ORGANOCHLORINE CONTAMINANTS IN BALD EAGLE EGGS

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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

HUDSON RIVER NATURAL RESOURCE DAMAGE ASSESSMENT

HUDSON RIVER NATURAL RESOURCE TRUSTEES

STATE OF NEW YORK

U.S. DEPARTMENT OF COMMERCE

U.S. DEPARTMET 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 supports a rich array of ecological resources that interact in complex ways, and provides habitat for a wide range of plants and animals. As part of the NRDA, the Trustees are documenting exposure of the natural resources of the Hudson River to PCBs.

One of the species for which the Hudson River provides habitat, and which has been exposed to PCBs, is the bald eagle (*Haliaeetus leucocephalus*). Bald eagles are at risk of accumulating PCBs because they are at the top of the food web. Eagles prey on fish and scavenge carcasses of birds, mink, otter, and other organisms that may contain PCBs. Because much of the eagles' diet may contain PCBs, they are at risk of accumulating concentrations that are associated with adverse health impacts.

In the 1990s, the Trustees began monitoring Hudson River bald eagle nests for reproductive success. As part of those studies the Trustees collected samples from bald eagles for contaminants analysis.

This report addresses bald eagle egg 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 three bald eagle egg samples 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 bald eagle eggs ranged from 20,000 parts per billion (ppb) wet weight (ww) to 62,000 ppb ww. Note that these units are not fresh wet weight.

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October 24, 2000

REPORT #4
Organochlorine Contaminants in Bald Eagle Eggs

FY-00-31-04

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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. Downstream movement of the PCBs was retarded by the Ft. Edward Dam 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.

<u>This report contains the results for the 3 Bald Eagle Eggs:</u>

PCB congeners,
OC pesticides,
non-*ortho* PCB congeners,
2,3,7,8-substituted polychlorinated dibenzo-*p*-dioxins and -dibenzofurans

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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 3 eagle eggs. After receipt, the samples were assigned CERC database numbers.

CERC Database Number	FWS Field Identifier
19861	BE-EG906-98
19862	BE-EG910-98
20032	BE-EG970-99

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 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. Additionally, one sample (20032) was prepared, processed, and analyzed in triplicate.

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 ^{13}C-labeled non-*ortho* PCB congeners
Seventeen ^{13}C-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-butylchlorendate

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 (^{12}C) 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 Gravity-Flow Gel Permeation Chromatography (3) followed by High Performance Gel Permeation Chromatography (HPGPC) (4) before fractionation on high performance Porous Graphitic Carbon (PGC) (5) into the following fractions:

PGC-1	*ortho*-chlorinated PCB congeners Analysis by gas chromatography (GC)/electron-capture detection (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 (6) before GC/HRMS analysis

Organochlorine pesticides extracts were first cleaned on gravity-GPC (3) followed by HPGPC (4). 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 140 ng/g. (See the tables for individual MDL values). Triplicate analysis of sample 20032 showed the PCB method to have a relative standard deviation of 11%.

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 H_2-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:

$$MDL = (PB\ Avg) + 3(PB\ SD)$$

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 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 (Cl_1 - Cl_3). PCB 155, a hexachlorobiphenyl, is representative of mid-range eluting congeners (Cl_4 - Cl_6). PCB 204), an octachlorobiphenyl, is less volatile and representative of later eluting PCBs (Cl_7 - Cl_{10}).

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, and the precision of the triplicate analysis of sample 20032 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 H_2-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).

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 the eagle egg samples, ion ratios of the primary ions for all detected analytes in both samples and calibration standards were within the QC range (±15% of theoretical). 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 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. One of the triplicate eagle egg samples suffered from chromatographic interferences and could not be quantified with accuracy. The resulting duplicate analysis indicates high precision, however. 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) ranged 60 to 102%. This is within QC limits of 25-125%.

Summary of GC/HRMS method for non-*ortho*-PCB

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 5 m x 320 µm deactivated fused silica retention gap via heated (285 °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 Cl_4-biphenyls #77 and 81 and Cl_5-biphenyl #126; Group 2 from 47:05-64 min included ions for Cl_6-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, Cl_{4-8} naphthalenes (PCNs), Cl_{3-5} terphenyls (PCTs), Br_5- and Cl_6-diphenyl ethers (residual carryover from PGC-1), and Cl_4-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 ^{13}C-labeled surrogate was used. Quantification is inherently corrected by the ^{13}C-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*-Cl_5-PCB 126 is only minimally resolved from Cl_6-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 Cl_{4-8} 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 ^{13}C-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 ±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, designated by their CERC database number and are cross-referenced to their field identification number. Concentrations are expressed as picograms of analyte per gram of sample (wet weight). Quality control results are well within QC limits. In the procedural blank, amounts of PCDFs and PCDDs are expressed as total mass (pg) divided by 10g to normalize to sample concentrations (Table 7). 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 precision of the analysis is shown in Table 7. One of the triplicate samples suffered chromatographic losses on PGC and accurate quantification was not possible. No other samples were affected by this loss. The efficiency of the extraction and cleanup procedure was montitored by quantifying the ^{13}C-labeled surrogates in the *final* isolated extract, using a ^{13}C-labeled compound as an instrumental internal standard. Recoveries of the ^{13}C-labeled surrogates (Table 8) were within the expected QC range of 25-125%.

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 (6). A total of 1 ng of the internal standard, ^{13}C-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 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 Cl_{4-8} 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 diphenlyethers (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 ^{13}C-labeled surrogates 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 ^{13}C-TCDDs and of native TCDD versus ^{13}C-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 ^{13}C-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 ^{13}C-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

Eagle eggs were analyzed for congener specific and non-*ortho* PCBs, organochlorine pesticides, and polychlorinated dibenzo-*p*-dioxins and dibenzofurans. These eggs 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 the eagle eggs are within our guidelines. Detections limits, precision of the methods, procedural blanks, and matrix spikes were used to monitor the quality of these data.

The levels of PCBs, pesticides, dioxins and furans in these eagle eggs are elevated. There is clear indication of exposure to these contaminants. The total dioxin toxic equivalents, using avian TEQs (16) are as follows:

BE-EG906-98..... 2100 pg/g
BE-EG910-98..... 1200 pg/g
BE-EG-~~2~~70-99..... 520 pg/g
9 co 10-25-01

A large percent of the dioxin-like toxicity was from non-*ortho* PCBs (84%). The remainder of the dioxin-like toxicity was attributed to mono-*ortho*-PCBs (8%) and dioxins and furans (8%).

The major organochlorine pesticides found as contaminants in the eagle eggs were p,p'-DDE, p,p'-DDD, and chlordane constituents. Once site location and other information is available about egg related samples, patterns of PCBs can be interpreted to discern trends in PCB trophic transfer.

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

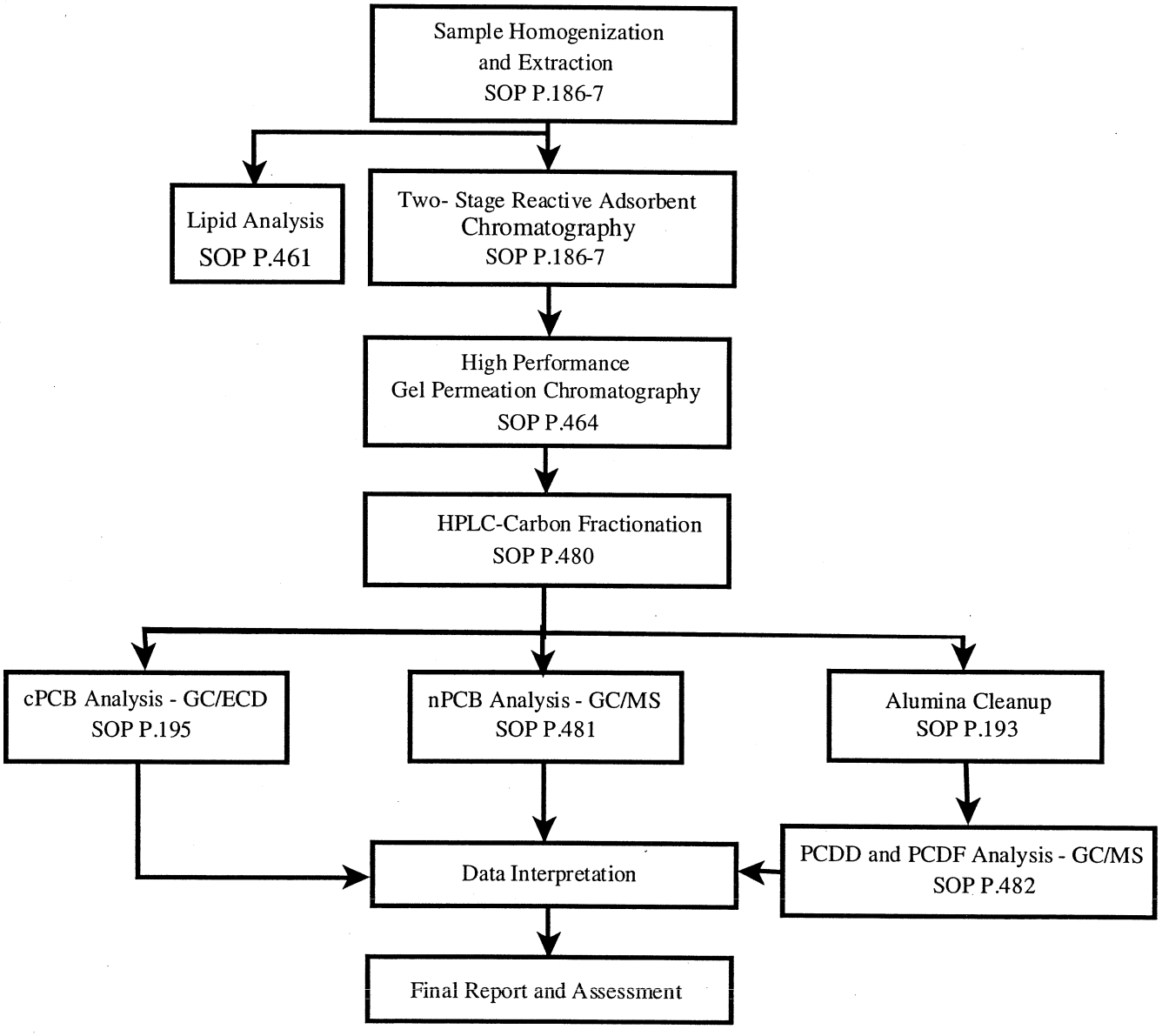
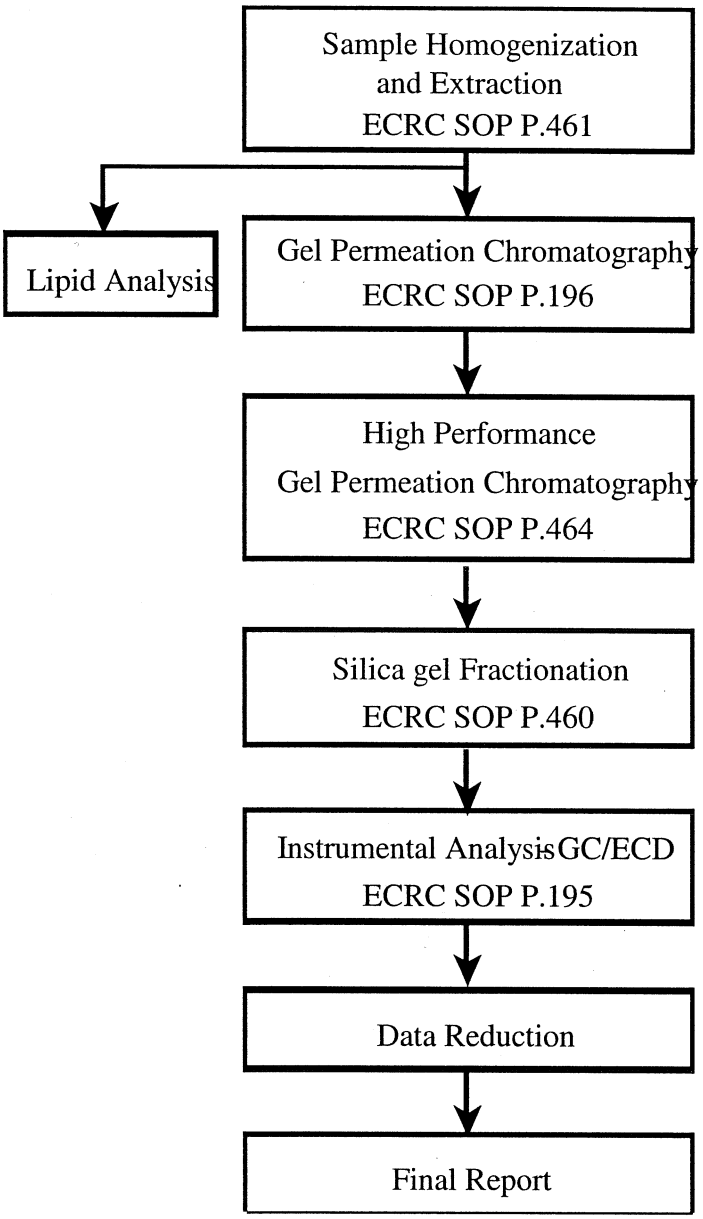


Figure 2: Analysis for Organochlorine Pesticides and Total PCB Residues



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

Final Report: October 24, 2000

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Table 1. Congener PCBs in Eagle Eggs, plus Quality Control Samples

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	001	003	004	005	006	007	008	009	010	015	016	017
19861	BE-EG906-98	Eagle Egg	10.08	5.7	16	0.36	95	0.07	7.9	0.22	21	1.8	26	0.56	19	160
19862	BE-EG910-98	Eagle Egg	9.83	4.5	18	< 0.36	120	0.08	11	0.28	31	2.1	37	0.16	39	160
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	4.2
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	4.2
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	3.1
20032 Average	9		9.88	5.3							0.28				0.73	3.8
200032 SD(n-1)	(n=3)		0.08	0.25							0.04				0.20	0.65
%RSD			0.82	5							**13**				**28**	**17**
MS051100 GCR1	Matrix Spike	Bluegill	9.86	4.1	11	3.8	69	2.8	36	4.5	130	10	2.7	40	85	91
Recovery					***46***	***57***	***69***	***60***	***69***	***65***	***68***	***72***	***65***	***72***	***65***	***61***
Mock 100% PCBs					25	6.7	100	4.6	52	6.9	190	14	4.2	55	130	150
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	0.07
	Average mass	=	*8.73*													
PB051100 GCR1	Procedure Blank	Na_2SO_4	---	---	1.9	2.9	2.9	0.03	0.00	0.02	0.15	0.05	0.03	0.05	0.00	0.00
PB051100 GCR2	Procedure Blank	Na_2SO_4	---	---	2.1	2.9	2.1	0.02	0.00	0.02	0.20	0.07	0.03	0.06	0.00	0.18
PB051100 GCR3	Procedure Blank	Na_2SO_4	---	---	2.2	3.0	2.2	0.03	0.00	0.03	0.19	0.05	0.04	0.05	0.00	0.13
Average					2.1	2.9	2.4	0.03	0.00	0.02	0.18	0.06	0.04	0.05	0.00	0.10
Standard Deviation					0.14	0.07	0.42	0.00	0.00	0.00	0.03	0.01	0.01	0.01	0.00	0.09
MDL	= PB Average + 3 (SD)				2.5	3.1	3.7	0.04	0.00	0.03	0.26	0.09	0.05	0.07	0.01	0.38
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**	**0.04**

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. Congener PCBs in Eagle Eggs, plus Quality Control Samples

Sample ID	Field ID	Sample Type	018	019	020	022	024	025	026	027	028	031	032	033	034	035	037,059
19861	BE-EG906-98	Eagle Egg	90	55	5.1	57	2.9	34	110	37	850	420	220	14	9.8	2.5	23
19862	BE-EG910-98	Eagle Egg	84	73	5.3	56	3.5	39	120	44	590	370	200	15	9.4	1.7	22
20032-1	BE-EG-270-99	Eagle Egg	1.9	0.99	0.50	4.5	0.04	2.6	8.3	0.20	44	37	6.0	2.0	0.27	1.7	1.7
20032-2	BE-EG-270-99	Eagle Egg	1.6	1.2	0.67	4.6	< 0.01	2.9	9.0	0.24	45	30	6.4	2.2	0.33	2.2	1.7
20032-3	BE-EG-270-99	Eagle Egg	1.3	0.99	0.54	4.2	< 0.01	3.0	7.8	0.18	41	20	5.4	1.9	0.32	1.9	1.6
20032 Average			1.6	1.0	0.57	4.4		2.8	8.4	0.21	43	29	5.9	2.0	0.31	1.9	1.7
200032 SD(n-1)	(n=3)		0.30	0.10	0.09	0.22		0.17	0.60	0.03	2.3	8.2	0.49	0.15	0.03	0.22	0.05
%RSD			**18**	**9**	**15**	**5**		**6**	**7**	**15**	**5**	**28**	**8**	**8**	**11**	**11**	**3**
MS051100 GCR1	Matrix Spike	Bluegill	250	22	12	80	2.8	14	43	11	190	180	79	120	0.73	0.50	18
Recovery			***76***	***86***	***75***	***72***	***65***	***71***	***77***	***74***	***70***	***75***	***79***	***75***	***96***	***81***	***66***
Mock 100% PCBs			330	26	15	110	4.3	20	56	15	270	240	100	160	0.76	0.62	28
MB051100	Matrix Blank	Bluegill	0.14	0.02	< 0.01	0.04	< 0.01	< 0.05	< 0.05	< 0.01	0.14	0.08	< 0.08	0.08	< 0.05	< 0.01	< 0.01
	Average mass	=															
PB051100 GCR1	Procedure Blank	Na_2SO_4	0.00	0.07	0.04	0.08	0.00	0.09	0.37	0.06	0.76	0.44	0.48	0.23	0.00	0.03	0.04
PB051100 GCR2	Procedure Blank	Na_2SO_4	0.30	0.64	0.03	0.11	0.00	0.00	0.29	0.06	0.89	0.45	0.59	0.24	0.00	0.02	0.00
PB051100 GCR3	Procedure Blank	Na_2SO_4	0.35	0.16	0.03	0.06	0.00	0.22	0.26	0.06	0.87	0.47	0.46	0.28	0.23	0.03	0.06
Average			0.22	0.29	0.03	0.08	0.00	0.10	0.30	0.06	0.84	0.45	0.51	0.25	0.08	0.02	0.03
Standard Deviation			0.19	0.31	0.00	0.02	0.00	0.11	0.06	0.00	0.07	0.01	0.07	0.03	0.13	0.00	0.03
MDL	= PB Average + 3 (SD)		0.79	1.2	0.05	0.15	0.00	0.44	0.47	0.06	1.1	0.49	0.72	0.33	0.47	0.04	0.12
MDL (mass normalized)[1]			**0.09**	**0.14**	**0.01**	**0.02**	**0.01**	**0.05**	**0.05**	**0.01**	**0.12**	**0.06**	**0.08**	**0.04**	**0.05**	**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. Congener PCBs in Eagle Eggs, plus Quality Control Samples

Sample ID	Field ID	Sample Type	040	041	042	043	044	045	046	047	048	049	051	052	053	*054*	055
19861	BE-EG906-98	Eagle Egg	42	10	420	29	330	50	8.0	2,100	34	1,800	25	1,100	34	0.04	1.1
19862	BE-EG910-98	Eagle Egg	45	11	360	9.0	280	54	9.3	760	33	1,500	27	910	33	0.01	1.4
20032-1	BE-EG-270-99	Eagle Egg	7.3	1.2	38	1.7	31	2.2	0.19	96	2.9	130	1.9	63	0.46	0.18	0.11
20032-2	BE-EG-270-99	Eagle Egg	6.1	1.3	39	1.4	31	2.1	0.30	100	2.9	140	2.1	70	0.95	0.18	0.11
20032-3	BE-EG-270-99	Eagle Egg	4.8	1.1	35	1.4	27	2.1	0.11	89	3.1	120	2.1	61	0.30	0.23	0.13
20032 Average			6.1	1.2	37	1.5	30	2.1	0.20	95	3.0	130	2.0	65	0.57	0.20	0.12
200032 SD(n-1)	(n=3)		1.2	0.09	1.7	0.1	2.3	0.05	0.10	5.4	0.15	9.9	0.07	4.9	0.34	0.03	0.01
%RSD			**20**	**8**	**5**	**10**	**8**	**2**	**48**	**6**	**5**	**8**	**3**	**8**	**60**	**16**	**12**
MS051100 GCR1	Matrix Spike	Bluegill	53	29	77	14	230	47	21	76	69	170	10	320	47	< 0.01	2.7
Recovery			***82***	***79***	***82***	***83***	***77***	***72***	***73***	***95***	***80***	***81***	***81***	***78***	***74***		***73***
Mock 100% PCBs			65	37	95	16	300	65	28	80	87	210	13	410	64	< 0.01	3.7
MB051100	Matrix Blank	Bluegill	0.03	< 0.01	< 0.12	0.04	0.16	< 0.01	< 0.02	< 0.74	< 0.01	< 0.43	< 0.03	0.47	< 0.03	< 0.01	< 0.01
	Average mass	=															
PB051100 GCR1	Procedure Blank	Na_2SO_4	0.04	0.05	0.84	0.00	0.63	0.04	0.05	5.9	0.00	3.5	0.25	2.5	0.18	0.01	0.02
PB051100 GCR2	Procedure Blank	Na_2SO_4	0.04	0.07	0.79	0.00	0.70	0.00	0.00	6.0	0.00	3.6	0.20	2.5	0.24	0.01	0.03
PB051100 GCR3	Procedure Blank	Na_2SO_4	0.04	0.06	0.90	0.00	0.73	0.03	0.07	6.2	0.00	3.6	0.22	2.5	0.20	0.02	0.03
Average			0.04	0.06	0.84	0.00	0.69	0.02	0.04	6.0	0.00	3.6	0.23	2.5	0.21	0.01	0.02
Standard Deviation			0.00	0.01	0.06	0.00	0.05	0.02	0.03	0.14	0.00	0.07	0.02	0.02	0.03	0.00	0.00
MDL	= PB Average + 3 (SD)		0.05	0.08	1.0	0.00	0.84	0.08	0.14	6.4	0.00	3.8	0.30	2.6	0.30	0.02	0.03
MDL (mass normalized)[1]			**0.01**	**0.01**	**0.12**	**0.01**	**0.10**	**0.01**	**0.02**	**0.74**	**0.01**	**0.43**	**0.03**	**0.29**	**0.03**	**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. Congener PCBs in Eagle Eggs, plus Quality Control Samples

Sample ID	Field ID	Sample Type	*056,060*	*057*	*058*	063	064	066	067	*069*	070	071	*072*	074	075	082	083
19861	BE-EG906-98	Eagle Egg	390	< 0.01	7.0	250	700	1,100	3.1	11	350	200	53	1,300	110	89	47
19862	BE-EG910-98	Eagle Egg	330	< 0.01	6.4	160	520	800	4.3	10	320	150	51	890	97	85	34
20032-1	BE-EG-270-99	Eagle Egg	34	< 0.01	2.3	24	52	140	0.85	0.80	90	19	6.5	81	9.0	26	5.8
20032-2	BE-EG-270-99	Eagle Egg	33	< 0.01	2.4	25	50	160	0.93	0.94	88	22	6.6	79	9.7	26	5.9
20032-3	BE-EG-270-99	Eagle Egg	32	< 0.01	2.1	21	48	140	0.94	0.82	86	19	6.0	73	9.1	24	5.2
20032 Average			33		2.2	23	50	150	0.91	0.85	88	20	6.4	78	9.2	25	5.6
200032 SD(n-1)	(n=3)		1.0		0.11	2.0	1.8	12	0.05	0.08	2.0	2.1	0.33	4.1	0.36	0.77	0.35
%RSD			**3**		**5**	**8**	**4**	**8**	**6**	**9**	**2**	**10**	**5**	**5**	**4**	**3**	**6**
MS051100 GCR1	Matrix Spike	Bluegill	150	< 0.01	0.49	8.2	87	150	4.9	0.30	260	73	0.69	120	4.1	36	4.8
Recovery			***75***		***52***	***88***	***79***	***75***	***78***	***145***	***76***	***82***	***62***	***86***	***105***	***80***	***82***
Mock 100% PCBs			200	< 0.01	0.93	9.3	110	200	6.3	0.21	340	90	1.1	140	3.9	45	5.9
MB051100	Matrix Blank	Bluegill	0.24	< 0.01	< 0.08	0.04	< 0.09	0.63	< 0.02	< 0.01	0.76	< 0.13	< 0.06	0.41	< 0.01	0.12	0.03
	Average mass	=															
PB051100 GCR1	Procedure Blank	Na_2SO_4	1.1	0.00	0.33	0.20	0.62	2.3	0.11	0.07	1.6	0.80	0.49	1.7	0.10	0.57	0.20
PB051100 GCR2	Procedure Blank	Na_2SO_4	1.1	0.00	0.00	0.19	0.70	2.3	0.09	0.06	1.6	0.87	0.45	1.7	0.11	0.55	0.18
PB051100 GCR3	Procedure Blank	Na_2SO_4	1.1	0.00	0.00	0.19	0.71	2.5	0.09	0.05	1.6	0.96	0.44	1.6	0.11	0.55	0.19
Average			1.1	0.00	0.11	0.19	0.68	2.4	0.10	0.06	1.6	0.87	0.46	1.7	0.10	0.56	0.19
Standard Deviation			0.04	0.00	0.19	0.01	0.05	0.14	0.01	0.01	0.01	0.08	0.03	0.02	0.00	0.01	0.01
MDL	= PB Average + 3 (SD)		1.2	0.00	0.68	0.21	0.82	2.8	0.13	0.09	1.6	1.1	0.55	1.7	0.11	0.60	0.23
MDL (mass normalized)[1]			**0.14**	**0.01**	**0.08**	**0.02**	**0.09**	**0.32**	**0.02**	**0.01**	**0.19**	**0.13**	**0.06**	**0.20**	**0.01**	**0.07**	**0.03**

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. Congener PCBs in Eagle Eggs, plus Quality Control Samples

Sample ID	Field ID	Sample Type	084	*086*	087	089	090	091	092	095	096	097	099	101	102	105
19861	BE-EG906-98	Eagle Egg	100	< 0.01	780	< 0.01	480	530	800	600	2.1	460	1,800	1,500	6.5	1,100
19862	BE-EG910-98	Eagle Egg	110	5.0	520	< 0.01	270	360	500	460	2.2	330	1,100	960	5.9	590
20032-1	BE-EG-270-99	Eagle Egg	25	1.5	250	< 0.01	73	77	100	120	0.88	87	350	490	2.2	270
20032-2	BE-EG-270-99	Eagle Egg	25	1.2	250	< 0.01	69	81	110	130	0.96	88	440	460	2.5	260
20032-3	BE-EG-270-99	Eagle Egg	24	1.8	250	< 0.01	61	70	87	120	0.43	82	430	480	2.1	260
20032 Average			25	1.5	250		68	76	99	120	0.75	86	410	480	2.3	260
200032 SD(n-1)	(n=3)		0.73	0.32	0		5.8	5.6	11	5.8	0.29	3.2	49	15	0.21	5.7
%RSD			**3**	**21**	**0**		**9**	**7**	**11**	**5**	**38**	**4**	**12**	**3**	**9**	**2**
MS051100 GCR1	Matrix Spike	Bluegill	83	1.9	150	< 0.01	7.6	45	58	250	2.1	92	100	260	5.4	100
Recovery			***83***	***92***	***83***		***122***	***91***	***90***	***83***	***64***	***83***	***91***	***84***	***36***	***83***
Mock 100% PCBs			100	2.1	180	< 0.01	6.2	50	65	300	3.3	110	110	310	15	120
MB051100	Matrix Blank	Bluegill	0.69	< 0.01	1.0	< 0.01	0.35	< 0.33	< 0.64	< 0.67	< 0.01	0.64	1.5	2.0	< 0.01	0.98
	Average mass	=														
PB051100 GCR1	Procedure Blank	Na_2SO_4	0.62	0.00	5.7	0.00	2.7	2.7	5.5	5.5	0.0	3.1	9	16	0.00	7.2
PB051100 GCR2	Procedure Blank	Na_2SO_4	0.59	0.00	5.9	0.00	2.8	2.6	5.5	5.1	0.0	3.1	10	16	0.00	7.6
PB051100 GCR3	Procedure Blank	Na_2SO_4	0.65	0.06	6.1	0.00	2.8	2.6	5.5	5.2	0.0	3.1	10	17	0.00	7.5
Average			0.62	0.02	5.9	0.00	2.8	2.6	5.5	5.3	0.0	3.1	10	16	0.00	7.4
Standard Deviation			0.03	0.04	0.20	0.00	0.06	0.09	0.01	0.18	0.01	0.02	0.20	0.42	0.00	0.2
MDL	= PB Average + 3 (SD)		0.70	0.13	6.5	0.00	3.0	2.9	5.5	5.8	0.0	3	10	18	0.00	8
MDL (mass normalized)[1]			**0.08**	**0.01**	**0.75**	**0.01**	**0.34**	**0.33**	**0.64**	**0.67**	**0.01**	**0.36**	**1.2**	**2.0**	**0.01**	**0.93**

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. Congener PCBs in Eagle Eggs, plus Quality Control Samples

Sample ID	Field ID	Sample Type	109	110	*112*	*113*	114	115	117	118	119	122	123	128	129
19861	BE-EG906-98	Eagle Egg	380	1,400	25	68	230	71	420	3,000	300	0.61	48	700	82
19862	BE-EG910-98	Eagle Egg	230	1,000	23	53	52	52	240	1,600	180	1.4	30	340	39
20032-1	BE-EG-270-99	Eagle Egg	79	290	7.6	110	13	14	34	790	42	0.53	11	250	21
20032-2	BE-EG-270-99	Eagle Egg	75	290	7.1	110	13	14	33	780	43	0.64	9.4	250	22
20032-3	BE-EG-270-99	Eagle Egg	58	300	11	98	11	13	30	780	38	0.52	8.6	250	20
20032 Average			71	290	8.4	110	13	14	32	780	41	0.56	9.5	250	21
200032 SD(n-1)	(n=3)		11	5.8	1.9	7	0.94	0.87	1.8	5.8	2.6	0.06	1.0	0	0.95
%RSD			**16**	**2**	**23**	**6**	**8**	**6**	**5**	**1**	**6**	**11**	**11**	**0**	**5**
MS051100 GCR1	Matrix Spike	Bluegill	21	270	1.3	2.1	7.7	7.0	12	200	4.7	2.8	3.7	54	15
Recovery			***131***	***90***	***104***	***142***	***79***	***89***	***93***	***83***	***108***	***82***	***99***	***92***	***81***
Mock 100% PCBs			16	300	1.3	1.5	9.8	7.8	13	240	4.4	3.4	3.7	58	19
MB051100	Matrix Blank	Bluegill	< 1.2	< 1.7	< 0.01	0.93	< 0.08	0.11	< 0.20	< 3.5	0.57	< 0.02	< 0.08	< 1.1	< 0.27
	Average mass	=													
PB051100 GCR1	Procedure Blank	Na_2SO_4	2.8	14	0.00	0.30	0.62	0.3	1.5	26	1.8	0.11	0.3	9.5	2.1
PB051100 GCR2	Procedure Blank	Na_2SO_4	2.5	13	0.00	0.38	0.59	0.4	1.4	23	1.8	0.09	0.3	9.5	1.8
PB051100 GCR3	Procedure Blank	Na_2SO_4	6.5	14	0.00	0.46	0.66	0.5	1.4	22	1.9	0.10	0.5	9.6	1.8
Average			4.0	14	0.00	0.38	0.62	0.4	1.4	24	1.8	0.10	0.4	9.5	1.9
Standard Deviation			2.2	0.37	0.00	0.08	0.03	0.07	0.10	2.1	0.09	0.01	0.12	0.04	0.16
MDL	= PB Average + 3 (SD)		11	15	0.00	0.61	0.72	0.6	1.7	30	2.1	0.13	0.7	9.6	2.4
MDL (mass normalized)[1]			**1.2**	**1.7**	**0.01**	**0.07**	**0.08**	**0.07**	**0.20**	**3.5**	**0.24**	**0.02**	**0.08**	**1.1**	**0.27**

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. Congener PCBs in Eagle Eggs, plus Quality Control Samples

Sample ID	Field ID	Sample Type	130	131	132	133	134	136	137	138	139	141	144	146	147
19861	BE-EG906-98	Eagle Egg	240	12	570	160	36	45	220	4,000	50	560	230	1,200	48
19862	BE-EG910-98	Eagle Egg	120	10	330	57	39	44	110	2,100	30	280	54	570	21
20032-1	BE-EG-270-99	Eagle Egg	68	6.7	300	21	20	32	44	1,800	13	260	48	360	7.7
20032-2	BE-EG-270-99	Eagle Egg	71	7.6	280	22	21	38	45	1,900	15	270	53	380	8.8
20032-3	BE-EG-270-99	Eagle Egg	63	6.1	280	21	21	31	42	1,900	12	280	45	380	9.7
20032 Average			67	6.8	290	21	21	33	44	1,900	13	270	49	370	8.7
200032 SD(n-1)	(n=3)		4.1	0.77	12	0.89	0.59	3.9	1.3	58	1.2	10	4.4	12	1.0
%RSD			**6**	**11**	**4**	**4**	**3**	**12**	**3**	**3**	**9**	**4**	**9**	**3**	**12**
MS051100 GCR1	Matrix Spike	Bluegill	17	5.5	150	5.4	30	56	15	330	5.1	96	33	57	1.7
Recovery			***94***	***82***	***94***	***97***	***117***	***81***	***95***	***97***	***89***	***96***	***91***	***107***	***58***
Mock 100% PCBs			18	6.7	160	5.5	26	69	16	340	5.8	100	36	53	2.9
MB051100	Matrix Blank	Bluegill	< 0.55	< 0.09	< 2.3	< 0.26	0.67	< 0.27	< 0.27	< 14	< 0.47	< 3.0	< 0.72	< 2.6	< 0.12
	Average mass	=													
PB051100 GCR1	Procedure Blank	Na_2SO_4	4.4	0.43	18	1.4	1.5	2.3	2.3	100	3.0	26	5.1	22	0.65
PB051100 GCR2	Procedure Blank	Na_2SO_4	4.4	0.57	19	1.8	1.8	2.3	2.3	110	2.1	26	5.3	22	0.70
PB051100 GCR3	Procedure Blank	Na_2SO_4	4.6	0.39	18	1.8	2.5	2.3	2.3	110	2.8	26	4.5	22	0.39
Average			4.5	0.46	19	1.7	1.9	2.3	2.3	107	2.6	26	5.0	22	0.58
Standard Deviation			0.10	0.09	0.54	0.21	0.52	0.03	0.02	5.8	0.50	0.08	0.43	0.15	0.17
MDL	= PB Average + 3 (SD)		4.8	0.75	20	2.3	3.5	2.4	2.4	124	4.1	26	6.3	22	1.1
MDL (mass normalized)[1]			**0.55**	**0.09**	**2.3**	**0.26**	**0.40**	**0.27**	**0.27**	**14**	**0.47**	**3.0**	**0.72**	**2.6**	**0.12**

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. Congener PCBs in Eagle Eggs, plus Quality Control Samples

Sample ID	Field ID	Sample Type	149	151	153	156	157	158	163	164	166	167	170	171	172
19861	BE-EG906-98	Eagle Egg	1,400	350	5,600	260	100	440	1,100	220	13	180	1,600	380	300
19862	BE-EG910-98	Eagle Egg	790	270	2,600	110	31	200	500	160	18	56	970	140	100
20032-1	BE-EG-270-99	Eagle Egg	750	270	2,400	86	17	170	370	150	19	45	660	170	130
20032-2	BE-EG-270-99	Eagle Egg	820	280	2,500	90	19	180	360	89	18	45	710	190	130
20032-3	BE-EG-270-99	Eagle Egg	780	280	2,500	81	17	170	370	150	17	39	620	160	130
20032 Average			780	280	2,500	86	17	170	370	130	18	43	660	170	130
200032 SD(n-1)	(n=3)		35	5.8	58	4.4	1.1	5.8	5.8	35	0.65	3.6	45	15	0.0
%RSD			**5**	**2**	**2**	**5**	**6**	**3**	**2**	**27**	**4**	**9**	**7**	**9**	**0**
MS051100 GCR1	Matrix Spike	Bluegill	300	110	370	22	5.2	43	73	32	1.8	10	140	37	23
Recovery			***91***	***92***	***103***	***90***	***83***	***89***	***101***	***93***	***143***	***98***	***93***	***96***	***99***
Mock 100% PCBs			330	120	360	25	6.2	48	73	35	1.2	10	150	39	23
MB051100	Matrix Blank	Bluegill	< 8.8	< 2.3	< 20	< 0.56	< 0.10	< 1.3	< 3.2	< 1.4	< 0.09	< 0.34	< 5.4	< 1.3	< 0.98
	Average mass	=													
PB051100 GCR1	Procedure Blank	Na_2SO_4	66	20	150	3.8	0.83	11	27	7.2	0.00	2.8	40	11	8.3
PB051100 GCR2	Procedure Blank	Na_2SO_4	67	20	160	3.9	0.77	11	27	8.0	0.32	2.8	41	11	8.4
PB051100 GCR3	Procedure Blank	Na_2SO_4	60	20	160	4.4	0.74	11	27	9.8	0.33	2.9	44	11	8.5
Average			65	20	157	4.0	0.78	11	27	8.3	0.21	2.8	41	11	8.4
Standard Deviation			4.1	0.04	5.77	0.31	0.04	0.13	0.32	1.3	0.18	0.04	1.9	0.24	0.05
MDL	= PB Average + 3 (SD)		77	20	174	4.9	0.91	11	28	12	0.77	2.9	47	12	8.6
MDL (mass normalized)[1]			**8.8**	**2.3**	**20**	**0.56**	**0.10**	**1.3**	**3.2**	**1.4**	**0.09**	**0.34**	**5.4**	**1.3**	**0.98**

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. Congener PCBs in Eagle Eggs, plus Quality Control Samples

Sample ID	Field ID	Sample Type	173	174	175	176	177	178	179	180	183	185	187	189	190
19861	BE-EG906-98	Eagle Egg	8.6	570	61	61	620	450	28	3,700	1,300	72	2,800	42	830
19862	BE-EG910-98	Eagle Egg	4.3	250	26	39	250	180	31	1,400	540	39	1,100	18	270
20032-1	BE-EG-270-99	Eagle Egg	6.9	350	24	27	370	200	22	1,800	680	40	1,100	17	400
20032-2	BE-EG-270-99	Eagle Egg	5.2	380	26	25	390	210	32	1,900	740	49	1,200	19	420
20032-3	BE-EG-270-99	Eagle Egg	5.2	340	22	20	370	200	21	1,800	670	36	1,100	16	380
20032 Average			5.8	360	24	24	380	200	25	1,800	700	42	1,100	17	400
200032 SD(n-1)	(n=3)		1.0	21	2.1	3.6	12	5.8	6.2	58	38	7.0	58	1.6	20
%RSD			**17**	**6**	**9**	**15**	**3**	**3**	**25**	**3**	**5**	**17**	**5**	**9**	**5**
MS051100 GCR1	Matrix Spike	Bluegill	3.1	140	7.0	16	68	28	51	250	100	15	160	5.3	53
Recovery			***94***	***93***	***94***	***95***	***96***	***99***	***85***	***100***	***91***	***94***	***114***	***101***	***99***
Mock 100% PCBs			3.3	150	7.4	16	71	28	59	250	110	16	140	5.3	54
MB051100	Matrix Blank	Bluegill	< 0.15	< 3.9	< 0.18	< 0.47	< 2.4	< 1.1	< 0.80	< 14	< 5.6	< 0.65	< 8.8	< 0.22	< 2.9
	Average mass	=													
PB051100 GCR1	Procedure Blank	Na_2SO_4	0.79	31	1.6	2.0	20	10	6.6	120	45	5.3	76	1.8	20
PB051100 GCR2	Procedure Blank	Na_2SO_4	1.0	31	1.6	2.7	20	9.6	6.6	120	46	4.9	76	1.8	21
PB051100 GCR3	Procedure Blank	Na_2SO_4	1.0	33	1.6	3.0	20	9.6	6.8	120	47	5.1	75	1.8	23
Average			0.93	32	1.6	2.6	20	9.7	6.7	120	46	5.1	76	1.8	21
Standard Deviation			0.12	0.87	0.01	0.52	0.13	0.08	0.09	0.00	1.0	0.19	0.41	0.03	1.4
MDL	= PB Average + 3 (SD)		1.3	34	1.6	4.1	21	9.9	7.0	120	49	5.7	77	1.9	26
MDL (mass normalized)[1]			**0.15**	**3.9**	**0.18**	**0.47**	**2.4**	**1.1**	**0.80**	**14**	**5.6**	**0.65**	**8.8**	**0.22**	**2.9**

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. Congener PCBs in Eagle Eggs, plus Quality Control Samples

Sample ID	Field ID	Sample Type	191	193	194	195	196	197	198	199	200	201	202	203	205
19861	BE-EG906-98	Eagle Egg	55	240	600	200	330	31	30	1,000	15	63	180	600	70
19862	BE-EG910-98	Eagle Egg	23	94	200	86	120	9	12	290	12	27	59	210	27
20032-1	BE-EG-270-99	Eagle Egg	21	75	280	86	210	11	13	350	13	29	56	220	27
20032-2	BE-EG-270-99	Eagle Egg	24	83	290	100	210	12	14	370	15	31	56	260	29
20032-3	BE-EG-270-99	Eagle Egg	20	70	280	76	210	10	12	350	11	27	48	210	24
20032 Average			22	76	280	87	210	11	13	360	13	29	54	230	27
200032 SD(n-1)	(n=3)		2.0	7	5.8	12	0.0	0.80	1.0	12	1.9	2.1	4.6	26	2.4
%RSD			**9**	**9**	**2**	**14**	**0**	**7**	**8**	**3**	**15**	**7**	**9**	**12**	**9**
MS051100 GCR1	Matrix Spike	Bluegill	5.3	15	45	25	28	4.5	3.1	49	7.7	6.7	10	36	3.4
Recovery			***100***	***110***	***89***	***94***	***93***	***98***	***90***	***99***	***89***	***94***	***101***	***97***	***106***
Mock 100% PCBs			5.3	14	50	26	30	4.6	3.5	50	8.7	7.2	10	37	3.2
MB051100	Matrix Blank	Bluegill	< 0.20	< 0.93	< 1.6	< 0.85	< 1.3	< 0.30	< 0.07	< 1.6	< 0.16	< 0.27	< 0.43	< 1.7	< 0.14
	Average mass	=													
PB051100 GCR1	Procedure Blank	Na_2SO_4	1.5	7.6	14	6.7	9.8	2.1	0.61	14	1.3	2.2	3.2	11	1.2
PB051100 GCR2	Procedure Blank	Na_2SO_4	1.5	7.6	14	6.8	10	2.2	0.60	14	1.4	2.2	3.4	12	1.2
PB051100 GCR3	Procedure Blank	Na_2SO_4	1.6	7.9	14	7.1	9.7	2.4	0.60	14	1.3	2.3	3.5	13	1.2
Average			1.6	7.7	14	6.9	9.9	2.2	0.60	14	1.3	2.2	3.4	12	1.2
Standard Deviation			0.06	0.14	0.01	0.19	0.36	0.12	0.00	0.05	0.01	0.06	0.13	1.1	0.01
MDL	= PB Average + 3 (SD)		1.7	8.1	14	7.4	11	2.6	0.61	14	1.4	2.4	3.8	15	1.2
MDL (mass normalized)[1]			**0.20**	**0.93**	**1.6**	**0.85**	**1.3**	**0.30**	**0.07**	**1.6**	**0.16**	**0.27**	**0.43**	**1.7**	**0.14**

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. Congener PCBs in Eagle Eggs, plus Quality Control Samples

Sample ID	Field ID	Sample Type	206	208	Total PCBs	(units)
19861	BE-EG906-98	Eagle Egg	810	320	62,000	ng/g
19862	BE-EG910-98	Eagle Egg	160	31	34,000	ng/g
20032-1	BE-EG-270-99	Eagle Egg	360	55	20,000	ng/g
20032-2	BE-EG-270-99	Eagle Egg	400	58	20,000	ng/g
20032-3	BE-EG-270-99	Eagle Egg	320	48	20,000	ng/g
20032 Average			360	54	20,000	ng/g
200032 SD(n-1)	(n=3)		40	5.1	0	ng/g
%RSD			**11**	**9**	**0**	**%**
MS051100 GCR1	Matrix Spike	Bluegill	13	2.9	8,500	ng
Recovery			***94***	***95***	***85***	%
Mock 100% PCBs			14	3.0	10,000	ng
MB051100	Matrix Blank	Bluegill	< 0.43	< 0.22	< 130	ng/g
	Average mass	=				
PB051100 GCR1	Procedure Blank	Na_2SO_4	3.1	1.5	1,100	ng
PB051100 GCR2	Procedure Blank	Na_2SO_4	3.1	1.6	1,100	ng
PB051100 GCR3	Procedure Blank	Na_2SO_4	3.4	1.3	1,100	ng
Average			3.2	1.4	1,100	ng
Standard Deviation			0.18	0.16	0	ng
MDL	= PB Average + 3 (SD)		3.7	1.9	1,100	ng
MDL (mass normalized)[1]			**0.43**	**0.22**	**130**	ng/g
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 2. Procedural Standard Recoveries in Eagle Eggs

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	029 Amount or Concentration		029 % Recovery	155 Amount or Concentration		155 % Recovery	204 Amount or Concentration		204 % Recovery
MS051100	Matrix Spike	Bluegill	---	4.1	310	ng	***72***	330	ng	***77***	330	ng	***79***
MB051100	Matrix Blank	Bluegill	**9.89**	3.8	24	ng/g	***56***	27	ng/g	***62***	27	ng/g	***62***
PB051100	Procedure Blank	Na_2SO_4	---	---	240	ng	***56***	274	ng	***64***	275	ng	***66***
19861	BE-EG906-98	Eagle Egg	**10.08**	5.7	35	ng/g	***84***	49	ng/g	***115***	37	ng/g	***89***
19862	BE-EG910-98	Eagle Egg	**9.83**	4.5	36	ng/g	***83***	43	ng/g	***100***	37	ng/g	***88***
20032-1	BE-EG-270-99	Eagle Egg	**9.87**	5.5	33	ng/g	***76***	39	ng/g	***91***	33	ng/g	***78***
20032-2	BE-EG-270-99	Eagle Egg	**9.97**	5.3	32	ng/g	***76***	40	ng/g	***94***	33	ng/g	***79***
20032-3	BE-EG-270-99	Eagle Egg	**9.81**	5.0	34	ng/g	***77***	41	ng/g	***94***	36	ng/g	***83***
Average Recovery							***72***			***87***			***78***
SD							***11***			***18***			***10***
MOCK 100% PCBs #1	240W + 237W-3		---	---	430		***100***	430		***100***	420		***100***

Table 2. Procedural Standard Recoveries in Eagle Eggs

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid	029 Amount or Concentration		029 % Recovery	155 Amount or Concentration		155 % Recovery	204 Amount or Concentration		204 % Recovery
MS051100	Matrix Spike	Bluegill	---	4.1	310	ng	***72***	330	ng	***77***	330	ng	***79***
MB051100	Matrix Blank	Bluegill	**9.89**	3.8	24	ng/g	***56***	27	ng/g	***62***	27	ng/g	***62***
PB051100	Procedure Blank	Na_2SO_4	---	---	240	ng	***56***	274	ng	***64***	275	ng	***66***
19861	BE-EG906-98	Eagle Egg	**10.08**	8.6	35	ng/g	***84***	49	ng/g	***115***	37	ng/g	***89***
19862	BE-EG910-98	Eagle Egg	**9.83**	4.5	36	ng/g	***83***	43	ng/g	***100***	37	ng/g	***88***
20032-1	BE-EG-270-99	Eagle Egg	**9.87**	5.5	33	ng/g	***76***	39	ng/g	***91***	33	ng/g	***78***
20032-2	BE-EG-270-99	Eagle Egg	**9.97**	5.4	32	ng/g	***76***	40	ng/g	***94***	33	ng/g	***79***
20032-3	BE-EG-270-99	Eagle Egg	**9.81**	4.9	34	ng/g	***77***	41	ng/g	***94***	36	ng/g	***83***
Average Recovery	9						***72***			***87***			***78***
SD							***11***			***18***			***10***
MOCK 100% PCBs #1	240W + 237W-3		---	---	430		***100***	430		***100***	420		***100***

Table 3. Organochlorine Pesticides in Eagle Eggs, plus Quality Control Samples

Sample Name	Field ID	Sample Type	Total geq for Analysis	% Lipid	HCB	PCA	alpha-BHC	beta-BHC	Lindane	delta-BHC	Heptachlor
19861	BE-EG906-98 EGG	BALD EAGLE EGG	1.99	7.14	23	4.0	< 0.02	2.2	< 0.41	< 0.11	< 0.01
19862	BE-EG910-98 EGG	BALD EAGLE EGG	2.05	5.74	16	1.8	< 0.02	1.7	< 0.41	0.77	0.79
20032-1	BE-EG970-99 EGG	BALD EAGLE EGG REP #1	2.09	6.34	19	3.0	0.49	3.7	< 0.41	2.2	0.18
20032-2	BE-EG970-99 EGG	BALD EAGLE EGG REP #2	1.99	6.9	19	3.1	0.46	4.0	< 0.41	1.8	0.16
20032-3	BE-EG970-99 EGG	BALD EAGLE EGG REP #3	1.96	6.25	19	3.3	0.92	5.8	< 0.41	1.4	0.16
20032 Average					19	3.1	0.62	4.5		1.8	0.17
20032 SD (n-1)	(n=3)				0.15	0.16	0.26	1.1		0.39	0.01
%RSD					0.78	5.0	42	25		22	6.5
MS051100 OC	Matrix Spike OCPs	Bluegill	2.00	5.64	120	130	120	120	120	130	120
% Recovery					***67***	***72***	***67***	***67***	***67***	***72***	***71***
MB051100	Matrix Blank	Bluegill	2.24	5.02	0.27	0.55	0.80	< 0.01	< 0.41	0.28	< 0.01
PB051100 GCR1	Procedure Blank	Na_2SO_4	---	---	0.08	0.17	0.02	0.00	0.08	0.11	0.00
PB051100 GCR2	Procedure Blank	Na_2SO_4	---	---	0.10	0.21	0.02	0.00	0.41	0.14	0.00
PB051100 GCR3	Procedure Blank	Na_2SO_4	---	---	0.07	0.30	0.03	0.00	0.37	0.17	0.00
Average					0.08	0.23	0.02	0.00	0.29	0.14	0.00
Standard Deviation					0.02	0.07	0.01	0.00	0.18	0.03	0.00
Method Detection Limit (MDL) = PB Average + 3 (SD)					0.13	0.43	0.04	0.00	0.83	0.23	0.00
MDL[1]	mass normalized	*average mass=*	*2.03*		***0.06***	***0.21***	***0.02***	***0.01***	***0.41***	***0.11***	***0.01***

Note: Values are recovery corrected.

Note: values rounded to 2 significant figures.

[1] *If MDL is zero value set to instrument detection limit.*

Table 3. Organochlorine Pesticides in Eagle Eggs, plus Quality Control Samples

Sample Name	Field ID	Sample Type	Heptachlor Epoxide	Dacthal	Dieldrin	Endrin	Oxychlordane	*cis*-Chlordane	*trans*-Chlordane
19861	BE-EG906-98 EGG	BALD EAGLE EGG	33	13	320	< 0.02	120	73	14
19862	BE-EG910-98 EGG	BALD EAGLE EGG	11	9.4	73	< 0.02	36	41	6.3
20032-1	BE-EG970-99 EGG	BALD EAGLE EGG REP #1	19	< 0.52	130	4.8	74	88	11
20032-2	BE-EG970-99 EGG	BALD EAGLE EGG REP #2	19	< 0.52	130	4.9	74	87	10
20032-3	BE-EG970-99 EGG	BALD EAGLE EGG REP #3	24	< 0.52	140	5.5	83	95	11
20032 Average			21		130	5.1	77	90	10
20032 SD (n-1)	(n=3)		3.1		5.8	0.39	5.1	4.3	0.30
%RSD			15		4.4	7.6	6.7	4.8	2.8
MS051100 OC	Matrix Spike OCPs	Bluegill	130	130	130	120	130	120	130
% Recovery			***76***	***72***	***76***	***71***	***76***	***71***	***76***
MB051100	Matrix Blank	Bluegill	0.29	0.93	3.0	4.3	1.5	2.1	0.64
PB051100 GCR1	Procedure Blank	Na_2SO_4	0.00	0.95	0.07	0.03	0.00	0.03	0.02
PB051100 GCR2	Procedure Blank	Na_2SO_4	0.00	0.98	0.03	0.02	0.00	0.01	0.01
PB051100 GCR3	Procedure Blank	Na_2SO_4	0.00	1.00	0.01	0.02	0.00	0.38	0.01
Average			0.00	0.98	0.04	0.02	0.00	0.14	0.01
Standard Deviation			0.00	0.03	0.03	0.01	0.00	0.21	0.01
Method Detection Limit (MDL) = PB Average + 3 (SD)			0.00	1.05	0.13	0.04	0.00	0.76	0.03
MDL[1]	mass normalized	*average mass=*	***0.01***	***0.52***	***0.06***	***0.02***	***0.01***	***0.38***	***0.02***

Note: Values are recovery corrected.

Note: values rounded to 2 significant figures.

[1] If MDL is zero value set to instrument detection limit.

Table 3. Organochlorine Pesticides in Eagle Eggs, plus Quality Control Samples

Sample Name	Field ID	Sample Type	*cis*-Nonachlor	*trans*-Nonachlor	o,p'-DDE	o,p'-DDD	o,p'-DDT	p,p'-DDE	p,p'-DDD	p,p'-DDT
19861	BE-EG906-98 EGG	BALD EAGLE EGG	170	540	4.6	15	< 0.01	6800	590	< 0.01
19862	BE-EG910-98 EGG	BALD EAGLE EGG	63	180	1.1	9.2	3.5	4100	320	10
20032-1	BE-EG970-99 EGG	BALD EAGLE EGG REP #1	130	360	4.9	11	< 0.01	4900	500	< 0.01
20032-2	BE-EG970-99 EGG	BALD EAGLE EGG REP #2	130	340	4.3	12	< 0.01	5200	490	< 0.01
20032-3	BE-EG970-99 EGG	BALD EAGLE EGG REP #3	140	370	4.2	13	< 0.01	5000	520	< 0.01
20032 Average			130	360	4.5	12		5000	500	
20032 SD (n-1)	(n=3)		5.8	15	0.40	0.87		153	15	
%RSD			4.4	4.2	8.9	7.2		3.1	3.1	
MS051100 OC	Matrix Spike OCPs	Bluegill	130	130	130	130	110	120	130	140
% Recovery			***76***	***76***	***76***	***76***	***65***	***71***	***76***	***78***
MB051100	Matrix Blank	Bluegill	0.66	4.0	4.7	2.4	0.20	4.3	0.42	16
PB051100 GCR1	Procedure Blank	Na_2SO_4	0.01	0.06	0.00	0.80	0.00	0.65	0.00	0.60
PB051100 GCR2	Procedure Blank	Na_2SO_4	0.00	0.05	0.00	0.78	0.00	0.62	0.00	0.54
PB051100 GCR3	Procedure Blank	Na_2SO_4	0.00	0.07	0.00	0.88	0.00	0.59	0.00	0.42
Average			0.00	0.06	0.00	0.82	0.00	0.62	0.00	0.52
Standard Deviation			0.01	0.01	0.00	0.05	0.00	0.03	0.00	0.09
Method Detection Limit (MDL) = PB Average + 3 (SD)			0.02	0.09	0.00	0.98	0.00	0.71	0.00	0.79
MDL[1]	mass normalized	*average mass=*	***0.01***	***0.04***	***0.01***	***0.48***	***0.01***	***0.35***	***0.01***	***0.39***

Note: Values are recovery corrected.

Note: values rounded to 2 significant figures.

[1] *If MDL is zero value set to instrument detection limit.*

Table 3. Organochlorine Pesticides in Eagle Eggs, plus Quality Control Samples

Sample Name	Field ID	Sample Type	Endosulfan 1	Endosulfan II	Endosulfate	Methoxychlor	Mirex	*units*
19861	BE-EG906-98 EGG	BALD EAGLE EGG	< 0.01	< 0.01	< 0.01	1.3	53	ng/g
19862	BE-EG910-98 EGG	BALD EAGLE EGG	0.58	< 0.01	< 0.01	< 0.48	23	ng/g
20032-1	BE-EG970-99 EGG	BALD EAGLE EGG REP #1	< 0.01	< 0.01	< 0.01	16	22	ng/g
20032-2	BE-EG970-99 EGG	BALD EAGLE EGG REP #2	< 0.01	< 0.01	< 0.01	17	24	ng/g
20032-3	BE-EG970-99 EGG	BALD EAGLE EGG REP #3	< 0.01	< 0.01	< 0.01	18	24	ng/g
20032 Average						17	23	ng/g
20032 SD (n-1)	(n=3)					1.0	1.1	ng/g
%RSD						6.1	4.7	%
MS051100 OC	Matrix Spike OCPs	Bluegill	130	130	140	140	150	ng
% Recovery			***76***	***72***	***82***	***78***	***83***	%
MB051100	Matrix Blank	Bluegill	< 0.01	< 0.01	0.81	2.3	0.07	ng/g
PB051100 GCR1	Procedure Blank	Na_2SO_4	0.00	0.00	0.00	0.77	0.00	ng
PB051100 GCR2	Procedure Blank	Na_2SO_4	0.00	0.00	0.00	0.74	0.00	ng
PB051100 GCR3	Procedure Blank	Na_2SO_4	0.00	0.00	0.00	0.86	0.00	ng
Average			0.00	0.00	0.00	0.79	0.00	ng
Standard Deviation			0.00	0.00	0.00	0.06	0.00	ng
Method Detection Limit (MDL) = PB Average + 3 (SD)			0.00	0.00	0.00	0.98	0.00	ng
MDL[1]	mass normalized	*average mass=*	***0.01***	***0.01***	***0.01***	***0.48***	***0.01***	ng/g

Note: Values are recovery corrected.

Note: values rounded to 2 significant figures.

[1] *If MDL is zero value set to instrument detection limit.*

Table 4. Recoveries of PCB and OC Pesticide Procedural Internal Standards

Sample ID	Field ID	Sample Type	Gram-equivalents for Analysis (g)	% Lipid		TCM-Xylene (ng/g)	TCM-Xylene % Recovery	029 ng/g	029 % Recovery	155* ng/g	155* % Recovery	204 ng/g	204 % Recovery	DBC ng/g	DBC % Recovery
PB051100 GCR1	Proc Blank	Na2so4	0.00	0.00		110	**61**	110	**58**	180	**90**	170	**89**	180	**95**
PB051100 GCR2	Proc Blank	Na2so4	0.00	0.00		110	**61**	120	**63**	180	**90**	180	**95**	190	**100**
PB051100 GCR3	Proc Blank	Na2so4	0.00	0.00		110	**61**	110	**58**	180	**90**	180	**95**	170	**89**
MB051100	Matrix Blank	Bluegill	2.24	5.02		67	**83**	62	**73**	89	**100**	82	**96**	85	**100**
MS051100 OC	Matrix Spike OCPs	Bluegill	2.00	5.64		120	**67**	120	**63**	170	**85**	160	**84**	140	**74**
19861	BE-EG906-98 EGG	BALD EAGLE EGG	1.99	7.14		77	**85**	73	**76**	150	**149**	93	**97**	82	**86**
19862	BE-EG910-98 EGG	BALD EAGLE EGG	2.05	5.74		64	**73**	60	**64**	130	**133**	58	**63**	87	**94**
20032-1	BE-EG970-99 EGG	BALD EAGLE EGG REP #1	2.09	6.34		72	**83**	77	**85**	100	**105**	72	**79**	94	**103**
20032-2	BE-EG970-99 EGG	BALD EAGLE EGG REP #2	1.99	6.90		74	**82**	74	**78**	110	**109**	71	**74**	100	**105**
20032-3	BE-EG970-99 EGG	BALD EAGLE EGG REP #3	1.96	6.25		73	**79**	77	**80**	110	**108**	71	**73**	94	**97**
Average Recovery							***74***		***70***		***106***		***85***		***94***
SD							***10***		***10***		***21***		***12***		***9***

*PCB 155 may have an interference contributing to higher recovery.

Table 5. Non-*o*-Chloro-Substituted PCBs (pg/g) in Bald Eagle Eggs from the Hudson River Area, NY

22-Sep-00
N42-secordnye-eggs.xls

GC/MS Sets: N42PCB
Dates: Sept. 15-18, 2000

NFCR Number:	Field Number:	Sample Description:	GC/MS Run No.	Non-o-Polychlorinated Biphenyls Tetra: 3,4,4',5-TCB (81)	Tetra: 3,3',4,4'-TCB (77)	Penta: 3,3',4,4',5-PeCB (126)	Hexa: 3,3',4,4',5,5'-HxCB (169)
19861	BE-EG906-98	Bald Eagle Egg, 10.21 g	42-10	4,700	11,000	7,300	460
19862	BE-EG910-98	Bald Eagle Egg, 10.03 g	42-11	2,400	8,200	3,600	190
20032-2	BE-EG970-99	Bald Eagle Egg, 10.17 g, Replicate 2	42-14	390	3,200	2,200	270
20032-3	BE-EG970-99	Bald Eagle Egg, 10.01 g, Replicate 3	42-15	430	3,000	1,900	250
		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. Non-*o*-Chloro-Substituted PCBs (pg/g) in Bald Eagle Eggs from the Hudson River Area, NY

9/22/2000-Revised 10/25/2001
N42-secordnye-eggs.xls

GC/MS Sets: N42PCB
Dates: Sept. 15-18, 2000

NFCR Number:	Field Number:	Sample Description:	GC/MS Run No.	Non-*o*-Polychlorinated Biphenyls Tetra: 3,4,4',5-TCB (81)	3,3',4,4'-TCB (77)	Penta: 3,3',4,4',5-PeCB (126)	Hexa: 3,3',4,4',5,5'-HxCB (169)	**TEQs TOTAL**
		DIOXIN Toxic Equivalent Factor (Birds):		**0.1**	**0.05**	**0.1**	**0.001**	
19861	BE-EG906-98	Bald Eagle Egg, 10.21 g	42-10	470	550	730	0.5	1,750
19862	BE-EG910-98	Bald Eagle Egg, 10.03 g	42-11	240	410	360	0.2	1,010
20032-1	BE-EG970-99	Bald Eagle Egg, 10.07 g, Replicate 1	42-12	20	155	100	0.1	275
20032-2	BE-EG970-99	Bald Eagle Egg, 10.17 g, Replicate 2	42-14	39	160	220	0.3	419
20032-3	BE-EG970-99	Bald Eagle Egg, 10.01 g, Replicate 3	42-15	43	150	190	0.3	383
		Quality Control Samples:						
Proc. Blk 5/11/2000		Procedure Blank, 5/11/2000 **(10 g sample basis)**	42-5	**0.2**	**3**	**5**	**0.005**	8.4
Bluegill Blk 5/11/2000		Bluegill Matrix Blank, 5/11/2000, 10.09 g	42-6	0.2 LQ	3	1	**0.002** LQ	4.4
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	10	70	7	0.003	87
Pos. Ctrl 5/11/2000		Positive Control Saginaw Carp, 5/11/2000, 5.12 g	42-9	39	130	96	0.1	265

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 ^{13}C-Non-*o*-Chloro-Substituted PCBs in Bald Eagle Eggs from the Hudson River Area, NY

22-Sep-00
N42-secordnye-eggs.xls

GC/MS Sets: N42PCB
Dates: Sept. 15-18, 2000

NFCR Number:	Submitter Number:	Sample Description:	GC/MS Run No.	^{13}C-Non-*o*-Polychlorinated Biphenyls			
				Tetra:		Penta:	Hexa:
				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)
19861	BE-EG906-98	Bald Eagle Egg, 10.21 g	42-10	96	83	70	91
19862	BE-EG910-98	Bald Eagle Egg, 10.03 g	42-11	102	89	68	94
20032-1	BE-EG970-99	Bald Eagle Egg, 10.17 g, Replicate 2	42-14	75	74	60	79
20032-1	BE-EG970-99	Bald Eagle Egg, 10.01 g, Replicate 3	42-15	77	94	77	93
		Quality Control Samples:					
Proc. Blk 5/11/2000		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

Columbia Environmental Research Center
U.S. Geological Survey- Biological Resources Division
4200 New Haven Road, Columbia, Missouri 65201

CORRECTION
To Report #4 (Original report date of 10/24/00)
Organochlorine Contaminants in Bald Eagle Eggs

Concerning **2,3,7,8-TCDD, 2,3,7,8-TCDF, and 2,3,4,7,8-PeCDF**

Date of Correction: October 30, 2001

Reply to
Carl Orazio- USGS Project Leader

FY-00-31-04
FWS NO: 1448-50181-99-H-007
CERC NO: 3307-70L1D

FWS Project Title:

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

Principal Investigator

Anne Secord
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Endangered Species Unit
Wildlife Resources Center
New York State Department of Environmental Conservation
Delmar, New York 12054

This report is to inform you that we have found that the concentrations that we reported for 2,3,7,8-TCDD, 2,3,7,8-TCDF, and 2,3,4,7,8-PeCDF in the October 24, 2000 Eagle Egg Report (Report #4) had a systematic positive bias. Included with this report are replacement Tables 7 and 8 that contain the correct results. Note: **All other results** reported on 10/24/00, i.e. the results for the organochlorine pesticides, PCBs, and for non-*ortho* PCB congeners, and the other 14 PCDD/Fs **are correct**. Furthermore, all other results for all PCDD/Fs in all other Hudson River reports that we have sent you are also correct. The positive bias and the problem that caused it occurred only during analysis of the three eagle egg samples.

We discovered that the data for these three PCDD/Fs were positively biased through evaluation of recent trends in our positive control data (i.e. the Saginaw Bay carp that we include with our analyses). The positive control serves as a standard reference material by which we monitor the analysis. The Saginaw Bay Carp run with your three eagle eggs indicated that the values for 2,3,7,8-TCDD, 2,3,7,8-TCDF, and 2,3,4,7,8-PeCDF were higher than expected, and that in each egg sample, the three accompanying ^{13}C-PCDD/Fs had recoveries lower than optimum. Initially puzzling was the fact that the Matrix Spike that was analyzed with the eagle eggs, indicated that the data for all of the PCDD/Fs were within QC limits. We investigated this evidence further and found the cause of the systematic positive bias in the results for these three PCDD/Fs, which also explained why the matrix spike was OK. **Cause**: The spiking standards (both the ^{13}C-PCDD/Fs and the matrix spike (MS) natives), were exposed to window sunlight for a sufficient amount of time to allow UV to photolyze these three photosensitive PCDD/Fs standards (1,2).

Using GC/HRMS, we have determined the actual amounts of the spiking standard that was added to the samples, and in turn have used these amounts for the isotope dilution quantification of the eagle egg samples. The actual amounts of ^{13}C-2,3,7,8-TCDD, ^{13}C-2,3,7,8-TCDF, and ^{13}C-2,3,4,7,8-PeCDF were respectively 56%, 60%, and 59% of the intended amounts. We also have confirmed that the positive bias in the Saginaw Carp is equal in magnitude to the reduction in concentration of the three ^{13}C-standards. Because the isotope dilution method for calculating the native PCDD/Fs is based on the relative concentrations of the ^{13}C- standard and the native PCDD/F, equal declines in concentrations of the ^{13}C and native spike standards cancelled out, and the matrix spike results were "OK".

Using the actual amounts of the three ^{13}C-PCDD/Fs that were spiked into the eagle egg samples, we have calculated the true concentrations of native 2,3,7,8-TCDD, 2,3,7,8-TCDF, and 2,3,4,7,8-PeCDF in the eagle eggs. See attached Tables.

Because of the correction to these three high TEF PCDD/Fs, the total TEQs that we reported on 10/24/00 are lower by about 2% for each eagle egg. Although the overwhelming dioxin-like toxicity is due to non-*ortho* and mono-*ortho* PCBs, for purposes of temporal and spatial monitoring of PCDD/Fs in eagle eggs, and for developing various models, the approximate 35% reduction from the previously

reported values for the three PCDD/Fs may be significant. We have included Table 9 which shows the TEQ contributions.

We apologize for any inconvenience that this correction to the three PCDD/Fs causes you. Please let me, Carl Orazio know if you have any questions regarding the updated concentrations. I can be reached at (573) 876-1823.

References

1) Comparative Rates of Photolysis of Polychlorinated Dibenzofurans in Organic Solvents and in Aqueous Solutions. Dung, Mei H.; O'Keefe, Patrick W. Wadsworth Center for Laboratories and Research, New York State Department of Health, Albany, NY, USA. Environ. Sci. Technol. (1994), 28(4), 549-54.

2) Photodegradation of Water Pollutants. Halmann, M.M. CRC Press. Boca Raton, FL 1996.

CORRECTION to Report # 4: Organochlorine Contaminants in Bald Eagle Eggs Concerning 2,3,7,8-TCDD, 2,3,7,8-TCDF, and 2,3,4,7,8-PeCDF

Date of Correction: October 30, 2001

Original report date: 10/24/00

By:

Carl E. Orazio,
Leader, Organic Chemistry Section
USGS Project Officer

Reviewed by

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Approved By:

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Paul Heine
CERC Quality Assurance Officer

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Susan B. Jones
Acting Director, Columbia Environmental Research Center

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

File: DF34secord-eggs.xls
Date Reported: Oct. 5, 2000-Revised Oct. 25, 2001
Date Analyzed: Sept. 28-29, 2000

Sample Site/Matrix:	Egg	Egg	Egg	Egg	**Multiplication Factor that was used to Correct Inflated Conc. of 3 Analytes in Samples due to Partial Photolysis of ^{13}C-Surrogate Std**
CERC Number:	19861	19862	20032-2	20032-3	
GC/HRMS Sets: DF34- Injection No.	34-10	34-11	34-14	34-15	
			Replicate 2	Replicate 3	
Sample Submitter No.	BE-EG906-98	BE-EG910-98	BE-EG970-99	BE-EG970-99	
Sample Mass Extracted (grams):	10.21	10.03	10.17	10.01	
DIOXINS					
2,3,7,8-Tetrachloro	24 R	13 R	8.7 R	7.5 R	**0.56**
1,2,3,7,8-Pentachloro	15	5.6	7.7	7.8	
1,2,3,4,7,8-Hexachloro	2.2 LQ	1.6 LQ	1.7 LQ	0.9 LQ	
1,2,3,6,7,8-Hexachloro	15	8.7	11	11	
1,2,3,7,8,9-Hexachloro	0.1 ND	1.1 LQ	1.0 LQ	0.9 LQ	
1,2,3,4,6,7,8-Heptachloro	9.1	2.0	1.7	2.3 LQ	
Octachloro	250	16	17	17 LQ	
FURANS 2,3,7,8-Tetrachloro	6.2 R	6.2 R	7.4 R	6.9 R	**0.60**
1,2,3,7,8-Pentachloro	1.1	1.0	2.9	2.9 LQ	
2,3,4,7,8-Pentachloro	31 R	15 R	11 R	11 R	**0.59**
1,2,3,4,7,8-Hexachloro	1.6 LQ	1.3 LQ	1.0 LQ	1.5 LQ	
1,2,3,6,7,8-Hexachloro	1.6 LQ	1.3 LQ	1.8 LQ	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	1.5	1.8	2.9	1.4 LQ	
1,2,3,4,6,7,8-Heptachloro	2.7 LQ	1.9 LQ	4.0	2.4 LQ	
1,2,3,4,7,8,9-Heptachloro	1.0 LQ	1.2 LQ	1.3 LQ	0.8 LQ	
Octachloro	34	34	30	29	

R (Revised) 2,3,7,8-TCDD, 2,3,7,8-TCDF, & 2,3,4,7,8-PeCDF are corrected-(^{13}C-surrogates had partially photolyzed)
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 Eagle Egg Samples from the Hudson River Area

File: DF34secord-eggs.xls
Date Reported: Oct. 5, 2000-Revised Oct. 25, 2001
Date Analyzed: Sept. 28-29, 2000

Sample Site/Matrix:	Quality Assurance:		Quality Assurance Samples		
CERC Number:	Procedure Blank	Bluegill Blank	Bluegill Spike	Pos.Ctrl Sag.Carp	*CARP*
GC/HRMS Sets: DF34- Injection No.	34-5	34-6	34-7	34-8	*QC AVG.*
	5/11/2000	5/11/2000	5/11/2000	5/11/2000	*from*
Sample Submitter No.	**Conc. (pg/g-eq)**		250 or 1250 pg total		*1994-1997*
	based on sample		(25 or 125 pg/g)		
Sample Mass Extracted (grams):	**wgts 10 g**	10.09	10.06	5.12	
DIOXINS					
2,3,7,8-Tetrachloro	**0.1 LQ, R**	0.1 ND	23	22 R	*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, R**	0.1 LQ, R	38	34 R	*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	**0.1 LQ, R**	0.1 LQ, R	36	36 R	*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*

R (Revised) 2,3,7,8-TCDD, 2,3,7,8-TCDF, & 2,3,4,7,8-PeCDF are corrected-(^{13}C-surrogates had partially photolyzed)
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 ^{13}C-Substituted Polychlorinated Dibenzo-*p*-dioxins and Dibenzofurans in Eagle Egg Samples from the Hudson River Area

File: DF34secord-eggs.xls
Date Reported: Oct. 5, 2000-Revised Oct. 25, 2001
Date Analyzed: Sept. 28-29, 2000

Sample Site/Matrix:	Egg	Egg	Egg	Egg	
CERC Number:	19861	19862	20032-2	20032-3	**Multiplication Factor**
GC/HRMS Sets: DF34- Injection No.	34-10	34-11	34-14	34-15	**that was used to**
			Replicate 2	Replicate 3	**Correct Recovery of**
Sample Submitter No.	BE-EG906-98	BE-EG910-98	BE-EG970-99	BE-EG970-99	**Three ^{13}C-Surrogates**
					Due to their
Sample Mass Extracted (grams):	10.21	10.03	10.17	10.01	**Partial Photolysis**
DIOXINS					
2,3,7,8-Tetrachloro	74 R	77 R	65 R	70 R	**1.76**
1,2,3,7,8-Pentachloro	67	83	63	60	
1,2,3,4,7,8-Hexachloro	58	63	52	56	
1,2,3,6,7,8-Hexachloro	64	73	59	58	
1,2,3,7,8,9-Hexachloro	53	56	47	51	
1,2,3,4,6,7,8-Heptachloro	62	70	58	60	
Octachloro	41	49	37	41	
FURANS 2,3,7,8-Tetrachloro	77 R	80 R	65 R	62 R	**1.67**
1,2,3,7,8-Pentachloro	65	69	54	52	
2,3,4,7,8-Pentachloro	74 R	83 R	73 R	69 R	**1.69**
1,2,3,4,7,8-Hexachloro	31	44	27	23	
1,2,3,6,7,8-Hexachloro	29	45	23	19	
1,2,3,7,8,9-Hexachloro	46	49	40	47	
1,2,3,4,6,7,8-Heptachloro	35	43	27	27	
1,2,3,4,7,8,9-Heptachloro	44	54	40	50	

R (Revised) ^{13}C-2,3,7,8-TCDD, 2,3,7,8-TCDF, and 2,3,4,7,8-PeCDF are now correct--had partially photolyzed

Table 8. Percent Recovery of ^{13}C-Substituted Polychlorinated Dibenzo-*p*-dioxins and Dibenzofurans in Eagle Egg Samples from the Hudson River Area

File: DF34secord-eggs.xls
Date Reported: Oct. 5, 2000-Revised Oct. 25, 2001
Date Analyzed: Sept. 28-29, 2000

Sample Site/Matrix:	Quality Assurance Samples				
CERC Number:	Procedure Blank	Bluegill Blank	Bluegill Spike	Pos.Ctrl Sag.Carp	**Multiplication Factor that was used to Correct Recovery of Three ^{13}C-Surrogates Due to their Partial Photolysis**
GC/HRMS Sets: DF34- Injection No.	34-5	34-6	34-7	34-8	
	5/11/2000	5/11/2000	5/11/2000	5/11/2000	
Sample Submitter No.					
Sample Mass Extracted (grams):		10.09	10.06	5.12	
DIOXINS					
2,3,7,8-Tetrachloro	63 R	58 R	67 R	67 R	**1.76**
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	60 R	57 R	62 R	65 R	**1.67**
1,2,3,7,8-Pentachloro	52	45	56	54	
2,3,4,7,8-Pentachloro	66 R	56 R	66 R	68 R	**1.69**
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	

R (Revised) ^{13}C-2,3,7,8-TCDD, 2,3,7,8-TCDF, and 2,3,4,7,8-PeCDF are now correct--had partially photolyzed

Table 9. Eagle Egg TEQs (pg/g)

Sample ID		Mono-*ortho* congeners 123	118	114	105	167	156	157	189	Sum mPCB
	Avian TEFs[1]	**0.00001**	**0.00001**	**0.0001**	**0.0001**	**0.00001**	**0.0001**	**0.0001**	**0.00001**	
		Concetrations ng/g								
19861	BE-EG906-98	48	3,000	230	1,100	180	260	100	42	4960
19862	BE-EG910-98	30	1,600	52	590	56	110	31	18	2487
20032	BE-EG970-99	9.4	780	13	260	45	90	19	19	1235
		TEQs pg/g								
19861	BE-EG906-98	0.48	30	23	110	1.8	26	10	0.42	202
19862	BE-EG910-98	0.30	16	5.2	59	0.56	11	3.1	0.18	95
20032	BE-EG970-99	0.09	7.8	1.3	26	0.45	9.0	1.9	0.19	47

Table 9. Eagle Egg TEQs (pg/g)

Sample ID		Non-*ortho* congeners 81	77	126	169	Sum nPCB
	Avian TEFs[1]	**0.1**	**0.05**	**0.1**	**0.001**	
		Concentrations pg/g				
19861	BE-EG906-98	4,700	11,000	7,300	460	23,460
19862	BE-EG910-98	2,400	8,200	3,600	190	14,390
20032	BE-EG970-99	390	3,200	2,200	270	6,060
		TEQs pg/g				
19861	BE-EG906-98	470	550	730	0.46	1750
19862	BE-EG910-98	240	410	360	0.19	1010
20032	BE-EG970-99	39	160	220	0.27	419

Table 9. Eagle Egg TEQs (pg/g)

Sample ID		Dioxins 2378-TCDD	12378-PCDD	123478-HxCDD	123678-HxCDD	123789-HxCDD	1234678-HpCDD	OCDD	Total Dioxins
	Avian TEFs[1]	**1**	**1**	**0.05**	**0.01**	**0.1**	**0.001**	**0.0001**	
		Concentrations pg/g							
19861	BE-EG906-98	24	15	2.2	15	0.1	9.1	250	315
19862	BE-EG910-98	13	5.6	1.6	8.7	1.1	2.0	16	48
20032	BE-EG970-99	8	7.7	1.7	11	1.0	1.7	17	48
		TEQs pg/g							
19861	BE-EG906-98	24	15	0.11	0.15	0.01	0.009	0.025	39
19862	BE-EG910-98	13	5.6	0.08	0.09	0.11	0.002	0.002	19
20032	BE-EG970-99	8	7.7	0.09	0.11	0.10	0.002	0.002	16

Table 9. Eagle Egg TEQs (pg/g)

Sample ID		Furans 2378-TCDF	12378-PCDF	23478-PCDF	123478-HxCDF	123678-HxCDF	123789-HxCDF	234678-HxCDF	1234678-HpCDF	1234789-HpCDF	OCDF	Total Furans
	Avian TEFs[1]	**1**	**0.1**	**1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.01**	**0.01**	**0.0001**	
		Concentrations pg/g										
19861	BE-EG906-98	6.2	1.1	31	1.6	1.6	0.1	1.5	2.7	1.0	34	81
19862	BE-EG910-98	6.2	1.0	15	1.3	1.3	0.1	1.8	1.9	1.2	34	64
20032	BE-EG970-99	7.2	2.9	11	1.0	1.8	0.1	2.9	4.0	1.3	30	62
		TEQs pg/g										
19861	BE-EG906-98	6.2	0.11	31	0.16	0.16	0.01	0.15	0.03	0.01	0.0034	38
19862	BE-EG910-98	6.2	0.10	15	0.13	0.13	0.01	0.18	0.02	0.01	0.0034	22
20032	BE-EG970-99	7.2	0.29	11	0.10	0.18	0.01	0.29	0.04	0.01	0.0030	19

Table 9. Eagle Egg TEQs (pg/g)

Sample ID			Total TEQs						
	Avian TEFs[1]								
19861	BE-EG906-98								
19862	BE-EG910-98								
20032	BE-EG970-99								
				pg/g	%	%	%	%	%
				rounded TEQs	frxn mPCB	frxn nPCB	frxn PCDD	frxn PCDF	frxn DF
19861	BE-EG906-98		2029	2000	9.9	86	1.9	1.9	3.8
19862	BE-EG910-98		1146	1100	8.3	88	1.6	1.9	3.5
20032	BE-EG970-99		501	500	9.3	84	3.2	3.8	7.0

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