

ORGANOCHLORINE CONTAMINANTS IN TREE SWALLOW NESTLINGS AND IN ADIPOSE TISSUE FROM GREAT BLUE HERON NESTLINGS

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GREAT BLUE HERONS, AND RESIDENT/NESTING BALD EAGLES
ALONG THE HUDSON RIVER

HUDSON RIVER NATURAL RESOURCE DAMAGE ASSESSMENT

HUDSON RIVER NATURAL RESOURCE TRUSTEES

STATE OF NEW YORK

U.S. DEPARTMENT OF COMMERCE

U.S. DEPARTMENT OF THE INTERIOR

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EXECUTIVE SUMMARY

Past and continuing discharges of polychlorinated biphenyls (PCBs) have contaminated the natural resources of the Hudson River. The Hudson River Natural Resource Trustees – New York State, the U.S. Department of Commerce, and the U.S. Department of the Interior – are conducting a natural resource damage assessment (NRDA) to assess and restore those natural resources injured by PCBs.

The Hudson River and surrounding area support more than 150 species of birds, including waterfowl, wading birds, shorebirds, songbirds, and raptors. These birds are an integral part of the ecosystem and provide a number of important ecosystem services such as seed distribution, plant pollination, and insect control. Birds are also an important source of prey to other species. Birds may be exposed to PCBs through direct ingestion of contaminated water, sediment, and soil. A more important exposure pathway is likely their consumption of food items that contain PCBs derived from the Hudson River and its floodplain. PCB contaminated food items linked to the river may include fish, amphibians, benthic invertebrates, adult insects that develop from aquatic larvae, plants growing in or near the river, and mammals that forage in the floodplain. Birds are valued by the public through participation in activities such as bird-watching, nature study, and bird-feeding.

Two avian species for which the Hudson River provides habitat, and which have been exposed to PCBs, are the tree swallow (*Tachycineta bicolor*) and the great blue heron (*Ardea herodias*). As part of the NRDA, the Trustees are documenting exposure of the natural resources of the Hudson River to PCBs. The Trustees have collected samples from these avian species for contaminants analysis.

This report addresses tree swallow and great blue heron samples collected from the Hudson River in 1998-1999 and analyzed by the U.S. Geological Survey, Biological Resources Division, Columbia Environmental Research Center in Columbia, Missouri.

Specifically this report provides the analytical results for seven tree swallow nestling samples and adipose tissue samples from two great blue heron nestlings which were analyzed for total PCBs and selected congeners, organochlorine pesticides, non-ortho substituted PCB congeners, and 2,3,7,8-substituted polychlorinated dibenzo-p-dioxins and dibenzofurans.

Within this set of samples, total PCB concentrations in the tree swallow nestlings ranged from 510 parts per billion (ppb) to 8,000 ppb and total PCB concentration in the two great blue heron nestling adipose tissue samples were 15,000 ppb and 220,000 ppb.



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November 30, 2000

REPORT #5
**Organochlorine Contaminants in Tree Swallow Nestlings and in
Adipose Tissue from Great Blue Heron Nestlings**

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By

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FWS Project Title:

Chemical Contamination of Nesting Tree Swallows, Great Blue Herons, and
Resident/Nesting Bald Eagles Along the Hudson River, New York

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Project History:

The Hudson River is highly contaminated with PCBs from industrial sources, primarily two capacitor-manufacturing facilities operated by General Electric. The 200 river miles from the New York Harbor upstream to Hudson Falls, New York, are designated a Superfund Site. From 1946 until 1977, it is estimated that between 209,000 and 1.3 million pounds of PCBs were discharged into the waters of the Hudson by these two plants. The Ft. Edward Dam retarded downstream movement of the PCBs until its removal in 1973, at which time the heavily contaminated sediments and detritus began to migrate downstream. In addition to contamination of the river itself, dredging operations have deposited contaminated material at nine known upland sites adjacent to the river. In 1993, it was discovered that one of the facilities was continuing to discharge PCBs into the river.

Contamination of water, sediments, and fish along the Hudson River by PCBs has been examined, but less is known about the concentration and movement of the contaminants among other trophic levels. Many resident and migrating avian species may be affected, including a fairly substantial population of wintering bald eagles (*Haliaeetus leucocephalus*). The samples described in this report are part of a series of studies designed to expand the knowledge of PCB flux in the food chain of bird species and other biota on and around the Hudson River. In 1995-1997, we took part in a study involving tree swallows (*Tachycineta bicolor*) as the indicator species along the river. Eggs, pre-fledgling chicks, odonates (emergent insects which comprise a large percentage of the diet of the swallows), and two species of ducks were assessed for contaminant concentrations. In 1997-1998, the scope of the study expanded to include samples from a bald eagle and a number of bald eagle prey species. Several species of fish, tree swallows, bluebirds, wood ducks, and two species of sparrow were analyzed.

The present segment of the study expands the diversity of the sample matrices still further. In response to the growing number of wintering, and in some cases, nesting bald eagles on the Hudson, tissue and eggs from a larger group of bald eagles and prey species have been added. The great blue heron (*Ardea herodias*), another top predator inhabiting the area, was examined. To gain further understanding of the factors influencing the life cycles and reproduction of these animals, more comprehensive organic analyses were conducted. PCB congeners including non-ortho-chlorinated (dioxin-like) PCBs, polychlorinated dibenzo-dioxins and-furans (PCDDs, PCDFs), polycyclic aromatic hydrocarbons (PAHs), and a suite of organochlorine pesticides were targeted in this investigation. As the information base on this ecosystem grows, a clearer picture of the remedial efforts required to restore it to its normal function will hopefully emerge.

Biota sampled by US F&WS were analyzed by the Organic Chemistry Section of the Columbia Environmental Research Center. A total of 124 samples were investigated, targeting selected analytes from the following list (each sample was not analyzed for all analytes):

- Total PCBs and selected PCB congeners,
- Organochlorine pesticides
- 2,3,7,8-Substituted polychlorinated dibenzo-*p*-dioxins and -dibenzofurans
- Non-*ortho* PCB congeners
- Polycyclic aromatic hydrocarbons

Samples were generally grouped by analysis type. The various groups are reported separately. In addition to organic analysis, selected samples were analyzed for mercury, arsenic, and selenium; these are reported under a separate cover.

This report contains the results for the 7 Tree Swallow nestlings and adipose tissue samples from 2 Great Blue Heron nestlings:

- PCB congeners,
- Organochlorine pesticides,
- Non-*ortho* PCB congeners,
- 2,3,7,8-Substituted polychlorinated dibenzo-*p*-dioxins and -dibenzofurans

The PAH data for the selected Tree Swallow nestlings will be reported later.

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2. Analytical scheme for organochlorine pesticides and total PCBs.

I. Summary of Analytical Methods for Sample Preparation

The samples in this set consisted of seven Tree Swallow nestling and adipose tissue samples from two Great Blue Heron nestlings. After receipt, the samples were assigned CERC database numbers.

<u>CERC</u> <u>Database Number</u>	<u>FWS</u> <u>Field Identifier</u>
Tree Swallow Nestlings	
18763	TSC227-98
18768	TSC324-98
18773	TSC415-98
18776	TSC614-98
18779	TSC707-98
18782	TSC812-98
18787	TSC914-98
Adipose Tissue - Great Blue Heron Nestlings	
18801	GBHC401F-98
18804	GBHC605F-98

Quality Control:

The following QC samples were analyzed with the samples:

- 1 procedural blank
- 1 matrix blank (negative control bluegill)
- 2 matrix spikes (spiked negative control bluegill,
for OC pesticides and for PCBs, non-ortho PCBs, PCDDs/PCDFs)
- 1 positive control (Saginaw Bay carp)

Matrix QC samples (blanks and spikes) prepared from clean bluegill were analyzed with each set of samples. Positive control samples were prepared from CERC's standard positive control matrix (common carp tissue from Saginaw Bay, MI). One of each category of QC sample (procedural blank, matrix blank, matrix spike, and positive control) was analyzed with the samples.

All samples, including QC samples were spiked with surrogate compounds before extraction to monitor recoveries through the cleanup procedures. Since the samples were processed through two separate analytical procedures, two different sets of internal standards were used. Where congener-specific PCBs, non-ortho-PCBs, PCDDs, and PCDFs were targeted, the following compounds were used:

- PCB 029 (2,4,5-trichlorobiphenyl)
- PCB 155 (2,2',4,4',6,6'-hexachlorobiphenyl)
- PCB 204 (2,2',3,4,4',5,6,6'-octachlorobiphenyl)

Four ¹³C-labeled non-*ortho* PCB congeners
Seventeen ¹³C-labeled 2,3,7,8 substituted dioxin/furans

For analysis of organochlorine pesticides, the following compounds were added:

PCB 029 (2,4,5-trichlorobiphenyl)
PCB 155 (2,2',4,4',6,6'-hexachlorobiphenyl)
PCB 204 (2,2',3,4,4',5,6,6'-octachlorobiphenyl)
Tetrachloro-*m*-xylene
Di-*n*-butylchloroendate

The following compounds were added to matrix spikes according to the analytical protocol to which they were subjected:

Organochlorine pesticides (27 compounds)
PCBs (mixed Aroclors 1242, 1248, 1254, 1260)
Native (¹²C) dioxin and furan congeners

Sample Preparation:

Two different analytical protocols were performed on portions of each sample. In each protocol, the samples were dehydrated by addition of anhydrous sodium sulfate and method recovery standards were added. Samples were extracted with methylene chloride, and a small portion of the extract (1%) was used to determine percent lipid (1). In the analytical protocol targeting congener-specific PCBs, PCDDs, and PCDFs, extracts were cleaned with acid- and base-treated silica gels and adsorbent chromatography on activated silica gel (2). All extracts were further purified by High Performance Gel Permeation Chromatography (HPGPC) (3) before fractionation on high performance Porous Graphitic Carbon (PGC) (4) into the following fractions:

PGC-1 *ortho*-chlorinated PCB congeners
Analysis by gas chromatography/electron-capture detection (GC/ECD)
PGC-2 non-*ortho*-chlorinated PCBs
Analysis by GC/high resolution mass spectrometry (GC/HRMS)
PGC-3 polychlorinated dibenzo-*p*-dioxins and -furans (PCDD/PCDFs)
Clean-up by alumina chromatography (5) before GC/HRMS analysis

Organochlorine pesticides extracts were first cleaned on gravity-gel permeation chromatography (GPC) (6) followed by HPGPC (3). The extracts were then fractionated on a two-layered octadecyl silica/activated silica gel column into fractions containing PCBs and four of the targeted OCs (SODS-1), and a second fraction containing the remainder of the OCs (SODS-2) (7).

II. Congener-specific PCB Analysis and Results

Results for the congener-specific PCB analysis are given in Table 1, designated by their CERC database number and are cross-referenced to their field identification number. Concentrations are expressed as nanograms of analyte per gram of sample (wet weight). The quality control accompanying the data indicates the results are well within QC limits. Matrix and procedural blank results, spike recoveries, detection limits, method precision, and instrument precision are presented in Table 1. The matrix spike recovery for total-PCBs was 85%. Recoveries of the procedural internal standards were well within QC limits. The MDL for total PCBs was 150 ng/g. (See the tables for individual MDL values).

Summary of gas chromatographic method for congener-specific PCBs

The sample extracts were adjusted to a final volume of 10 mL. Two instrumental internal standards were used: congeners 030 and 207 (400 ng each). Individual PCB congeners were measured in PGC1 fractions by GC/ECD. Analyses were performed using Hewlett-Packard 5890 Series II GCs with cool on-column capillary injection systems and Hewlett-Packard model 7673 autosamplers (8). For all analyses, a 3-m section of 0.53 mm i.d. uncoated and deactivated (Restek Corp., Inc.) capillary retention gap was attached to the front of each analytical column by a "Press-Tight" (Restek Corp., Inc.) union. The analytical columns were a 60-m x 0.25-mm DB-5 (0.25µm 5% phenyl-, 95% methylsilicone, J&W Scientific) and a 60-m x 0.25-mm DB-17 (0.25µm 50% phenyl-, 50% methylsilicone, J&W Scientific). The H₂-carrier gas was pressure regulated at 25 psi. The temperature program for the PCB analysis was as follows: initial temperature 60 °C, immediately ramped to 150 °C at 15 °C/min, then ramped to 250 °C at 1 °C/min, and finally ramped to 320 °C at 10 °C/min, and held for 1 min. The temperature of the electron capture detectors was 330 °C.

Capillary GC/ECD data were collected, archived in digital form, and processed using a PE-Nelson chromatography data system, which included the model 970 interface and version 6.1 of Turbochrom Workstation™ chromatography software on a Pentium III microcomputer (9). Six levels of PCB standards, a combination of Aroclors 1242, 1248, 1254, 1260 in 1:1:1:1 w/w/w/w ratio (designated A1111), were used for PCB congeners calibration, with total PCB concentrations ranging from 200 to 8000 ng/mL. PCB congeners 030 and 207 were used as instrumental internal standards. The method detection limits (MDLs) for individual PCB congeners and for total PCBs are based on procedural blank (PB) results according to the method outlined by Keith *et al.* (10,11). Briefly, an average and standard deviation are determined. The MDL (ng) is calculated using the following formula:

$$\text{MDL} = (\text{PB Avg}) + 3(\text{PB SD})$$

The MDL is then expressed in units of concentration, e.g. mass of analyte per mass of sample. An average mass for the set is used.

Accuracy of the method is monitored through rigorous quality control. Analytical standards have been verified against certified standards (Accustandard, New Haven CT). The extraction efficiency and method are monitored by analysis of positive control, Saginaw Bay carp. Recoveries of analytes (Table 2) are monitored by the following measures:

1. Procedural internal standards spiked into each sample
2. PCB-spiked control bluegill tissue analyzed with each set

PCB 029, a trichlorobiphenyl, is representative of more volatile early eluting PCBs (Cl₁ - Cl₃). PCB 155, a hexachlorobiphenyl, is representative of mid-range eluting congeners (Cl₄ - Cl₆). PCB 204, an octachlorobiphenyl, is less volatile and representative of later eluting PCBs (Cl₇ - Cl₁₀).

III. Organochlorine Pesticide Analysis and Results

Results of the OC pesticide analysis are presented in Table 3. Quality control data for procedural and matrix blanks, spikes, replicates, and positive controls are presented in Tables 3 and 4. The data are well within QC limits. The MDLs for the OC pesticides are also shown the tables. All concentrations are reported in nanograms per gram, except for procedural blank samples, which are reported as a mass amount (ng). The method detection limits (MDLs) for individual compounds are calculated by the method already described in the previous section.

Summary of gas chromatographic method for OC pesticides

Organochlorine pesticide fractions (SODS-1 and SODS-2) were adjusted to a final volume of 4 mL and the instrumental internal standards (IIS) were added (PCB congeners 030 and 207). Individual organochlorine pesticides were measured in both fractions by GC/ECD. Analyses were performed using Hewlett-Packard 5890 Series II GCs with cool on-column capillary injection systems and Hewlett-Packard model 7673 autosamplers (12). For all analyses, a 3-m section of 0.53 mm i.d. uncoated and deactivated (Restek Corp., Inc.) capillary retention gap was attached to the front of the analytical column by a "Press-Tight" (Restek Corp., Inc.) union. The analytical column for the SODS-2 fraction was a 30-m x 0.25-mm DB-35ms (J&W Scientific). The H₂-carrier gas was pressure regulated at 11 psi. The temperature program for the analysis was as follows: initial temperature 90 °C, immediately ramped to 165 °C at 15 °C/min, held 3 minutes, then ramped to 260 °C at 2.5 °C/min with a 5 minute hold, and finally ramped to 320 °C at 10 °C/min, and held for 1 min. The ECD temperature was 330 °C.

Capillary GC/ECD data were collected, archived in digital form, and processed using a PE-Nelson chromatography data system that included the model 970 interface and

version 6.1 of Turbochrom Workstation™ chromatography software on a Pentium III microcomputer (9). Six levels of OC pesticide standards were used for calibration, with each pesticide at concentrations ranging from 1 to 80 ng/mL. Organochlorine pesticide results are presented in Table 3, designated by their CERC database number and cross-referenced to their field identification number. Concentrations are expressed as nanograms of analyte per gram of sample (wet weight). Recoveries of OC pesticide procedural internal standards are presented in Table 4.

IV. Non-ortho-PCB Congener Analysis and Results

Results for the non-ortho-PCB congeners are presented in Table 5. Concentrations are expressed as picograms of analyte per gram of sample (wet weight). In this sample set, ion ratios of the primary/secondary ions for all detected analytes in both samples and calibration standards were within the QC range ($\pm 15\%$ of theoretical), except for PCB-169 in samples 18782 and 18787 which was near the detection limit. The quality control accompanying the data indicates high quality results, well within QC limits. Total mass (pg) of native non-ortho-PCBs in the procedural blanks is normalized to approximate sample size (in this case 10 g in Table 5). In the procedural blank (PB 5/11/00), values are much below the lowest concentrations in the sample. Non-ortho-PCB concentrations are also very low in the bluegill (matrix) blank. In the Aroclor-spiked bluegill sample, the most abundant non-ortho congener, PCB 77, is within 25% of the historic mean determined for our mixed Aroclor spiking standard. Less abundant non-ortho congeners PCBs 81 and 126 in the Aroclor-spiked samples are also within 9% and 35% of their respective mean values. PCB 169 is too low for meaningful comparisons. The efficiency of the extraction and cleanup procedure was determined by measuring the ^{13}C -labeled surrogates in the *final* extract, using a ^{13}C -labeled compound as the instrumental internal standard. Percent recoveries of the ^{13}C -labeled surrogates in the eagle egg samples (Table 6) were within QC limits of 25-125%, except for sample 18804, which required dilution and requantification because of chromatographic interferences from residual matrix components.

Summary of GC/HRMS method for non-ortho-PCBs

The non-ortho-PCB fractions (PGC-2) were transferred to conical autosampler vials, evaporated to less than 50 μL with nitrogen, and then spiked with 5 ng of instrumental internal standard (50 μL of 100 pg/ μL ^{13}C -labeled 2,2',4,5,5'-PeCB (PCB #101) in nonane). The final volume was adjusted to about 50 μL with nitrogen blow-down. Non-ortho-PCBs were determined by GC/HRMS, monitoring two sequential mass windows during the chromatographic separation (13,14). GC/HRMS analysis was performed with a HP 5890A capillary gas chromatograph interfaced to a VG 70-250AS high resolution mass spectrometer. An HP 7673 autosampler was used to introduce 2 μL of the extract from a conical vial onto a 2.5 m x 320 μm deactivated fused silica retention gap via heated (285 $^{\circ}\text{C}$) direct on-column injection with a Restek spiral

Uniliner. A 50 m x 200 μm x 0.11 μm Ultra-1 capillary column was used to resolve non-*ortho*-PCBs from most interferences. The GC oven was held at 120 °C for 1 min, programmed to 240 °C at 2.2 °C/min, then ramped to 310 °C at 5 °C/min, and a final hold of 5 min. Helium carrier gas was maintained at 45 psig with an initial linear velocity of 27 cm/s. The analytical column was put into the MS interface, heated at 310 °C. All column-to-column connections were made with fused silica press-tight connectors.

The VG GC/HRMS system was tuned to 10,000 resolution and calibrated using perfluorodecalin. Mass windows were established for two groups of non-*ortho*-PCBs. Group 1 from 23-47:00 min included ions for Cl₄-biphenyls #77 and 81 and Cl₅-biphenyl #126; Group 2 from 47:00-64 min included ions for Cl₆-biphenyl #169. Within each mass window, two most abundant ions were measured for positive identification and quantitation of each analyte. The ion responses were quantified and averaged. Within each mass window, additional ions monitored the responses of higher chlorinated, potential interfering PCB congeners, Cl₄₋₈ naphthalenes (PCNs), Cl₃₋₅ terphenyls (PCTs), Br₅- and Cl₆-diphenyl ethers (residual carryover from PGC-1), and Cl₄-PCDF (to ensure no breakthrough of PCDFs).

A calibration curve describing the response of each native congener (0.25 to 2,500 pg/ μL) to that of its ¹³C-labeled surrogate was used. Quantification is inherently corrected by the ¹³C-isotopically labeled surrogates, which account for analytical losses during isolation procedures and variations in the instrumental analysis.

Molecular ion responses of certain PCB congeners are measured to ensure that their fragment ion responses do not contribute an interference >10% to the responses of the respective non-*ortho*-PCB. Column performance is verified by analyzing standards of individual congeners, labeled congeners, and congeners from Aroclor spiked mixtures. Because non-*ortho*-Cl₅-PCB 126 is only minimally resolved from Cl₆-PCB 129, PCB 129's molecular ion response is monitored to assure that its fragment ion response (3.5% abundance) does not contribute an interference of >10% to the response of PCB 126. PCB 129's molecular ion response must not exceed three times that of PCB 126. Adequate mass resolution is verified while monitoring ions for Cl₄₋₈ PCNs.

Criteria for Confirmation: For the positive identification and quantitation of each congener, the following criteria were established and met in this study:

1. Peak areas for the selected ion responses must be greater than three times background noise.
2. Native ion peaks must occur at retention times from -1 to +3 sec that for the corresponding ¹³C-labeled ion peaks, that elute about 1 sec earlier.
3. The ion ratio for the two principal ion responses must be within the acceptable range (generally $\pm 15\%$). These ion ratios were determined experimentally for the system during calibrations, compared with the theoretical values, and were tracked.

V. 2,3,7,8-Cl Substituted Dioxin and Furan Analysis and Results

The results for the 2,3,7,8-substituted PCDDs and PCDFs are presented in Table 7. Concentrations are expressed as picograms of analyte per gram of sample (wet weight). Quality control results are within QC limits. In the procedural blank, amounts of PCDFs and PCDDs are expressed as total mass (pg) divided by 10g to normalize to approximate sample size. In this blank, values are at or below the lowest concentrations in the samples, with the exception of OCDF, which is elevated (~30 pg/g equivalent). Concentrations of native PCDFs and PCDDs in the spiked bluegill or chicken egg samples are within 25% of those expected except for OCDF and OCDD. Concentrations of 2,3,7,8-substituted PCDDs and PCDFs in the positive control Saginaw Bay carp matrix (Table 7) are within the QC range of the ongoing determinations of this matrix, again, with the exception of OCDF. The efficiency of the extraction and cleanup procedure was monitored by quantifying the ¹³C-labeled surrogates in the *final* isolated extract, using a ¹³C-labeled compound as an instrumental internal standard. Generally, recoveries of the ¹³C-labeled surrogates (Table 8) were within the expected QC range of 25-125%, except for the hexa- and heptachlorinated furans, which were only partially recovered in the alumina cleanup procedure.

Summary of GC/HRMS method for 2,3,7,8-Cl substituted dioxins and furans

PCDD/PCDF fractions from PGC (PGC-3) were eluted through basic alumina to remove potential co-contaminants such as chlorinated diphenyl ethers and residual PCNs and PCBs (5). A total of 1 ng of the internal standard, ¹³C-labeled 1,2,3,4-TCDD was added to each semiconical autosampler vial prior to transferring the PCDDs/PCDFs. The final extract was concentrated to a volume of ~25 µL under a stream of nitrogen. PCDFs and PCDDs were determined by GC/HRMS by monitoring five sequential mass windows of selected ions during the chromatographic separation (15). The GC/HRMS analysis was performed using a HP 5890A capillary gas chromatograph interfaced to a VG 70-AS high-resolution mass spectrometer. An HP 7673 autosampler was used to introduce 2 of 25 µL of the extract from a conical vial through a spiral uniliner onto a 2.5 m x 320 µm deactivated fused silica retention gap via a heated (285 °C) direct inlet. The analytes of interest were separated on a 50 m x 200 µm x 0.11 µm Ultra-2 (Hewlett Packard) capillary column with an initial hold of 1 min at 120 °C followed by a ramp to 200 °C at 20 °C/min, another ramp to 300 °C at 2.3 °C/min, and a final hold of 5 min. The helium carrier gas was maintained at 44 psig with an initial linear velocity of 25 cm/s. All column-to-column connections were made using fused silica press-tight connectors.

The VG GC/HRMS system was tuned to 10,000 resolution and calibrated using perfluorokerosene. Mass windows were established for five ion groups to measure Cl₄₋₈ PCDFs and PCDDs. Within each mass window, two most abundant ions were measured for positive identification and quantitation of each analyte. The ion

responses were quantified and averaged. Additional ions monitored any responses from potentially interfering Cl_{5,9}-polychlorinated diphenylethers (PCDEs) and Cl_{5,7}-polychlorinated terphenyls (PCTs), and dioxin-like Cl_{6,7}-polychlorinated naphthalenes (PCNs), Cl_{3,8} dibenzothiophenes (PCDTs), and Cl_{3,8} phenanthrene and anthracenes. A calibration curve describing the response of each native congener to that of a ¹³C-labeled surrogate congener was used for quantification.

Window switching times were established using a window-defining PCDF/PCDD standard mixture; relative retention times were then established for PCDTs. The chromatographic column resolved 2,3,7,8-TCDD from 1,2,3,7/1,2,3,8-TCDD (and from 1,2,3,4-TCDD) by a resolution factor of at least 0.5. Column performance was verified by analyzing standards of individual components, and observing the chromatographic resolution of the TCDDs, HxCDDs, and HxCDFs. Similarly, relative retention times for all other congeners of interest were evaluated with respect to labeled analogs. Adequate mass resolution was verified while monitoring ions Cl_{6,7} PCNs vs. ion responses of ¹³C-TCDDs and of native TCDD versus ¹³C-TCDF. Lock-mass and lock-mass-check ions were used to maintain and verify the accuracy of mass measurement.

For the positive identification and quantitation of a particular congener, the following criteria were met:

1. The peak areas for the selected ion responses must be greater than three times the background noise (S/N > 3)
2. For congeners with isotopically-labeled analogs, the ion peaks for the native must occur at retention times from -1 to +3 sec that for the corresponding ¹³C-labeled ion peaks, which elute about 1 sec earlier than the native ion peaks;
3. For OCDF (without an isotopically-labeled analog), ion responses in sample analyses must occur at RRTs from -0.2 to 0.5% of ¹³C-labeled OCDD, analogous to the window above;
4. For the two principal ion responses, the ion ratio must be within the acceptable range (generally ±15%). These ion ratios were determined experimentally for the system during calibrations, compared with the theoretical values, and were tracked for quality assurance.

VI. Summary

Tree Swallow nestlings and adipose tissue from Great Blue Heron nestlings were analyzed for congener specific and non-*ortho* PCBs, organochlorine pesticides, and polychlorinated dibenzo-*p*-dioxins and dibenzofurans. These samples are part of the investigation of exposure of biota to contaminants along the Hudson River, NY. Included in this large project are fish, bird eggs, eagle prey items, and eagle bloods. The quality control associated with the results for this set of samples is within our guidelines. We calculated TEQs (see below) for these samples using avian TEF values (16). In these samples the dioxin-like toxicity (70-98%) is predominately due to the non-

ortho PCBs. However, when samples show decreasing TEQ values the percentage of dioxin-like toxicity due to dioxins and furans increased to 20-30% of the total.

Sample Type	Sample ID	TEQs (pg/g)	% frxn		% frxn	
			mPCB	nPCB	PCDD	PCDF
TS Nestling	18763	2,000	1.1	98	0.1	0.5
TS Nestling	18768	1,700	1.2	98	0.1	0.7
TS Nestling	18773	1,100	1.3	97	0.2	1.8
TS Nestling	18776	300	4.4	91	1.2	3.7
TS Nestling	18779	140	7.3	84	1.7	7.2
TS Nestling	18782	39	2.7	81	4.4	12
TS Nestling	18787	45	3.4	75	10	12
GBH Fat	18801	9,600	8.9	90	0.4	0.7
GBH Fat	18804	580	7.7	86	2.7	4.1

ortho PCBs. However, when samples show decreasing TEQ values the percentage of dioxin-like toxicity due to dioxins and furans increased to 20-30% of the total.

Sample Type	Sample ID	TEQs (pg/g)	% frxn mPCB	% frxn nPCB	% frxn PCDD	% frxn PCDF
TS Nestling	18763	2,000	1.1	98	0.1	0.6
TS Nestling	18768	1,700	1.2	98	0.1	1.0
TS Nestling	18773	1,100	1.3	96	0.3	2.5
TS Nestling	18776	300	4.4	89	1.3	5.1
TS Nestling	18779	140	7.0	81	1.9	9.7
TS Nestling	18782	39	2.5	77	4.9	15
TS Nestling	18787	45	3.2	70	11	16
GBH Fat	18801	9,600	8.9	90	0.5	1.0
GBH Fat	18804	580	7.6	84	3.2	5.6

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Figure 1: Analysis for Congener-specific PCB, PCDD, and PCDF Residues

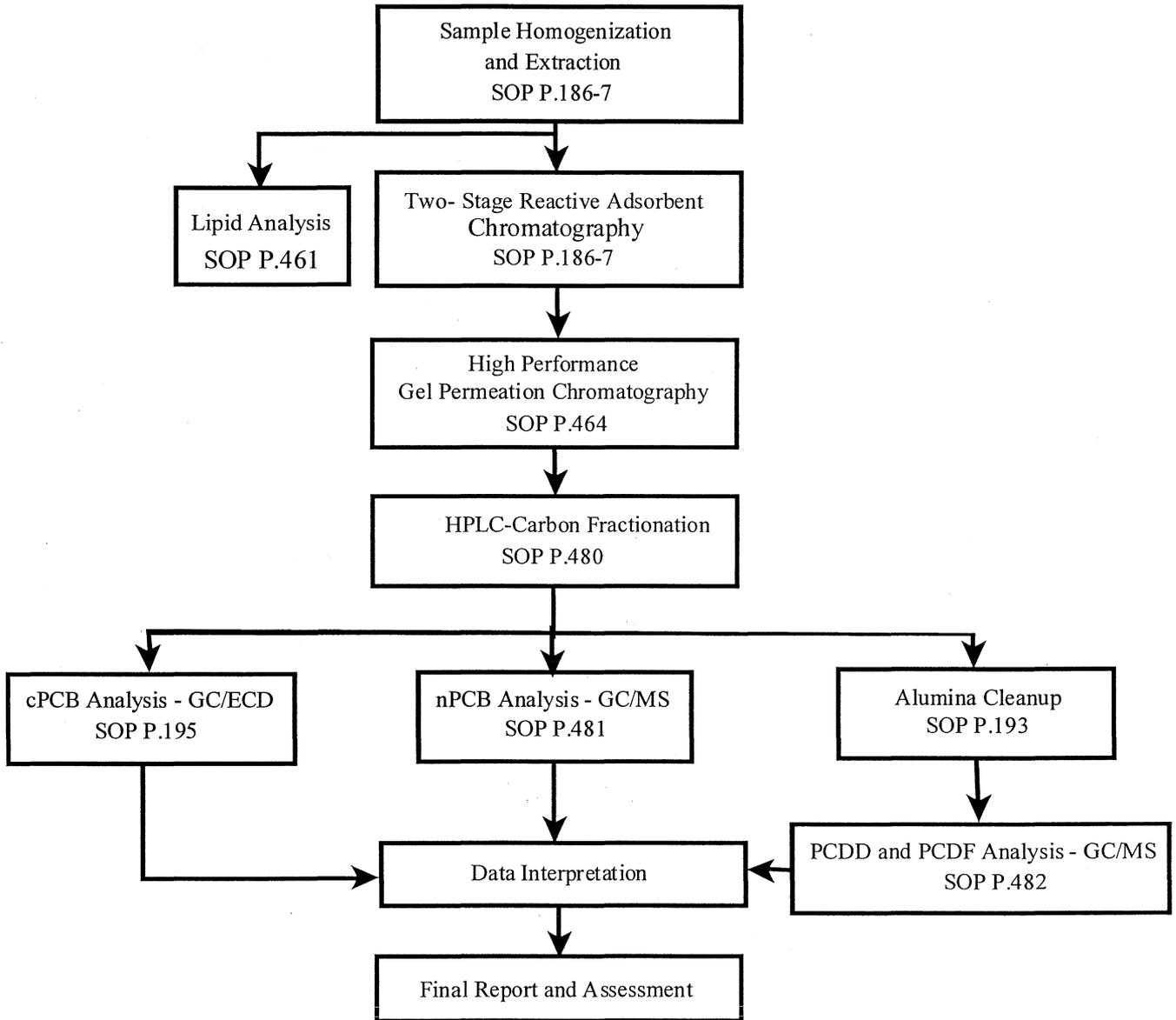
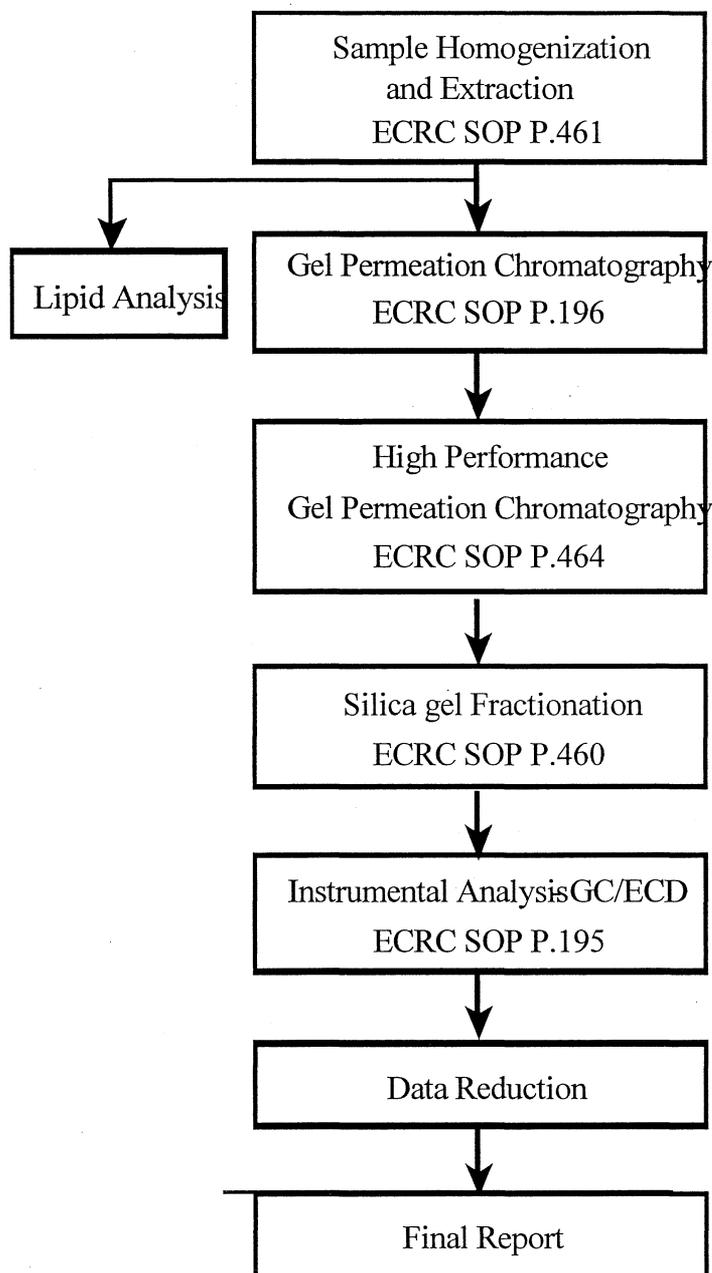


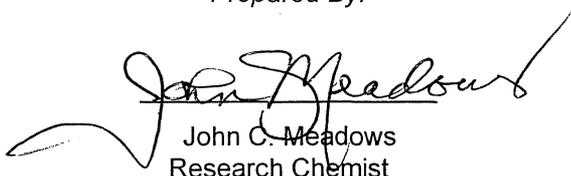
Figure 2: Analysis for Organochlorine Pesticides and Total PCB Residues



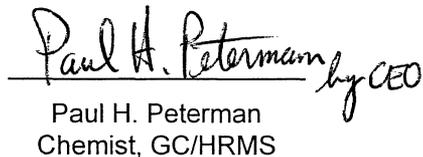
Chemical Contamination of Nesting Tree Swallows, Great Blue Herons, and Resident/Nesting Bald Eagles Along the Hudson River, New York

Final Report: November 30, 2000

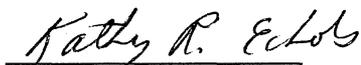
Prepared By:


John C. Meadows
Research Chemist

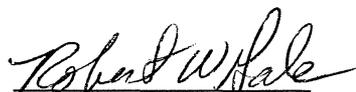
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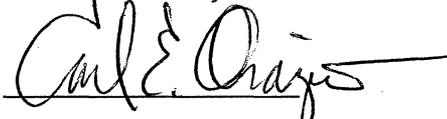
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CERC Quality Assurance Officer

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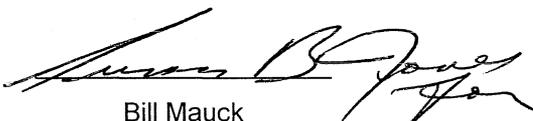

Bill Mauck
Director, Columbia Environmental Research Center

Table 1. PCB Congeners Concentrations in Nestlings, plus QC Data

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	001	003	004	005	006	007	008	009	010	015	016
18763	TSC227-98	Tree Swallow Nestling	9.81	13	< 0.29	< 0.36	2.4	< 0.01	0.29	0.09	1.9	0.19	1.5	32	15
18768	TSC324-98	Tree Swallow Nestling	9.87	7.4	2.7	0.38	42	< 0.01	1.8	0.10	7.4	1.0	20	34	14
18773	TSC415-98	Tree Swallow Nestling	9.96	13	0.72	0.45	23	< 0.01	2.2	0.06	10	0.78	8.7	34	29
18776	TSC614-98	Tree Swallow Nestling	9.81	12	< 0.29	0.47	1.0	< 0.01	0.14	0.08	0.7	0.05	0.59	5.6	0.17
18779	TSC707-98	Tree Swallow Nestling	9.85	12	0.68	< 0.36	4.4	< 0.01	0.19	0.03	1.6	0.13	1.9	4.4	3.6
18782	TSC812-98	Tree Swallow Nestling	9.9	11	< 0.29	< 0.36	< 0.42	< 0.01	< 0.01	< 0.01	0.06	0.04	0.06	0.02	< 0.01
18787	TSC914-98	Tree Swallow Nestling	5.22	3.5	1.2	0.95	< 0.42	< 0.01	< 0.01	0.08	0.07	< 0.01	0.02	0.12	< 0.01
18801	GBHC401F-98	Great Blue Heron Nestling Fat	3.99	74	< 0.29	< 0.36	< 0.42	< 0.01	< 0.01	< 0.01	< 0.03	< 0.01	0.41	5.4	3.9
18804	GBHC605F-98	Great Blue Heron Nestling Fat	6.67	79	< 0.29	< 0.36	< 0.42	< 0.01	< 0.01	< 0.01	< 0.03	< 0.01	< 0.01	< 0.01	< 0.01
20032-1	BE-EG-270-99	Eagle Egg	9.87	5.5	< 0.29	< 0.36	< 0.42	< 0.01	< 0.01	< 0.01	0.26	< 0.01	< 0.01	< 0.01	0.67
20032-2	BE-EG-270-99	Eagle Egg	9.97	5.3	< 0.29	< 0.36	< 0.42	< 0.01	< 0.01	< 0.01	0.32	< 0.01	< 0.01	< 0.01	0.57
20032-3	BE-EG-270-99	Eagle Egg	9.81	5.0	< 0.29	< 0.36	< 0.42	< 0.01	< 0.01	< 0.01	0.26	< 0.01	< 0.01	< 0.01	0.96
Average			9.88	5.3	< 0.29	< 0.36	< 0.42	< 0.01	< 0.01	< 0.01	0.28	< 0.01	< 0.01	< 0.01	0.73
SD			0.08	0.32							0.04				0.20
%RSD			0.82	6							13				28
MS051100 GCR1	Matrix Spike	Bluegill	9.86	4.1	11	3.8	69	2.8	36	4.5	130	10	2.7	40	85
Recovery					46	57	69	60	69	65	68	72	65	72	65
Mock 100% PCBs					25	6.7	100	4.6	52	6.9	190	14	4.2	55	130
MB051100	Matrix Blank	Bluegill	9.89	3.8	< 0.29	< 0.36	< 0.42	< 0.01	< 0.01	< 0.01	0.08	0.04	< 0.01	< 0.01	0.05
	Average mass	=	8.73												
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	---	1.9	2.9	2.9	0.03	0.00	0.02	0.15	0.05	0.03	0.05	0.00
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	---	2.1	2.9	2.1	0.02	0.00	0.02	0.20	0.07	0.03	0.06	0.00
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	---	2.2	3.0	2.2	0.03	0.00	0.03	0.19	0.05	0.04	0.05	0.00
Average					2.1	2.9	2.4	0.03	0.00	0.02	0.18	0.06	0.04	0.05	0.00
Standard Deviation					0.14	0.07	0.42	0.00	0.00	0.00	0.03	0.01	0.01	0.01	0.00
MDL	Method Detection Limit = PB Average + 3 (SD)					2.5	3.1	3.7	0.04	0.00	0.03	0.26	0.09	0.05	0.07
MDL (mass normalized) ¹					0.29	0.36	0.42	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.01
Sample concentrations were recovery corrected.															
All values are rounded to 2 significant figures.															
¹ MDLs below 0.01 are reported as the instrument detection limit of 0.01.															

Table 1. PCB Congeners Concentrations in Nestlings, plus QC Data

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	017	018	019	020	022	024	025	026	027	028	031
18763	TSC227-98	Tree Swallow Nestling	9.81	13	30	25	14	1.6	46	< 0.01	34	57	24	580	380
18768	TSC324-98	Tree Swallow Nestling	9.87	7.4	33	36	74	2.2	30	< 0.01	28	54	66	360	210
18773	TSC415-98	Tree Swallow Nestling	9.96	13	44	25	40	1.2	16	< 0.01	36	120	74	250	330
18776	TSC614-98	Tree Swallow Nestling	9.81	12	7.8	3.1	1.9	0.36	4.0	< 0.01	6.6	20	3.3	59	55
18779	TSC707-98	Tree Swallow Nestling	9.85	12	16	8.6	5.2	0.44	4.5	< 0.01	8.0	28	7.2	45	54
18782	TSC812-98	Tree Swallow Nestling	9.9	11	0.41	0.58	0.51	< 0.01	0.13	< 0.01	0.29	0.89	0.17	2.7	1.7
18787	TSC914-98	Tree Swallow Nestling	5.22	3.5	1.1	0.76	0.90	< 0.01	0.25	< 0.01	0.46	1.3	0.31	6.3	3.6
18801	GBHC401F-98	Great Blue Heron Nestling Fat	3.99	74	0.15	19	4.1	0.31	0.72	< 0.01	130	3,800	20	5,900	10,000
18804	GBHC605F-98	Great Blue Heron Nestling Fat	6.67	79	1.6	2.2	4.9	0.08	0.09	0.38	0.91	36	2.4	200	120
20032-1	BE-EG-270-99	Eagle Egg	9.87	5.5	4.2	1.9	0.99	0.50	4.5	0.04	2.6	8.3	0.20	44	37
20032-2	BE-EG-270-99	Eagle Egg	9.97	5.3	4.2	1.6	1.2	0.67	4.6	< 0.01	2.9	9.0	0.24	45	30
20032-3	BE-EG-270-99	Eagle Egg	9.81	5.0	3.1	1.3	0.99	0.54	4.2	< 0.01	3.0	7.8	0.18	41	20
Average			9.88	5.3	3.8	1.6	1.0	0.57	4.4	0.03	2.8	8.4	0.21	43	29
SD			0.08	0.32	0.65	0.30	0.10	0.09	0.22		0.17	0.60	0.03	2.3	8.2
%RSD			0.82	6	17	18	9	15	5		6	7	15	5	28
MS051100 GCR1	Matrix Spike	Bluegill	9.86	4.1	91	250	22	12	80	2.8	14	43	11	190	180
Recovery					61	76	86	75	72	65	71	77	74	70	75
Mock 100% PCBs					150	330	26	15	110	4.3	20	56	15	270	240
MB051100	Matrix Blank	Bluegill	9.89	3.8	0.07	0.14	0.02	< 0.01	0.04	< 0.01	< 0.05	< 0.05	< 0.01	0.14	0.08
	<i>Average mass</i>	=	8.73												
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	---	0.00	0.00	0.07	0.04	0.08	0.00	0.09	0.37	0.06	0.76	0.44
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	---	0.18	0.30	0.64	0.03	0.11	0.00	0.00	0.29	0.06	0.89	0.45
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	---	0.13	0.35	0.16	0.03	0.06	0.00	0.22	0.26	0.06	0.87	0.47
Average					0.10	0.22	0.29	0.03	0.08	0.00	0.10	0.30	0.06	0.84	0.45
Standard Deviation					0.09	0.19	0.31	0.00	0.02	0.00	0.11	0.06	0.00	0.07	0.01
MDL	Method Detection Limit = PB Average + 3 (SD)				0.38	0.79	1.2	0.05	0.15	0.00	0.44	0.47	0.06	1.1	0.49
MDL (mass normalized)¹					0.04	0.09	0.14	0.01	0.02	0.01	0.05	0.05	0.01	0.12	0.06
<i>Sample concentrations were recovery corrected.</i>															
<i>All values are rounded to 2 significant figures.</i>															
¹ MDLs below 0.01 are reported as the instrument detection limit of 0.01.															

Table 1. PCB Congeners Concentrations in Nestlings, plus QC Data

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	032	033	034	035	037,059	040	041	042	043	044	045
18763	TSC227-98	Tree Swallow Nestling	9.81	13	71	13	1.2	0.49	31	8.6	5.1	130	15	230	3.2
18768	TSC324-98	Tree Swallow Nestling	9.87	7.4	61	6.5	4.0	0.13	22	20	5.2	100	5.9	180	9.2
18773	TSC415-98	Tree Swallow Nestling	9.96	13	100	3.1	6.9	0.12	15	11	2.6	72	17	110	4.4
18776	TSC614-98	Tree Swallow Nestling	9.81	12	14	0.37	0.26	0.09	4.2	2.8	0.12	24	< 0.01	45	0.35
18779	TSC707-98	Tree Swallow Nestling	9.85	12	27	0.92	0.74	0.09	3.2	4.3	0.48	22	< 0.01	37	0.90
18782	TSC812-98	Tree Swallow Nestling	9.9	11	0.88	0.05	0.05	0.04	0.19	0.15	0.01	1.6	0.48	1.8	0.12
18787	TSC914-98	Tree Swallow Nestling	5.22	3.5	2.1	0.14	0.11	< 0.01	0.39	0.90	0.03	2.8	< 0.01	3.5	0.13
18801	GBHC401F-98	Great Blue Heron Nestling Fat	3.99	74	46	3.3	0.63	10	180	< 0.01	< 0.01	180	< 0.01	2,200	0.44
18804	GBHC605F-98	Great Blue Heron Nestling Fat	6.67	79	3.0	< 0.04	< 0.05	5.8	0.64	< 0.01	2.3	8.7	< 0.01	28	0.18
20032-1	BE-EG-270-99	Eagle Egg	9.87	5.5	6.0	2.0	0.27	1.7	1.7	7.3	1.2	38	5.8	31	2.2
20032-2	BE-EG-270-99	Eagle Egg	9.97	5.3	6.4	2.2	0.33	2.2	1.7	6.1	1.3	39	1.4	31	2.1
20032-3	BE-EG-270-99	Eagle Egg	9.81	5.0	5.4	1.9	0.32	1.9	1.6	4.8	1.1	35	4.0	27	2.1
Average			9.88	5.3	5.9	2.0	0.31	1.9	1.7	6.1	1.2	37	3.7	30	2.1
SD			0.08	0.32	0.49	0.15	0.03	0.22	0.05	1.2	0.09	1.7	2.2	2.3	0.05
%RSD			0.82	6	8	8	11	11	3	20	8	5	60	8	2
MS051100 GCR1	Matrix Spike	Bluegill	9.86	4.1	79	120	0.73	0.50	18	53	29	77	14	230	47
Recovery					79	75	96	81	66	82	79	82	83	77	72
Mock 100% PCBs					100	160	0.76	0.62	28	65	37	95	16	300	65
MB051100	Matrix Blank	Bluegill	9.89	3.8	< 0.08	0.08	< 0.05	< 0.01	< 0.01	0.03	< 0.01	< 0.12	0.04	0.16	< 0.01
	Average mass	=	8.73												
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	---	0.48	0.23	0.00	0.03	0.04	0.04	0.05	0.84	0.00	0.63	0.04
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	---	0.59	0.24	0.00	0.02	0.00	0.04	0.07	0.79	0.00	0.70	0.00
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	---	0.46	0.28	0.23	0.03	0.06	0.04	0.06	0.90	0.00	0.73	0.03
Average					0.51	0.25	0.08	0.02	0.03	0.04	0.06	0.84	0.00	0.69	0.02
Standard Deviation					0.07	0.03	0.13	0.00	0.03	0.00	0.01	0.06	0.00	0.05	0.02
MDL	Method Detection Limit = PB Average + 3 (SD)				0.72	0.33	0.47	0.04	0.12	0.05	0.08	1.0	0.00	0.84	0.08
MDL (mass normalized)¹					0.08	0.04	0.05	0.01	0.01	0.01	0.01	0.12	0.01	0.10	0.01
<i>Sample concentrations were recovery corrected.</i>															
<i>All values are rounded to 2 significant figures.</i>															
<i>¹ MDLs below 0.01 are reported as the instrument detection limit of 0.01.</i>															

Table 1. PCB Congeners Concentrations in Nestlings, plus QC Data

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	046	047	048	049	051	052	053	054	055	056,060	057	
18763	TSC227-98	Tree Swallow Nestling	9.81	13	9.5	230	44	490	18	480	63	0.85	6.1	300	< 0.01	
18768	TSC324-98	Tree Swallow Nestling	9.87	7.4	7.5	250	29	420	19	410	75	1.4	4.1	220	0.26	
18773	TSC415-98	Tree Swallow Nestling	9.96	13	6.1	300	19	480	29	540	92	0.9	2.0	120	0.50	
18776	TSC614-98	Tree Swallow Nestling	9.81	12	0.79	94	3.2	130	6.0	150	9.7	0.10	0.12	22	< 0.01	
18779	TSC707-98	Tree Swallow Nestling	9.85	12	1.3	83	5.8	110	6.5	120	10	0.15	0.20	15	< 0.01	
18782	TSC812-98	Tree Swallow Nestling	9.9	11	0.20	8	0.49	7.0	0.29	7.8	0.49	< 0.01	< 0.01	1.5	< 0.01	
18787	TSC914-98	Tree Swallow Nestling	5.22	3.5	0.12	14	2.0	16	0.41	13	0.61	0.02	< 0.01	3.3	< 0.01	
18801	GBHC401F-98	Great Blue Heron Nestling Fat	3.99	74	1.8	17,000	6.0	17,000	35	16,000	87	7.6	0.67	4,100	< 0.01	
18804	GBHC605F-98	Great Blue Heron Nestling Fat	6.67	79	0.09	300	0.81	240	2.1	190	2.7	< 0.01	< 0.01	71	< 0.01	
20032-1	BE-EG-270-99	Eagle Egg	9.87	5.5	0.19	96	2.9	130	1.9	63	0.46	0.18	0.11	34	< 0.01	
20032-2	BE-EG-270-99	Eagle Egg	9.97	5.3	0.30	100	2.9	140	2.1	70	1.6	0.18	0.11	33	< 0.01	
20032-3	BE-EG-270-99	Eagle Egg	9.81	5.0	0.11	89	3.1	120	2.1	61	0.30	0.23	0.13	32	< 0.01	
Average			9.88	5.3	0.20	95	3.0	130	2.0	65	0.79	0.20	0.12	33	< 0.01	
SD			0.08	0.32	0.10	5.4	0.15	10	0.07	4.9	0.72	0.03	0.01	1.0		
%RSD			0.82	6	48	6	5	8	3	8	91	16	12	3		
MS051100 GCR1	Matrix Spike	Bluegill	9.86	4.1	21	76	69	170	10	320	47	< 0.01	2.7	150	< 0.01	
Recovery					73	95	80	81	81	78	74		73	75		
Mock 100% PCBs					28	80	87	210	13	410	64	< 0.01	3.7	200	< 0.01	
MB051100	Matrix Blank	Bluegill	9.89	3.8	< 0.02	< 0.74	< 0.01	< 0.43	< 0.03	0.47	< 0.03	< 0.01	< 0.01	0.24	< 0.01	
Average mass		=	8.73													
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	---	0.05	5.9	0.00	3.5	0.25	2.5	0.18	0.01	0.02	1.1	0.00	
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	---	0.00	6.0	0.00	3.6	0.20	2.5	0.24	0.01	0.03	1.1	0.00	
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	---	0.07	6.2	0.00	3.6	0.22	2.5	0.20	0.02	0.03	1.1	0.00	
Average					0.04	6.0	0.00	3.6	0.23	2.5	0.21	0.01	0.02	1.1	0.00	
Standard Deviation					0.03	0.14	0.00	0.07	0.02	0.02	0.03	0.00	0.00	0.04	0.00	
MDL	Method Detection Limit = PB Average + 3 (SD)					0.14	6.4	0.00	3.8	0.30	2.6	0.30	0.02	0.03	1.2	0.00
MDL (mass normalized) ¹					0.02	0.74	0.01	0.43	0.03	0.29	0.03	0.01	0.01	0.14	0.01	
Sample concentrations were recovery corrected.																
All values are rounded to 2 significant figures.																
¹ MDLs below 0.01 are reported as the instrument detection limit of 0.01.																

Table 1. PCB Congeners Concentrations in Nestlings, plus QC Data

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	058	063	064	066	067	069	070	071	072	074	075
18763	TSC227-98	Tree Swallow Nestling	9.81	13	2.9	44	280	500	24	2.3	500	89	8.9	320	24
18768	TSC324-98	Tree Swallow Nestling	9.87	7.4	3.0	51	210	370	13	3.1	270	61	17	240	20
18773	TSC415-98	Tree Swallow Nestling	9.96	13	3.0	50	150	270	10	4.0	190	72	33	190	24
18776	TSC614-98	Tree Swallow Nestling	9.81	12	1.1	10	23	52	1.6	0.87	55	21	3.9	45	4.9
18779	TSC707-98	Tree Swallow Nestling	9.85	12	0.94	5.5	25	32	1.6	0.69	38	26	4.0	28	3.9
18782	TSC812-98	Tree Swallow Nestling	9.9	11	0.11	0.8	1.2	3.2	0.09	0.02	3.7	1.8	0.30	3.3	0.29
18787	TSC914-98	Tree Swallow Nestling	5.22	3.5	0.13	1.8	3.2	5.9	0.16	0.07	5.9	3.9	0.67	5.5	0.50
18801	GBHC401F-98	Great Blue Heron Nestling Fat	3.99	74	16	1,800	4,000	120	33	100	6,300	930	1,400	11,000	1,200
18804	GBHC605F-98	Great Blue Heron Nestling Fat	6.67	79	0.80	48	43	280	1.0	1.1	120	25	20	200	25
20032-1	BE-EG-270-99	Eagle Egg	9.87	5.5	2.3	24	52	140	0.85	0.80	90	19	6.5	81	9.0
20032-2	BE-EG-270-99	Eagle Egg	9.97	5.3	2.4	25	50	160	0.93	0.94	88	22	6.6	79	9.7
20032-3	BE-EG-270-99	Eagle Egg	9.81	5.0	2.1	21	48	140	0.94	0.82	86	19	6.0	73	9.1
Average			9.88	5.3	2.2	23	50	150	0.91	0.85	88	20	6.4	78	9.2
SD			0.08	0.32	0.11	2.0	1.8	12	0.05	0.08	2.0	2.1	0.33	4.1	0.36
%RSD			0.82	6	5	8	4	8	6	9	2	10	5	5	4
MS051100 GCR1	Matrix Spike	Bluegill	9.86	4.1	0.49	8.2	87	150	4.9	0.30	260	73	0.69	120	4.1
Recovery					52	88	79	75	78	145	76	82	62	86	105
Mock 100% PCBs					0.93	9.3	110	200	6.3	0.21	340	90	1.1	140	3.9
MB051100	Matrix Blank	Bluegill	9.89	3.8	< 0.08	0.04	< 0.09	0.63	< 0.02	< 0.01	0.76	< 0.13	< 0.06	0.41	< 0.01
	Average mass	=	8.73												
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	---	0.33	0.20	0.62	2.3	0.11	0.07	1.6	0.80	0.49	1.7	0.10
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	---	0.00	0.19	0.70	2.3	0.09	0.06	1.6	0.87	0.45	1.7	0.11
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	---	0.00	0.19	0.71	2.5	0.09	0.05	1.6	0.96	0.44	1.6	0.11
Average					0.11	0.19	0.68	2.4	0.10	0.06	1.6	0.87	0.46	1.7	0.10
Standard Deviation					0.19	0.01	0.05	0.14	0.01	0.01	0.01	0.08	0.03	0.02	0.00
MDL	Method Detection Limit = PB Average + 3 (SD)				0.68	0.21	0.82	2.8	0.13	0.09	1.6	1.1	0.55	1.7	0.11
MDL (mass normalized) ¹					0.08	0.02	0.09	0.32	0.02	0.01	0.19	0.13	0.06	0.20	0.01
Sample concentrations were recovery corrected.															
All values are rounded to 2 significant figures.															
¹ MDLs below 0.01 are reported as the instrument detection limit of 0.01.															

Table 1. PCB Congeners Concentrations in Nestlings, plus QC Data

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	082	083	084	086	087	089	090	091	092	095	096	097
18763	TSC227-98	Tree Swallow Nestling	9.81	13	30	2.3	22	3.1	130	< 0.01	14	60	67	140	1.4	120
18768	TSC324-98	Tree Swallow Nestling	9.87	7.4	30	3.7	30	2.7	99	< 0.01	21	65	82	130	1.4	91
18773	TSC415-98	Tree Swallow Nestling	9.96	13	18	3.1	29	2.9	70	< 0.01	39	92	110	160	3.1	55
18776	TSC614-98	Tree Swallow Nestling	9.81	12	6.3	1.7	9.5	1.3	45	< 0.01	18	31	61	100	0.44	30
18779	TSC707-98	Tree Swallow Nestling	9.85	12	6.1	1.6	8.6	1.1	42	< 0.01	16	27	56	81	0.47	26
18782	TSC812-98	Tree Swallow Nestling	9.9	11	0.51	0.37	1.8	0.09	5.0	< 0.01	3.1	3.1	5.4	8.1	0.03	3.0
18787	TSC914-98	Tree Swallow Nestling	5.22	3.5	0.81	0.35	1.9	0.17	5.2	< 0.01	4.2	3.5	8.1	7.1	0.01	4.7
18801	GBHC401F-98	Great Blue Heron Nestling Fat	3.99	74	26	35	190	< 0.01	3,600	< 0.01	1,800	2,100	5,900	3,100	12	380
18804	GBHC605F-98	Great Blue Heron Nestling Fat	6.67	79	1.4	4.9	13	< 0.01	74	< 0.01	78	43	150	88	0.32	18
20032-1	BE-EG-270-99	Eagle Egg	9.87	5.5	26	5.8	25	< 0.01	250	< 0.01	73	77	100	120	0.61	87
20032-2	BE-EG-270-99	Eagle Egg	9.97	5.3	26	5.9	25	1.5	250	< 0.01	69	81	110	130	0.98	88
20032-3	BE-EG-270-99	Eagle Egg	9.81	5.0	24	5.2	24	2.3	250	< 0.01	61	70	87	120	0.26	82
Average			9.88	5.3	25	5.6	25	1.9	250	< 0.01	68	76	99	120	0.62	86
SD			0.08	0.32	0.77	0.35	0.73	0.57	0.0		5.8	5.6	11	5.8	0.36	3.2
%RSD			0.82	6	3	6	3	31	0		9	7	11	5	58	4
MS051100 GCR1	Matrix Spike	Bluegill	9.86	4.1	36	4.8	83	1.9	150	< 0.01	8.2	45	58	250	2.1	92
Recovery					80	82	83	92	83		132	91	90	83	64	83
Mock 100% PCBs					45	5.9	100	2.1	180	< 0.01	6.2	50	65	300	3.3	110
MB051100	Matrix Blank	Bluegill	9.89	3.8	0.12	0.03	0.69	< 0.01	1.0	< 0.01	0.35	< 0.33	< 0.64	< 0.67	< 0.01	0.64
	Average mass	=	8.73													
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	---	0.57	0.20	0.62	0.00	5.7	0.00	2.7	2.7	5.5	5.5	0.0	3.1
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	---	0.55	0.18	0.59	0.00	5.9	0.00	2.8	2.6	5.5	5.1	0.0	3.1
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	---	0.55	0.19	0.65	0.06	6.1	0.00	2.8	2.6	5.5	5.2	0.0	3.1
Average					0.56	0.19	0.62	0.02	5.9	0.00	2.8	2.6	5.5	5.3	0.0	3.1
Standard Deviation					0.01	0.01	0.03	0.04	0.20	0.00	0.06	0.09	0.01	0.18	0.01	0.02
MDL	Method Detection Limit = PB Average + 3 (SD)				0.60	0.23	0.70	0.13	6.5	0.00	3.0	2.9	5.5	5.8	0.0	3
MDL (mass normalized) ¹					0.07	0.03	0.08	0.01	0.75	0.01	0.34	0.33	0.64	0.67	0.01	0.36
Sample concentrations were recovery corrected.																
All values are rounded to 2 significant figures.																
¹ MDLs below 0.01 are reported as the instrument detection limit of 0.01.																

Table 1. PCB Congeners Concentrations in Nestlings, plus QC Data

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	099	101	102	105	109	110	112	113	114	115	117	118
18763	TSC227-98	Tree Swallow Nestling	9.81	13	200	270	4.1	150	25	230	1.9	2.8	15	15	22	320
18768	TSC324-98	Tree Swallow Nestling	9.87	7.4	180	220	2.4	140	33	200	6.4	4.5	14	13	33	270
18773	TSC415-98	Tree Swallow Nestling	9.96	13	170	150	3.5	92	29	170	6.1	6.0	10	8.0	45	230
18776	TSC614-98	Tree Swallow Nestling	9.81	12	110	210	0.95	48	21	110	0.8	2.6	6.4	2.3	11	160
18779	TSC707-98	Tree Swallow Nestling	9.85	12	90	190	0.79	30	16	110	1.3	2.5	3.4	1.9	11	120
18782	TSC812-98	Tree Swallow Nestling	9.9	11	8.8	15	< 0.01	5.4	2.4	13	< 0.01	1.4	0.41	0.32	2.0	13
18787	TSC914-98	Tree Swallow Nestling	5.22	3.5	11	14	0.03	8.1	3.9	16	0.53	1.1	0.64	0.37	4.6	23
18801	GBHC401F-98	Great Blue Heron Nestling Fat	3.99	74	10,000	5,300	7.7	5,500	1,200	< 1.7	220	240	600	440	1,600	13,000
18804	GBHC605F-98	Great Blue Heron Nestling Fat	6.67	79	870	190	7.6	220	95	170	20	45	23	19	49	690
20032-1	BE-EG-270-99	Eagle Egg	9.87	5.5	350	490	2.2	270	79	290	7.6	110	13	14	34	790
20032-2	BE-EG-270-99	Eagle Egg	9.97	5.3	440	460	2.5	260	75	290	7.1	110	13	14	33	780
20032-3	BE-EG-270-99	Eagle Egg	9.81	5.0	430	480	2.1	260	58	300	11	98	11	13	30	780
Average			9.88	5.3	410	480	2.3	260	71	290	8.4	110	13	14	32	780
SD			0.08	0.32	49	15	0.21	5.7	11	5.8	1.9	7	0.94	0.87	1.8	5.8
%RSD			0.82	6	12	3	9	2	16	2	23	6	8	6	5	1
MS051100 GCR1	Matrix Spike	Bluegill	9.86	4.1	100	260	5.4	100	21	270	1.3	3.0	7.7	7.0	12	200
Recovery					91	84	36	83	131	90	104	204	79	89	93	83
Mock 100% PCBs					110	310	15	120	16	300	1.3	1.5	9.8	7.8	13	240
MB051100	Matrix Blank	Bluegill	9.89	3.8	1.5	2.0	< 0.01	0.98	< 1.2	< 1.7	< 0.01	0.93	< 0.08	0.11	< 0.20	< 3.5
	Average mass	=	8.73													
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	---	9	16	0.00	7.2	2.8	14	0.00	0.30	0.62	0.3	1.5	26
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	---	10	16	0.00	7.6	2.5	13	0.00	0.38	0.59	0.4	1.4	23
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	---	10	17	0.00	7.5	6.5	14	0.00	0.46	0.66	0.5	1.4	22
Average					10	16	0.00	7.4	4.0	14	0.00	0.38	0.62	0.4	1.4	24
Standard Deviation					0.20	0.42	0.00	0.2	2.2	0.37	0.00	0.08	0.03	0.07	0.10	2.1
MDL	Method Detection Limit = PB Average + 3 (SD)				10	18	0.00	8	11	15	0.00	0.61	0.72	0.6	1.7	30
MDL (mass normalized) ¹					1.2	2.0	0.01	0.93	1.2	1.7	0.01	0.07	0.08	0.07	0.20	3.5
<i>Sample concentrations were recovery corrected.</i>																
<i>All values are rounded to 2 significant figures.</i>																
<i>¹MDLs below 0.01 are reported as the instrument detection limit of 0.01.</i>																

Table 1. PCB Congeners Concentrations in Nestlings, plus QC Data

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	119	122	123	128	129	130	131	132	133	134	136
18763	TSC227-98	Tree Swallow Nestling	9.81	13	10	4.0	8.6	34	10	12	1.9	30	3.9	1.8	5.9
18768	TSC324-98	Tree Swallow Nestling	9.87	7.4	12	2.9	7.9	34	7.3	12	1.7	27	6.8	3.9	7.6
18773	TSC415-98	Tree Swallow Nestling	9.96	13	16	2.1	6.6	26	5.3	11	1.2	29	10	4.8	15
18776	TSC614-98	Tree Swallow Nestling	9.81	12	14	0.68	3.6	46	8.3	22	2.4	69	12	12	26
18779	TSC707-98	Tree Swallow Nestling	9.85	12	12	0.71	2.6	44	9.0	22	2.4	68	13	16	26
18782	TSC812-98	Tree Swallow Nestling	9.9	11	1.9	0.04	0.23	4.2	0.79	2.0	0.23	8.9	1.2	3.0	4.3
18787	TSC914-98	Tree Swallow Nestling	5.22	3.5	1.5	0.09	0.41	5.7	0.89	2.2	0.15	4.9	2.0	2.6	2.4
18801	GBHC401F-98	Great Blue Heron Nestling Fat	3.99	74	1,100	6.8	360	1,900	68	610	20	1,600	540	51	280
18804	GBHC605F-98	Great Blue Heron Nestling Fat	6.67	79	47	0.51	18	140	5.3	50	1.9	66	19	160	29
20032-1	BE-EG-270-99	Eagle Egg	9.87	5.5	42	0.53	11	250	21	68	6.7	300	21	20	32
20032-2	BE-EG-270-99	Eagle Egg	9.97	5.3	43	0.64	9.4	250	22	71	7.6	280	22	21	38
20032-3	BE-EG-270-99	Eagle Egg	9.81	5.0	38	0.52	8.6	250	20	63	6.1	280	21	21	31
Average			9.88	5.3	41	0.56	9.5	250	21	67	6.8	290	21	21	33
SD			0.08	0.32	2.6	0.06	1.0	0.0	0.95	4.1	0.77	12	0.89	0.59	3.9
%RSD			0.82	6	6	11	11	0	5	6	11	4	4	3	12
MS051100 GCR1	Matrix Spike	Bluegill	9.86	4.1	5.3	2.8	3.7	54	15	17	5.5	150	5.4	30	56
Recovery					122	82	99	92	81	94	82	94	97	117	81
Mock 100% PCBs					4.4	3.4	3.7	58	19	18	6.7	160	5.5	26	69
MB051100	Matrix Blank	Bluegill	9.89	3.8	0.57	< 0.02	< 0.08	< 1.1	< 0.27	< 0.55	< 0.09	< 2.3	< 0.26	0.67	< 0.27
	Average mass	=	8.73												
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	---	1.8	0.11	0.3	9.5	2.1	4.4	0.43	18	1.4	1.5	2.3
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	---	1.8	0.09	0.3	9.5	1.8	4.4	0.57	19	1.8	1.8	2.3
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	---	1.9	0.10	0.5	9.6	1.8	4.6	0.39	18	1.8	2.5	2.3
Average					1.8	0.10	0.4	9.5	1.9	4.5	0.46	19	1.7	1.9	2.3
Standard Deviation					0.09	0.01	0.12	0.04	0.16	0.10	0.09	0.54	0.21	0.52	0.03
MDL	Method Detection Limit = PB Average + 3 (SD)				2.1	0.13	0.7	9.6	2.4	4.8	0.75	20	2.3	3.5	2.4
MDL (mass normalized) ¹					0.24	0.02	0.08	1.1	0.27	0.55	0.09	2.3	0.26	0.40	0.27
<i>Sample concentrations were recovery corrected.</i>															
<i>All values are rounded to 2 significant figures.</i>															
<i>¹MDLs below 0.01 are reported as the instrument detection limit of 0.01.</i>															

Table 1. PCB Congeners Concentrations in Nestlings, plus QC Data

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	137	138	139	141	144	146	147	149	151	153	156	157
18763	TSC227-98	Tree Swallow Nestling	9.81	13	13	150	4.0	31	7.4	26	3.4	86	17	160	20	5.0
18768	TSC324-98	Tree Swallow Nestling	9.87	7.4	11	130	4.2	24	5.4	34	2.1	87	29	150	18	4.9
18773	TSC415-98	Tree Swallow Nestling	9.96	13	9	110	3.1	18	3.9	40	3.8	110	41	160	13	3.9
18776	TSC614-98	Tree Swallow Nestling	9.81	12	11	360	3.6	130	32	120	5.6	400	140	680	53	6.6
18779	TSC707-98	Tree Swallow Nestling	9.85	12	10	360	2.9	150	33	130	5.7	410	150	710	47	5.6
18782	TSC812-98	Tree Swallow Nestling	9.9	11	1.4	37	0.23	8.9	2.6	11	0.40	28	9.9	59	2.0	0.59
18787	TSC914-98	Tree Swallow Nestling	5.22	3.5	1.9	36	0.41	5.1	0.95	11	0.23	15	4.9	59	2.4	0.86
18801	GBHC401F-98	Great Blue Heron Nestling Fat	3.99	74	690	10,000	160	1,000	140	2,600	110	3,900	2,000	11,000	840	250
18804	GBHC605F-98	Great Blue Heron Nestling Fat	6.67	79	47	2,300	20	100	28	250	7.7	350	150	1,900	100	19
20032-1	BE-EG-270-99	Eagle Egg	9.87	5.5	44	1,800	13	260	48	360	7.7	750	270	2,400	86	17
20032-2	BE-EG-270-99	Eagle Egg	9.97	5.3	45	1,900	15	270	53	380	8.8	820	280	2,500	90	19
20032-3	BE-EG-270-99	Eagle Egg	9.81	5.0	42	1,900	12	280	45	380	9.7	780	280	2,500	81	17
Average			9.88	5.3	44	1,900	13	270	49	370	8.7	780	280	2,500	86	17
SD			0.08	0.32	1.3	58	1.2	10	4.4	12	1.0	35	5.8	58	4.4	1.1
%RSD			0.82	6	3	3	9	4	9	3	12	4	2	2	5	6
MS051100 GCR1	Matrix Spike	Bluegill	9.86	4.1	15	330	5.1	96	33	57	1.7	300	110	370	22	5.2
Recovery					95	97	89	96	91	107	58	91	92	103	90	83
Mock 100% PCBs					16	340	5.8	100	36	53	2.9	330	120	360	25	6.2
MB051100	Matrix Blank	Bluegill	9.89	3.8	< 0.27	< 14	< 0.47	< 3.0	< 0.72	< 2.6	< 0.12	< 8.8	< 2.3	< 20	< 0.56	< 0.10
	Average mass	=	8.73													
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	---	2.3	100	3.0	26	5.1	22	0.65	66	20	150	3.8	0.83
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	---	2.3	110	2.1	26	5.3	22	0.70	67	20	160	3.9	0.77
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	---	2.3	110	2.8	26	4.5	22	0.39	60	20	160	4.4	0.74
Average					2.3	107	2.6	26	5.0	22	0.58	65	20	157	4.0	0.78
Standard Deviation					0.02	5.8	0.50	0.08	0.43	0.15	0.17	4.1	0.04	5.77	0.31	0.04
MDL	Method Detection Limit = PB Average + 3 (SD)				2.4	124	4.1	26	6.3	22	1.1	77	20	174	4.9	0.91
MDL (mass normalized) ¹					0.27	14	0.47	3.0	0.72	2.6	0.12	8.8	2.3	20	0.56	0.10
<i>Sample concentrations were recovery corrected.</i>																
<i>All values are rounded to 2 significant figures.</i>																
¹ MDLs below 0.01 are reported as the instrument detection limit of 0.01.																

Table 1. PCB Congeners Concentrations in Nestlings, plus QC Data

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	158	163	164	166	167	170	171	172	173	174	175	176
18763	TSC227-98	Tree Swallow Nestling	9.81	13	21	32	14	0.93	6.0	65	5.1	4.1	0.82	13	0.66	2.5
18768	TSC324-98	Tree Swallow Nestling	9.87	7.4	18	43	15	0.88	5.7	48	5.2	4.9	0.18	12	0.94	2.1
18773	TSC415-98	Tree Swallow Nestling	9.96	13	12	67	13	0.67	4.5	36	4.3	5.5	0.47	14	0.64	2.3
18776	TSC614-98	Tree Swallow Nestling	9.81	12	52	150	38	1.2	15	630	64	44	2.4	230	10	18
18779	TSC707-98	Tree Swallow Nestling	9.85	12	53	150	45	1.2	15	350	67	50	2.9	250	11	18
18782	TSC812-98	Tree Swallow Nestling	9.9	11	3.8	10	3.5	0.30	1.3	16	3.3	2.8	< 0.15	13	0.63	1.0
18787	TSC914-98	Tree Swallow Nestling	5.22	3.5	3.5	11	3.5	0.12	1.4	14	2.2	2.4	< 0.15	4.6	0.36	0.62
18801	GBHC401F-98	Great Blue Heron Nestling Fat	3.99	74	930	3,400	< 1.4	88	370	1,800	370	360	25	810	66	130
18804	GBHC605F-98	Great Blue Heron Nestling Fat	6.67	79	92	340	49	13	30	610	71	43	2.0	140	11	13
20032-1	BE-EG-270-99	Eagle Egg	9.87	5.5	170	370	150	19	45	660	170	130	6.9	350	24	27
20032-2	BE-EG-270-99	Eagle Egg	9.97	5.3	180	360	89	18	45	710	190	130	5.2	380	26	25
20032-3	BE-EG-270-99	Eagle Egg	9.81	5.0	170	370	150	17	39	620	160	130	5.2	340	22	20
Average			9.88	5.3	170	370	130	18	43	660	170	130	5.8	360	24	24
SD			0.08	0.32	5.8	5.8	35	0.65	3.6	45	15	0	1.0	21	2.1	3.6
%RSD			0.82	6	3	2	27	4	9	7	9	0	17	6	9	15
MS051100 GCR1	Matrix Spike	Bluegill	9.86	4.1	43	73	32	1.8	10	140	37	23	3.1	140	7.0	16
Recovery					89	101	93	143	98	93	96	99	94	93	94	95
Mock 100% PCBs					48	73	35	1.2	10	150	39	23	3.3	150	7.4	16
MB051100	Matrix Blank	Bluegill	9.89	3.8	< 1.3	< 3.2	< 1.4	< 0.09	< 0.34	< 5.4	< 1.3	< 0.98	< 0.15	< 3.9	< 0.18	< 0.47
	Average mass	=	8.73													
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	---	11	27	7.2	0.00	2.8	40	11	8.3	0.79	31	1.6	2.0
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	---	11	27	8.0	0.32	2.8	41	11	8.4	1.0	31	1.6	2.7
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	---	11	27	9.8	0.33	2.9	44	11	8.5	1.0	33	1.6	3.0
Average					11	27	8.3	0.21	2.8	41	11	8.4	0.93	32	1.6	2.6
Standard Deviation					0.13	0.32	1.3	0.18	0.04	1.9	0.24	0.05	0.12	0.87	0.01	0.52
MDL	Method Detection Limit = PB Average + 3 (SD)				11	28	12	0.77	2.9	47	12	8.6	1.3	34	1.6	4.1
MDL (mass normalized)¹					1.3	3.2	1.4	0.09	0.34	5.4	1.3	0.98	0.15	3.9	0.18	0.47
<i>Sample concentrations were recovery corrected.</i>																
<i>All values are rounded to 2 significant figures.</i>																
¹ MDLs below 0.01 are reported as the instrument detection limit of 0.01.																

Table 1. PCB Congeners Concentrations in Nestlings, plus QC Data

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	177	178	179	180	183	185	187	189	190	191	193	194
18763	TSC227-98	Tree Swallow Nestling	9.81	13	8.5	4.6	2.3	100	15	1.8	25	1.5	7.2	0.87	2.6	5.7
18768	TSC324-98	Tree Swallow Nestling	9.87	7.4	12	8.9	3.6	70	16	1.4	35	1.3	8.4	0.65	3.2	8.4
18773	TSC415-98	Tree Swallow Nestling	9.96	13	13	13	6.9	53	14	1.4	45	1.5	9.1	0.71	4	11
18776	TSC614-98	Tree Swallow Nestling	9.81	12	96	46	41	860	160	28	350	8.7	48	12	37	95
18779	TSC707-98	Tree Swallow Nestling	9.85	12	110	51	46	620	180	31	400	9.2	38	13	38	100
18782	TSC812-98	Tree Swallow Nestling	9.9	11	6.4	3.8	2.6	33	13	1.5	26	0.81	6.1	0.60	2.2	3.2
18787	TSC914-98	Tree Swallow Nestling	5.22	3.5	4.5	3.8	1.6	35	9.2	< 0.65	20	0.72	6.2	0.42	2.3	4.3
18801	GBHC401F-98	Great Blue Heron Nestling Fat	3.99	74	860	910	330	3,600	1,400	130	4,200	99	1,000	65	300	680
18804	GBHC605F-98	Great Blue Heron Nestling Fat	6.67	79	100	75	40	900	210	3.9	470	12	53	7.2	36	81
20032-1	BE-EG-270-99	Eagle Egg	9.87	5.5	370	200	22	1800	680	40	1100	17	400	21	75	280
20032-2	BE-EG-270-99	Eagle Egg	9.97	5.3	390	210	32	1900	740	49	1200	19	420	24	140	290
20032-3	BE-EG-270-99	Eagle Egg	9.81	5.0	370	200	21	1800	670	36	1100	16	380	20	69	280
Average			9.88	5.3	380	200	25	1,800	700	42	1100	17	400	22	95	280
SD			0.08	0.32	12	5.8	6.2	58	38	7.0	58	1.6	20	2.0	39	5.8
%RSD			0.82	6	3	3	25	3	5	17	5	9	5	9	42	2
MS051100 GCR1	Matrix Spike	Bluegill	9.86	4.1	68	28	51	250	100	15	160	5.3	53	5.3	15	45
Recovery					96	99	85	100	91	94	114	101	99	100	110	89
Mock 100% PCBs					71	28	59	250	110	16	140	5.3	54	5.3	14	50
MB051100	Matrix Blank	Bluegill	9.89	3.8	< 2.4	< 1.1	< 0.80	< 14	< 5.6	< 0.65	< 8.8	< 0.22	< 2.9	< 0.20	< 0.93	< 1.6
	Average mass	=	8.73													
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	---	20	10	6.6	120	45	5.3	76	1.8	20	1.5	7.6	14
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	---	20	9.6	6.6	120	46	4.9	76	1.8	21	1.5	7.6	14
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	---	20	9.6	6.8	120	47	5.1	75	1.8	23	1.6	7.9	14
Average					20	9.7	6.7	120	46	5.1	76	1.8	21	1.6	7.7	14
Standard Deviation					0.13	0.08	0.09	0.00	1.0	0.19	0.41	0.03	1.4	0.06	0.14	0.01
MDL	Method Detection Limit = PB Average + 3 (SD)				21	9.9	7.0	120	49	5.7	77	1.9	26	1.7	8.1	14
MDL (mass normalized) ¹					2.4	1.1	0.80	14	5.6	0.65	8.8	0.22	2.9	0.20	0.93	1.6
<i>Sample concentrations were recovery corrected.</i>																
<i>All values are rounded to 2 significant figures.</i>																
<i>¹MDLs below 0.01 are reported as the instrument detection limit of 0.01.</i>																

Table 1. PCB Congeners Concentrations in Nestlings, plus QC Data

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	195	196	197	198	199	200	201	202	203	205	206	208
18763	TSC227-98	Tree Swallow Nestling	9.81	13	1.8	2.7	0.40	0.33	5.9	0.43	0.68	1.5	5.4	0.95	2.1	0.77
18768	TSC324-98	Tree Swallow Nestling	9.87	7.4	3.1	3.8	0.48	0.44	9.5	0.52	0.69	2.5	8.2	0.69	4.2	1.4
18773	TSC415-98	Tree Swallow Nestling	9.96	13	3.1	3.3	0.51	0.63	13	0.74	0.80	5.5	11	0.88	6.6	2.4
18776	TSC614-98	Tree Swallow Nestling	9.81	12	56	47	3.6	5.1	97	10	10	17	83	9.3	23	3.4
18779	TSC707-98	Tree Swallow Nestling	9.85	12	56	53	4.2	5.7	110	11	34	18	84	10	21	3.0
18782	TSC812-98	Tree Swallow Nestling	9.9	11	1.8	2.4	0.48	0.24	5.9	0.52	0.94	1.5	3.7	0.21	1.5	0.90
18787	TSC914-98	Tree Swallow Nestling	5.22	3.5	1.5	2.7	0.44	0.22	6.2	0.29	0.63	2.2	4.2	0.48	3.3	1.6
18801	GBHC401F-98	Great Blue Heron Nestling Fat	3.99	74	240	310	27	46	1,000	60	87	330	850	110	540	110
18804	GBHC605F-98	Great Blue Heron Nestling Fat	6.67	79	39	45	4.1	6.3	120	10	15	43	110	11	54	15
20032-1	BE-EG-270-99	Eagle Egg	9.87	5.5	86	210	11	13	350	13	29	56	220	27	360	55
20032-2	BE-EG-270-99	Eagle Egg	9.97	5.3	100	210	12	14	370	15	31	56	260	29	400	58
20032-3	BE-EG-270-99	Eagle Egg	9.81	5.0	76	210	10	12	350	11	27	48	210	24	320	48
Average			9.88	5.3	87	210	11	13	360	13	29	54	230	27	360	54
SD			0.08	0.32	12	0	0.80	1.0	12	1.9	2.1	4.6	26	2.4	40	5.1
%RSD			0.82	6	14	0	7	8	3	15	7	9	12	9	11	9
MS051100 GCR1	Matrix Spike	Bluegill	9.86	4.1	25	28	4.5	3.1	49	7.7	6.7	10	36	3.4	13	2.9
Recovery					94	93	98	90	99	89	94	101	97	106	94	95
Mock 100% PCBs					26	30	4.6	3.5	50	8.7	7.2	10	37	3.2	14	3.0
MB051100	Matrix Blank	Bluegill	9.89	3.8	< 0.85	< 1.3	< 0.30	< 0.07	< 1.6	< 0.16	< 0.27	< 0.43	< 1.7	< 0.14	< 0.43	< 0.22
	Average mass	=	8.73													
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	---	6.7	9.8	2.1	0.61	14	1.3	2.2	3.2	11	1.2	3.1	1.5
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	---	6.8	10	2.2	0.60	14	1.4	2.2	3.4	12	1.2	3.1	1.6
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	---	7.1	9.7	2.4	0.60	14	1.3	2.3	3.5	13	1.2	3.4	1.3
Average					6.9	9.9	2.2	0.60	14	1.3	2.2	3.4	12	1.2	3.2	1.4
Standard Deviation					0.19	0.36	0.12	0.00	0.05	0.01	0.06	0.13	1.1	0.01	0.18	0.16
MDL	Method Detection Limit = PB Average + 3 (SD)				7.4	11	2.6	0.61	14	1.4	2.4	3.8	15	1.2	3.7	1.9
MDL (mass normalized) ¹					0.85	1.3	0.30	0.07	1.6	0.16	0.27	0.43	1.7	0.14	0.43	0.22
<i>Sample concentrations were recovery corrected.</i>																
<i>All values are rounded to 2 significant figures.</i>																
¹ MDLs below 0.01 are reported as the instrument detection limit of 0.01.																

Table 1. PCB Congeners Concentrations in Nestlings, plus QC Data

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	209	Total PCBs	
18763	TSC227-98	Tree Swallow Nestling	9.81	13	< 0.78	8,000	ng/g
18768	TSC324-98	Tree Swallow Nestling	9.87	7.4	0.79	6,800	ng/g
18773	TSC415-98	Tree Swallow Nestling	9.96	13	1.3	6,500	ng/g
18776	TSC614-98	Tree Swallow Nestling	9.81	12	< 0.78	7,400	ng/g
18779	TSC707-98	Tree Swallow Nestling	9.85	12	1.1	6,900	ng/g
18782	TSC812-98	Tree Swallow Nestling	9.9	11	1.1	510	ng/g
18787	TSC914-98	Tree Swallow Nestling	5.22	3.5	2.3	540	ng/g
18801	GBHC401F-98	Great Blue Heron Nestling Fat	3.99	74	< 0.78	220,000	ng/g
18804	GBHC605F-98	Great Blue Heron Nestling Fat	6.67	79	2.4	15,000	ng/g
20032-1	BE-EG-270-99	Eagle Egg	9.87	5.5	280	20,000	ng/g
20032-2	BE-EG-270-99	Eagle Egg	9.97	5.3	150	21,000	ng/g
20032-3	BE-EG-270-99	Eagle Egg	9.81	5.0	260	20,000	ng/g
Average			9.88	5.3	230	20,000	ng/g
SD			0.08	0.32	70	580	ng/g
%RSD			0.82	6	30	3	%
MS051100 GCR1	Matrix Spike	Bluegill	9.86	4.1	5.6	8,500	ng
Recovery					119	85	%
Mock 100% PCBs					4.7	10,000	ng
MB051100	Matrix Blank	Bluegill	9.89	3.8	< 0.78	< 140	ng/g
	<i>Average mass</i>	=	8.73				
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	---	4.6	1,113	ng
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	---	5.1	1,139	ng
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	---	5.7	1,149	ng
Average					5.1	1,134	ng
Standard Deviation					0.55	18	ng
MDL	Method Detection Limit = PB Average + 3 (SD)				6.8	1,189	ng
MDL (mass normalized)[†]					0.78	140	ng/g
<i>Sample concentrations were recovery corrected.</i>							
<i>All values are rounded to 2 significant figures.</i>							
<i>[†] MDLs below 0.01 are reported as the instrument detection limit of 0.01.</i>							

Table 2. Recoveries (%) of PCB Procedural Standards

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	029		155		204	
				ng or ng/g	% Recovery	ng or ng/g	% Recovery	ng or ng/g	% Recovery
MS051100	Matrix Spike	Bluegill	9.9	310	72	330	77	330	79
MB051100	Matrix Blank	Bluegill	9.9	24	56	27	62	27	62
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	240	56	270	63	280	67
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	240	56	270	63	280	67
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	240	56	270	63	280	67
18763	TSC227-98	Tree Swallow Nestling	9.8	29	67	31	71	30	69
18768	TSC324-98	Tree Swallow Nestling	9.9	35	79	36	83	35	83
18773	TSC415-98	Tree Swallow Nestling	10	32	74	34	79	33	78
18776	TSC614-98	Tree Swallow Nestling	9.8	31	71	33	75	33	76
18779	TSC707-98	Tree Swallow Nestling	9.9	33	76	35	81	35	82
18782	TSC812-98	Tree Swallow Nestling	9.9	31	72	34	77	33	79
18787	TSC914-98	Tree Swallow Nestling	5.2	25	30	27	33	26	33
18801	GBHC401F-98	Great Blue Heron Nestling Fat	4.0	37	34	45	41	39	37
18804	GBHC4605F-98	Great Blue Heron Nestling Fat	6.7	19	30	19	30	20	32
Average Recovery					59		64		65
SD					17		18		18

Table 3. Organochlorine Pesticides (ng/g) in Tree Swallow Nestlings, Great Blue Heron Fat Tissue, plus Quality Control Samples

Sample Name	Field ID	Sample Type	Total geq for Analysis	HCB	PCA	alpha-BHC	beta-BHC	Lindane	delta-BHC	Heptachlor	Heptachlor Epoxide
18763	TSC227-98 REMN	TREE SWALLOW NESTLING	2.0	3.1	1.3	4.5	< 0.01	0.63	< 0.11	< 0.01	1.5
18768	TSC324-98 SA-13	TREE SWALLOW NESTLING	2.0	2.5	1.3	3.4	0.59	1.0	< 0.11	< 0.01	1.2
18773	TSC415-98 SARA	TREE SWALLOW NESTLING	2.1	2.0	0.95	5.7	2.3	1.9	< 0.11	< 0.01	2.2
18776	TSC614-98 RVNA	TREE SWALLOW NESTLING	2.1	4.5	0.62	15	1.6	0.55	< 0.11	< 0.01	2.8
18779	TSC707-98 STJO	TREE SWALLOW NESTLING	2.0	1.8	1.2	5.0	2.1	0.86	< 0.11	< 0.01	3.8
18782	TSC812-98 STAL	TREE SWALLOW NESTLING	2.0	0.91	1.1	11	1.2	< 0.41	< 0.11	< 0.01	2.5
18787	TSC914-98 CHEL	TREE SWALLOW NESTLING	2.0	1.1	< 0.21	2.1	< 0.01	< 0.41	0.2	< 0.01	1.1
18801	GBHC401F-98 SARA	GREAT BLUE HERON NESTLING/FAT	2.0	54	26	< 0.02	< 0.01	< 0.41	< 0.11	< 0.01	31
18804	GBHC605F-98 CAST	GREAT BLUE HERON NESTLING/FAT	2.2	22	12	< 0.02	< 0.01	< 0.41	< 0.11	< 0.01	38
MS051100 OC	Matrix Spike OCPs	Bluegill	2.0	120	130	120	120	120	130	120	130
% Recovery				67	72	67	67	67	72	71	76
MB051100	Matrix Blank	Bluegill	2.2	0.27	0.55	0.80	< 0.01	< 0.41	0.28	< 0.01	0.29
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	0.08	0.17	0.02	0.00	0.08	0.11	0.00	0.00
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	0.10	0.21	0.02	0.00	0.41	0.14	0.00	0.00
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	0.07	0.30	0.03	0.00	0.37	0.17	0.00	0.00
Average				0.08	0.23	0.02	0.00	0.29	0.14	0.00	0.00
Standard Deviation				0.02	0.07	0.01	0.00	0.18	0.03	0.00	0.00
Method Detection Limit (MDL) = PB Average + 3 (SD)				0.13	0.43	0.04	0.00	0.83	0.23	0.00	0.00
MDL ¹	mass normalized	average mass=	2.03	0.06	0.21	0.02	0.01	0.41	0.11	0.01	0.01
<i>Note: Values are recovery corrected.</i>											
<i>Note: values rounded to 2 significant figures.</i>											
¹ If MDL is zero value set to instrument detection limit.											

Table 3. Organochlorine Pesticides (ng/g) in Tree Swallow Nestlings, Great Blue Heron Fat Tissue, plus Quality Control Samples

Sample Name	Field ID	Sample Type	Dacthal	Dieldrin	Endrin	Oxychlorane	cis-Chlordane	trans-Chlordane	cis-Nonachlor
18763	TSC227-98 REMN	TREE SWALLOW NESTLING	2.6	3.8	< 0.02	2.4	< 0.38	0.42	1.2
18768	TSC324-98 SA-13	TREE SWALLOW NESTLING	4.5	3.2	< 0.02	3.7	< 0.38	< 0.02	< 0.01
18773	TSC415-98 SARA	TREE SWALLOW NESTLING	2.5	3.6	< 0.02	2.9	< 0.38	< 0.02	1.0
18776	TSC614-98 RVNA	TREE SWALLOW NESTLING	1.0	5.1	< 0.02	4.6	< 0.38	< 0.02	0.33
18779	TSC707-98 STJO	TREE SWALLOW NESTLING	0.25	8.8	< 0.02	7.8	< 0.38	< 0.02	3.2
18782	TSC812-98 STAL	TREE SWALLOW NESTLING	0.46	96	1.0	5.0	0.56	< 0.02	1.2
18787	TSC914-98 CHEL	TREE SWALLOW NESTLING	< 0.52	6.3	< 0.02	4.0	< 0.38	0.31	0.78
18801	GBHC401F-98 SARA	GREAT BLUE HERON NESTLING/FAT	< 0.52	120	< 0.02	80	51	< 0.02	110
18804	GBHC605F-98 CAST	GREAT BLUE HERON NESTLING/FAT	< 0.52	240	< 0.02	60	19	< 0.02	89
MS051100 OC	Matrix Spike OCPs	Bluegill	130	130	120	130	120	130	130
% Recovery			72	76	71	76	71	76	76
MB051100	Matrix Blank	Bluegill	0.93	3.0	4.3	1.5	2.1	0.64	0.66
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	0.95	0.07	0.03	0.00	0.03	0.02	0.01
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	0.98	0.03	0.02	0.00	0.01	0.01	0.00
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	1.00	0.01	0.02	0.00	0.38	0.01	0.00
Average			0.98	0.04	0.02	0.00	0.14	0.01	0.00
Standard Deviation			0.03	0.03	0.01	0.00	0.21	0.01	0.01
Method Detection Limit (MDL) = PB Average + 3 (SD)			1.05	0.13	0.04	0.00	0.76	0.03	0.02
MDL ¹	mass normalized	average mass=	0.52	0.06	0.02	0.01	0.38	0.02	0.01
<i>Note: Values are recovery corrected.</i>									
<i>Note: values rounded to 2 significant figures.</i>									
¹ If MDL is zero value set to instrument detection limit.									

Table 3. Organochlorine Pesticides (ng/g) in Tree Swallow Nestlings, Great Blue Heron Fat Tissue, plus Quality Control Samples

Sample Name	Field ID	Sample Type	trans-Nonachlor	o,p'-DDE	o,p'-DDD	o,p'-DDT	p,p'-DDE	p,p'-DDD	p,p'-DDT	Endosulfan 1
18763	TSC227-98 REMN	TREE SWALLOW NESTLING	1.6	< 0.01	1.0	0.09	33	1.3	< 0.39	< 0.01
18768	TSC324-98 SA-13	TREE SWALLOW NESTLING	0.44	< 0.01	< 0.48	< 0.01	76	< 0.01	< 0.39	< 0.01
18773	TSC415-98 SARA	TREE SWALLOW NESTLING	0.78	< 0.01	< 0.48	0.21	64	1.6	< 0.39	< 0.01
18776	TSC614-98 RVNA	TREE SWALLOW NESTLING	0.93	< 0.01	< 0.48	< 0.01	100	1.4	< 0.39	< 0.01
18779	TSC707-98 STJO	TREE SWALLOW NESTLING	18	< 0.01	< 0.48	1.4	130	3.0	2.4	< 0.01
18782	TSC812-98 STAL	TREE SWALLOW NESTLING	7.5	< 0.01	1.8	2.3	51	15	6.2	< 0.01
18787	TSC914-98 CHEL	TREE SWALLOW NESTLING	5.0	2.1	< 0.48	< 0.01	32	1.7	4.1	< 0.01
18801	GBHC401F-98 SARA	GREAT BLUE HERON NESTLING/FAT	340	< 0.01	< 0.48	< 0.01	3,200	140	140	< 0.01
18804	GBHC605F-98 CAST	GREAT BLUE HERON NESTLING/FAT	240	< 0.01	< 0.48	< 0.01	11,000	820	520	< 0.01
MS051100 OC	Matrix Spike OCPs	Bluegill	130	130	130	110	120	130	140	130
% Recovery			76	76	76	65	71	76	78	76
MB051100	Matrix Blank	Bluegill	4.0	4.7	2.4	0.20	4.3	0.42	16	< 0.01
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	0.06	0.00	0.80	0.00	0.65	0.00	0.60	0.00
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	0.05	0.00	0.78	0.00	0.62	0.00	0.54	0.00
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	0.07	0.00	0.88	0.00	0.59	0.00	0.42	0.00
Average			0.06	0.00	0.82	0.00	0.62	0.00	0.52	0.00
Standard Deviation			0.01	0.00	0.05	0.00	0.03	0.00	0.09	0.00
Method Detection Limit (MDL) = PB Average + 3 (SD)			0.09	0.00	0.98	0.00	0.71	0.00	0.79	0.00
MDL ¹	mass normalized	average mass=	0.04	0.01	0.48	0.01	0.35	0.01	0.39	0.01
<i>Note: Values are recovery corrected.</i>										
<i>Note: values rounded to 2 significant figures.</i>										
¹ If MDL is zero value set to instrument detection limit.										

Table 3. Organochlorine Pesticides (ng/g) in Tree Swallow Nestlings, Great Blue Heron Fat Tissue, plus Quality Control Samples

Sample Name	Field ID	Sample Type	Endosulfan II	Endosulfate	Methoxychlor	Mirex	units
18763	TSC227-98 REMN	TREE SWALLOW NESTLING	< 0.01	< 0.01	1.2	2.7	ng/g
18768	TSC324-98 SA-13	TREE SWALLOW NESTLING	< 0.01	< 0.01	< 0.48	0.78	ng/g
18773	TSC415-98 SARA	TREE SWALLOW NESTLING	< 0.01	< 0.01	1.0	1.3	ng/g
18776	TSC614-98 RVNA	TREE SWALLOW NESTLING	< 0.01	< 0.01	< 0.48	1.1	ng/g
18779	TSC707-98 STJO	TREE SWALLOW NESTLING	< 0.01	< 0.01	0.51	2.7	ng/g
18782	TSC812-98 STAL	TREE SWALLOW NESTLING	< 0.01	< 0.01	< 0.48	0.69	ng/g
18787	TSC914-98 CHEL	TREE SWALLOW NESTLING	< 0.01	< 0.01	< 0.48	0.43	ng/g
18801	GBHC401F-98 SARA	GREAT BLUE HERON NESTLING/FAT	< 0.01	< 0.01	< 0.48	22	ng/g
18804	GBHC605F-98 CAST	GREAT BLUE HERON NESTLING/FAT	< 0.01	< 0.01	< 0.48	6.4	ng/g
MS051100 OC	Matrix Spike OCPs	Bluegill	130	140	140	150	ng
% Recovery			72	82	78	83	%
MB051100	Matrix Blank	Bluegill	< 0.01	0.81	2.3	0.07	ng/g
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	0.00	0.00	0.77	0.00	ng
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	0.00	0.00	0.74	0.00	ng
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	0.00	0.00	0.86	0.00	ng
Average			0.00	0.00	0.79	0.00	ng
Standard Deviation			0.00	0.00	0.06	0.00	ng
Method Detection Limit (MDL) = PB Average + 3 (SD)			0.00	0.00	0.98	0.00	ng
MDL ¹	mass normalized	average mass=	0.01	0.01	0.48	0.01	ng/g
<i>Note: Values are recovery corrected.</i>							
<i>Note: values rounded to 2 significant figures.</i>							
¹ If MDL is zero value set to instrument detection limit.							

Table 4. Recoveries (%) of OC Pesticide Procedural Internal Standards

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	TCM-Xylene			029			155		
				Amount or Concentration	% Recovery		Amount or Concentration	% Recovery		Amount or Concentration	% Recovery	
PB051100 GCR1	Procedure Blank	Na ₂ SO ₄	---	110	ng	61	94	ng	49	140	ng	70
PB051100 GCR2	Procedure Blank	Na ₂ SO ₄	---	100	ng	56	94	ng	49	140	ng	70
PB051100 GCR3	Procedure Blank	Na ₂ SO ₄	---	110	ng	61	94	ng	49	140	ng	70
MB051100	Matrix Blank	Bluegill	2.2	64	ng/g	80	54	ng/g	64	73	ng/g	81
MS051100 OC	Matrix Spike OCPs	Bluegill	2.0	120	ng	67	120	ng	63	170	ng	85
18763	TSC227-98 REMN	Tree Swallow Nestling	2.0	75	ng/g	81	67	ng/g	70	100	ng/g	98
18768	TSC324-98 SA-13	Tree Swallow Nestling	2.0	74	ng/g	82	64	ng/g	67	110	ng/g	110
18773	TSC415-98 SARA	Tree Swallow Nestling	2.1	68	ng/g	80	51	ng/g	56	85	ng/g	90
18776	TSC614-98 RVNA	Tree Swallow Nestling	2.1	71	ng/g	82	56	ng/g	62	79	ng/g	83
18779	TSC707-98 STJO	Tree Swallow Nestling	2.0	74	ng/g	81	61	ng/g	63	83	ng/g	82
18782	TSC812-98 STAL	Tree Swallow Nestling	2.0	75	ng/g	83	71	ng/g	75	83	ng/g	83
18787	TSC914-98 CHEL	Tree Swallow Nestling	2.0	71	ng/g	78	61	ng/g	63	83	ng/g	83
18801	GBHC401F-98 SARA	Great Blue Heron Nestling/Fat	2.0	65	ng/g	72	50	ng/g	52	83	ng/g	82
18804	GBHC605F-98 CAST	Great Blue Heron Nestling/Fat	2.2	64	ng/g	78	58	ng/g	66	63	ng/g	69
Average Recovery						74			61			83
SD						9			8			11

Table 4. Recoveries (%) of OC Pesticide Procedural Internal Standards

Sample ID	204			DBC		
	Amount or Concentration		% Recovery	Amount or Concentration		% Recovery
PB051100 GCR1	150	ng	79	180	ng	95
PB051100 GCR2	150	ng	79	190	ng	100
PB051100 GCR3	150	ng	79	190	ng	100
MB051100	73	ng/g	86	83	ng/g	98
MS051100 OC	160	ng	84	140	ng	74
18763	87	ng/g	89	94	ng/g	97
18768	81	ng/g	86	99	ng/g	100
18773	76	ng/g	84	86	ng/g	95
18776	81	ng/g	89	87	ng/g	96
18779	80	ng/g	84	85	ng/g	88
18782	82	ng/g	86	90	ng/g	95
18787	81	ng/g	85	91	ng/g	94
18801	37	ng/g	39	38	ng/g	40
18804	82	ng/g	94	62	ng/g	71
Average Recovery			82			89
SD			13			17

Table 5. Non-*o*-Chloro-Substituted PCBs (pg/g) in Tree Swallow Nestlings and in Adipose Tissue of Great Blue Heron Nestlings from the Hudson River Area, NY

10-Oct-00 N42-secord-nestlings.xls		GC/MS Sets: N42PCB Dates: Sept. 15-18, 2000		Non- <i>o</i> -Polychlorinated Biphenyls			
NFCR Number:	Field Number:	Sample Description:	GC/MS Run No.	Tetra:		Penta:	Hexa:
				3,4,4',5-TCB (81)	3,3',4,4'-TCB (77)	3,3',4,4',5-PeCB (126)	3,3',4,4',5,5'-HxCB (169)
18763	TSC227-98	Tree Swallow Nestling, REMN, 10.01 g	42-16	2,500	34,000	470	7
18768	TSC324-98	Tree Swallow Nestling, SA13, 10.07 g	42-17	2,000	29,000	510	9
18773	TSC415-98	Tree Swallow Nestling, SARA, 10.16 g	42-19	1,300	18,000	430	11
18776	TSC614-98	Tree Swallow Nestling, RVNA, 10.01 g	42-20	240	3,900	520	62
18779	TSC707-98	Tree Swallow Nestling, STJO, 10.05 g	42-21	100	1,400	360	58
18782	TSC812-98	Tree Swallow Nestling, STAL, 10.10 g	42-22	28	410	72	8 LQ
18787	TSC914-98	Tree Swallow Nestling, CHEL, 5.43 g	42-24	26	440	69	7 LQ
18801	GBHC401F-98	Great Blue Heron Fat, SARA, 4.10 g	42-25,55	17,000	120,000	9,200	330
18804	GBHC605F-98	Great Blue Heron Fat, CAST, 6.75 g	42-26	470	4,900	1,900	150
Quality Control Samples:							
Proc. Blk 5/11/2000		Procedure Blank, 5/11/2000 (10 g sample basis)	42-5	2	68	48	5
Bluegill Blk 5/11/2000		Bluegill Matrix Blank, 5/11/2000, 10.09 g	42-6	2 LQ	57	14	2 LQ
Matrix Spike 5/11/2000		Bluegill Matrix Spike, 5/11/2000, 10.06 g (Spiked with 10 µg Aroclors: 1242, 1248, 1254, 1260)	42-7	100	1,400	69	3
Pos. Ctrl 5/11/2000		Positive Control Saginaw Carp, 5/11/2000, 5.12 g	42-9	390	2,600	960	72

LQ Less than Method Quantification Limit due to Incomplete Ion Cluster or Inaccurate Ion Ratio (Outside +/- 15% Tolerances)
 ND Not Detected at Specified Detection Limit

Table 6. Percent Recoveries of ¹³C-Non-*o*-Chloro-Substituted PCBs in Tree Swallow Nestlings and Adipose Tissue of Great Blue Heron Nestlings from the Hudson River Area, NY

10-Oct-00 N42-second-nestlings.xls		GC/MS Sets: N42PCB Dates: Sept. 15-18, 2000		¹³ C-Non- <i>o</i> -Polychlorinated Biphenyls			
				Tetra:		Penta:	Hexa:
NFCR Number:	Submitter Number:	Sample Description:	GC/MS Run No.	3,4,4',5-TCB (¹³ C-PCB #81)	3,3',4,4'-TCB (¹³ C-PCB #77)	3,3',4,4',5-PeCB (¹³ C-PCB #126)	3,3',4,4',5,5'-HxCB (¹³ C-PCB #169)
18763	TSC227-98	Tree Swallow Nestling, REMN, 10.01 g	42-16	55	46	58	44
18768	TSC324-98	Tree Swallow Nestling, SA13, 10.07 g	42-17	70	64	73	67
18773	TSC415-98	Tree Swallow Nestling, SARA, 10.16 g	42-19	55	59	59	61
18776	TSC614-98	Tree Swallow Nestling, RVNA, 10.01 g	42-20	60	68	64	73
18779	TSC707-98	Tree Swallow Nestling, STJO, 10.05 g	42-21	56	52	57	52
18782	TSC812-98	Tree Swallow Nestling, STAL, 10.10 g	42-22	54	60	123	57
18787	TSC914-98	Tree Swallow Nestling, CHEL, 5.43 g	42-24	59	54	55	54
18801	GBHC401F-98	Great Blue Heron Fat, SARA, 4.10 g	42-25,55	88	74	92	86
18804	GBHC605F-98	Great Blue Heron Fat, CAST, 6.75 g	42-26	10	19	20	25
Proc. Blk 5/11/2000		Quality Control Samples: Procedure Blank, 5/11/2000	42-5	22	26	33	25
Bluegill Blk 5/11/2000		Bluegill Matrix Blank, 5/11/2000, 10.09 g	42-6	40	37	42	39
Matrix Spike 5/11/2000		Bluegill Matrix Spike, 5/11/2000, 10.06 g Spiked with 10 µg Aroclors	42-7	50	52	65	51
Pos. Ctrl 5/11/2000		Positive Control Saginaw Carp, 5/11/2000, 5.12 g	42-9	80	71	69	86

Table 7. 2,3,7,8-Substituted Polychlorinated Dibenzo-*p*-dioxin and Dibenzofuran Concentrations (pg/g) in Tree Swallow Nestlings from the Hudson River Area

File: DF34secord-nestlings.xls
 Reported: Oct. 5, 2000; Revised Nov. 13, 2001
 Date Analyzed: Sept. 28-29, 2000

Sample Site/Matrix:	Nestling	Nestling	Nestling	Nestling	Nestling
CERC Number:	18763	18768	18773	18776	18779
GC/HRMS Sets: DF34- Injection No.	34-16	34-17	34-19	34-20	34-21
Sample Submitter No.	TSC227-98	TSC324-98	TSC415-98	TSC614-98	TSC707-98
	REMN	SA13	SARA	RVNA	STJO
Sample Mass Extracted (grams):	10.01	10.07	10.16	10.01	10.05

DIOXINS

2,3,7,8-Tetrachloro*	0.6	0.4 LQ	0.7	1.3	0.9
1,2,3,7,8-Pentachloro	1.3	1.3	1.5 LQ	2.0	1.2 LQ
1,2,3,4,7,8-Hexachloro	1.5 LQ	1.9	1.8 LQ	1.5 LQ	1.2
1,2,3,6,7,8-Hexachloro	4.5	3.3	13	4.5	3.2
1,2,3,7,8,9-Hexachloro	1.0	2.2	1.1	1.5 LQ	1.5 LQ
1,2,3,4,6,7,8-Heptachloro	6.5	28	23	17	14
Octachloro	12	310	44	50	110

FURANS

2,3,7,8-Tetrachloro*	7	10	18	8	7
1,2,3,7,8-Pentachloro	0.6 LQ	0.7 LQ	1.0 LQ	1.0	1.1
2,3,4,7,8-Pentachloro*	1.7 LQ	1.5 LQ	2.1	2.6	2.4
1,2,3,4,7,8-Hexachloro	0.6	1.0	1.6 LQ	1.3 LQ	1.5
1,2,3,6,7,8-Hexachloro	0.6 LQ	0.1 ND	0.8 LQ	0.9 LQ	0.7 LQ
1,2,3,7,8,9-Hexachloro	0.1 ND				
2,3,4,6,7,8-Hexachloro	0.5 LQ	0.1 ND	0.6 LQ	0.7 LQ	0.9
1,2,3,4,6,7,8-Heptachloro	1.7 LQ	2.1	3.6	4.0 LQ	3.2
1,2,3,4,7,8,9-Heptachloro	0.1 ND	0.7 LQ	0.7	0.7 LQ	0.9 LQ
Octachloro	28	30	29	28	30

* Revised Value updated using the corrected amount of ¹³C-surrogate

LQ Less than Method Quantification Limit due to Incomplete Ion Cluster or Ion Ratio Outside of +/- 15% Tolerances

ND Not Detected at Specified Detection Limit

Table 7. 2,3,7,8-Substituted Polychlorinated Dibenzo-*p*-dioxin and Dibenzofuran Concentrations (pg/g) in Tree Swallow Nestlings from the Hudson River Area

File: DF34second-nestlings.xls

Reported: Oct. 5, 2000; Revised Nov. 13, 2001

Date Analyzed: Sept. 28-29, 2000

Sample Site/Matrix:	Nestling	Nestling	Great Blue Heron Fats	
CERC Number:	18782	18787	18801	18804
GC/HRMS Sets: DF34- Injection No.	34-22	34-24	34-25	34-26
Sample Submitter No.	TSC812-98	TSC914-98	GBHC401F-98	GBHC605F-98
	STAL	CHEL	SARA	CAST
Sample Mass Extracted (grams):	10.10	5.43	4.10	6.75

DIOXINS

2,3,7,8-Tetrachloro *	0.7 LQ	2.5	25	8
1,2,3,7,8-Pentachloro	0.9 LQ	1.3 LQ	11	6.9
1,2,3,4,7,8-Hexachloro	0.9	1.8	3.8	2.7 LQ
1,2,3,6,7,8-Hexachloro	1.7 LQ	3.7	14	7.1
1,2,3,7,8,9-Hexachloro	0.6 LQ	1.3 LQ	3.7 LQ	2.5 LQ
1,2,3,4,6,7,8-Heptachloro	7.1	18	12	9.4 LQ
Octachloro	26	57	27	30

FURANS

2,3,7,8-Tetrachloro *	2.9	3.5 LQ	34	9
1,2,3,7,8-Pentachloro	0.7 LQ	0.8 LQ	6.2	2.3
2,3,4,7,8-Pentachloro *	1.2	1.4	32	13
1,2,3,4,7,8-Hexachloro	0.1 ND	1.1 LQ	3.9 LQ	2.1
1,2,3,6,7,8-Hexachloro	0.1 ND	0.7 LQ	2.9	1.0 LQ
1,2,3,7,8,9-Hexachloro	0.1 ND	0.1 ND	0.1 ND	0.1 ND
2,3,4,6,7,8-Hexachloro	0.9 LQ	1.1	3.5 LQ	2.1
1,2,3,4,6,7,8-Heptachloro	3.0 LQ	3.4	4.7	2.6
1,2,3,4,7,8,9-Heptachloro	0.7 LQ	0.1 ND	0.1 ND	0.9 LQ
Octachloro	31	31	27	31

* Revised Value updated using the corrected amount of ¹³C-surrogate

LQ Less than Method Quantification Limit due to Incomplete Ion Cluster or Ion Ratio Outside of +/- 15% Tolerances

ND Not Detected at Specified Detection Limit

Table 7. 2,3,7,8-Substituted Polychlorinated Dibenzo-*p*-dioxin and Dibenzofuran Concentrations (pg/g) in Tree Swallow Nestlings from the Hudson River Area

File: DF34second-nestlings.xls

Reported: Oct. 5, 2000; Revised Nov. 13, 2001

Date Analyzed: Sept. 28-29, 2000

Sample Site/Matrix:

CERC Number:

GC/HRMS Sets: DF34- Injection No.

Sample Submitter No.

Sample Mass Extracted (grams):

Quality Assurance:

Quality Assurance Samples

Procedure Blank	Bluegill Blank	Bluegill Spike	Pos.Ctrl Sag.Carp	CARP
34-5	34-6	34-7	34-8	QC AVG.
5/11/2000	5/11/2000	5/11/2000	5/11/2000	from
Conc. (pg/g-eq) based on sample				1994-1997
wtgs 10 g	10.09	(25 or 125 pg/g) 10.06	5.12	

DIOXINS

2,3,7,8-Tetrachloro *	0.1 LQ	0.1 ND	23	27	21.6
1,2,3,7,8-Pentachloro	0.1 ND	0.1 ND	26	12 LQ	11.4
1,2,3,4,7,8-Hexachloro	0.1 ND	0.1 ND	25	4.6 LQ	4.4
1,2,3,6,7,8-Hexachloro	0.1 ND	0.1 ND	31	13	14.8
1,2,3,7,8,9-Hexachloro	0.1 ND	0.1 ND	34	2.2 LQ	2.1
1,2,3,4,6,7,8-Heptachloro	0.1 ND	1.0 LQ	31	19	18.5
Octachloro	0.2 LQ	11 LQ	202	18	16.9

FURANS

2,3,7,8-Tetrachloro *	0.1 LQ	0.2 LQ	38	40	34.2
1,2,3,7,8-Pentachloro	0.1 ND	0.1 LQ	33	15 LQ	12.5
2,3,4,7,8-Pentachloro *	1.5 LQ	0.1 LQ	36	43	36.1
1,2,3,4,7,8-Hexachloro	0.1 ND	0.1 ND	34	13	9.2
1,2,3,6,7,8-Hexachloro	0.1 ND	0.1 ND	34	7.8	6.4
1,2,3,7,8,9-Hexachloro	0.1 ND	0.1 ND	27	0.1 ND	0.2
2,3,4,6,7,8-Hexachloro	0.1 ND	0.1 ND	35	6.8 LQ	5.4
1,2,3,4,6,7,8-Heptachloro	1.9 LQ	1.6 LQ	57	13	11.9
1,2,3,4,7,8,9-Heptachloro	1.0 LQ	0.7 LQ	29	2.5 LQ	0.6
Octachloro	29	30 LQ	173	59	3.6

* Revised Value updated using the corrected amount of ¹³C-surrogate

LQ Less than Method Quantification Limit due to Incomplete Ion Cluster or Ion Ratio Outside of +/- 15% Tolerances

ND Not Detected at Specified Detection Limit

Table 8. Percent Recovery of ¹³C-Substituted Polychlorinated Dibenzo-*p*-dioxins and Dibenzofurans in Tree Swallow Nestlings from the Hudson River Area 4

File: DF34secord-nestlings.xls
 Reported: Oct. 5, 2000; Revised Nov. 13, 2001
 Date Analyzed: Sept. 28-29, 2000

Sample Site/Matrix: CERC Number: GC/HRMS Sets: DF34- Injection No.	Nestling 18763 34-16	Nestling 18768 34-17	Nestling 18773 34-19	Nestling 18776 34-20	Nestling 18779 34-21
Sample Submitter No.	TSC227-98 REM N	TSC324-98 SA13	TSC415-98 SARA	TSC614-98 RVNA	TSC707-98 STJO
Sample Mass Extracted (grams):	10.01	10.07	10.16	10.01	10.05
DIOXINS	(% Recovery)				
2,3,7,8-Tetrachloro*	47	56	54	54	57
1,2,3,7,8-Pentachloro	55	68	63	70	58
1,2,3,4,7,8-Hexachloro	53	54	61	65	61
1,2,3,6,7,8-Hexachloro	57	60	59	65	57
1,2,3,7,8,9-Hexachloro	43	52	54	54	51
1,2,3,4,6,7,8-Heptachloro	55	61	66	64	63
Octachloro	38	45	47	48	46
FURANS					
2,3,7,8-Tetrachloro*	56	61	61	60	58
1,2,3,7,8-Pentachloro	53	60	60	59	55
2,3,4,7,8-Pentachloro*	54	60	61	63	60
1,2,3,4,7,8-Hexachloro	30	33	33	29	34
1,2,3,6,7,8-Hexachloro	29	32	25	23	33
1,2,3,7,8,9-Hexachloro	40	46	51	52	50
1,2,3,4,6,7,8-Heptachloro	33	36	36	32	42
1,2,3,4,7,8,9-Heptachloro	41	51	54	50	55

* Revised Value updated using the corrected amount of ¹³C-surrogate

Table 8. Percent Recovery of ¹³C-Substituted Polychlorinated Dibenzo-*p*-dioxins and Dibenzofurans in Tree Swallow Nestlings from the Hudson River Area 5

File: DF34secord-nestlings.xls
 Reported: Oct. 5, 2000; Revised Nov. 13, 2001
 Date Analyzed: Sept. 28-29, 2000

Sample Site/Matrix:	Nestling		Great Blue Heron Fats	
CERC Number:	18782	18787	18801	18804
GC/HRMS Sets: DF34- Injection No.	34-22	34-24	34-25	34-26
Sample Submitter No.	TSC812-98	TSC914-98	GBHC401F-98	GBHC605F-98
	STAL	CHEL	SARA	CAST
Sample Mass Extracted (grams):	10.10	5.43	4.10	6.75

DIOXINS

(% Recovery)

2,3,7,8-Tetrachloro*	55	53	62	38
1,2,3,7,8-Pentachloro	58	57	72	40
1,2,3,4,7,8-Hexachloro	55	56	70	40
1,2,3,6,7,8-Hexachloro	53	56	63	38
1,2,3,7,8,9-Hexachloro	48	46	59	34
1,2,3,4,6,7,8-Heptachloro	60	57	70	41
Octachloro	39	43	53	32

FURANS

2,3,7,8-Tetrachloro*	55	52	60	39
1,2,3,7,8-Pentachloro	54	49	62	36
2,3,4,7,8-Pentachloro*	56	57	65	39
1,2,3,4,7,8-Hexachloro	23	29	27	17
1,2,3,6,7,8-Hexachloro	21	26	19	12
1,2,3,7,8,9-Hexachloro	42	46	59	32
1,2,3,4,6,7,8-Heptachloro	27	37	32	19
1,2,3,4,7,8,9-Heptachloro	43	48	63	30

* Revised Value updated using the corrected amount of ¹³C-surrogate

Table 8. Percent Recovery of ¹³C-Substituted Polychlorinated Dibenzo-*p*-dioxins and Dibenzofurans in Tree Swallow Nestlings from the Hudson River Area 6

File: DF34secord-nestlings.xls
 Reported: Oct. 5, 2000; Revised Nov. 13, 2001
 Date Analyzed: Sept. 28-29, 2000

Sample Site/Matrix:

CERC Number:

GC/HRMS Sets: DF34- Injection No.

Sample Submitter No.

Sample Mass Extracted (grams):

Quality Assurance Samples

Procedure Blank	Bluegill Blank	Bluegill Spike	Pos.Ctrl Sag.Carp
34-5	34-6	34-7	34-8
5/11/2000	5/11/2000	5/11/2000	5/11/2000
	10.09	10.06	5.12

DIOXINS

(% Recovery)

2,3,7,8-Tetrachloro*	50	46	53	53
1,2,3,7,8-Pentachloro	53	48	59	57
1,2,3,4,7,8-Hexachloro	49	45	50	53
1,2,3,6,7,8-Hexachloro	53	50	55	58
1,2,3,7,8,9-Hexachloro	41	39	42	44
1,2,3,4,6,7,8-Heptachloro	49	44	54	54
Octachloro	37	32	37	37

FURANS

2,3,7,8-Tetrachloro*	52	49	53	56
1,2,3,7,8-Pentachloro	52	45	56	54
2,3,4,7,8-Pentachloro*	53	45	53	54
1,2,3,4,7,8-Hexachloro	33	28	20	34
1,2,3,6,7,8-Hexachloro	30	24	18	35
1,2,3,7,8,9-Hexachloro	41	32	37	38
1,2,3,4,6,7,8-Heptachloro	34	30	22	36
1,2,3,4,7,8,9-Heptachloro	43	34	39	39

* Revised Value updated using the corrected amount of ¹³C-surrogate

