use this criterion consistently when reporting the results. The validator used professional judgement to report concentrations for positive detects with a percent difference less than 100% between the two analytical columns with concentrations higher than the 10 ng/ml (in solution) method detection limit.

The laboratory did achieve the Project Quantitation Limits of 2 ug/Kg.

The sample extracts were concentrated to a volume of 0.25 ml instead of 1.0 ml. The laboratory did not take into consideration the resulting dilution factor of 4. Therefore, the reported values were four times higher than actual. The data validator corrected the reported values for the factor of four. The laboratory corrected their copy of the reported results.

### 2378-TCDD Toxicity Equivalents (TE) and Isomer Specificity

All TE values reported on the Data Summary Tables have been calculated by the ESAT data validator using the validated data discussed above in this report. As a result, the TE values in the Data Summary Table differ slightly from the values reported by the laboratory. The Fish TEF values used by ESAT are the ones published in Environmental Health Perspectives, volume 106, Number 12, December 1998, "Toxic Equivalency factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife."

### System Performance

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Revised: December 26, 2003

The laboratory did not analyze a SRM, MS/MSD, or a duplicate sample, the accuracy and precision of the results could not conclusively be demonstrated. Therefore, all the results are estimated (J). The reported results are usable for screening purposes only. Screening data can be thought of as a qualitative indication of the presence of the analytes of concern. Screening data gives an indication of where future work needs to be directed.

Very truly yours,

LOCKHEED ENVIRONMENTAL

Janine Bartels  
Principal Scientist

Louis Macri  
ESAT Program Manager

cc: Peter Nolan, EPA Project Manager (DV Memorandum, Data Summary Table)

Attachments: Table I: Recommendation Summary Table  
Table II: Overall Evaluation of Data  
Data Summary Tables  
Data Validation Worksheets  
QAPP  
Analytical Method  
Communication/Phone Logs  
Raw Data

Table I  
 Recommendation Summary Table for Co-Planar PCB Congeners  
 Connecticut River Site  
 Case No.: Connecticut River Fish Study/SDG No. Co-planar PCBs

Sample Nos.	CT3-SB-FI01	CT3-SB-FI02	CT3-SB-FI03	CT3-SB-FI04	CT3-SB-OI01	CT5-YP-OC01	CT5-YP-OC02	CT5-YP-OC03
Compound								
33'44'-TetraCB (#77)	J <sup>1</sup>							
344'5'-TetraCB (#81)	J <sup>1</sup>							
2'344'5'-PentaCB (#123)	J <sup>1</sup>							
23'44'5'-PentaCB (#118)	J <sup>1</sup>							
2344'5'-PentaCB (#114)	J <sup>1</sup>							
233'44'-PentaCB (#105)	J <sup>1</sup>							
33'44'5'-PentaCB (#126)	J <sup>1</sup>							
23'44'55'-HexaCB (#167)	J <sup>1</sup>							
233'44'5'-HexaCB (#156)	J <sup>1</sup>							
233'44'5'-HexaCB (#157)	J <sup>1</sup>							
33'44'55'-HexaCB (#169)	J <sup>1</sup>							
233'44'55'-HeptaCB (#189)	J <sup>1</sup>							

Table I  
 Recommendation Summary Table for Co-Planar PCB Congeners  
 Connecticut River Site  
 Case No.: Connecticut River Fish Study/SDG No. Co-planar PCBs

Sample Nos.	CT5-YP-OC04	CT5-YP-OC05	CT6-SMB-FC01	CT6-SMB-FC02	CT6-SMB-FC03	CT6-SMB-FC04	CT6-SMB-FC05
Compound							
33'44'-TetraCB (#77)	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1,2</sup>	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1</sup>	J <sup>1,2</sup>
344'5'-TetraCB (#81)	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1,2</sup>	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1</sup>	J <sup>1,2</sup>
2'344'5'-PentaCB (#123)	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1,2</sup>	J <sup>1,2</sup> J	<sup>1</sup>	J <sup>1</sup>	J <sup>1,2</sup>
23'44'5'-PentaCB (#118)	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1,2</sup>	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1</sup>	J <sup>1,2</sup>
2344'5'-PentaCB (#114)	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1,2</sup>	J <sup>1,2</sup> J	<sup>1</sup>	J <sup>1</sup>	J <sup>1,2</sup>
233'44'-PentaCB (#105)	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1,2</sup>	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1</sup>	J <sup>1,2</sup>
33'44'5'-PentaCB (#126)	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1,2</sup>	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1</sup>	J <sup>1,2</sup>
23'44'55'-HexaCB (#167)	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1,2</sup>	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1</sup>	J <sup>1,2</sup>
233'44'5'-HexaCB (#156)	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1,2</sup>	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1</sup>	J <sup>1,2</sup>
233'44'5'-HexaCB (#157)	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1,2</sup>	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1</sup>	J <sup>1,2</sup>
33'44'55'-HexaCB (#169)	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1,2</sup>	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1</sup>	J <sup>1,2</sup>
233'44'55'-HeptaCB (#189)	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1,2</sup>	J <sup>1,2</sup>	J <sup>1</sup>	J <sup>1</sup>	J <sup>1,2</sup>

Table I  
Recommendation Summary Table for Co-Planar PCB Congeners

- A - Accept all results.
- J<sup>1</sup> - Precision and accuracy was not demonstrated; J detects, UJ non-detects.
- J<sup>2</sup> - Surrogate recoveries are outside criterion; J detects, UJ non-detects.

EPA-NE - Data Validation Worksheet

Overall Evaluation of Data - Data Validation Memorandum - Table II

Co-PLANAR PCB ANALYSIS					
DQO (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability	Potential Usability Issues
		Analytical Error	Sampling Error*		
To perform a watershed-wide fish tissue monitoring program which will document current conditions with regard to contaminant concentrations of representative fish species from the mainstem of the Connecticut River. This information will enable states to revise human health risk assessments and will provide a basis for trend analysis when subsequent sampling is performed by monitoring teams.	Yes, Sampling Method appropriate for all samples  Yes, Analytical Method appropriate for all samples.	Refer to qualification in R/S Key on Table I:  J <sup>1,2</sup>	Refer to qualification in R/S Key on Table I:  NA	**	The laboratory did not analyze a SRM, MS/MSD, or a duplicate sample, the accuracy and precision of the results could not conclusively be demonstrated. Therefore, all the results are estimated (J). The reported results are usable for screening purposes only. Screening data can be thought of as a qualitative indication of the presence of the analytes of concern. Screening data gives an indication of where future work needs to be directed.

\* The evaluation of "sampling error" cannot be completely assessed in the data validation.

\*\* Sampling variability is not assessed in data validation.

NA Not Applicable

Validator: \_\_\_\_\_

Date: \_\_\_\_\_

#### **D-4. Chlorinated Pesticides and Non-Coplanar PCBs**

The data from 44 fish tissue samples analyzed for chlorinated pesticides was available for review from ERI. A Tier III data validation was carried out on the data.

The following QC parameters were checked and found to be acceptable: sample preservation and holding time, blank analyses, surrogate recoveries, and analyte identification. Several of the other QC parameters were found to have exceedances. For these instance the qualification actions recommended by the DV functional guideline were applied to the results.

The chlorinated pesticide results ranged from a low of 0.24 ppb (ng/g or ug/kg) for gamma-BHC to a high of 93 ppb for p,p'-DDE. Indeed p,p'-DDE was the major contaminant having been found in all the samples. The reported detection limits for the chlorinated pesticides averaged around 0.6 ppb. The laboratory did achieve the Project Quantitation Limit of 2 ppb.

Validation resulted in the estimation (J) of all the PCB results. The results ranged from a high of 92 ppb for PCB 153 down to values near the detection limit, e.g., 0.37 (ng/g or ug/kg) for PCB 195. Significant hits were noted for PCB 118, PCB 153, PCB 138, and PCB 187 in many of the samples. The detection limits for the PCBs averaged around 0.6 ppb. The laboratory did achieve the Project Quantitation Limit of 2 ppb.

Even though some of the chlorinated pesticide data in this set had to be rejected due to the QC exceedances, the positive results for p,p'-DDE and p,p'-DDT across all the samples will have a significant impact and should not be ignored. However, the over all quality of this data set is the lowest of the four that were considered.

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US EPA Approval Signature

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Date

Ms. Christine Clark  
Regional Sample Control Center  
U.S. EPA Region I  
11 Technology Drive  
North Chelmsford, Massachusetts 01863

November 21, 2002

RE: TO No. 9, Task No. 2, TDF No. 421  
Connecticut River Fish Tissue Study  
Environmental Research Institute (ERI), UCONN  
Pesticides/PCB Congeners Analyses

Pesticides/PCB Congeners:

44/ Fish Tissue/	CT-BT-FC01 to CT-BT-FC05, CT1-SMB-FC01 to CT1-SMB-FC05, CT2-SMB-FC01 to CT2-SMB-FC05, CT3-SB-FI01 to CT3-SB-FI04, CT3-SMB-FC01 to CT3-SMB-FC05, CT4-SMB-FC01 to CT4-SMB-FC05, CT5-SMB-FC01 to CT5-SMB-FC05, CT6-SMB-FC01 to CT6-SMB-FC05, CT7-SMB-FC01 to CT7-SMB-FC05
5/Aqueous Equipment Blanks/	Rinsate Blk (Phase I) (8/7/00), Rinsate Blk (Phase II) (8/7/00), Phase I (Blank) (10/23/00), Phase II (Blank) (10/23/00), Phase I Blank (11/1/00)
1/Tissue SRM/	SRM 1945 "Organics in Whale Blubber" obtained from NOAA/NMFS NIST

Dear Ms. Clark:

A Tier III data validation was performed on the organic analytical data for 44 tissue samples and one tissue SRM. The five aqueous equipment blanks were not validated since the associated raw data were not available from the laboratory. The tissue samples were collected by the following state agencies: CTDEP, MADEP, NHDES with USFWS, and VTDEC for the NEIWPC and the U.S. EPA in the Connecticut River. The samples were analyzed according to the NOAA Technical Memorandum NOS ORCA 130 (modified method) and ERI's laboratory SOP for the Analysis of Pesticides and PCB Congeners in Tissue Samples. The samples were validated according to the NOAA Technical Memorandum NOS ORCA 130 (modified method), ERI's laboratory SOP for the Analysis of Pesticides and PCB Congeners in Tissue Samples, and criteria in the Connecticut River Fish Tissue Study Quality Assurance Project Plan (QAPP), April 6, 2000; defaulting next to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating

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Environmental Analyses, December 1996 criteria, and finally to EPA Region I's Environmental Services Assistance Team Organic Data Validation SOP ESAT-01-0082 (1/31/01).

The data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness (CSF Audit - Tier I)
- \* ● Preservation and Technical Holding Times
- PE Samples/Accuracy Check
- GC/ECD Instrument Performance Check
- Initial Calibration and Continuing Calibration Verification
- \* ● Blanks
- \* ● Surrogate Analytes
- \* ● Analyte Identification
- Matrix Spike/Matrix Spike Duplicate
- NA ● Laboratory and Field Duplicates
- NA ● Instrument Sensitivity Check
- Sample Quantitation
- System Performance

\* - All criteria were met for this parameter.

NA - Not applicable.

The following information was used to generate the Data Validation Memorandum attachments:

Table I: Recommendation Summary Table - summarizes validation recommendations

Table II: Overall Evaluation of Data - summarizes Site DQOs and potential usability issues

Data Summary Tables - summarize accepted, qualified, and rejected data

Overall Evaluation of Data and Potential Usability Issues

The following is a summary of the site DQOs:

- To perform a watershed-wide fish tissue monitoring program which will document current conditions with regard to contaminant concentrations of representative fish species from the mainstem of the Connecticut River. This information will enable states to revise human health risk assessments and will provide a basis for trend analysis when subsequent sampling is performed by monitoring teams.

One Standard Reference Material sample (SRM 1945 "Organics in Whale Blubber") obtained from NOAA/NMFS NIST (intercomparison exercise) was analyzed for this project. Sixteen out of the 30 spiked compounds with certified values had recoveries within established acceptance limits. For the compounds that are outside QC limits, five (hexachlorobenzene, PCB 52, PCB

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105, PCB 138, PCB 195) were recovered outside the lower limit and nine (o,p'-DDT, o,p'-DDE, p,p'-DDE, o,p'-DDD, oxychlordan, mirex, PCB 180, PCB 206, PCB 209) were recovered above the upper limit. The analytes that do not meet criteria are qualified accordingly for all samples.

The five rinsate blanks sampled on 8/7/00, 10/23/00, and 11/1/00 are not validated since associated raw data for the rinsate blanks and supporting laboratory benchsheet documentation were not supplied by the laboratory.

The laboratory was unable to recover the compounds hexachlorobenzene, oxychlordan, o,p'-DDE, trans-nonachlor, o,p'-DDT, cis-nonachlor, endosulfan II, and mirex in the matrix spike samples. All endosulfan II and mirex results are non-detected and are rejected (R). All non-detected hexachlorobenzene results are rejected (R) except for sample CT3-SB-FI02 which is estimated (J). All non-detected o,p'-DDE results are rejected (R) except for sample CT3-SB-FI04 which is estimated (J). Oxychlordan, trans-Nonachlor, o,p'-DDT, and cis-Nonachlor results in the samples are mixed with non-detects and positive detects. For these compounds, non-detects are rejected (R) and positive detects are estimated (J).

For the compounds that were not recovered in the matrix spike samples, all compounds were recovered in the SRM with the exception of endosulfan II which was not a spiked compound in the SRM. However, all of these compounds were outside QC limits in the SRM except for trans-nonachlor and cis-nonachlor. Hexachlorobenzene recovered below the lower QC limit and oxychlordan, o,p'-DDE, o,p'-DDT, and mirex recovered above the upper QC limit.

It is noted that the NIST/NOAA intercomparison exercise SRM was analyzed with some of the samples for this project but was not extracted along with any of them. The SRM was extracted some time before 9/29/00, which was the date the laboratory reported results to NIST for evaluation, while the samples were extracted from 8/17/00 to 11/15/00. Inspection of the sample extraction logs do not show the SRM to be extracted with them. Therefore, the matrix spike results are more accurate indicators of the laboratory's method performance.

Data validation identified the data quality issues which required qualification or rejection of specific results. The rejected (R) data cannot be used for the site objectives. The remaining data are qualified as estimated (J). Estimated data are often used in human health risk assessments. All the spiked surrogate compounds had percent recoveries within their acceptable ranges which supports the use of the J qualified data for the site objectives. Acceptable quality control results which support the use of the qualified data include holding times, available initial calibrations, continuing calibration verifications, and pesticide degradation checks. The majority of matrix spike compounds percent recoveries were within acceptable ranges and there were only minor exceedences in the continuing calibration verifications.

#### Data Completeness

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The following data or information in the data package had discrepancies and/or were missing and were requested from the laboratory:

1. A copy of the analytical method NOAA ORCA 130.
2. Tabulation of the initial calibration and continuing calibration Response Factors, %RSD, %D, and %Breakdowns were not submitted for any of the associated calibration standards.
3. Tabulation of the internal and cleanup standard % recoveries were not submitted for any of the associated samples and QC.
4. Tabulation of results and data files were not submitted for any of the associated Rinse Blanks, instrument blanks, or SRMs.
5. A copy of the laboratory's analytical SOP and/or an itemization of the modifications applied to method NOAA ORCA 130.
6. For the analytical sequence T001127.s, the initial calibration data were not submitted on the electronic data CD. According to the instrument run log, the file names are P112703.d through P112707.d. Submit the missing information as hardcopy or electronic data.
7. The data file T022624.d from the analytical sequence T010226.s did not have an associated quant results file. Only a raw unlabeled chromatogram could be generated. Provide the missing quant report file, either hardcopy or electronic file.
8. The raw result (quant report concentration) cannot be reproduced by the validator. Provide an example calculation for the quant report value, for each column, using a relevant sample.
9. The laboratory reported "ND" for all non-detected analytes in each sample. Provide the sample specific detection limits for all non-detected results for each sample.
10. Clarify the procedure and criteria used to establish retention time windows for analytes.
11. Clarify the procedure used to determine which value (from which column) was reported for a detected analyte.
12. The MS/MSD %Recoveries reported do not appear to have the native amount present in the sample subtracted prior to calculating recovery. Verify the recoveries and resubmit

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corrected forms if necessary.

Items 1 through 4 were requested from the laboratory via the TOPO on 2/12/02. Items 5 through 12 were requested from the laboratory via the TOPO on 8/9/02.

Item 1 was adequately addressed on 6/6/02. Item 2 was adequately addressed on 4/15/02. Item 3 was adequately addressed on 3/19/02. Item 4 was adequately addressed on 7/16/02. Items 5 and 12 were adequately addressed on 9/27/02. Items 6, 7, 10, and 11 were adequately addressed on 8/29/02. Item 8 was adequately addressed on 10/1/02. Item 9 was adequately addressed on 8/19/02.

PE Samples/Accuracy Check

One Standard Reference Material sample (SRM 1945 “Organics in Whale Blubber”) obtained from NOAA/NMFS NIST (intercomparison exercise) was analyzed for this project. Sixteen out of the 30 spiked compounds with certified values had recoveries within established acceptance limits.

It is noted that the NIST/NOAA intercomparison exercise SRM was analyzed with some of the samples for this project but was not extracted along with any of them. The SRM was extracted some time before 9/29/00, which was the date the laboratory reported results to the NIST for evaluation, while the samples were extracted from 8/17/00 to 11/15/00. Inspection of the sample extraction logs do not show the SRM to be extracted with them. Therefore, the matrix spike results are more accurate indicators of the laboratory’s method performance.

The following table summarizes the pesticide/PCB compounds that failed to meet the QC limits.

Compound	Value (ng/g)	QC limits (ng/g)	Action		Affected Samples
			Positive Detects	NDs	
o, p'-DDT	122	106 ± 14	J	A	All
o, p'-DDE	15.0	12.3 ± 0.87	J	A	All
p, p'-DDE	533	445 ± 37	J	A	All
o, p'-DDD	24.5	18.1 ± 2.8	J	A	All
Hexachlorobenzene	26.7	32.9 ± 1.7	J	UJ	All
Oxychlorodane	21.9	19.8 ± 1.9	J	A	All
Mirex	28.7	18.9 ± 2.8	J	A	All
PCB 52	38.6	43.6 ± 2.5	J	UJ	All
PCB 105	25.0	30.1 ± 2.3	J	UJ	All

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Compound	Value (ng/g)	QC limits (ng/g)	Action		Affected Samples
			Positive Detects	NDs	
PCB 138	123	131.5 ± 7.4	J	UJ	All
PCB 180	116	107 ± 5.3	J	A	All
PCB 195	12.3	17.7 ± 4.3	J	UJ	All
PCB 206	34.1	31.1 ± 2.7	J	A	All
PCB 209	15.4	11 ± 1.1	J	A	All

### Instrument Performance Check

Percent breakdown results and initial calibration results are not available for analytical sequence T0913.s due to a computer error at the laboratory. Please see initial calibration section.

### Initial Calibration

Percent breakdown and initial calibration results are not available for review by the validator for analytical sequence T0913.s due to a computer error at the laboratory. Professional judgment is used to take no action for the missing information since associated continuing calibration verification standards results are available. The associated samples CT3-SMB-FC01, CT3-SMB-FC02, CT3-SMB-FC04, and CT3-SMB-FC05 are estimated (J, UJ) for affected noncompliant analytes in the associated continuing calibration verification standards.

The laboratory inadvertently analyzed the low standard at 5.0 ng/mL in all eight initial calibrations instead of 2.5 ng/mL (indicated on the raw data) as required by ERI's laboratory *SOP for Analysis of Pesticides and PCB Congeners in Tissue Samples*. The validator increased sample specific quantitation limits for all samples accordingly. This does not adversely affect the results and it is noted that sample quantitation limits are below the project action limits.

### Continuing Calibration Verification

The following table summarizes the Continuing Calibration Verification (CCV) results which do not meet the Connecticut River Fish Tissue Study Quality Assurance Project Plan (QAPP), April 6, 2000 criterion of 80%-120% and the resulting sample qualifications:

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CCV	Date/ Time	Instr.	Column	Compound	%Rec.	Action		Samples Affected
						Positive Detects	NDs	
P091343	9/15/00 01:15	GC11	1	Heptachlor	125	J	UJ	CT3-SMB-FC01 CT3-SMB-FC02 CT3-SMB-FC04 CT3-SMB-FC05
			2	Heptachlor	130	J	UJ	
			2	Dieldrin	121	J	UJ	
			2	o, p'-DDD	122	J	UJ	
			1	Endrin	138	J	UJ	
			2	Endrin	154	J	UJ	
			1	Methoxychlor	123	J	UJ	
P091352a	9/15/00 09:38	GC11	1	Heptachlor	123	J	UJ	CT3-SMB-FC01 CT3-SMB-FC02 CT3-SMB-FC04 CT3-SMB-FC05
			2	Heptachlor	124	J	UJ	
			1	Heptachlor epoxide	66	J	UJ	
			1	Endrin	128	J	UJ	
			2	Endrin	141	J	UJ	
P091353	9/15/00 10:27	GC11	1	PCB 195	76	J	UJ	CT3-SMB-FC01 CT3-SMB-FC02 CT3-SMB-FC04 CT3-SMB-FC05
			2	PCB 195	79	J	UJ	
			1	PCB 170	79	J	UJ	
P110831	11/9/00 21:10	GCECD	2	Methoxychlor	121	J	UJ	CT1-SMB-FC01 to CT1- SMB-FC05 CT2-SMB-FC03 CT2-SMB-FC04
P110852	11/10/00 20:10	GCECD	2	Heptachlor	128	J	UJ	CT2-SMB-FC03 CT2-SMB-FC04 CT3-SMB-FC03
			2	gamma- Chlordane	48	J	UJ	
			1	Endrin	136	J	UJ	
			2	Endrin	140	J	UJ	
			1	Methoxychlor	128	J	UJ	
			2	Methoxychlor	134	J	UJ	
			2	PCB 126	123	J	UJ	

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CCV	Date/ Time	Instr.	Column	Compound	%Rec.	Action		Samples Affected
						Positive Detects	NDs	
P110873	11/11/00 19:11	GCECD	2	gamma- Chlordane	49	J	UJ	CT3-SMB-FC03
			1	Methoxychlor	128	J	UJ	
			2	Methoxychlor	132	J	UJ	
P111790	11/21/00 15:33	GCECD	2	gamma- Chlordane	44	J	UJ	CT2-SMB-FC01 CT2-SMB-FC02 CT2-SMB-FC05
			2	Endosulfan II	162	J	UJ	
P112750	11/29/00 19:23	GCECD	2	p, p'-DDT	124	J	UJ	CT5-SMB-FC01 to CT5- SMB-FC05 CT4-SMB-FC01 to CT4- SMB-FC05
P112771	11/30/00 17:40	GCECD	2	p, p'-DDT	121	J	UJ	CT4-SMB-FC01 to CT4- SMB-FC05
P120455	12/6/00 22:05	GCECD	2	Heptachlor	121	J	UJ	CT7-SMB-FC01 CT7-SMB-FC02 CT7-SMB-FC03 CT7-SMB-FC05
			2	Endrin	121	J	UJ	
			2	p, p'-DDT	122	J	UJ	
			1	Methoxychlor	125	J	UJ	
			2	Methoxychlor	125	J	UJ	
P120466	12/7/00 09:44	GCECD	2	o, p'-DDT	121	J	UJ	CT7-SMB-FC01 CT7-SMB-FC02 CT7-SMB-FC03 CT7-SMB-FC05
			2	Endosulfan II	174	J	UJ	
			1	Methoxychlor	124	J	UJ	
			2	Methoxychlor	127	J	UJ	
			1	PCB 126	123	J	UJ	
T120780	12/11/00 01:25	GCECD	1	Heptachlor epoxide	129	J	UJ	CT-BT-FC01 to CT-BT- FC05
T120794	12/11/00 16:29	GCECD	1	Heptachlor epoxide	126	J	UJ	CT-BT-FC01 to CT-BT- FC05
T022617	2/27/01 01:34	GCECD	2	o, p'-DDT	77	J	UJ	CT7-SMB-FC04
			2	Endrin aldehyde	122	J	UJ	

The data associated with the noncompliant continuing calibration verification results are

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estimated (J, UJ) due to the recoveries outside acceptance range. The quantitation of the associated analytes in the samples could be biased.

Matrix Spike/Matrix Spike Duplicate

Seven MS/MSD pairs were evaluated for this SDG: CT-BT-FC04 MS/MSD, CT2-SMB-FC01 MS/MSD, CT3-SB-FI02 MS/MSD, CT3-SB-FI03 MS/MSD, CT4-SMB-FC04 MS/MSD, CT5-SMB-FC01 MS/MSD, CT7-SMB-FC04 MS/MSD.

The tables below summarize the MS/MSD results which do not meet the recovery criteria of 30-130% and/or RPD  $\leq$  40% as specified in the Connecticut River Fish Tissue Study Quality Assurance Project Plan (QAPP), April 6, 2000.

Please note that %RPD values reported in the table are calculated prior to rounding.

CT-BT-FC04					
Compound	MS % Rec. 30-130%	MSD % Rec. 30-130%	% RPD $\leq$ 40%	Action	
				Positive Detects	NDs
Hexachlorobenzene	NR	NR	NC	J	R
Oxychlorodane	NR	6	NC	J	R
o, p'-DDE	4	5	17*	J	R
trans-Nonachlor	4	5	15*	J	R
o, p'-DDT	NR	NR	NC	J	R
cis-Nonachlor	5	6	14*	J	R
Endosulfan II	NR	4	NC	J	R
Endrin ketone	28	27	4*	J	UJ
Mirex	4	3	18*	J	R

NR Not recovered

NC Not calculated

\* Recoveries and/or RPDs were acceptable

CT2-SMB-FC01					
Compound	MS % Rec. 30-130%	MSD % Rec. 30-130%	% RPD $\leq$ 40%	Action	
				Positive Detects	NDs
Hexachlorobenzene	NR	NR	NC	J	R
Oxychlorodane	NR	NR	NC	J	R
o, p'-DDE	2	NR	17*	J	R
trans-Nonachlor	NR	NR	NC	J	R
p, p'-DDE	56*	31*	57	J	UJ
o, p'-DDT	NR	NR	NC	J	R
cis-Nonachlor	16	13	25*	J	UJ

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CT2-SMB-FC01					
Compound	MS % Rec. 30-130%	MSD % Rec. 30-130%	% RPD ≤40%	Action	
				Positive Detects	NDs
Endosulfan II	11	9	12*	J	R
Mirex	9	8	14*	J	R
PCB 153	73*	46*	47	J	UJ
PCB 206	132	111*	17*	J	A

NR Not recovered

NC Not calculated

\* Recoveries and/or RPDs were acceptable

CT3-SB-FI02					
Compound	MS % Rec. 30-130%	MSD % Rec. 30-130%	% RPD ≤40%	Action	
				Positive Detects	NDs
Hexachlorobenzene	NR	NR	NC	J	R
Oxychlorane	4	3	33*	J	R
o, p'-DDE	13	13	1*	J	UJ
trans-Nonachlor	NR	NR	NC	J	R
o, p'-DDD	200	207	3*	J	A
o, p'-DDT	NR	NR	NC	J	R
Endosulfan sulfate	138	129*	6*	J	A
Mirex	14	15	11*	J	UJ
PCB 101 (dil)	114*	131	14*	J	A
PCB 187 (dil)	144	144	0*	J	A

NR Not recovered

NC Not calculated

\* Recoveries and/or RPDs were acceptable

(dil) Concentration reported from diluted analyses (1:5) since over calibration range in 1:1 analyses.

CT3-SB-FI03					
Compound	MS % Rec. 30-130%	MSD % Rec. 30-130%	% RPD ≤40%	Action	
				Positive Detects	NDs
Hexachlorobenzene	5	4	23*	J	R
Oxychlorane	NR	NR	NC	J	R
o, p'-DDE	11	12	9*	J	UJ
trans-Nonachlor	NR	NR	NC	J	R
o, p'-DDD	241	260	8*	J	A
o, p'-DDT	NR	NR	NC	J	R
Endosulfan II	29	5	136	J	R
Mirex	15	17	9*	J	UJ
PCB 66	158	166	5*	J	A

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CT3-SB-FI03					
Compound	MS % Rec. 30-130%	MSD % Rec. 30-130%	% RPD ≤40%	Action	
				Positive Detects	NDs
PCB 105	122*	133	9*	J	A
PCB 187 (dil)	147	178	19*	J	A
PCB 180 (dil)	123*	174	34*	J	A

NR Not recovered

NC Not calculated

\* Recoveries and/or RPDs were acceptable

(dil) Concentration reported from diluted analyses (1:5) since over calibration range in 1:1 analyses.

CT4-SMB-FC04					
Compound	MS % Rec. 30-130%	MSD % Rec. 30-130%	% RPD ≤40%	Action	
				Positive Detects	NDs
Hexachlorobenzene	NR	NR	NC	J	R
Oxychlorodane	3	NR	NC	J	R
o, p'-DDE	NR	NR	NC	J	R
trans-Nonachlor	12	8	40*	J	R
o, p'-DDD	43*	22	63	J	UJ
o, p'-DDT	NR	NR	NC	J	R
cis-Nonachlor	12	8	38*	J	R
Endosulfan II	14	20	38*	J	UJ
Mirex	14	8	52	J	R
PCB 118	146	99*	39*	J	A

NR Not recovered

NC Not calculated

\* Recoveries and/or RPDs were acceptable

CT5-SMB-FC01					
Compound	MS % Rec. 30-130%	MSD % Rec. 30-130%	% RPD ≤40%	Action	
				Positive Detects	NDs
Hexachlorobenzene	NR	NR	NC	J	R
Oxychlorodane	2	NR	NC	J	R
o, p'-DDE	3	2	18*	J	R
trans-Nonachlor	NR	NR	NC	J	R
o, p'-DDD	18	16	10*	J	UJ
o, p'-DDT	NR	NR	NC	J	R
cis-Nonachlor	7	6	9*	J	R
Endosulfan II	2	2	10*	J	R
Mirex	2	7	99	J	R

NR Not recovered

NC Not calculated

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\* Recoveries and/or RPDs were acceptable

CT7-SMB-FC04					
Compound	MS % Rec. 30-130%	MSD % Rec. 30-130%	% RPD ≤40%	Action	
				Positive Detects	NDs
Hexachlorobenzene	NR	NR	NC	J	R
Oxychlorodane	NR	NR	NC	J	R
o, p'-DDE	NR	NR	NC	J	R
trans-Nonachlor	NR	NR	NC	J	R
o, p'-DDD	340	321	6*	J	A
o, p'-DDT	NR	NR	NC	J	R
cis-Nonachlor	3	3	19*	J	R
Endosulfan II	12	14	13*	J	UJ
Mirex	3	3	19*	J	R

NR Not recovered

NC Not calculated

\* Recoveries and/or RPDs were acceptable

The following discussion summarizes the qualifications which were made based on the results of the seven sets of MS/MSD samples:

All endosulfan II and mirex results are non-detected and are rejected (R). All non-detected hexachlorobenzene results are rejected (R) except for sample CT3-SB-FI02 which is estimated (J). All non-detected o,p'-DDE results are rejected (R) except for sample CT3-SB-FI04 which is estimated (J). Oxychlorodane, trans-Nonachlor, o,p'-DDT, and cis-Nonachlor results in the samples are mixed with non-detects and positive detects. For these compounds, non-detects are rejected (R) and positive detects are estimated (J). All other affected compounds are qualified accordingly for the associated samples.

#### Compound Quantitation and Reported Quantitation Limits

ERI's laboratory *SOP for Analysis of Pesticides and PCB Congeners in Tissue Samples* indicated acceptance criteria of ≤25.0% difference between two dissimilar columns. During validation it was found that this criteria was inconsistently applied. Therefore, professional judgement was used to estimate (J, UJ) all the compounds for all the samples due to this inconsistency.

Concentrations quantitated below the lowest calibration standard are flagged (J) on the Data Summary Tables. Quantitation is not accurate when results are reported below the lowest calibration standard.

Sample number CT3-SB-FI04 contains PCB 153 at a concentration above the instrument

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calibration range and is estimated (J). Quantitation is not accurate when the reported result is above the highest calibration standard.

The laboratory did not report quantitation limits for the non-detected results. The sample specific quantitation limits were calculated by the validator using the lowest calibration standard concentration (5.0 ng/mL) corrected for sample weight and volumes and reported on the Data Summary Table.

### System Performance

The laboratory was unable to recover the compounds hexachlorobenzene, oxychlordan, o,p'-DDE, trans-nonachlor, o,p'-DDT, cis-nonachlor, endosulfan II, and mirex in the matrix spike samples. All endosulfan II and mirex results are non-detected and are rejected (R). All non-detected hexachlorobenzene results are rejected (R) except for sample CT3-SB-FI02 which is estimated (J). All non-detected o,p'-DDE results are rejected (R) except for sample CT3-SB-FI04 which is estimated (J). Oxychlordan, trans-Nonachlor, o,p'-DDT, and cis-Nonachlor results in the samples are mixed with non-detects and positive detects. For these compounds, non-detects are rejected (R) and positive detects are estimated (J).

It is noted that the NIST/NOAA intercomparison exercise SRM was analyzed with some of the samples for this project but was not extracted along with any of them. The SRM was extracted some time before 9/29/00, which was the date the laboratory reported results to the NIST for evaluation, while the samples were extracted from 8/17/00 to 11/15/00. Inspection of the sample extraction logs do not show the SRM to be extracted with them. Therefore, the matrix spike results are more accurate indicators of the laboratory's method performance.

Data validation identified the data quality issues which required qualification or rejection of specific results. The rejected (R) data cannot be used for the site objectives. The remaining data are qualified as estimated (J). Estimated data are often used in human health risk assessments. All the spiked surrogate compounds had percent recoveries within their acceptable ranges which supports the use of the J qualified data for the site objectives. Acceptable quality control results which support the use of the qualified data include holding times, available initial calibrations, continuing calibration verifications, and pesticide degradation checks. The majority of matrix spike compounds percent recoveries were within acceptable ranges and there were only minor exceedences in the continuing calibration verifications.

Very truly yours,

LOCKHEED MARTIN

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ENVIRONMENTAL

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Scientist

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Team Manager

Attachments: Table I: Recommendation Summary Table  
Table II: Overall Evaluation of Data  
Data Summary Table  
Data Validation Worksheets  
Support Documentation  
Analytical Method  
Communications/Phone Logs  
Field Sampling Notes  
Workplan and QAPP

Table I  
 Recommendation Summary Table for Pesticides/PCB Congeners  
 Connecticut River Fish Tissue Study

Sample Nos.	CT-BT-FC01	CT-BT-FC02	CT-BT-FC03	CT-BT-FC04	CT-BT-FC05	CT1-SMB-FC01	CT1-SMB-FC02	CT1-SMB-FC03	CT1-SMB-FC04	CT1-SMB-FC05
alpha-BHC	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>					
Hexachlorobenzene	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>					
gamma-BHC	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>					
beta-BHC	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>					
delta-BHC	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>					
Heptachlor	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>					
Aldrin	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>					
Oxychlorthane	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>					
Heptachlor Epoxide	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>				
o, p'-DDE	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>					
gamma-Chlordane	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>					
alpha-Chlordane	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>					
Endosulfan I	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>					
trans-Nonachlor	R <sup>1</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>				
p, p'-DDE	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>					
Dieldrin	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>					
o, p'-DDD	J <sup>4,5</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>					
Endrin	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>					
o, p'-DDT	R <sup>1</sup>	J <sup>4,6,7</sup>	R <sup>1</sup>	J <sup>4,6,7</sup>	J <sup>4,6,7</sup>	J <sup>4,6,7</sup>				
cis-Nonachlor	R <sup>1</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>				
p, p'-DDD	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>					
Endosulfan II	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>					
Endrin Aldehyde	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>					
p, p'-DDT	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>					
Endosulfan Sulfate	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>					
Endrin Ketone	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4,5</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>

Table I  
 Recommendation Summary Table for Pesticides/PCB Congeners  
 Connecticut River Fish Tissue Study

Sample Nos.	CT-BT-FC01	CT-BT-FC02	CT-BT-FC03	CT-BT-FC04	CT-BT-FC05	CT1-SMB-FC01	CT1-SMB-FC02	CT1-SMB-FC03	CT1-SMB-FC04	CT1-SMB-FC05
Methoxychlor	J <sup>4</sup>	J <sup>3,4</sup>								
Mirex	R <sup>1</sup>									
PCB 8	J <sup>4</sup>									
PCB 18	J <sup>4</sup>									
PCB 28	J <sup>4</sup>									
PCB 52	J <sup>1,4</sup>									
PCB 44	J <sup>4</sup>									
PCB 66	J <sup>4</sup>									
PCB 101	J <sup>4</sup>									
PCB 77	J <sup>4</sup>									
PCB 118	J <sup>4</sup>									
PCB 153	J <sup>4</sup>									
PCB 105	J <sup>1,4</sup>									
PCB 138	J <sup>1,4</sup>									
PCB 187	J <sup>4</sup>									
PCB 126	J <sup>4</sup>									
PCB 128	J <sup>4</sup>									
PCB 180	J <sup>4,7</sup>									
PCB 170	J <sup>4</sup>									
PCB 195	J <sup>1,4</sup>									
PCB 206	J <sup>4</sup>	J <sup>4,7</sup>								
PCB 209	J <sup>4</sup>	J <sup>4,7</sup>								

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Sample Nos.	CT2-SMB-FC01	CT2-SMB-FC02	CT2-SMB-FC03	CT2-SMB-FC04	CT2-SMB-FC05	CT3-SB-FI01	CT3-SB-FI02	CT3-SB-FI03	CT3-SB-FI04
alpha-BHC	J <sup>4</sup>								
Hexachlorobenzene	R <sup>1</sup>	J <sup>1,4,6</sup>	R <sup>1</sup>	R <sup>1</sup>					
gamma-BHC	J <sup>4</sup>								
beta-BHC	J <sup>4</sup>								
delta-BHC	J <sup>4</sup>								
Heptachlor	J <sup>4</sup>	J <sup>4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>				
Aldrin	J <sup>4</sup>								
Oxychlorthane	J <sup>4,6,7</sup>	J <sup>4,6,7</sup>	R <sup>1</sup>	R <sup>1</sup>	J <sup>4,6,7</sup>				
Heptachlor Epoxide	J <sup>4</sup>								
o, p'-DDE	R <sup>1</sup>	J <sup>4,6,7</sup>							
gamma-Chlordane	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>				
alpha-Chlordane	J <sup>4</sup>								
Endosulfan I	J <sup>4</sup>								
trans-Nonachlor	J <sup>4,6</sup>								
p, p'-DDE	J <sup>4,5,7</sup>	J <sup>4,7</sup>							
Dieldrin	J <sup>4</sup>								
o, p'-DDD	J <sup>4,5</sup>								
Endrin	J <sup>4</sup>	J <sup>4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>				
o, p'-DDT	J <sup>4,6,7</sup>	J <sup>4,6,7</sup>	J <sup>4,6,7</sup>	J <sup>4,6,7</sup>	R <sup>1</sup>	R <sup>1</sup>	J <sup>4,6,7</sup>	J <sup>4,6,7</sup>	J <sup>4,6,7</sup>
cis-Nonachlor	J <sup>4,6</sup>								
p, p'-DDD	J <sup>4</sup>								
Endosulfan II	R <sup>1</sup>								
Endrin Aldehyde	J <sup>4</sup>								
p, p'-DDT	J <sup>4</sup>								
Endosulfan Sulfate	J <sup>4</sup>								
Endrin Ketone	J <sup>4</sup>								

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 Recommendation Summary Table for Pesticides/PCB Congeners  
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Sample Nos.	CT2-SMB-FC01	CT2-SMB-FC02	CT2-SMB-FC03	CT2-SMB-FC04	CT2-SMB-FC05	CT3-SB-FI01	CT3-SB-FI02	CT3-SB-FI03	CT3-SB-FI04
Methoxychlor	J <sup>4</sup>	J <sup>4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
Mirex	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>
PCB 8	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 18	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 28	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 52	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>
PCB 44	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 66	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4,5</sup>	J <sup>4</sup>
PCB 101	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4,5</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 77	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 118	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 153	J <sup>4,5</sup>	J <sup>4</sup>	J <sup>2,4</sup>						
PCB 105	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4,5</sup>	J <sup>1,4</sup>
PCB 138	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>
PCB 187	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>	J <sup>4</sup>
PCB 126	J <sup>4</sup>	J <sup>4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 128	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 180	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,5,7</sup>	J <sup>4,7</sup>
PCB 170	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 195	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>
PCB 206	J <sup>4,5,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>						
PCB 209	J <sup>4</sup>	J <sup>4</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>

Table I  
 Recommendation Summary Table for Pesticides/PCB Congeners  
 Connecticut River Fish Tissue Study

Sample Nos.	CT3-SMB-FC01	CT3-SMB-FC02	CT3-SMB-FC03	CT3-SMB-FC04	CT3-SMB-FC05	CT4-SMB-FC01	CT4-SMB-FC02	CT4-SMB-FC03	CT4-SMB-FC04	CT4-SMB-FC05
alpha-BHC	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
Hexachlorobenzene	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>
gamma-BHC	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
beta-BHC	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
delta-BHC	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
Heptachlor	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
Aldrin	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
Oxychlorane	J <sup>4,6,7</sup>	J <sup>4,6,7</sup>	R <sup>1</sup>	J <sup>4,6,7</sup>	J <sup>4,6,7</sup>	R <sup>1</sup>	J <sup>4,6,7</sup>	R <sup>1</sup>	R <sup>1</sup>	J <sup>4,6,7</sup>
Heptachlor Epoxide	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
o, p'-DDE	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>
gamma-Chlordane	J <sup>4</sup>	J <sup>4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
alpha-Chlordane	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
Endosulfan I	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
trans-Nonachlor	J <sup>4,6</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>	R <sup>1</sup>	R <sup>1</sup>	J <sup>4,6</sup>
p, p'-DDE	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>
Dieldrin	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
o, p'-DDD	J <sup>3,4,5</sup>	J <sup>3,4,5</sup>	J <sup>4,5</sup>	J <sup>3,4,5</sup>	J <sup>3,4,5</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>
Endrin	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
o, p'-DDT	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>
cis-Nonachlor	J <sup>4,6</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>	J <sup>4,6</sup>	R <sup>1</sup>	R <sup>1</sup>	J <sup>4,6</sup>	R <sup>1</sup>	R <sup>1</sup>
p, p'-DDD	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
Endosulfan II	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>
Endrin Aldehyde	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
p, p'-DDT	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>
Endosulfan Sulfate	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
Endrin Ketone	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>

Table I  
 Recommendation Summary Table for Pesticides/PCB Congeners  
 Connecticut River Fish Tissue Study

Sample Nos.	CT3-SMB-FC01	CT3-SMB-FC02	CT3-SMB-FC03	CT3-SMB-FC04	CT3-SMB-FC05	CT4-SMB-FC01	CT4-SMB-FC02	CT4-SMB-FC03	CT4-SMB-FC04	CT4-SMB-FC05
Methoxychlor	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>				
Mirex	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>
PCB 8	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 18	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 28	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 52	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>
PCB 44	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 66	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 101	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 77	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 118	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4,5</sup>	J <sup>4</sup>
PCB 153	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 105	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>
PCB 138	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>	J <sup>1,4</sup>
PCB 187	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 126	J <sup>4</sup>	J <sup>4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 128	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
PCB 180	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>
PCB 170	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>				
PCB 195	J <sup>1,3,4</sup>	J <sup>1,3,4</sup>	J <sup>1,4</sup>	J <sup>1,3,4</sup>	J <sup>1,3,4</sup>	J <sup>1,4</sup>				
PCB 206	J <sup>4</sup>	J <sup>4</sup>	J <sup>4,7</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4</sup>	J <sup>4,7</sup>
PCB 209	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>

Table I  
 Recommendation Summary Table for Pesticides/PCB Congeners  
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Sample Nos.	CT5-SMB-FC01	CT5-SMB-FC02	CT5-SMB-FC03	CT5-SMB-FC04	CT5-SMB-FC05	CT6-SMB-FC01	CT6-SMB-FC02	CT6-SMB-FC03	CT6-SMB-FC04	CT6-SMB-FC05
alpha-BHC	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
Hexachlorobenzene	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>
gamma-BHC	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
beta-BHC	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
delta-BHC	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
Heptachlor	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
Aldrin	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
Oxychlorthane	R <sup>1</sup>	J <sup>4,6,7</sup>	R <sup>1</sup>	R <sup>1</sup>	J <sup>4,6,7</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	J <sup>4,6,7</sup>
Heptachlor Epoxide	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
o, p'-DDE	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>
gamma-Chlordane	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
alpha-Chlordane	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
Endosulfan I	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
trans-Nonachlor	J <sup>4,6</sup>	R <sup>1</sup>	J <sup>4,6</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	J <sup>4,6</sup>	R <sup>1</sup>	R <sup>1</sup>
p, p'-DDE	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>
Dieldrin	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
o, p'-DDD	J <sup>4,5</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>	J <sup>4,5</sup>
Endrin	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
o, p'-DDT	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>
cis-Nonachlor	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>
p, p'-DDD	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
Endosulfan II	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>
Endrin Aldehyde	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
p, p'-DDT	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>				
Endosulfan Sulfate	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>
Endrin Ketone	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>

Table I  
 Recommendation Summary Table for Pesticides/PCB Congeners  
 Connecticut River Fish Tissue Study

Sample Nos.	CT5-SMB-FC01	CT5-SMB-FC02	CT5-SMB-FC03	CT5-SMB-FC04	CT5-SMB-FC05	CT6-SMB-FC01	CT6-SMB-FC02	CT6-SMB-FC03	CT6-SMB-FC04	CT6-SMB-FC05
Methoxychlor	J <sup>4</sup>									
Mirex	R <sup>1</sup>									
PCB 8	J <sup>4</sup>									
PCB 18	J <sup>4</sup>									
PCB 28	J <sup>4</sup>									
PCB 52	J <sup>1,4</sup>									
PCB 44	J <sup>4</sup>									
PCB 66	J <sup>4</sup>									
PCB 101	J <sup>4</sup>									
PCB 77	J <sup>4</sup>									
PCB 118	J <sup>4</sup>									
PCB 153	J <sup>4</sup>									
PCB 105	J <sup>1,4</sup>									
PCB 138	J <sup>1,4</sup>									
PCB 187	J <sup>4</sup>									
PCB 126	J <sup>4</sup>									
PCB 128	J <sup>4</sup>									
PCB 180	J <sup>4,7</sup>									
PCB 170	J <sup>4</sup>									
PCB 195	J <sup>1,4</sup>									
PCB 206	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>	J <sup>4</sup>	J <sup>4,7</sup>				
PCB 209	J <sup>4</sup>									

Table I  
 Recommendation Summary Table for Pesticides/PCB Congeners  
 Connecticut River Fish Tissue Study

Sample Nos.	CT7-SMB-FC01	CT7-SMB-FC02	CT7-SMB-FC03	CT7-SMB-FC04	CT7-SMB-FC05
alpha-BHC	J <sup>4</sup>				
Hexachlorobenzene	R <sup>1</sup>				
gamma-BHC	J <sup>4</sup>				
beta-BHC	J <sup>4</sup>				
delta-BHC	J <sup>4</sup>				
Heptachlor	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>3,4</sup>
Aldrin	J <sup>4</sup>				
Oxychlorane	R <sup>1</sup>				
Heptachlor Epoxide	J <sup>4</sup>				
o, p'-DDE	R <sup>1</sup>				
gamma-Chlordane	J <sup>4</sup>				
alpha-Chlordane	J <sup>4</sup>				
Endosulfan I	J <sup>4</sup>				
trans-Nonachlor	R <sup>1</sup>	R <sup>1</sup>	R <sup>1</sup>	J <sup>4,6</sup>	R <sup>1</sup>
p, p'-DDE	J <sup>4,7</sup>				
Dieldrin	J <sup>4</sup>				
o, p'-DDD	J <sup>4,5</sup>				
Endrin	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>3,4</sup>
o, p'-DDT	R <sup>1</sup>				
cis-Nonachlor	R <sup>1</sup>				
p, p'-DDD	J <sup>4</sup>				
Endosulfan II	R <sup>1</sup>				
Endrin Aldehyde	J <sup>4</sup>	J <sup>4</sup>	J <sup>4</sup>	J <sup>3,4</sup>	J <sup>4</sup>
p, p'-DDT	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>3,4</sup>
Endosulfan Sulfate	J <sup>4</sup>				
Endrin Ketone	J <sup>4</sup>				

Table I  
 Recommendation Summary Table for Pesticides/PCB Congeners  
 Connecticut River Fish Tissue Study

Sample Nos.	CT7-SMB-FC01	CT7-SMB-FC02	CT7-SMB-FC03	CT7-SMB-FC04	CT7-SMB-FC05
Methoxychlor	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>3,4</sup>
Mirex	R <sup>1</sup>				
PCB 8	J <sup>4</sup>				
PCB 18	J <sup>4</sup>				
PCB 28	J <sup>4</sup>				
PCB 52	J <sup>1,4</sup>				
PCB 44	J <sup>4</sup>				
PCB 66	J <sup>4</sup>				
PCB 101	J <sup>4</sup>				
PCB 77	J <sup>4</sup>				
PCB 118	J <sup>4</sup>				
PCB 153	J <sup>4</sup>				
PCB 105	J <sup>1,4</sup>				
PCB 138	J <sup>1,4</sup>				
PCB 187	J <sup>4</sup>				
PCB 126	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>3,4</sup>	J <sup>4</sup>	J <sup>3,4</sup>
PCB 128	J <sup>4</sup>				
PCB 180	J <sup>4</sup>	J <sup>4,7</sup>	J <sup>4</sup>	J <sup>4,7</sup>	J <sup>4,7</sup>
PCB 170	J <sup>4</sup>				
PCB 195	J <sup>1,4</sup>				
PCB 206	J <sup>4</sup>				
PCB 209	J <sup>4</sup>				

Table I  
Recommendation Summary Table for Pesticide/PCB Congeners

A	-	Accept results.
J <sup>1</sup>	-	SRM compound outside lower QC limits; J detects, UJ non-detects.
J <sup>2</sup>	-	Compound concentration outside instrument calibration range; J detect.
J <sup>3</sup>	-	Continuing calibration verification % recovery outside criterion: J detects, UJ non-detects.
J <sup>4</sup>	-	Analyte identification criterion (>25%D between columns) inconsistently applied by laboratory: J detects, UJ non-detects.
J <sup>5</sup>	-	MS/MSD recoveries and/or RPD outside criteria: J detects, UJ non-detects.
J <sup>6</sup>	-	MS not recovered or <10% recovery: J detects.
J <sup>7</sup>	-	SRM compound outside upper QC limits; J detects.
R <sup>1</sup>	-	MS not recovered or <10% recovery; R non-detects.

PESTICIDES/PCB CONGENERS					
DQO (list all DQOs)	Sampling* and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability	Potential Usability Issues
		Analytical Error	Sampling Error		
<p>To perform a watershed-wide fish tissue monitoring program which will document current conditions with regard to contaminant concentrations of representative fish species from the mainstem of the Connecticut River. This information will enable states to revise human health risk assessments and will provide a basis for trend analysis when subsequent sampling is performed by monitoring teams.</p>	<p>Yes, Sampling Method appropriate for all samples.</p> <p>Yes, Analytical Method appropriate for all samples.</p>	<p>Refer to qualification in R/S Key on Table I</p> <p>J<sup>1,2,3,4,5,6,7</sup>, R<sup>1</sup></p>	<p>Refer to qualification in R/S Key on Table I</p> <p>None</p>	<p>**</p>	<p>One Standard Reference Material sample (SRM 1945 "Organics in Whale Blubber") obtained from NOAA/NMFS NIST (intercomparison exercise) was analyzed for this project. Sixteen out of the 30 spiked compounds with certified values had recoveries within established acceptance limits. For the compounds that are outside QC limits, five (hexachlorobenzene, PCB 52, PCB 105, PCB 138, PCB 195) were recovered outside the lower limit and nine (o,p'-DDT, o,p'-DDE, p,p'-DDE, o,p'-DDD, oxychlordan, mirex, PCB 180, PCB 206, PCB 209) were recovered above the upper limit. The analytes that do not meet criteria are qualified accordingly for all samples.</p> <p>The five rinsate blanks sampled on 8/7/00, 10/23/00, and 11/1/00 are not validated since associated raw data for the rinsate blanks and supporting laboratory benchsheet documentation were not supplied by the laboratory.</p> <p>The laboratory was unable to recover the compounds hexachlorobenzene, oxychlordan, o,p'-DDE, trans-nonachlor, o,p'-DDT, cis-nonachlor, endosulfan II, and mirex in the matrix spike samples. All endosulfan II and mirex results are non-detected and are rejected (R). All non-detected hexachlorobenzene results are rejected (R) except for sample CT3-SB-FI02 which is estimated (J). All non-detected o,p'-DDE results are rejected (R) except for sample CT3-SB-FI04 which is estimated (J). Oxychlordan, trans-Nonachlor, o,p'-DDT, and cis-Nonachlor results in the samples are mixed with non-detects and positive detects. For these compounds, non-detects are rejected (R) and positive detects are estimated (J).</p> <p>Data validation identified the data quality issues which required qualification or rejection of specific results. The rejected (R) data cannot be used for the site objectives. The remaining data are qualified as estimated (J). Estimated data are often used in human health risk assessments. All the spiked surrogate compounds had percent recoveries within their acceptable ranges which supports the use of the J qualified data for the site objectives. Acceptable quality control results which support the use of the qualified data include holding times, available initial calibrations, continuing calibration verifications, and pesticide degradation checks. The majority of matrix spike compounds percent recoveries were within acceptable ranges and there were only minor exceedences in the continuing calibration verifications.</p>

\* The evaluation of "sampling error" cannot be completely assessed in the data validation.

\*\* Sampling variability is not assessed in data validation.

Validator: \_\_\_\_\_

Date: \_\_\_\_\_