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DETERMINATION OF ELEMENTS IN SAMPLES OF BLOOD AND VARIOUS TISSUE MATRICES FROM THE HUDSON RIVER, NY

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DETERMINATION OF ELEMENTS IN BLOOD AND VARIOUS TISSUE MATRICES FROM THE HUDSON RIVER, NY

SAMPLE HISTORY:

A shipment of 126 samples of various tissue matrices (Great Blue Heron, small mammal, tree swallow, Hooded Merganser, wood duck, bird livers, and fish) were received by the Inorganic Chemistry section of the Columbia and Environmental Research Center (CERC) on 2/3/99. The samples were collected from the Hudson River area by Anne Secord and Diane Mann-Klager of the U.S. Fish and Wildlife Service (USFWS) from June to August, 1998. This group was assigned a Batch # (517) and CERC ID #s (18747 - 18872). A second sample group was received on 5/25/99, consisting of 28 samples of bald eagle blood, egg, and prey. This group, collected from the Hudson River area between October 1997 and May 1999, was submitted by Peter Nye of the New York State Department of Environmental Conservation (NYSDEC), and assigned a Batch # (549) and CERC ID #s (19848 - 19875). A third group of 7 samples, consisting of eagle blood and egg, was received from Peter Nye on 6/22/99. These latter samples were collected from the Hudson River area during May and June of 1999 and assigned a Batch #558 and CERC ID #s 20026 - 20032. Regarding the blood matrix, samples consisted of whole blood, serum, and blood cells, with the whole blood separation into serum/cells conducted by NYSDEC personnel. These three groups of samples were part of an Interagency Agreement between the USFWS and USGS to assess the extent of chemical contamination of species along the Hudson River, NY. Only selected samples from the groups were analyzed for metals, and others for organic contaminants.

METHODS:

Non-Chemical Preparation:
Nestlings, nestling livers, adult birds, prey species, and voles were chopped and minced with a titanium knife (SOP P.238a). Wholebody fish were cut into smaller pieces with a Hobart band saw (SOP P.471). Eagle egg samples were placed in a glass crystallizing dish and homogenized with a high speed emulsifier (SOP P.211), whereas swallow eggs were stirred with a glass rod (SOP P.238b) while in a glass scintillation vial. Nestlings and voles were then ground using a custom-built miniature titanium grinder (SOP E.037), following which the ground product was placed in a glass crystallizing dish. Wholebody fish, following band-sawing, were ground with a Hobart meat grinder with the

product placed in a glass crystalling dish. Percent moisture was then determined on each wet homogenized sample during the lyophilization process, as described in standard operating procedure (SOP) P.259. Once lyophilized, each dried tissue, except fish, was transferred to a 40 mL glass vial (eggs remained in the scintillation vials) and further homogenized by crushing with a glass rod until a uniform material was produced (SOP P.238b). Fish tissue was ground with a Bamix® mixer and then transferred to the 40 mL glass vial.

Chemical Preparation:
To prepare digestates of dried tissues and egg samples (all matrices except blood) suitable for semi-quantitative scan by ICP-MS and Hg by cold vapor atomic absorption, a homogenized aliquant of each dried sample (~ 0.5 g) was heated either with HNO_3 and H_2O_2 in a sealed low-pressure Teflon vessel in a microwave oven as specified in SOP P.281, or with HNO_3 alone in a high pressure Teflon vessel as specified in SOP P.510. The cooled digestate liquid was transferred into a 125 mL polyethylene bottle with ultrapure H2O (> 10 megOhm/cm) to a final weight of 101.5 g (100 mL). Final acid matrix was either 5% or 4% HNO_3, depending upon the digestion SOP used. About 25 mL of diluted digestate was removed and placed in a glass tube to which 0.3 mL of HCl was added for preservation of Hg. An additional aliquant (~0.5 g) of fish, bird, and prey samples was subjected to a magnesium nitrate - nitric acid dry ashing procedure followed by HCl reduction (SOP P.256) to prepare digestates for the determination of As and Se. For egg, liver, and vole samples, 20 mL of microwave digestate (P.281 or P.510) was subjected to the dry ash procedure (P.256). The dry ashing procedure consisted of three steps: boiling with nitric acid for solubilization and partial oxidation, 500°C ashing with magnesium nitrate to complete the oxidation and decompose remaining organic matter, and heating with hydrochloric acid to dissolve the ash and reduce Se to the Se^{+4} oxidation state required for hydride generation. The reduction procedure does not affect As. Following reduction, digestates were diluted to ~100 mL with deionized water, yielding a final acid matrix of 10% HCL.

For blood serum, whole blood, and blood cell samples, an aliquot (~ 1 mL for serum and whole blood; ~1 g for cells) was subjected to the above described microwave digestion procedure for tissues (SOP P.281), except that the final dilution volume was 20 mL. A 5 mL portion of this digestate was then subjected to dry ashing (P.256) as described above for the determination of As and Se. However, the microwave digestates of whole blood and blood cell samples contained significant particulates, which could have caused autosampler clogging problems during ICP-MS analysis. Thus, the remainder of the digestate (15 mL) for whole blood and

blood cells was subjected to a second microwave procedure (P.510) to produce clear digestates for subsequent ICP-MS analysis. Any digestate not used for ICP-MS analysis was acidified with HCl (1% HCl final matrix) for the preservation and subsequent determination of Hg.

Instrumental Analysis:
Digestates were analyzed by inductively-coupled plasma-mass spectrometry (ICP-MS, SOP P.458) using the semi-quantitative scan mode (TotalQuant®). This scanning mode has a manufacturer's reported accuracy of ± 30% to ± 50%. All samples were diluted 10X by a CETAC ASD-500 autodiluter as part of the analytical sequence. Internal standards were Ge (50ppb), Rh (10ppb) and Th (10ppb), and the external standard consisted of a NIST traceable reference solution (Trace Metals in Drinking Water; High Purity Standards, Charleston, SC) to which 5 elements (Pr, Tb, Tm, Ta, and Au) were added for improved calibration in the rare earth region of the mass spectral range.

Mercury in digested samples was determined by flow injection cold vapor atomic absorption spectroscopy in accordance with SOP P.198. In this procedure, Hg vapor is produced by reacting the sample digestate with stannous chloride, with the vapor then being swept into a ~100°C quartz cell on an atomic absorption spectrometer for measurement.

The determination of As and Se in dry-ashed samples was accomplished by flow injection hydride generation atomic absorption spectroscopy (SOP P.207). In this procedure, the digestate is mixed with a hydrochloric acid carrier solution and then reduced by sodium tetrahydridoborate which has been stabilized with sodium hydroxide. The resulting volatile hydrogen selenide or arsenide is transferred with argon carrier gas into a heated quartz cell mounted on an atomic absorption spectrophotometer for decomposition and measurement.

Quality Control:
Samples were processed through the preparative and analytical flow scheme in numerous analytical blocks, each with an associated BID (block initiation date). Quality control included in each BID depended on the final instrumental approach. For semi-quantitative scan by ICP-MS, quality control included a continuing calibration blank, independent calibration verification standard, laboratory control samples, within run precision measurement, digested reference materials, replicate digestion and analysis, digestion spikes, analysis (post-digestion) spikes, interference check solution, and dilution percent difference. For qualitative analysis of samples for As, Se, and Hg, by flow injection atomic

absorption spectroscopy, quality control included those parameters as described for the semi-quantitative scan, with the exception of dilution percent difference and interference check solution. All quality control results were tabulated to provide an overview of quality assurance and to facilitate interpretation.

RESULTS AND DISCUSSION:

Concentrations of elements in blood serum, whole blood, and blood cells determined by ICP-MS semi-quantitative scan are presented in Table 1. There were a number of elements having significantly higher concentrations in whole blood as opposed to serum (Mg, Al, K, Ti, Mn Fe, Ga, Rb, Zr, Mo, Cd, W, Au, Hg, and Pb). Also, some of the toxicologically important trace elements (e.g., Hg and Se) were highest in blood cells, whereas others (e.g., Cd, Cu, Pb, Sn, and Zn) were noticeably higher in whole blood. Percent moisture and concentrations (ug/g dry weight) of elements in bird eggs and whole body fish are indicated in Table 2. Metals data among bird eggs were quite comparable, except for some isolated cases where some elemental concentrations were noticeably higher (e.g., Cd in #18758, Co and Cu in #18800, and Co in #18820). The same situation existed for wholebody fish samples, where data was quite comparable except for Ti in #18827 and #18831. One fish sample, #18829, contained quite lower concentrations of several elements (Mg, K, Ca, Ti, Mn, Rb, Sr, and Ba) when compared with the rest of the fish collection. Concentrations of elements found in bird livers, meadow voles, and mice are presented in Table 3. Elemental concentrations were similar between samples from each matrix, and the data were generally unremarkable. Concentrations of elements in swallow nestlings, duck and eagle eggs, and prey species (fish, bird, and eel) are presented in Table 4. Data are generally comparable among samples of swallow nestlings, and otherwise unremarkable. Elemental concentrations were generally similar among duck/eagle eggs, except for moderately elevated Cu in two egg samples (#19862 and #20032). Among prey samples, there were a few standout elemental concentrations, such as Sr in #19863 and #19874 fish), Ba in #19863 (fish), and Ni, Ba, Tb, Tm, and Pb in #19872 (eel).

QUALITY CONTROL:

Calibration:

Periodic runs of a laboratory control solution served to monitor calibration throughout the semi-quantitative scan for blood (Table 5), eggs and fish (Table 6), livers and voles (Table 7), and nestlings and prey (Table 8). In addition, a separate calibration solution was also analyzed at the beginning of each run, which

exibited recoveries ranging from 68% to 158% (Tables 9 and 10). For As, Se and Hg, a calibration check solution was analyzed at the beginning and end of the analytical runs (Table 11).

Control Materials:

Results from the analysis of control materials are indicated in Tables 12-16. For the set of blood samples, two reference tissues exhibited recoveries ranging from 76% to 116%, with the exception of Ni (Table 12). Two reference tissues were digested and analyzed with bird egg and fish samples (Table 13). Elemental recoveries ranged from 100% to 136% with the exception of Cr, which exhibited one very high result (500%). Two NIST 1577 livers and a dogfish muscle reference material were analyzed with bird livers and voles, which resulted in recoveries of 80% to 123% for all elements except for a very high Cr result in one of the livers (Table 14). Table 15 indicates results from a nitric acid digestion of two tissue reference materials: CERC striped bass and DORM-2 dogfish muscle. Recoveries were good (95% to 116%) for all elements except Al and Cr (high) and Cd (low). Table 16 contains recoveries of elements from various reference/research materials digested and analyzied in conjunction with the determination of As, Se, and Hg by quanititative flow injection atomic absorption spectroscopy. Se results were either within specified limits or within 10% of the upper limit, except for one NIST bovine liver material. Arsenic and Hg were within specified limits for most materials where the upper and lower limits were specified for the element and measured concentrations exceeded the method detection limits (Table 16).

Analytical and Method Precision:

Analytical precision for the semi-quantitative scan on digestates of blood and tissues was determined by repeated runs of a reference solution, which exhibited percent relative standard deviation (%RSD) values of < 11% (Tables 5-8). Instrumental precision for As,Se, and Hg, determined by repeated analysis of a standard throughout the run, was < 11% RSD (Table 17). Method precision for blood and tissues was determined by triplicate digestion and analysis of a sample or reference/research material (Tables 18-25). Percent RSD results were quite variable among elements for whole blood (0%RSD - 171%RSD), and may have been related to the difficulty of keeping blood components in suspension between cessation of manual stirring and commencement of pipetting. Thus, replicate aliquots could have contained disproportunate amounts of serum and cells (Table 18). The triplicate digestion and analysis of a dried blood reference material produced %RSDs ≤ 35% (Table 19). For this reason, our preferred method for analysis of blood for trace elements is to lyophilize the whole blood and conduct a dry weight determination. Percent RSDs for the replicate digestion and analysis of a bird

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egg and fish sample were ≤ 49% (Table 20 and 21), and ≤ 43% for bird liver and vole samples (Tables 22 and 23). Triplicate digestion and analysis of an eagle egg sample exhibited %RSDs ≤ 50% except for Al (Table 24). Percent RSDs from a fish prey sample (Table 25) were more varible for most elements, ranging from 6% to 85%. Replicate digestion and analysis of samples for As, Se, and Hg determination produced %RSDs ≤ 43, disregarding those samples having concentrations below the method detection limit (MDL) for As and Hg (Table 26). Blood was the most variable sample matrix. Duplicate digestion and analysis of tissue samples yielded relative percent differences (RPD) < 20% for elements with measurable values (above MDL) (Table 27).

Spikes:

Recoveries of elements spiked into blanks and tissue samples prepared for the semi-quantitative scan are presented in Tables 28-31. Spikes prepared with blood samples (Table 28) had elemental recoveries ranging from 73% to 133%, except for Ca (56%), Fe (60%), and Al (165%). Average recovery was 107%. Spikes of bird egg and fish samples had elemental recoveries ranging from 90% to 155% and averaging 120% (Table 29). Recoveries of Ba and Zn were higher than normal for two of the spikes in this set. Elements spiked into liver and vole samples (Table 30) had recoveries ranging from 81% to 147% and averaged 106%. Spikes of a blank and bird egg sample had elemental recoveries ranging from 66% to 135% and averaged 102% (Table 31). Samples of all matrices spiked with As, Se, and Hg exhibited recoveries ranging from 63% to 115% and averaging 99%, with the exception of As spikes of blood samples (Table 32). Blood samples spiked with As exhibited poor recoveries due to a technical error of spiking the same samples with too high levels of Se. Selenium behaves as a chemical interferent for As during the hydride generation chemistry, thus precluding quantitative As spike recovery. Recoveries of As, Se, and Hg in analysis (post-digestion) spikes ranged from 94% to 113% and averaged 102% (Table 33).

Blank Equivalent Concentrations:

Blank equivalent concentrations (BEC) were computed for digestion blanks analyzed with each set of blood and tissue samples (Tables 34-37). For most elements, BECs were generally below the arbitrarily set limits of measurement of the semi-quantitative scan ("less than" values). Mean BECs for As, Se, and Hg are indicated in Table 38. One Hg BEC was above the method detection limit (MDL), but all other BECS were below their respective MDLs.

Instrument Detection Limits, Method Detection Limits, and Limits of Quantitation:

Instrument detection limits for As, Se, and Hg determined by ICP-MS quantitative analysis are indicated in Table 39. Method detection limits, and limits of quantitation are indicated in

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Table 40 for each analyte determined by ICP-MS quantitative analysis.

Overall, quality control results were acceptable for all analytes except Cr. Otherwise, the quality control results were considered to be acceptable based on specifications established by CERC. Erratic results for Cr probably resulted from a combination of laboratory contamination and isobaric interferences for ICP-MS analysis. In general, the determination of Cr at trace and ultra-trace levels cannot usually be conducted accurately by routine methods.

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Table 1. Concentrations[a] of elements in eagle blood products determined by semi-quantitative scan.

Element	BE-A-BL904-98 serum CERC# 19848	BE-A-BL949-98 serum CERC# 19849	BE-IM-BL935-98 serum CERC# 19850	BE-A-BL913-98 serum CERC# 19851	BE-A-BL956-98 serum CERC# 19852	BE-IM-BL914-98 serum CERC# 19853	BE-BL921-98 serum CERC# 19854	BE-A-BL898-97 serum CERC# 19855
Li	4	< 1	2	2	4	2	2	2
Be	2	< 1	< 1	2	< 1	< 1	2	< 1
Na	3000	4000	4000	4000	4000	4000	4000	3000
Mg	20	30	30	20	40	20	20	20
Al	40	100	30	40	300	100	50	80
K	50	50	10	30	60	50	60	80
Ca	90	100	100	100	100	100	100	90
Ti	20	< 0.1	< 0.1	100	10	< 0.1	20	< 0.1
V	5	7	8	20	10	8	10	9
Cr	100	200	200	200	200	200	200	200
Mn	20	4	2	4	6	4	2	2
Fe	3000	1000	4000	2000	5000	5000	4000	3000
Co	< 0.1	< 0.1	< 0.1	2	2	< 0.1	< 0.1	2
Ni	5	2	4	2	6	4	< 1	4
Cu	200	300	400	400	500	300	500	400
Zn	2000	3000	4000	3000	3000	4000	3000	2000
Ga	2	2	< 0.1	< 0.1	2	2	2	< 0.1
Ge	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
As[b]	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14
Se[b]	0.23	0.31	0.42	0.35	0.47	0.48	0.46	0.33
Rb	60	100	8	30	90	70	40	200
Sr	40	50	70	50	70	60	40	90
Y	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Zr	4	4	2	2	4	2	2	4
Nb	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Mo	4	2	2	2	20	4	4	5
Ru	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Pd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ag	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cd	2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
In	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Sn	7	20	6	6	8	6	8	10

[a]ug/L for serum and whole blood for all elements except Na,Mg,Ca, and K, which are mg/L; units are ug/g wet weight for all elements for blood cells.

[b]As and Se determined by flow injection hydride generation atomic absorption spectrometry.

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Table 1. Concentrations[a] of elements in eagle blood products determined by semi-quantitative scan....(cont'd)..

Element	BE-A-BL968-99 serum CERC# 19856	BE-NE-BL950-98 serum CERC# 19857	BE-NE-BL911A-98 serum CERC# 19858	BE-NE-BL911B-98 serum CERC# 19859	BE-NE-BL911C-98 serum CERC# 19860	BE-IM-BL976-99 serum CERC# 20026	BE-NE-BL972a-99 whole blood CERC# 20027	BE-NE-BL972b-99 whole blood CERC# 20028
Li	< 1	< 1	2	2	< 1	2	5	2
Be	< 1	< 1	< 1	< 1	2	< 1	< 1	< 1
Na	4000	4000	4000	3000	2000	4000	2000	3000
Mg	30	30	30	20	20	30	50	90
Al	600	60	40	40	200	50	600	1000
K	60	80	70	60	50	200	900	1000
Ca	100	100	100	100	100	100	50	70
Ti	8	4	2	90	< 0.1	4	300	800
V	10	10	9	10	9	8	7	20
Cr	200	200	200	100	100	200	200	300
Mn	4	8	4	4	20	6	30	60
Fe	7000	3000	4000	3000	4000	18000	155000	275000
Co	2	< 0.1	< 0.1	< 0.1	2	2	2	2
Ni	6	30	40	< 1	2	70	20	30
Cu	400	800	600	300	200	500	300	500
Zn	4000	4000	3000	2000	2000	4000	4000	7000
Ga	2	2	2	< 0.1	< 0.1	2	2	10
Ge	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
As[b]	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14
Se[b]	0.39	0.84	0.69	0.36	0.31	0.50	0.67	0.66
Rb	80	100	70	50	40	100	1000	2000
Sr	40	200	200	200	200	70	70	90
Y	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Zr	2	2	4	2	2	2	9	20
Nb	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Mo	2	2	2	2	< 0.1	2	10	20
Ru	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Pd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ag	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	20	20
Cd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	5	2
In	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Sn	10	10	6	4	20	6	20	30

[a]ug/L for serum and whole blood for all elements except Na,Mg,Ca, and K, which are mg/L; units are ug/g wet weight for all elements for blood cells.

[b]As and Se determined by flow injection hydride generation atomic absorption spectrometry.

Table 1. Concentrations[a] of elements in eagle blood products determined by semi-quantitative scan....(cont'd)..

Element	BE-NE-BL971-99 whole blood CERC# 20029	BE-NE-BL974-99 whole blood CERC# 20030	BE-IM-BL981-99 whole blood CERC# 20031	BE-A-BL904-98 blood cells CERC# 19848	BE-A-BL949-98 blood cells CERC# 19849	BE-IM-BL935-98 blood cells CERC# 19850	BE-A-BL913-98 blood cells CERC# 19851	BE-A-BL956-98 blood cells CERC# 19852
Li	< 1	5	2	< 1	< 1	< 1	< 1	< 1
Be	< 1	2	< 1	< 1	< 1	< 1	< 1	< 1
Na	3000	2000	3000	900	700	1000	800	900
Mg	90	50	90	200	200	100	100	200
Al	2000	3000	600	9	4	3	0.5	5
K	1000	900	2000	4000	4000	3000	3000	4000
Ca	60	60	70	60	90	40	20	50
Ti	800	200	400	0.8	1	0.3	0.3	0.6
V	20	5	5	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cr	800	200	300	< 1	< 1	< 1	< 1	< 1
Mn	50	30	30	0.1	0.1	< 0.1	< 0.1	< 0.1
Fe	284000	167000	318000	700	800	600	500	900
Co	4	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ni	50	2	20	< 1	< 1	< 1	< 1	< 1
Cu	700	400	600	< 1	< 1	< 1	< 1	< 1
Zn	6000	6000	7000	10	10	7	8	10
Ga	7	7	10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ge	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
As[b]	< 0.14	0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14
Se[b]	0.65	0.53	0.63	2.22	1.10	1.76	1.64	1.90
Rb	2000	1000	1000	5	10	2	2	8
Sr	100	80	40	< 1	< 1	< 1	< 1	< 1
Y	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Zr	40	10	10	< 1	< 1	< 1	< 1	< 1
Nb	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Mo	20	2	10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ru	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Pd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ag	20	< 0.1	2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cd	4	5	2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
In	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Sn	70	20	20	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

[a]ug/L for serum and whole blood for all elements except Na,Mg,Ca, and K, which are mg/L; units are ug/g wet weight for all elements for blood cells.

[b]As and Se determined by flow injection hydride generation atomic absorption spectrometry.

Table 1. Concentrations[a] of elements in eagle blood products determined by semi-quantitative scan....(cont'd)..

Element	BE-A-BL898-97 blood cells CERC# 19855	BE-A-BL968-99 blood cells CERC# 19856	BE-IM-BL976-99 blood cells CERC# 20026
Li	< 1	< 1	< 1
Be	< 1	< 1	< 1
Na	1000	1000	900
Mg	200	200	200
Al	2	5	5
K	5000	4000	4000
Ca	20	50	40
Ti	0.6	0.4	0.5
V	< 0.1	< 0.1	< 0.1
Cr	< 1	< 1	< 1
Mn	< 0.1	< 0.1	< 0.1
Fe	800	800	700
Co	< 0.1	< 0.1	< 0.1
Ni	< 1	< 1	< 1
Cu	< 1	< 1	< 1
Zn	40	10	9
Ga	< 0.1	< 0.1	< 0.1
Ge	< 0.1	< 0.1	< 0.1
As[b]	< 0.14	0.18	0.20
Se[b]	1.61	2.44	1.94
Rb	10	6	3
Sr	< 1	< 1	< 1
Y	< 1	< 1	< 1
Zr	< 1	< 1	< 1
Nb	< 1	< 1	< 1
Mo	< 0.1	< 0.1	< 0.1
Ru	< 1	< 1	< 1
Pd	< 0.1	< 0.1	< 0.1
Ag	< 0.1	< 0.1	< 0.1
Cd	< 0.1	< 0.1	< 0.1
In	< 1	< 1	< 1
Sn	< 0.1	< 0.1	< 0.1

[a]ug/L for serum and whole blood for all elements except Na,Mg,Ca, and K, which are mg/L; units are ug/g wet weight for all elements for blood cells.

[b]As and Se determined by flow injection hydride generation atomic absorption spectrometry.

Table 1. Concentrations[a] of elements in eagle blood products determined by semi-quantitative scan....(cont'd)..

Element	BE-A-BL904-98 serum CERC# 19848	BE-A-BL949-98 serum CERC# 19849	BE-IM-BL935-98 serum CERC# 19850	BE-A-BL913-98 serum CERC# 19851	BE-A-BL956-98 serum CERC# 19852	BE-IM-BL914-98 serum CERC# 19853	BE-BL921-98 serum CERC# 19854	BE-A-BL898-97 serum CERC# 19855
Sb	< 0.1	< 0.1	< 0.1	< 0.1	2	< 0.1	< 0.1	< 0.1
Te	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	2	< 0.1
Cs	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Ba	80	80	100	100	200	200	100	60
La	< 0.1	< 0.1	< 0.1	< 0.1	2	< 0.1	< 0.1	< 0.1
Ce	2	< 0.1	2	2	6	2	< 0.1	< 0.1
Pr	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Eu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Gd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dy	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ho	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Er	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Yb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Lu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hf	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ta	2	4	2	4	20	10	8	4
W	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	4	5
Re	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Os	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ir	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pt	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	2
Au	10	10	8	10	20	10	10	5
Tl	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hg[b]	0.03	0.13	0.03	0.03	0.12	0.08	0.02	0.15
Pb	4	4	2	4	4	20	4	4
Bi	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
U	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

[a]ug/L for serum and whole blood for all elements except Na,Mg,Ca, and K, which are mg/L; units are ug/g wet weight for all elements for blood cells.

[b]Hg determined by flow injection cold vapor atomic absorption spectrometry.

Table 1. Concentrations[a] of elements in eagle blood products determined by semi-quantitative scan....(cont'd)..

Element	BE-A-BL968-99 serum CERC# 19856	BE-NE-BL950-98 serum CERC# 19857	BE-NE-BL911A-98 serum CERC# 19858	BE-NE-BL911B-98 serum CERC# 19859	BE-NE-BL911C-98 serum CERC# 19860	BE-IM-BL976-99 serum CERC# 20026	BE-NE-BL972a-99 whole blood CERC# 20027	BE-NE-BL972b-99 whole blood CERC# 20028
Sb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	2	2
Te	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cs	< 1	< 1	< 1	< 1	< 1	< 1	2	5
Ba	200	80	90	80	70	90	30	300
La	2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ce	4	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pr	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Eu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Gd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dy	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ho	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Er	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Yb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Lu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hf	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ta	4	4	4	2	2	2	10	10
W	< 0.1	< 0.1	< 0.1	< 0.1	9	< 0.1	20	30
Re	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Os	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ir	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pt	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Au	6	6	7	4	4	6	30	90
Tl	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hg[b]	0.08	0.02	0.02	0.01	0.01	0.03	0.17	0.19
Pb	2	2	2	2	8	4	30	70
Bi	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
U	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

[a]ug/L for serum and whole blood for all elements except Na,Mg,Ca, and K, which are mg/L; units are ug/g wet weight for all elements for blood cells.

[b]Hg determined by flow injection cold vapor atomic absorption spectrometry.

Table 1. Concentrations[a] of elements in eagle blood products determined by semi-quantitative scan....(cont'd)..

Element	BE-NE-BL971-99 whole blood CERC# 20029	BE-NE-BL974-99 whole blood CERC# 20030	BE-IM-BL981-99 whole blood CERC# 20031	BE-A-BL904-98 blood cells CERC# 19848	BE-A-BL949-98 blood cells CERC# 19849	BE-IM-BL935-98 blood cells CERC# 19850	BE-A-BL913-98 blood cells CERC# 19851	BE-A-BL956-98 blood cells CERC# 19852
Sb	4	2	2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Te	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cs	4	2	5	< 1	< 1	< 1	< 1	< 1
Ba	80	100	100	< 1	< 1	< 1	< 1	< 1
La	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ce	< 0.1	< 0.1	2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pr	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Eu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Gd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dy	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ho	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Er	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Yb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Lu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hf	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ta	10	2	2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
W	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Re	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Os	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ir	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pt	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Au	10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tl	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hg[b]	0.14	0.23	0.62	3.6	11.7	2.3	2.4	6.1
Pb	70	10	40	< 1	< 1	< 1	< 1	< 1
Bi	< 1	5	< 1	< 1	< 1	< 1	< 1	< 1
U	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

[a]ug/L for serum and whole blood for all elements except Na,Mg,Ca, and K, which are mg/L; units are ug/g wet weight for all elements for blood cells.

[b]Hg determined by flow injection cold vapor atomic absorption spectrometry.

Table 1. Concentrations[a] of elements in eagle blood products determined by semi-quantitative scan....(cont'd)..

Element	BE-A-BL898-97 blood cells CERC# 19855	BE-A-BL968-99 blood cells CERC# 19856	BE-IM-BL976-99 blood cells CERC# 20026
Sb	< 0.1	< 0.1	< 0.1
Te	< 0.1	< 0.1	< 0.1
Cs	< 1	< 1	< 1
Ba	< 1	< 1	< 1
La	< 0.1	< 0.1	< 0.1
Ce	0.2	< 0.1	< 0.1
Pr	< 0.1	< 0.1	< 0.1
Nd	< 0.1	< 0.1	< 0.1
Sm	< 0.1	< 0.1	< 0.1
Eu	< 0.1	< 0.1	< 0.1
Gd	< 0.1	< 0.1	< 0.1
Tb	< 0.1	< 0.1	< 0.1
Dy	< 0.1	< 0.1	< 0.1
Ho	< 0.1	< 0.1	< 0.1
Er	< 0.1	< 0.1	< 0.1
Tm	< 0.1	< 0.1	< 0.1
Yb	< 0.1	< 0.1	< 0.1
Lu	< 0.1	< 0.1	< 0.1
Hf	< 0.1	< 0.1	< 0.1
Ta	< 0.1	< 0.1	< 0.1
W	< 0.1	< 0.1	< 0.1
Re	< 0.1	< 0.1	< 0.1
Os	< 0.1	< 0.1	< 0.1
Ir	< 0.1	< 0.1	< 0.1
Pt	< 0.1	< 0.1	< 0.1
Au	< 0.1	< 0.1	< 0.1
Tl	< 0.1	< 0.1	< 0.1
Hg[b]	22.	5.8	0.95
Pb	< 1	< 1	< 1
Bi	< 1	< 1	< 1
U	< 1	< 1	< 1

[a]ug/L for serum and whole blood for all elements except Na,Mg,Ca, and K, which are mg/L; units are ug/g wet weight for all elements for blood cells.

[b]Hg determined by flow injection cold vapor atomic absorption spectrometry.

Table 2. Concentrations[a] of elements in bird egg and fish samples determined by semi-quantitative scan.

Element	TSE216-98 REMN bird egg CERC# 18747	TSE217-98 REMN bird egg CERC# 18748	TSE224-98 REMN bird egg CERC# 18749	TSE306-98 SA13 bird egg CERC# 18750	TSE310-98 SA13 bird egg CERC# 18751	TSE3B-98 SA13 bird egg CERC# 18752	TSE412-98 SARA bird egg CERC# 18753
% Moist	80	84	81	81	78	82	79
Li	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Be	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Na	8000	10000	9000	8000	7000	9000	8000
Mg	500	500	400	500	500	400	500
Al	< 0.1	< 0.1	< 0.1	< 0.1	1	< 0.1	0.4
K	7000	8000	8000	8000	7000	8000	6000
Ca	3000	3000	3000	3000	4000	4000	4000
Ti	2	2	2	3	4	2	4
V	< 0.1	0.1	0.5	0.4	0.4	0.8	0.4
Cr	3	3	3	3	4	4	3
Mn	4	6	4	4	7	3	7
Fe	70	100	100	70	100	70	100
Co	< 0.1	< 0.1	0.1	0.1	0.2	0.1	0.2
Ni	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cu	3	3	3	4	4	3	3
Zn	90	70	80	90	100	80	100
Ga	< 0.1	< 0.1	0.1	0.1	0.1	< 0.1	< 0.1
Ge	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
As[b]	< 0.23	0.46	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23
Se[b]	2.44	2.65	3.08	2.90	2.43	2.49	2.12
Rb	5	7	5	4	4	5	3
Sr	6	5	7	6	7	6	5
Y	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Zr	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Nb	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Mo	0.2	0.1	0.1	0.1	0.1	< 0.1	0.3
Ru	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Pd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ag	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
In	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Sn	< 0.1	< 0.1	< 0.1	0.3	0.3	< 0.1	0.2

[a]Concentration units ug/g dry weight for all elements.

[b]As and Se determined by flow injection hydride generation atomic absorption spectrometry.

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Table 2. Concentrations[a] of elements in bird egg and fish samples determined by semi-quantitative scan..(cont'd)..

Element	TSE415-98 SARA bird egg CERC# 18754	TSE421-98 SARA bird egg CERC# 18755	TSE913-98 CHEL bird egg CERC# 18756	TSE914-98 CHEL bird egg CERC# 18757	TSE907-98 CHEL bird egg CERC# 18758	GBHE401-98 SARA bird egg CERC# 18800	WDE401-98 GRIF bird egg CERC# 18820
% Moist	79	82	77	82	82	82	69
Li	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Be	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Na	8000	9000	7000	9000	10000	11000	5000
Mg	500	400	400	400	400	700	500
Al	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	20	< 0.1
K	7000	9000	7000	8000	9000	7000	5000
Ca	4000	4000	3000	3000	4000	3000	2000
Ti	4	2	4	0.5	2	2	2
V	0.2	0.3	0.2	0.8	0.9	0.2	0.2
Cr	3	3	3	4	4	3	3
Mn	4	3	6	5	6	2	1
Fe	100	80	100	80	100	90	80
Co	0.2	0.1	0.1	< 0.1	< 0.1	50	6
Ni	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cu	3	3	3	3	4	20	7
Zn	100	80	100	80	90	60	70
Ga	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ge	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
As[b]	< 0.23	< 0.23	< 0.23	0.51	0.32	< 0.23	< 0.23
Se[b]	2.65	1.94	3.08	2.43	2.28	1.75	1.27
Rb	4	5	5	6	5	4	7
Sr	5	6	7	7	7	4	9
Y	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Zr	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Nb	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Mo	0.1	0.1	0.1	0.1	< 0.1	0.8	0.1
Ru	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Pd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ag	< 0.1	< 0.1	< 0.1	< 0.1	0.4	< 0.1	< 0.1
Cd	< 0.1	< 0.1	< 0.1	< 0.1	9	1	2
In	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Sn	0.2	< 0.1	< 0.1	< 0.1	0.2	0.6	0.2

[a]Concentration units ug/g dry weight for all elements.

[b]As and Se determined by flow injection hydride generation atomic absorption spectrometry.

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Table 2. Concentrations[a] of elements in bird egg and fish samples determined by semi-quantitative scan..(cont'd)..

Element	BBSH-98 SCHU fish CERC# 18821	SHSH-98 SCHU fish CERC# 18822	SHTC-98 COVE fish CERC# 18823	SBTC-98 COVE fish CERC# 18824	CCTC-98 COVE fish CERC# 18825	SBSA-98 SARA fish CERC# 18826	SHSA-98 SARA fish CERC# 18827	BBSA-98 SARA fish CERC# 18828
% Moist	77	76	77	74	78	74	77	73
Li	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Be	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Na	4000	2000	3000	5000	5000	5000	3000	5000
Mg	2000	2000	2000	2000	2000	2000	2000	2000
Al	40	30	70	20	100	10	200	50
K	11000	11000	11000	12000	13000	10000	11000	11000
Ca	41000	33000	41000	60000	40000	64000	30000	33000
Ti	9	90	30	10	7	8	100	8
V	0.4	0.2	0.3	0.2	0.8	0.3	0.4	0.5
Cr	3	4	3	2	3	2	4	3
Mn	30	20	30	10	40	20	30	30
Fe	200	80	100	60	300	70	300	200
Co	0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	0.2	0.1
Ni	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cu	5	2	2	2	9	2	3	4
Zn	80	200	200	90	400	90	200	70
Ga	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.2
Ge	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
As[b]	0.26	0.34	< 0.23	0.36	0.32	< 0.23	0.27	< 0.23
Se[b]	1.13	1.45	1.81	1.11	1.36	1.11	1.75	1.42
Rb	20	20	10	20	10	10	20	20
Sr	70	50	60	70	60	100	50	50
Y	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Zr	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Nb	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Mo	< 0.1	0.1	< 0.1	< 0.1	0.1	< 0.1	0.2	< 0.1
Ru	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Pd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ag	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cd	0.3	0.1	0.1	< 0.1	0.1	< 0.1	0.3	0.1
In	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Sn	7	0.1	0.1	30	30	10	0.2	10

[a]Concentration units ug/g dry weight for all elements.

[b]As and Se determined by flow injection hydride generation atomic absorption spectrometry.

304910

Table 2. Concentrations[a] of elements in bird egg and fish samples determined by semi-quantitative scan..(cont'd).

Element	AESA-98 SARA fish CERC# 18829	BBL3-98 LOCK3 fish CERC# 18830	SHL3-98 LOCK3 fish CERC# 18831	SBL3-98 LOCK3 fish CERC# 18832
% Moist	64	77	73	74
Li	< 1	< 1	< 1	< 1
Be	< 1	< 1	< 1	< 1
Na	3000	5000	3000	5000
Mg	800	2000	2000	2000
Al	10	4	20	6
K	8000	13000	11000	13000
Ca	8000	34000	35000	48000
Ti	3	7	300	8
V	0.1	0.4	0.2	0.1
Cr	3	3	2	2
Mn	9	30	20	20
Fe	100	200	70	80
Co	< 0.1	0.1	< 0.1	< 0.1
Ni	< 1	< 1	< 1	< 1
Cu	2	3	3	2
Zn	100	70	200	70
Ga	< 0.1	0.3	0.2	0.2
Ge	< 0.1	< 0.1	< 0.1	< 0.1
As[b]	< 0.23	< 0.23	< 0.23	< 0.23
Se[b]	1.59	1.95	1.01	1.88
Rb	6	10	10	10
Sr	7	40	40	40
Y	< 1	< 1	< 1	< 1
Zr	< 1	< 1	< 1	< 1
Nb	< 1	< 1	< 1	< 1
Mo	< 0.1	< 0.1	0.1	< 0.1
Ru	< 1	< 1	< 1	< 1
Pd	< 0.1	< 0.1	< 0.1	< 0.1
Ag	< 0.1	< 0.1	< 0.1	< 0.1
Cd	0.2	< 0.1	0.5	< 0.1
In	< 1	< 1	< 1	< 1
Sn	7	5	< 0.1	10

[a]Concentration units ug/g dry weight for all elements.

[b]As and Se determined by flow injection hydride generation atomic absorption spectrometry.

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Table 2. Concentrations[a] of elements in bird egg and fish samples determined by semi-quantitative scan..(cont'd)..

Element	TSE216-98 REMN bird egg CERC# 18747	TSE217-98 REMN bird egg CERC# 18748	TSE224-98 REMN bird egg CERC# 18749	TSE306-98 SA13 bird egg CERC# 18750	TSE310-98 SA13 bird egg CERC# 18751	TSE3B-98 SA13 bird egg CERC# 18752	TSE412-98 SARA bird egg CERC# 18753
Sb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Te	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cs	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Ba	2	2	2	2	3	1	3
La	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ce	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pr	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Eu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Gd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dy	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ho	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Er	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Yb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Lu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hf	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ta	0.3	0.2	0.2	0.1	< 0.1	< 0.1	0.7
W	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Re	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Os	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ir	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pt	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Au	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.4
Tl	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hg[b]	0.37	0.63	0.58	0.32	0.32	0.52	0.22
Pb	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bi	< 1	< 1	< 1	< 1	< 1	< 1	< 1
U	< 1	< 1	< 1	< 1	< 1	< 1	< 1

[a]Concentration units ug/g dry weight for all elements.

[b]Hg determined by flow injection cold vapor atomic absorption spectrometry.

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Table 2. Concentrations[a] of elements in bird egg and fish samples determined by semi-quantitative scan..(cont'd)..

Element	TSE415-98 SARA bird egg CERC# 18754	TSE421-98 SARA bird egg CERC# 18755	TSE913-98 CHEL bird egg CERC# 18756	TSE914-98 CHEL bird egg CERC# 18757	TSE907-98 CHEL bird egg CERC# 18758	GBHE401-98 SARA bird egg CERC# 18800	WDE401-98 GRIF bird egg CERC# 18820
Sb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Te	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cs	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Ba	2	3	4	2	2	< 1	9
La	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ce	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pr	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Eu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Gd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dy	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ho	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Er	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Yb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Lu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hf	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ta	0.2	0.2	< 0.1	0.1	0.1	< 0.1	< 0.1
W	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	1	0.2
Re	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Os	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ir	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pt	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Au	0.2	0.1	< 0.1	0.1	0.1	< 0.1	< 0.1
Tl	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hg[b]	0.39	0.49	0.35	0.66	0.25	0.99	0.23
Pb	< 1	< 1	< 1	< 1	8	1	2
Bi	< 1	< 1	< 1	< 1	< 1	< 1	< 1
U	< 1	< 1	< 1	< 1	< 1	< 1	< 1

[a]Concentration units ug/g dry weight for all elements.

[b]Hg determined by flow injection cold vapor atomic absorption spectrometry.

Table 2. Concentrations[a] of elements in bird egg and fish samples determined by semi-quantitative scan..(cont'd)..

Element	BBSH-98 SCHU fish CERC# 18821	SHSH-98 SCHU fish CERC# 18822	SHTC-98 COVE fish CERC# 18823	SBTC-98 COVE fish CERC# 18824	CCTC-98 COVE fish CERC# 18825	SBSA-98 SARA fish CERC# 18826	SHSA-98 SARA fish CERC# 18827	BBSA-98 SARA fish CERC# 18828
Sb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Te	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cs	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Ba	9	10	10	3	9	4	10	6
La	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.2	< 0.1
Ce	< 0.1	< 0.1	0.1	< 0.1	0.2	< 0.1	0.3	< 0.1
Pr	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nd	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.2	< 0.1
Sm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Eu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Gd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dy	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ho	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Er	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Yb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Lu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hf	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ta	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
W	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Re	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Os	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ir	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pt	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Au	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tl	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hg[b]	0.49	0.29	0.36	0.75	0.43	1.20	0.27	0.30
Pb	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bi	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
U	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

[a]Concentration units ug/g dry weight for all elements.

[b]Hg determined by flow injection cold vapor atomic absorption spectrometry.

Table 2. Concentrations[a] of elements in bird egg and fish samples determined by semi-quantitative scan..(cont'd).

Element	AESA-98 SARA fish CERC# 18829	BBL3-98 LOCK3 fish CERC# 18830	SHL3-98 LOCK3 fish CERC# 18831	SBL3-98 LOCK3 fish CERC# 18832
Sb	< 0.1	< 0.1	< 0.1	< 0.1
Te	< 0.1	< 0.1	< 0.1	< 0.1
Cs	< 1	< 1	< 1	< 1
Ba	< 1	4	7	2
La	< 0.1	< 0.1	< 0.1	< 0.1
Ce	< 0.1	< 0.1	< 0.1	< 0.1
Pr	< 0.1	< 0.1	< 0.1	< 0.1
Nd	< 0.1	< 0.1	< 0.1	< 0.1
Sm	< 0.1	< 0.1	< 0.1	< 0.1
Eu	< 0.1	< 0.1	< 0.1	< 0.1
Gd	< 0.1	< 0.1	< 0.1	< 0.1
Tb	< 0.1	< 0.1	< 0.1	< 0.1
Dy	< 0.1	< 0.1	< 0.1	< 0.1
Ho	< 0.1	< 0.1	< 0.1	< 0.1
Er	< 0.1	< 0.1	< 0.1	< 0.1
Tm	< 0.1	< 0.1	< 0.1	< 0.1
Yb	< 0.1	< 0.1	< 0.1	< 0.1
Lu	< 0.1	< 0.1	< 0.1	< 0.1
Hf	< 0.1	< 0.1	< 0.1	< 0.1
Ta	< 0.1	< 0.1	< 0.1	< 0.1
W	< 0.1	< 0.1	< 0.1	< 0.1
Re	< 0.1	< 0.1	< 0.1	< 0.1
Os	< 0.1	< 0.1	< 0.1	< 0.1
Ir	< 0.1	< 0.1	< 0.1	< 0.1
Pt	< 0.1	< 0.1	< 0.1	< 0.1
Au	< 0.1	< 0.1	< 0.1	< 0.1
Tl	< 0.1	< 0.1	< 0.1	< 0.1
Hg[b]	0.32	0.55	0.24	0.59
Pb	< 1	< 1	< 1	< 1
Bi	< 1	< 1	< 1	< 1
U	< 1	< 1	< 1	< 1

[a]Concentration units ug/g dry weight for all elements.

[b]Hg determined by flow injection cold vapor atomic absorption spectrometry.

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Table 3. Concentrations[a] of elements in liver, vole, and mouse samples determined by semi-quantitative scan.

Element	GBHC401L-98 bird liver CERC# 18802	GBHC602L-98 bird liver CERC# 18809	GBHC603L-98 bird liver CERC# 18810	GBHC604L-98 bird liver CERC# 18811	GBHC605L-98 bird liver CERC# 18812	GBHC606L-98 bird liver CERC# 18813	MV401-98 meadow vole CERC# 18833	MV402-98 meadow vole CERC# 18834	MV403-98 meadow vole CERC# 18835
% Moist	74	73	70	73	76	73	74	74	72
Li	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Be	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Na	7000	5000	4000	4000	6000	5000	6000	5000	4000
Mg	700	700	700	800	700	700	2000	2000	2000
Al	4	10	3	3	4	2	40	60	20
K	8000	6000	7000	8000	9000	8000	10000	10000	9000
Ca	300	1000	500	600	500	500	35000	28000	38000
Ti	50	80	40	50	300	100	60	100	20
V	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cr	3	1	1	3	1	1	2	1	1
Mn	10	9	8	10	10	10	9	10	6
Fe	1000	200	200	300	300	300	200	200	200
Co	0.2	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.2	0.2	0.1
Ni	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cu	50	20	30	60	20	20	10	10	8
Zn	300	200	200	200	200	90	100	100	100
Ga	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.3	0.2	0.3
Ge	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
As[b]	< 0.39	< 0.39	< 0.39	< 0.39	< 0.39	< 0.39	< 0.39	< 0.39	< 0.39
Se[b]	5.87	4.18	3.31	5.33	6.73	4.05	0.71	0.63	0.43
Rb	8	6	5	7	6	6	20	20	20
Sr	< 1	3	< 1	< 1	< 1	< 1	30	30	40
Y	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Zr	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Nb	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Mo	3	0.6	0.8	1	2	1	0.4	0.5	0.4
Ru	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Pd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ag	0.4	0.2	0.2	0.5	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cd	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.5	0.3	0.2
In	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Sn	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

[a]Concentration units ug/g dry weight for all elements.

[b]As and Se determined by flow injection hydride generation atomic absorption spectrometry.

Table 3. Concentrations[a] of elements in liver, vole, and mouse samples determined by semi-quantitative scan...(cont'd)..

Element	MV404-98 meadow vole CERC# 18836	MV405-98 meadow vole CERC# 18837	MV301-98 meadow vole CERC# 18838	MV302-98 meadow vole CERC# 18839	MV303-98 meadow vole CERC# 18840	MV304-98 vole meadow vole CERC# 18841	MV305-98 vole meadow mouse CERC# 18842
% Moist	75	75	76	74	76	74	73
Li	< 1	< 1	< 1	1	< 1	< 1	< 1
Be	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Na	5000	5000	5000	5000	5000	4000	4000
Mg	2000	2000	2000	2000	2000	2000	1000
Al	200	40	300	1000	100	500	100
K	10000	13000	10000	10000	10000	10000	9000
Ca	31000	27000	53000	43000	28000	22000	27000
Ti	10	80	100	50	70	50	70
V	0.4	< 0.1	0.5	3	0.2	0.9	0.2
Cr	2	3	2	3	2	3	2
Mn	50	20	20	40	10	20	10
Fe	300	200	400	800	200	500	300
Co	0.3	0.3	0.4	1	0.3	0.5	< 0.1
Ni	< 1	< 1	< 1	1	< 1	< 1	< 1
Cu	9	10	9	10	10	10	10
Zn	100	100	100	100	100	100	100
Ga	0.4	0.2	0.5	1	0.3	0.5	0.3
Ge	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
As[b]	< 0.39	< 0.39	< 0.39	< 0.39	< 0.39	< 0.39	0.49
Se[b]	0.42	0.86	0.68	0.57	0.59	0.44	0.71
Rb	40	10	7	10	10	8	10
Sr	20	30	60	50	30	30	20
Y	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Zr	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Nb	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Mo	0.4	0.7	2	2	1	1	0.6
Ru	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Pd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ag	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cd	0.2	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
In	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Sn	0.2	< 0.1	< 0.1	< 0.1	< 0.1	0.2	0.1

[a]Concentration units ug/g dry weight for all elements.

[b]As and Se determined by flow injection hydride generation atomic absorption spectrometry.

Table 3. Concentrations[a] of elements in liver, vole, and mouse samples determined by semi-quantitative scan...(cont'd).

Element	GBHC401L-98 bird liver CERC# 18802	GBHC602L-98 bird liver CERC# 18809	GBHC603L-98 bird liver CERC# 18810	GBHC604L-98 bird liver CERC# 18811	GBHC605L-98 bird liver CERC# 18812	GBHC606L-98 bird liver CERC# 18813	MV401-98 meadow vole CERC# 18833	MV402-98 meadow vole CERC# 18834	MV403-98 meadow vole CERC# 18835
Sb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Te	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cs	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Ba	< 1	< 1	< 1	< 1	< 1	< 1	20	10	20
La	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1
Ce	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1
Pr	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Eu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Gd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dy	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ho	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Er	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Yb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Lu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hf	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ta	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
W	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Re	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Os	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ir	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pt	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Au	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tl	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hg[b]	3.31	1.24	0.65	1.27	2.39	0.86	< 0.02	< 0.02	< 0.02
Pb	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bi	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
U	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

[a]Concentration units ug/g dry weight for all elements.

[b]Hg determined by flow injection cold vapor atomic absorption spectrometry.

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Table 3. Concentrations[a] of elements in liver, vole, and mouse samples determined by semi-quantitative scan...(cont'd)..

Element	MV404-98 meadow vole CERC# 18836	MV405-98 meadow vole CERC# 18837	MV301-98 meadow vole CERC# 18838	MV302-98 meadow vole CERC# 18839	MV303-98 meadow vole CERC# 18840	MV304-98 vole meadow vole CERC# 18841	MV305-98 vole meadow mouse CERC# 18842
Sb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Te	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cs	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Ba	8	10	10	20	6	10	8
La	0.2	< 0.1	0.2	0.8	< 0.1	0.3	0.9
Ce	0.3	< 0.1	0.3	2	< 0.1	0.6	2
Pr	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	0.2
Nd	0.2	< 0.1	0.1	0.6	< 0.1	0.3	0.6
Sm	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1
Eu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Gd	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1
Tb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dy	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1
Ho	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Er	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Yb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Lu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hf	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ta	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1
W	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Re	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Os	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ir	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pt	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Au	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tl	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hg[b]	0.03	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Pb	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bi	< 1	< 1	< 1	< 1	< 1	< 1	< 1
U	< 1	< 1	< 1	< 1	< 1	< 1	< 1

[a]Concentration units ug/g dry weight for all elements.

[b]Hg determined by flow injection cold vapor atomic absorption spectrometry.

Table 4. Concentrations[a] of elements in nestlings, eggs, and prey determined by semi-quantitative scan.

Element	TSC227-98 swallow nestling CERC# 18763	TSC324-98 swallow nestling CERC# 18768	TSC415-98 swallow nestling CERC# 18773	TSC614-98 swallow nestling CERC# 18776	TSC707-98 swallow nestling CERC# 18779	TSC812-98 swallow nestling CERC# 18782	TSC914-98 swallow nestling CERC# 18787	TSWI1-98 swallow nestling CERC# 18797
% Moist	65	69	63	65	67	65	73	66
Li	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Be	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Na	5000	6000	4000	4000	4000	3000	6000	4000
Mg	1000	1000	1000	1000	700	800	1000	900
Al	9	20	10	4	5	6	10	5
K	8000	8000	4000	6000	6000	6000	8000	8000
Ca	18000	27000	29000	17000	5000	8000	23000	7000
Ti	10	10	8	9	5	5	9	5
V	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cr	7	2	1	1	2	2	4	2
Mn	2	4	2	2	2	4	4	4
Fe	200	50	100	200	100	90	100	200
Co	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ni	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cu	10	7	5	7	6	8	8	9
Zn	100	100	200	100	90	100	100	90
Ga	0.1	0.2	0.2	0.1	< 0.1	< 0.1	0.2	0.1
Ge	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
As[b]	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.06	< 0.03
Se[b]	2.34	2.64	2.07	2.57	2.33	2.02	2.74	1.62
Rb	20	20	5	5	5	5	5	8
Sr	10	30	30	20	8	10	30	3
Y	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Zr	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Nb	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Mo	0.5	0.2	< 0.1	0.3	< 0.1	0.3	0.2	0.1
Ru	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Pd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ag	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.3	< 0.1	< 0.1
In	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Sn	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

[a]Concentrations units ug/g dry weight for all elements.

[b]As and Se determined by flow injection hydride generation atomic absorption spectrometry.

Table 4. Concentrations[a] of elements in nestlings, eggs, and prey determined by semi-quantitative scan..(cont'd)..

Element	HME301-98 duck egg CERC# 18819	BE-EG906-98 eagle egg CERC# 19861	BE-EG910-98 eagle egg CERC# 19862	BE-EG970-99 eagle egg CERC# 20032	FI-BH912B-98 fish CERC# 19863	FI-EL912A-98 eel CERC# 19864	FI-EL965-99 eel CERC# 19865	BI-BWT908-97 bird CERC# 19866
% Moist	64	73	57	74	76	82	68	58
Li	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Be	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Na	5000	11000	15000	14000	8000	2000	3000	2000
Mg	500	600	700	700	3000	1000	600	800
Al	1	3	80	4	90	80	60	60
K	5000	5000	6000	8000	5000	5000	8000	5000
Ca	9000	6000	4000	9000	92000	23000	6000	25000
Ti	6	3	5	3	30	7	5	7
V	< 0.1	< 0.1	< 0.1	< 0.1	1	0.2	0.1	< 0.1
Cr	< 1	1	2	1	1	2	1	1
Mn	2	0.4	2	2	80	20	20	10
Fe	100	70	100	100	200	200	100	300
Co	< 0.1	0.6	20	3	0.1	< 0.1	< 0.1	< 0.1
Ni	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cu	3	6	20	20	8	3	2	7
Zn	60	60	60	70	100	200	100	80
Ga	< 0.1	< 0.1	< 0.1	< 0.1	0.6	0.2	< 0.1	0.2
Ge	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
As	< 0.03	< 0.03	0.04	< 0.03	0.07	0.21	0.32	0.07
Se[b]	1.75	2.29	3.01	2.49	0.98	1.77	1.26	1.77
Rb	10	7	10	8	6	3	7	7
Sr	20	2	3	5	200	30	8	20
Y	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Zr	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Nb	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Mo	< 0.1	0.2	0.3	0.2	< 0.1	0.2	< 0.1	0.3
Ru	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Pd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ag	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1
In	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Sn	< 0.1	0.1	1	0.9	5	3	10	5

[a]Concentrations units ug/g dry weight for all elements.

[b]As and Se determined by flow injection hydride generation atomic absorption spectrometry.

Table 4. Concentrations[a] of elements in nestlings, eggs, and prey determined by semi-quantitative scan..(cont'd)..

Element	FI-CA969-99 fish CERC# 19867	FI-GS966-99 fish 19868	FI-GS915-98 fish 19869	FI-DR906A-98 fish 19870	FI-WS906B-98 fish 19871	FI-EL906C-98 eel 19872	FI-CF906D-98 fish 19873	FI-CF909A-98 fish 19874
% Moist	72	59	59	64	75	63	73	81
Li	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Be	< 1	< 1	< 1	< 1	< 1	30	< 1	< 1
Na	1000	2000	4000	4000	4000	5000	7000	3000
Mg	900	1000	1000	2000	2000	2000	1000	2000
Al	100	30	400	200	500	300	60	400
K	6000	8000	4000	7000	12000	12000	10000	2000
Ca	18000	23000	38000	80000	38000	54000	36000	79000
Ti	6	7	20	20	20	10	10	20
V	0.2	0.4	1	0.3	1	0.5	0.5	3
Cr	1	1	2	1	2	30	2	2
Mn	10	20	50	30	40	40	40	80
Fe	100	100	300	200	600	300	100	300
Co	0.1	0.1	0.2	< 0.1	0.3	30	0.1	0.2
Ni	< 1	< 1	< 1	< 1	< 1	30	< 1	< 1
Cu	2	3	3	10	4	4	4	4
Zn	100	40	60	100	90	2000	60	100
Ga	0.2	0.2	0.5	0.5	0.5	0.5	0.2	0.6
Ge	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
As[b]	0.10	1.94	1.52	0.35	0.10	0.81	0.76	0.14
Se[b]	1.01	1.74	0.79	2.00	1.40	0.84	0.70	0.85
Rb	4	3	3	6	10	10	20	2
Sr	20	40	60	80	50	70	60	200
Y	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Zr	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Nb	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Mo	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1
Ru	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Pd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ag	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1
Cd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	30	< 0.1	0.3
In	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Sn	5	6	7	5	7	10	7	2

[a]Concentrations units ug/g dry weight for all elements.

[b]As and Se determined by flow injection hydride generation atomic absorption spectrometry.

Table 4. Concentrations[a] of elements in nestlings, eggs, and prey determined by semi-quantitative scan..(cont'd)..

Element	FI-EL909B-98 eel 19875
% Moist	64
Li	< 1
Be	< 1
Na	2000
Mg	1000
Al	300
K	3000
Ca	32000
Ti	10
V	0.5
Cr	2
Mn	30
Fe	300
Co	0.2
Ni	< 1
Cu	2
Zn	200
Ga	0.3
Ge	< 0.1
As[b]	0.40
Se[b]	0.99
Rb	2
Sr	40
Y	< 1
Zr	< 1
Nb	< 1
Mo	< 0.1
Ru	< 1
Pd	< 0.1
Ag	< 0.1
Cd	< 0.1
In	< 1
Sn	4

[a]Concentrations units ug/g dry weight for all elements.

[b]As and Se determined by flow injection hydride generation atomic absorption spectrometry.

Table 4. Concentrations[a] of elements in nestlings, eggs, and prey determined by semi-quantitative scan..(cont'd)..

Element	TSC227-98 swallow nestling CERC# 18763	TSC324-98 swallow nestling CERC# 18768	TSC415-98 swallow nestling CERC# 18773	TSC614-98 swallow nestling CERC# 18776	TSC707-98 swallow nestling CERC# 18779	TSC812-98 swallow nestling CERC# 18782	TSC914-98 swallow nestling CERC# 18787	TSWI1-98 swallow nestling CERC# 18797
Sb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Te	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cs	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Ba	1	2	4	2	1	5	7	2
La	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ce	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pr	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Eu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Gd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dy	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ho	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Er	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Yb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Lu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hf	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ta	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
W	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Re	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Os	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ir	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pt	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1
Au	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1
Tl	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hg[b]	0.19	0.14	0.38	0.18	0.18	0.15	0.27	0.28
Pb	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bi	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
U	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

[a]Concentrations units ug/g dry weight for all elements.

[b]Hg determined by flow injection cold vapor atomic absorption spectrometry.

Table 4. Concentrations[a] of elements in nestlings, eggs, and prey determined by semi-quantitative scan..(cont'd)..

Element	HME301-98 duck egg CERC# 18819	BE-EG906-98 eagle egg CERC# 19861	BE-EG910-98 eagle egg CERC# 19862	BE-EG970-99 eagle egg CERC# 20032	FI-BH912B-98 fish CERC# 19863	FI-EL912A-98 eel CERC# 19864	FI-EL965-99 eel CERC# 19865	BI-BWT908-97 bird CERC# 19866
Sb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Te	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cs	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Ba	8	< 1	< 1	< 1	20	3	1	6
La	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ce	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1
Pr	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Eu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Gd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dy	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ho	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Er	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Yb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Lu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hf	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ta	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1
W	< 0.1	0.2	1	2	< 0.1	< 0.1	< 0.1	< 0.1
Re	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Os	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ir	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pt	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Au	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1
Tl	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hg[b]	1.70	1.85	1.31	1.74	0.51	1.87	1.09	0.24
Pb	< 1	< 1	< 1	< 1	2	< 1	< 1	< 1
Bi	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
U	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

[a]Concentrations units ug/g dry weight for all elements.

[b]Hg determined by flow injection cold vapor atomic absorption spectrometry.

Table 4. Concentrations[a] of elements in nestlings, eggs, and prey determined by semi-quantitative scan..(cont'd)..

Element	FI-CA969-99 fish CERC# 19867	FI-GS966-99 fish 19868	FI-GS915-98 fish 19869	FI-DR906A-98 fish 19870	FI-WS906B-98 fish 19871	FI-EL906C-98 eel 19872	FI-CF906D-98 fish 19873	FI-CF909A-98 fish 19874
Sb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Te	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cs	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Ba	6	9	10	8	8	40	2	9
La	< 0.1	< 0.1	0.2	0.1	0.2	0.1	< 0.1	0.2
Ce	< 0.1	< 0.1	0.4	0.2	0.4	0.2	< 0.1	0.3
Pr	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nd	< 0.1	< 0.1	0.2	< 0.1	0.2	< 0.1	< 0.1	0.1
Sm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Eu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Gd	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	20	< 0.1	< 0.1
Dy	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ho	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Er	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	20	< 0.1	< 0.1
Yb	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Lu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1
Hf	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ta	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
W	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Re	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Os	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ir	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pt	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Au	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tl	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hg[b]	0.43	0.04	0.10	0.64	0.47	0.60	0.30	0.92
Pb	< 1	< 1	< 1	< 1	< 1	20	< 1	3
Bi	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
U	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

[a]Concentrations units ug/g dry weight for all elements.

[b]Hg determined by flow injection cold vapor atomic absorption spectrometry.

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Table 4. Concentrations[a] of elements in nestlings, eggs, and prey determined by semi-quantitative scan..(cont'd)..

Element	FI-EL909B-98 eel 19875
Sb	< 0.1
Te	< 0.1
Cs	< 1
Ba	6
La	0.1
Ce	0.2
Pr	< 0.1
Nd	0.1
Sm	< 0.1
Eu	< 0.1
Gd	< 0.1
Tb	< 0.1
Dy	< 0.1
Ho	< 0.1
Er	< 0.1
Tm	< 0.1
Yb	< 0.1
Lu	< 0.1
Hf	< 0.1
Ta	< 0.1
W	< 0.1
Re	< 0.1
Os	< 0.1
Ir	< 0.1
Pt	< 0.1
Au	< 0.1
Tl	< 0.1
Hg[b]	1.20
Pb	< 1
Bi	< 1
U	< 1

[a]Concentrations units ug/g dry weight for all elements.

[b]Hg determined by flow injection cold vapor atomic absorption spectrometry.

Table 5. Percent relative standard deviation from repeated analysis of Trace Metals in Drinking Water Standard[a] during whole blood/serum run. Results expressed in ng/mL.

Element	Run #1	Run #2	Run #3	Run #4	Run #5	Actual Conc	Mean Conc	SD	% RSD
Li	19.	18.	19.	19.	19.	20.	19.	0.5	2.
Be	19.	19.	18.	19.	19.	20.	19.	0.2	1.2
Na	5851.	6690.	6597.	6522.	6957.	6000.	6523.	410.	6.3
Mg	8747.	9640.	9756.	9694.	10187.	9000.	9605.	526.	5.5
Al	126.	127.	125.	113.	118.	120.	122.	5.9	4.9
K	2108.	2349.	2367.	2421.	2512.	2500.	2351.	150.	6.4
Ca	34911.	36397.	36767.	35722.	35481.	35000.	35855.	737.	2.
V	30.	31.	31.	31.	32.	30.	31.	0.7	2.2
Cr	21.	20.	20.	21.	21.	20.	21.	0.4	2.2
Mn	40.	41.	42.	40.	43.	40.	41.	1.3	3.2
Fe	74.	79.	96.	83.	93.	100.	85.	9.	11.
Co	24.	26.	25.	25.	25.	25.	25.	0.7	2.6
Ni	57.	62.	61.	60.	59.	60.	60.	1.8	3.1
Cu	21.	21.	21.	21.	21.	20.	21.	0.3	1.
Zn	70.	73.	70.	71.	71.	70.	71.	1.1	2.
As	83.	85.	84.	82.	82.	80.	83.	1.2	1.4
Rb	10.2	10.5	10.9	10.5	10.8	10.	10.6	0.3	2.8
Sr	244.	265.	275.	285.	288.	250.	271.	18.	6.7
Mo	106.	107.	106.	110.	108.	100.	108.	1.9	1.8
Ag	2.0	2.1	2.1	2.1	2.1	2.0	2.1	0.0	1.3
Cd	10.0	10.6	10.2	10.5	10.	10.	10.3	0.2	2.3
Sb	10.	10.4	10.0	10.3	10.2	10.	10.2	0.2	1.6
Te	3.2	3.3	3.2	3.2	3.3	3.0	3.2	0.1	1.6
Ba	51.	52.	54.	56.	55.	50.	54.	1.9	3.5
Pr	10.	10.	10.	10.	10.	10.	10.	0.2	2.2
Tb	10.	10.	10.	10.2	9.2	10.	10.	0.5	4.9
Tm	10.	10.0	9.	10.	9.	10.	10.	0.3	3.2
Ta	10.5	10.3	9.9	10.9	11.0	10.	10.5	0.5	4.5
Au	10.	9.9	9.	9.4	8.9	10.	9.6	0.6	6.
Tl	10.	10.0	10.	10.	10.0	10.	10.	0.2	1.5
Pb	39.	41.	39.	39.	39.	40.	39.	0.9	2.4
Bi	8.3	8.1	7.7	7.9	8.2	10.	8.0	0.3	3.1
U	10.	9.7	10.	11.	10.	10.	10.	0.4	3.7

[a] High Purity Trace Metals in Drinking Water, Cat # CRM-TMDW, Charleston, SC.; Pr, Tb, Tm, Ta, and Au manually added to represent rare earth area of mass spectral range.

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Table 6. Percent relative standard deviation from repeated analysis of Trace Metals in Drinking Water Standard[a] during bird egg/fish run. Results expressed in ng/mL.

Element	Run #1	Run #2	Run #3	Run #4	Run #5	Actual Conc	Mean Conc	SD	% RSD
Li	20.	22.	21.	18.	19.	20.	20.	1.5	7.
Be	20.	21.	22.	19.	19.	20.	20.	1.2	5.8
Na	6057.	6172.	6427.	6109.	6609.	6000.	6275.	234.	3.7
Mg	9826.	9390.	9924.	9963.	10832.	9000.	9987.	525.	5.3
Al	123.	134.	129.	126.	133.	120.	129.	4.7	3.6
K	2304.	2377.	2460.	2332.	2553.	2500.	2405.	101.	4.2
Ca	34974.	35874.	32076.	35243.	37017.	35000.	35037.	1832.	5.
V	30.	30.	31.	30.	32.	30.	31.	0.7	2.2
Cr	20.	21.	22.	20.	21.	20.	21.	0.7	3.5
Mn	41.	41.	43.	42.	43.	40.	42.	1.1	2.7
Fe	71.	77.	97.	94.	105.	100.	89.	14.	16.
Co	26.	27.	27.	26.	25.	25.	26.	0.8	2.9
Ni	61.	65.	67.	58.	62.	60.	63.	3.4	5.4
Cu	20.	21.	21.	20.	21.	20.	21.	0.6	3.
Zn	71.	74.	75.	70.	73.	70.	72.	2.2	3.
As	80.	85.	84.	83.	83.	80.	83.	1.8	2.1
Rb	9.8	10.5	10.5	10.6	10.3	10.	10.3	0.3	3.2
Sr	254.	266.	275.	272.	281.	250.	269.	10.	3.8
Mo	100.	105.	102.	101.	103.	100.	102.	2.0	1.9
Ag	2.0	2.0	2.1	2.0	1.9	2.0	2.0	0.0	2.3
Cd	10.3	10.1	10.0	10.0	10.	10.	10.1	0.1	1.1
Sb	10.	10.3	10.1	10.3	10.4	10.	10.3	0.1	1.3
Te	3.0	2.9	3.1	3.0	2.9	3.0	3.0	0.1	3.1
Ba	51.	50.	52.	53.	55.	50.	52.	1.8	3.5
Pr	11.	10.	10.	10.	10.	10.	10.	0.2	2.1
Tb	10.	10.	10.	9.7	9.7	10.	10.	0.3	3.2
Tm	11.	9.8	10.	10.	10.	10.	10.	0.4	3.6
Ta	10.7	9.7	9.4	9.1	8.7	10.	9.5	0.8	8.0
Au	10.	10.0	10.	10.1	9.8	10.	10.1	0.3	3.
Tl	11.	10.2	11.	10.	10.3	10.	10.	0.3	2.9
Pb	42.	42.	45.	45.	41.	40.	43.	1.7	4.0
Bi	8.9	8.7	8.6	8.8	8.6	10.	8.7	0.1	1.6
U	11.	10.2	10.	11.	10.	10.	11.	0.3	3.0

[a]High Purity Trace Metals in Drinking Water, Cat # CRM-TMDW, Charleston, SC.; Pr, Tb, Tm, Ta, and Au manually added to represent rare earth area of mass spectral range.

304929

Table 7. Percent relative standard deviation from repeated analysis of Trace Metals in Drinking Water Standard[a] during bird liver/vole run. Results expressed in ng/mL.

Element	Run #1	Run #2	Run #3	Run #4	Actual Conc	Mean Conc	SD	% RSD
Li	21.1	21.3	18.8	19.4	20.	20.	1.3	6.3
Be	19.8	20.4	18.8	19.3	20.	20.	0.7	3.5
Na	6253.	6269.	6315.	6930.	6000.	6442.	327.	5.1
Mg	9469.	9355.	9847.	10418.	9000.	9772.	479.	4.9
Al	121.	105.	105.	116.	120.	112.	8.1	7.3
K	2199.	2250.	2234.	2413.	2500.	2274.	95.	4.2
Ca	35729.	35514.	34679.	35829.	35000.	35438.	522.	1.5
V	29.2	30.1	29.1	31.2	30.	30.	1.0	3.3
Cr	19.0	19.4	19.4	20.8	20.	20.	0.8	4.0
Mn	40.4	40.5	41.3	40.9	40.	41.	0.4	1.0
Fe	82.7	83.7	91.4	94.5	100.	88.	6.	6.5
Co	25.5	24.6	23.9	26.1	25.	25.	1.0	3.9
Ni	60.2	61.0	59.3	62.9	60.	61.	1.5	2.5
Cu	20.5	20.6	20.2	20.7	20.	20.	0.2	1.1
Zn	67.7	69.3	68.4	71.1	70.	69.	1.5	2.1
As	79.1	80.2	78.9	80.1	80.	80.	0.6	0.8
Rb	10.0	10.6	10.1	10.5	10.	10.3	0.3	2.8
Sr	244.	279.	262.	272.	250.	264.	15.	5.7
Mo	96.1	102.5	99.1	98.0	100.	99.	2.7	2.7
Ag	1.9	2.0	2.0	1.8	2.0	1.9	0.1	4.4
Cd	9.1	9.9	9.8	9.4	10.	9.5	0.4	3.7
Sb	9.7	10.1	10.1	9.3	10.	9.8	0.4	3.8
Te	2.9	2.9	2.9	2.6	3.0	2.8	0.2	5.7
Ba	50.	52.	55.	48.	50.	51.	3.3	6.5
Pr	9.6	9.7	9.7	8.4	10.	9.	0.6	6.6
Tb	9.9	10.0	9.9	9.0	10.	10.	0.5	4.7
Tm	9.6	9.9	10.0	9.2	10.	10.	0.3	3.5
Ta	10.0	9.9	9.8	9.3	10.	9.8	0.3	3.0
Au	10.1	9.5	9.4	9.2	10.	9.5	0.4	4.1
Tl	9.9	9.7	9.6	9.6	10.	10.	0.1	1.3
Pb	39.6	38.3	39.4	37.2	40.	39.	1.1	2.8
Bi	7.6	7.6	7.6	7.2	10.	7.5	0.2	2.5
U	10.4	9.8	9.7	10.5	10.	10.	0.4	4.0

[a]High Purity Trace Metals in Drinking Water, Cat # CRM-TMDW, Charleston, SC.; Pr, Tb, Tm, Ta, and Au manually added to represent rare earth area of mass spectral range.

304930

Table 8. Percent relative standard deviation from repeated analysis of Trace Metals in Drinking Water Standard[a] during nestling/egg/prey run. Results expressed in ng/mL.

Element	Run #1	Run #2	Run #3	Run #4	Run #5	Actual Conc	Mean Conc	SD	% RSD
Li	19.8	19.2	19.1	18.9	18.6	20.	19.	0.4	2.3
Be	20.0	19.4	19.1	18.4	17.9	20.	19.	0.7	3.5
Na	6156.	6241.	6481.	6795.	6885.	6000.	6418.	286.	4.5
Mg	9280.	9575.	9881.	10426.	10138.	9000.	9790.	489.	5.0
Al	161.	158.	156.	138.	145.	120.	153.	10.4	6.8
K	2261.	2332.	2344.	2386.	2490.	2500.	2331.	52.	2.2
Ca	37357.	35924.	36270.	36873.	36120.	35000.	36606.	636.	1.7
V	29.6	31.5	30.4	29.9	30.2	30.	30.	0.8	2.7
Cr	21.2	21.2	20.7	20.7	21.0	20.	21.	0.3	1.5
Mn	40.3	40.4	39.8	41.1	40.4	40.	40.	0.5	1.4
Fe	78.8	91.6	98.4	98.6	105.1	100.	92.	9.	10.2
Co	25.9	24.9	25.5	26.0	25.7	25.	26.	0.5	2.0
Ni	61.0	61.1	59.0	61.5	59.7	60.	61.	1.1	1.9
Cu	20.8	20.6	21.2	20.1	20.9	20.	21.	0.5	2.2
Zn	72.5	71.8	71.4	71.4	70.4	70.	72.	0.6	0.8
As	80.6	78.8	79.4	76.7	78.3	80.	79.	1.6	2.0
Rb	10.2	10.3	10.1	10.1	10.3	10.	10.2	0.1	0.8
Sr	265.	264.	277.	293.	292.	250.	275.	13.	4.9
Mo	100.7	106.7	102.4	100.4	102.3	100.	103.	2.9	2.8
Ag	2.0	2.0	2.0	2.1	2.0	2.0	2.0	0.0	2.0
Cd	10.4	10.0	10.0	10.1	10.4	10.	10.1	0.2	1.8
Sb	10.1	9.9	10.0	9.9	10.1	10.	10.0	0.1	1.0
Te	3.0	3.1	3.0	3.0	3.0	3.0	3.0	0.0	1.5
Ba	51.	51.	53.	55.	56.	50.	53.	2.1	4.0
Pr	10.1	9.5	9.7	10.1	10.1	10.	10.	0.3	3.2
Tb	10.3	10.1	9.9	10.3	10.2	10.	10.	0.2	2.0
Tm	10.1	10.1	10.1	10.1	10.3	10.	10.	0.0	0.2
Ta	11.3	10.9	11.2	11.2	11.2	10.	11.1	0.2	1.4
Au	10.4	9.7	9.8	9.6	9.5	10.	9.9	0.4	3.8
Tl	10.2	9.7	9.9	10.1	9.9	10.	10.	0.2	2.2
Pb	37.6	36.2	39.4	40.1	36.2	40.	38.	1.8	4.6
Bi	7.7	7.5	7.6	7.5	7.6	10.	7.5	0.1	1.4
U	10.1	9.9	10.2	10.3	10.1	10.	10.	0.2	1.6

[a]High Purity Trace Metals in Drinking Water, Cat # CRM-TMDW, Charleston, SC.; Pr, Tb, Tm, Ta, and Au manually added to represent rare earth area of mass spectral range.

304931

Table 9. Recovery of elements from a laboratory control sample[a].

a. Whole blood/serum run

Element	Actual Conc	Meas Conc	% Rec
Be	50.	61.4	123.
Na	500.	567.	113.
Mg	500.	568.	114.
Al	50.	54.2	108.
K	500.	464.	93.
Ca	500.	612.	122.
Ti	50.	55.3	111.
V	50.	52.1	104.
Cr	50.	50.9	102.
Mn	50.	54.1	108.
Fe	500.	349.	70.
Co	50.	52.2	104.
Ni	50.	56.4	113.
Cu	50.	57.3	115.
Zn	50.	69.0	138.
As	50.	67.3	135.
Sr	50.	50.5	101.
Mo	50.	51.5	103.
Ag	50.	51.1	102.
Cd	50.	57.1	114.
Sn	50.	66.0	132.
Sb	50.	53.0	106.
Ba	50.	50.5	101.
Tl	50.	41.8	84.
Pb	50.	55.5	111.

b. Bird eggs/fish run

Element	Actual Conc	Meas Conc	% Rec
Be	50.	67.5	135.
Na	500.	509.	102.
Mg	500.	575.	115.
Al	50.	61.5	123.
K	500.	473.	95.
Ca	500.	610.	122.
Ti	50.	53.0	106.
V	50.	52.2	104.
Cr	50.	51.2	102.
Mn	50.	52.6	105.
Fe	500.	349.	70.
Co	50.	50.3	101.
Ni	50.	56.3	113.
Cu	50.	57.2	114.
Zn	50.	72.6	145.
As	50.	66.1	132.
Sr	50.	79.2	158.
Mo	50.	49.8	100.
Ag	50.	50.3	101.
Cd	50.	57.3	115.
Sn	50.	68.0	136.
Sb	50.	55.6	111.
Ba	50.	51.4	103.
Tl	50.	42.7	85.
Pb	50.	58.7	117.

[a]SPEX Claritas PPT, Instrument Check Standards 1, 3, and 5; Cat# CL-ICS-1, CL-ICS-3, and CL-ICS-5; SPEX CertiPrep, Inc., Metuchen, NJ

Table 10. Recovery of elements from a laboratory control sample[a].

a. Bird liver/vole run

Element	Actual Conc	Meas Conc	% Rec
Be	50.	65.8	132.
Na	500.	528.	106.
Mg	500.	540.	108.
Al	50.	52.7	105.
K	500.	451.	90.
Ca	500.	584.	117.
Ti	50.	54.0	108.
V	50.	50.0	100.
Cr	50.	50.3	101.
Mn	50.	50.5	101.
Fe	500.	351.	70.
Co	50.	52.4	105.
Ni	50.	55.2	110.
Cu	50.	55.9	112.
Zn	50.	68.6	137.
As	50.	63.5	127.
Sr	50.	51.3	103.
Mo	50.	48.5	97.
Ag	50.	47.7	95.
Cd	50.	55.8	112.
Sn	50.	66.7	133.
Sb	50.	53.9	108.
Ba	50.	51.6	103.
Tl	50.	41.9	84.
Pb	50.	49.0	98.

b. Nestling/egg/prey run

Element	Actual Conc	Meas Conc	% Rec
Be	50.	64.8	130.
Na	500.	560.	112.
Mg	500.	569.	114.
Al	50.	69.5	139.
K	500.	465.	93.
Ca	500.	603.	121.
Ti	50.	54.4	109.
V	50.	50.0	100.
Cr	50.	52.8	106.
Mn	50.	50.5	101.
Fe	500.	339.	68.
Co	50.	51.7	103.
Ni	50.	56.6	113.
Cu	50.	55.8	112.
Zn	50.	70.7	141.
As	50.	65.4	131.
Sr	50.	53.7	107.
Mo	50.	49.6	99.
Ag	50.	49.7	99.
Cd	50.	59.5	119.
Sn	50.	66.7	133.
Sb	50.	53.3	107.
Ba	50.	49.5	99.
Tl	50.	50.8	102.
Pb	50.	48.2	96.

[a]SPEX Claritas PPT, Instrument Check Standards 1, 3, and 5; Cat# CL-ICS-1, CL-ICS-3, and CL-ICS-5; SPEX CertiPrep, Inc., Metuchen, NJ

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Table 11. Performance of NIST and SPEX solutions used for instrument calibration during mercury, arsenic, and selenium analysis.

BID[a]	Ele.	Run Date	Ref. Material	Actual Conc	Meas Conc 1	Meas Conc 2	% Error 1	% Error 2	ISOP[b]	Oper Init.
10/13/99	Se	10/18/99	SPEX CALB	4.	4.04	4.39	1.0	9.9	P.207	MJW
11/01/99	Se	11/05/99	SPEX CALB	4.	4.11	4.20	2.8	4.9	P.207	MJW
11/19/99	Se	12/02/99	SPEX CALB	4.	4.11	3.65	2.8	-8.9	P.207	MJW
12/01/99	Se	12/06/99	SPEX CALB	4.	4.13	3.90	3.3	-2.5	P.207	MJW
01/11/00	Se	01/25/00	SPEX CALB	4.	4.20	4.03	4.9	0.7	P.207	MJW
11/01/99	As	12/17/99	SPEX CALB	9.	9.22	9.00	2.4	0.0	P.208	MJW
11/19/99	As	12/14/99	SPEX CALB	9.	9.01	8.14	0.2	-9.6	P.208	MJW
12/01/99	As	12/17/99	SPEX CALB	9.	8.58	9.83	-4.7	9.2	P.208	MJW
01/11/00	As	01/20/00	SPEX CALB	9.	8.92	9.19	-0.9	2.1	P.208	MJW
10/27/99	Hg	12/29/99	NIST 3133	9.	9.14	9.07	1.6	0.7	P.198	MJW
11/12/99	Hg	12/28/99	NIST 3133	9.	9.10	9.00	1.1	0.0	P.198	MJW
11/29/99	Hg	12/27/99	NIST 3133	9.	8.97	8.97	-0.4	-0.3	P.198	MJW
12/28/99	Hg	01/07/00	NIST 3133	9.	9.15	9.08	1.6	0.9	P.198	MJW
01/10/00	Hg	01/14/00	NIST 3133	9.	9.09	9.05	0.9	0.6	P.198	MJW

[a]BID = Block Initiation Date: a date assigned to each member of a group of samples that will identify the sample as a member of the group or "block."

[b]ISOP = instrumental standard operating procedure.

Table 12. Recovery of elements from tissue reference materials. analyzed with eagle blood.

a. ECRC Striped Bass

Element	Units	Meas. Conc.	Cert. Mean	Upper Limit	Lower Limit	% Rec
Al	ug/g dry	24.2	21.1	25.7	16.5	100.
Cr	ug/g dry	2.06	1.40	2.60	0.20	100.
Fe	ug/g dry	212.	269.	297.	241.	88.
Ni	ug/g dry	0.93	1.80	3.20	0.40	100.
Cu	ug/g dry	5.56	4.20	4.70	3.70	118.
Zn	ug/g dry	49.5	43.9	45.9	41.9	108.
Cd	ug/g dry	0.30	0.33	0.45	0.21	100.
Pb	ug/g dry	3.24	3.62	4.79	2.45	100.

b. IAEA A-13 Animal Blood

Element	Units	Meas. Conc.	Cert. Mean	Upper Limit	Lower Limit	% Rec
Na	ug/g dry	14555.	12600.	13550.	11650.	107.
Mg	ug/g dry	126.	(99.)	109.	89.	116.
K	ug/g dry	2334.	2500.	2850.	2150.	100.
Ca	ug/g dry	300.	286.	339.	233.	100.
Fe	ug/g dry	1699.	2400.	2550.	2250.	76.
Ni	ug/g dry	0.137	(1.)	1.10	0.90	15.
Cu	ug/g dry	4.8	4.3	4.9	3.7	100.
Zn	ug/g dry	13.7	13.0	14.0	12.0	100.
Rb	ug/g dry	2.6	2.3	3.0	1.6	100.
Pb	ug/g dry	0.23	(0.18)	0.20	0.16	115.

c. NRCC DORM-2

Element		Meas. Conc.	Cert. Mean	Upper Limit	Lower Limit	% Rec
Al	ug/g dry	6.09	10.9	12.6	9.20	151.
Cr	ug/g dry	8.32	34.7	40.2	29.2	28.
Mn	ug/g dry	1.43	3.66	4.00	3.32	43.
Fe	ug/g dry	71.9	142.	152.	132.	100.
Co	ug/g dry	0.049	0.182	0.213	0.151	32.
Ni	ug/g dry	3.83	19.4	22.5	16.3	23.
Cu	ug/g dry	2.48	2.34	2.50	2.18	100.
Zn	ug/g dry	26.8	25.6	27.9	23.3	100.
Ag	ug/g dry	0.061	0.041	0.054	0.028	113.
Cd	ug/g dry	0.061	0.043	0.051	0.035	120.
Sn	ug/g dry	0.086	(0.023)	---	---	---
Pb	ug/g dry	0.086	0.065	0.072	0.058	120.

Table 13. Recovery of elements from tissue reference materials. analyzed with bird eggs and fish.

a. ECRC Striped Bass

Element	Units	Meas. Conc.	Cert. Mean	Upper Limit	Lower Limit	% Rec
Al	ug/g dry	20.4	21.1	25.7	16.5	100.
Cr	ug/g dry	3.08	1.40	2.60	0.20	118.
Fe	ug/g dry	255.	269.	297.	241.	100.
Ni	ug/g dry	0.95	1.80	3.20	0.40	100.
Cu	ug/g dry	5.44	4.20	4.70	3.70	116.
Zn	ug/g dry	58.1	43.9	45.9	41.9	127.
As	ug/g dry	4.61	3.20	3.70	2.70	125.
Cd	ug/g dry	0.33	0.33	0.45	0.21	100.
Pb	ug/g dry	3.94	3.62	4.79	2.45	100.

b. NIST 8415 whole egg powder

Element	Units	Meas. Conc.	Cert. Mean	Upper Limit	Lower Limit	% Rec
Na	ug/g dry	4545.	3770.	4110.	3430.	111.
Mg	ug/g dry	452.	305.	332.	278.	136.
Al	ug/g dry	633.	540.	626.	454.	101.
K	ug/g dry	3422.	3190.	3560.	2820.	100.
Ca	ug/g dry	2936.	2480.	2670.	2290.	110.
V	ug/g dry	0.553	0.459	0.540	0.378	102.
Cr	ug/g dry	3.0	0.4	0.6	0.2	500.
Mn	ug/g dry	2.2	1.8	2.2	1.4	100.
Fe	ug/g dry	117.	112.0	128.0	96.0	100.
Co	ug/g dry	0.01	0.01	0.02	0.01	100.
Cu	ug/g dry	3.55	2.70	3.05	2.35	116.
Zn	ug/g dry	97.5	67.5	75.1	59.9	130.
Sr	ug/g dry	7.56	5.63	6.09	5.17	124.
Mo	ug/g dry	0.22	0.25	0.27	0.22	100.
Pb	ug/g dry	0.05	0.06	0.07	0.05	100.

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Table 14. Recovery of elements from tissue reference materials analyzed with bird livers and voles.

a. NIST 1577 bovine liver

Element	Units	Meas. Conc.	Cert. Mean	Upper Limit	Lower Limit	% Rec
Na	ug/g dry	2628.	2430.	2560.	2300.	108.
Mg	ug/g dry	687.	604.	613.	595.	112.
K	ug/g dry	9580.	9700.	10300.	9100.	100.
Ca	ug/g dry	101.	124.	130.	118.	86.
Cr	ug/g dry	1.26	0.09	0.10	0.08	1260.
Mn	ug/g dry	10.6	10.30	11.30	9.30	100.
Fe	ug/g dry	209.	268.	276.	260.	80.
Cu	ug/g dry	206.	193.	203.	183.	101.
Zn	ug/g dry	168.	130.	143.	117.	100.
Rb	ug/g dry	18.3	18.30	19.30	17.30	100.
Cd	ug/g dry	0.37	0.27	0.31	0.24	119.
Pb	ug/g dry	0.51	0.34	0.42	0.26	121.

b. NIST 1577b bovine liver

Element	Units	Meas. Conc.	Cert. Mean	Upper Limit	Lower Limit	% Rec
Na	ug/g dry	2743.	2420.	2480.	2360.	111.
Mg	ug/g dry	690.	601.	629.	573.	110.
K	ug/g dry	9716.	9940.	9960.	9920.	98.
Ca	ug/g dry	120.	116.	120.	112.	100.
Mn	ug/g dry	11.3	10.5	12.2	9.	100.
Fe	ug/g dry	167.	184.	199.	169.	99.
Cu	ug/g dry	181.	160.	168.	152.	108.
Zn	ug/g dry	160.	127.	143.	111.	112.
Rb	ug/g dry	13.4	13.7	14.8	12.6	100.
Sr	ug/g dry	0.15	0.14	0.14	0.14	107.
Mo	ug/g dry	3.85	3.50	3.80	3.20	101.
Ag	ug/g dry	0.040	0.039	0.046	0.032	100.
Cd	ug/g dry	0.57	0.50	0.53	0.47	107.
Pb	ug/g dry	0.16	0.13	0.13	0.13	123.

c. NRCC DORM-2

Element	Units	Meas. Conc.	Cert. Mean	Upper Limit	Lower Limit
Al	ug/g dry	8.19	10.9	12.6	9.20
Cr	ug/g dry	31.3	34.7	40.2	29.2
Mn	ug/g dry	3.48	3.66	4.00	3.32
Fe	ug/g dry	111.	142.	152.	132.
Co	ug/g dry	0.169	0.182	0.213	0.151
Ni	ug/g dry	17.7	19.4	22.5	16.3
Cu	ug/g dry	2.71	2.34	2.50	2.18
Zn	ug/g dry	25.5	25.6	27.9	23.3
As	ug/g dry	19.4	18.1	19.1	17.0
Ag	ug/g dry	0.031	0.041	0.054	0.028
Cd	ug/g dry	0.045	0.043	0.051	0.035
Pb	ug/g dry	0.067	0.065	0.072	0.058

Table 15. Recovery of elements from tissue reference materials. analyzed with nestlings, eggs, and prey.

a. ECRC Striped Bass

Element	Units	Meas. Conc.	Cert. Mean	Upper Limit	Lower Limit	% Rec
Al	ug/g dry	50.9	21.1	25.7	16.5	198.
Cr	ug/g dry	4.16	1.40	2.60	0.20	160.
Fe	ug/g dry	254.	269.	297.	241.	100.
Ni	ug/g dry	0.99	1.80	3.20	0.40	100.
Cu	ug/g dry	5.13	4.20	4.70	3.70	109.
Zn	ug/g dry	53.3	43.9	45.9	41.9	116.
As	ug/g dry	4.08	3.20	3.70	2.70	110.
Cd	ug/g dry	0.20	0.33	0.45	0.21	95.
Pb	ug/g dry	2.83	3.62	4.79	2.45	100.

c. NRCC DORM-2

Element		Meas. Conc.	Cert. Mean	Upper Limit	Lower Limit	% Rec
Al	ug/g dry	10.9	10.9	12.6	9.20	100.
Cr	ug/g dry	30.9	34.7	40.2	29.2	100.
Mn	ug/g dry	3.65	3.66	4.00	3.32	100.
Fe	ug/g dry	157.	142.	152.	132.	103.
Co	ug/g dry	0.18	0.182	0.21	0.15	100.
Ni	ug/g dry	18.4	19.4	22.5	16.3	100.
Cu	ug/g dry	2.40	2.34	2.50	2.18	100.
Zn	ug/g dry	25.8	25.6	27.9	23.3	100.
As	ug/g dry	19.8	18.1	19.1	17.0	104.
Ag	ug/g dry	0.039	0.041	0.054	0.028	100.
Cd	ug/g dry	0.0	0.043	0.051	0.035	0.
Sn	ug/g dry	0.048	(0.023)	---	---	---
Pb	ug/g dry	0.059	0.065	0.072	0.058	100.

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Table 16. Concentrations (ug/g) of mercury, arsenic, and selenium in various reference and/or research materials.

BID[a]	Ele.	QC #	Meas. Conc.	Reference Material	Matrix	Upper Limit	Lower Limit	Pass/ Fail	Prep SOP	Prep Init.	ISOP[b]	Oper. Init.
10/13/99	Se	2	2.59	CERC STRIPED BASS[c]	FISH (WHOLE)	2.69	1.83	+	P.256	MJW	P.207	MJW
10/13/99	Se	53	4.31	NIST RM50[d]	TUNA FISH FILLET	4.36	2.84	+	P.256	MJW	P.207	MJW
11/01/99	Se	2	2.80	CERC STRIPED BASS	FISH (WHOLE)	2.69	1.83	-	P.256	MJW	P.207	MJW
11/01/99	Se	89	1.79	NRCC DORM-2[e]	Fillet (Dogfish)	1.63	1.17	-	P.256	MJW	P.207	MJW
11/01/99	Se	43	0.14	IAEA A-13[f]	BLOOD	0.34	0.14	+	P.256	MJW	P.207	MJW
11/01/99	Se	43	0.24	IAEA A-13	BLOOD	0.34	0.14	+	P.256	MJW	P.207	MJW
11/01/99	Se	43	0.36	IAEA A-13	BLOOD	0.34	0.14	-	P.256	MJW	P.207	MJW
11/01/99	Se	2	2.75	CERC STRIPED BASS	FISH (WHOLE)	2.69	1.83	-	P.256	MJW	P.207	MJW
11/01/99	Se	89	1.61	NRCC DORM-2	Fillet (Dogfish)	1.63	1.17	+	P.256	MJW	P.207	MJW
11/01/99	Se	43	0.28	IAEA A-13	BLOOD	0.34	0.14	+	P.256	MJW	P.207	MJW
11/19/99	Se	2	2.42	CERC STRIPED BASS	FISH (WHOLE)	2.69	1.83	+	P.256	MJW	P.207	MJW
11/19/99	Se	75	1.62	NIST 8415[g]	EGG (Whole)	1.70	1.08	+	P.256	MJW	P.207	MJW
11/19/99	Se	2	2.45	CERC STRIPED BASS	FISH (WHOLE)	2.69	1.83	+	P.256	MJW	P.207	MJW
11/19/99	Se	75	1.47	NIST 8415	EGG (Whole)	1.70	1.08	+	P.256	MJW	P.207	MJW
11/19/99	Se	89	1.61	NRCC DORM-2	Fillet (Dogfish)	1.63	1.17	+	P.256	MJW	P.207	MJW
12/01/99	Se	59	2.32	NIST 1577[h]	LIVER (BOVINE)	1.31	0.89	-	P.256	MJW	P.207	MJW
12/01/99	Se	72	0.83	NIST 1577b[i]	LIVER (BOVINE)	0.86	0.60	+	P.256	MJW	P.207	MJW
12/01/99	Se	89	1.29	NRCC DORM-2	Fillet (Dogfish)	1.63	1.17	+	P.256	MJW	P.207	MJW
12/01/99	Se	59	1.03	NIST 1577	LIVER (BOVINE)	1.31	0.89	+	P.256	RHW	P.207	MJW
01/11/00	Se	2	2.71	CERC STRIPED BASS	FISH (WHOLE)	2.69	1.83	-	P.256	MJW	P.207	MJW
01/11/00	Se	48	3.32	IAEA MA-A-1[j]	COPEPOD	3.70	2.30	+	P.256	MJW	P.207	MJW
01/11/00	Se	68	1.05	NRCC PACS-1[k]	SEDIMENT (Marine)	1.31	0.87	+	P.256	MJW	P.207	MJW
01/11/00	Se	71	1.01	NIST 2704[l]	SEDIMENT (River)	1.28	0.96	+	P.256	MJW	P.207	MJW

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Table 16. Concentrations (ug/g) of mercury, arsenic, and selenium in various reference and/or research materials...(cont'd).

BID[a]	Ele.	QC #	Meas. Conc.	Reference Material	Matrix	Upper Limit	Lower Limit	Pass/ Fail	Prep SOP	Prep Init.	ISOP[b]	Oper. Init.
11/01/99	As	43	0.17	IAEA A-13	BLOOD	NC	NC		P.256	MJW	P.208	MJW
11/01/99	As	2	3.25	CERC STRIPED BASS	FISH (WHOLE)	4.02	2.38	+	P.256	MJW	P.208	MJW
11/01/99	As	89	19.0	NRCC DORM-2	Fillet (Dogfish)	20.9	15.1	+	P.256	MJW	P.208	MJW
11/01/99	As	43	0.02	IAEA A-13	BLOOD	NC	NC		P.256	MJW	P.208	MJW
11/19/99	As	2	3.39	CERC STRIPED BASS	FISH (WHOLE)	4.02	2.38	+	P.256	MJW	P.208	MJW
11/19/99	As	75	< 0.23	NIST 8415	EGG (Whole)	0.01	0.01		P.256	MJW	P.208	MJW
11/19/99	As	2	3.45	CERC STRIPED BASS	FISH (WHOLE)	4.02	2.38	+	P.256	MJW	P.208	MJW
11/19/99	As	75	< 0.23	NIST 8415	EGG (Whole)	0.01	0.01		P.256	MJW	P.208	MJW
11/19/99	As	89	17.9	NRCC DORM-2	Fillet (Dogfish)	20.9	15.1	+	P.256	MJW	P.208	MJW
12/01/99	As	59	< 0.39	NIST 1577	LIVER (BOVINE)	0.07	0.04		P.256	MJW	P.208	MJW
12/01/99	As	72	< 0.39	NIST 1577b	LIVER (BOVINE)	0.06	0.05		P.256	MJW	P.208	MJW
12/01/99	As	89	17.4	NRCC DORM-2	Fillet (Dogfish)	20.9	15.1	+	P.256	MJW	P.208	MJW
12/01/99	As	59	< 0.39	NIST 1577	LIVER (BOVINE)	0.07	0.04		P.256	RHW	P.208	MJW
01/11/00	As	2	3.51	CERC STRIPED BASS	FISH (WHOLE)	4.02	2.38	+	P.256	MJW	P.208	MJW
01/11/00	As	48	8.16	IAEA MA-A-1	COPEPOD	8.57	4.83	+	P.256	MJW	P.208	MJW
01/11/00	As	68	179.	NRCC PACS-1	SEDIMENT (Marine)	243.	179.	+	P.256	MJW	P.208	MJW
01/11/00	As	71	21.0	NIST 2704	SEDIMENT (River)	26.5	20.3	+	P.256	MJW	P.208	MJW
10/27/99	Hg	2	2.08	CERC STRIPED BASS	FISH (WHOLE)	3.00	1.52	+	P.281h	MJW	P.198	MJW
10/27/99	Hg	89	3.74	NRCC DORM-2	Fillet (Dogfish)	5.36	3.92	-	P.281h	MJW	P.198	MJW
10/27/99	Hg	43	0.15	IAEA A-13	BLOOD	NC	NC		P.281h	MJW	P.198	MJW
10/27/99	Hg	43	0.12	IAEA A-13	BLOOD	NC	NC		P.281h	MJW	P.198	MJW
10/27/99	Hg	43	0.13	IAEA A-13	BLOOD	NC	NC		P.281h	MJW	P.198	MJW

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Table16. Concentrations of mercury, arsenic, and selenium in various reference and/or research materials...(cont'd).

BID[a]	Ele.	QC #	Meas. Conc.	Reference Material	Matrix	Upper Limit	Lower Limit	Pass/ Fail	Prep SOP	Prep Init.	ISOP[b]	Oper. Init.
11/12/99	Hg	2	2.06	CERC STRIPED BASS	FISH (WHOLE)	3.00	1.52	+	P.281h	MJW	P.198	MJW
11/12/99	Hg	75	< 0.01	NIST 8415	EGG (Whole)	0.007	0.001		P.281h	MJW	P.198	MJW
11/29/99	Hg	59	0.05	NIST 1577	LIVER (BOVINE)	0.020	0.012	-	P.510	MJW	P.198	MJW
11/29/99	Hg	72	< 0.02	NIST 1577b	LIVER (BOVINE)	0.003	0.003		P.510	MJW	P.198	MJW
11/29/99	Hg	89	4.05	NRCC DORM-2	Fillet (Dogfish)	5.36	3.92	+	P.510	MJW	P.198	MJW
12/28/99	Hg	2	2.12	CERC STRIPED BASS	FISH (WHOLE)	3.00	1.52	+	P.510	RHW	P.198	MJW
12/28/99	Hg	89	3.93	NRCC DORM-2	Fillet (Dogfish)	5.36	3.92	+	P.510	RHW	P.198	MJW
01/10/00	Hg	48	0.19	IAEA MA-A-1	COPEPOD	0.33	0.23	-	P.281h	JWA	P.198	MJW
01/10/00	Hg	71	1.41	NIST 2704	SEDIMENT (River)	1.69	1.25	+	P.281h	JWA	P.198	MJW
01/10/00	Hg	99	2.22	IRMM 463[m]	TUNA	3.30	2.41	-	P.281h	JWA	P.198	MJW

[a]BID = Block Initiation Date: a date assigned to each member of a group of samples that will identify the sample as a member of the group or "block."

[b]ISOP = instrumental standard operating procedure.

[c]CERC STRIPED BASS = Columbia Environmental Research Center research material: Whole Striped Bass Powder.

[d]NIST RM50 = National Institute of Standards and Technology Tuna Research Material RM50.

[e]NRCC DORM-2 = National Research Council Canada DORM-2 Dogfish Muscle Reference Tissue.

[f]IAEA A-13 = International Atomic Energy Agency Certified Reference Material: Freeze Dried Animal Blood.

[g]NIST 8415 = National Institute of Standards and Technology SRM 8415 Whole Egg Powder Reference Material.

[h]NIST 1577 = National Institute of Standards and Technology SRM 1577 Certified Reference Material: Bovine Liver.

[i]NIST 1577b = National Institute of Standards and Technology SRM 1577b Certified Reference Material: Bovine Liver.

[j]IAEA MA-A-1 = International Atomic Energy Agency Reference Material MA-A-1: Copepod Homogenate.

[k]NRCC PACS-1 = National Research Council Canada PACS-1 Marine Sediment Reference Material.

[l]NIST 2704 = National Institute of Standards and Technology Standard Reference Material: Buffalo River Sediment.

[m]IRMM 463 = Institute for Reference Materials and Measurements Certified Reference Material 463: Tuna Fish.

Table 17. Instrumental precision and sensitivity within an analytical "run" for mercury, arsenic, and selenium determined by cold vapor or hydride generation techniques.

BID[a]	Ele.	Run Date	Std. Conc.[b]	Volc (µL)	Initial Abs/Read	Mean Read[d]	# of checks	SD[e]	%RSD[f]	ISOP	Oper. Init.
10/13/99	Se	10/18/99	4.	500	0.086	0.08640	5	0.005177	6.0	P.207	MJW
11/01/99	Se	11/05/99	4.	500	0.081	0.07883	12	0.002855	3.6	P.207	MJW
11/19/99	Se	12/02/99	4.	500	0.087	0.07494	16	0.008079	10.8	P.207	MJW
12/01/99	Se	12/06/99	4.	500	0.081	0.07588	8	0.005222	6.9	P.207	MJW
01/11/00	Se	01/25/00	4.	500	0.085	0.08354	13	0.003357	0.0	P.207	MJW
11/01/99	As	12/17/99	9.	500	0.103	0.10628	18	0.003102	2.9	P.208	MJW
11/19/99	As	12/14/99	9.	500	0.089	0.09094	16	0.008729	9.6	P.208	MJW
12/01/99	As	12/13/99	9.	500	0.072	0.07586	7	0.003671	4.8	P.208	MJW
01/11/00	As	01/20/00	9.	500	0.087	0.08891	11	0.001814	0.0	P.208	MJW
10/27/99	Hg	12/29/99	9.	500	0.099	0.09908	12	0.000793	0.8	P.198	MJW
11/12/99	Hg	12/28/99	9.	500	0.099	0.09783	6	0.000753	0.8	P.198	MJW
11/29/99	Hg	12/27/99	9.	500	0.097	0.09800	5	0.000707	0.7	P.198	MJW
12/28/99	Hg	01/07/00	9.	500	0.101	0.10033	6	0.000516	0.5	P.198	MJW
01/10/00	Hg	01/14/00	9.	500	0.105	0.10480	5	0.000447	0.0	P.198	MJW

[a]BID = Block Initiation Date: a date assigned to each member of a group of samples that will identify the sample as a member of the group or "block."

[b]Std. Conc. = units in ppb unless otherwise noted.

[c]Vol (µL) = microliters of standard injected into graphite furnace.

[d]Mean Read = units are absorbance, concentration, or intensity depending upon instrumentation used.

[e]SD = standard deviation.

[f]%RSD = percent relative standard deviation.

Table 18. Percent relative standard deviation from the triplicate preparation and analysis of a whole blood sample.

Element	CERC# 20029 Rep1	CERC# 20029 Rep2	CERC# 20029 Rep3	Mean	SD	%RSD
Li	2	3	5	---	---	---
Be	< 1	< 1	< 1	---	---	---
Na	2000	3000	2000	2333	577	25
Mg	60	80	200	113	76	67
Al	3000	5000	4000	4000	1000	25
K	1000	1000	1000	1000	0	0
Ca	100	100	200	133	58	43
Ti	300	400	200	300	100	33
V	5	6	8	6	2	24
Cr	300	600	300	400	173	43
Mn	40	100	1000	380	538	142
Fe	223000	270000	568000	353667	187100	53
Co	2	3	8	4	3	74
Ni	30	100	1000	377	541	144
Cu	400	600	1000	667	306	46
Zn	7000	8000	18000	11000	6083	55
Ga	5	9	8	7	2	28
Ge	< 0.1	< 0.1	< 0.1	---	---	---
As	20	30	7000	2350	4027	171
Rb	1000	1000	1000	1000	0	0
Sr	100	200	90	130	61	47
Y	< 1	< 1	< 1	---	---	---
Zr	30	30	10	23	12	49
Nb	< 1	< 1	< 1	---	---	---
Mo	7	20	20	16	8	48
Ru	< 1	< 1	< 1	---	---	---
Pd	< 0.1	< 0.1	< 0.1	---	---	---
Ag	2	10	< 0.1	6	6	94
Cd	2	3	3	3	1	22
In	< 1	< 1	< 1	---	---	---
Sn	100	100	8	69	53	77

Element	CERC# 20029 Rep1	CERC# 20029 Rep2	CERC# 20029 Rep2	Mean	SD	%RSD
Sb	2	3	5	3	2	46
Te	< 0.1	< 0.1	< 0.1	---	---	---
Cs	2	3	3	3	1	22
Ba	50	100	200	117	76	65
La	< 0.1	< 0.1	< 0.1	---	---	---
Ce	< 0.1	< 0.1	< 0.1	---	---	---
Pr	< 0.1	< 0.1	< 0.1	---	---	---
Nd	< 0.1	< 0.1	< 0.1	---	---	---
Sm	< 0.1	< 0.1	< 0.1	---	---	---
Eu	< 0.1	< 0.1	< 0.1	---	---	---
Gd	< 0.1	< 0.1	< 0.1	---	---	---
Tb	< 0.1	< 0.1	< 0.1	---	---	---
Dy	< 0.1	< 0.1	< 0.1	---	---	---
Ho	< 0.1	< 0.1	< 0.1	---	---	---
Er	< 0.1	< 0.1	< 0.1	---	---	---
Tm	< 0.1	< 0.1	< 0.1	---	---	---
Yb	< 0.1	< 0.1	< 0.1	---	---	---
Lu	< 0.1	< 0.1	< 0.1	---	---	---
Hf	< 0.1	< 0.1	< 0.1	---	---	---
Ta	2	3	3	3	1	22
W	20	90	< 0.1	55	49	90
Re	< 0.1	< 0.1	< 0.1	---	---	---
Os	< 0.1	< 0.1	< 0.1	---	---	---
Ir	< 0.1	3	< 0.1	---	---	---
Pt	< 0.1	6	< 0.1	---	---	---
Au	2	< 0.1	< 0.1	---	---	---
Tl	< 0.1	< 0.1	< 0.1	---	---	---
Pb	40	100	1000	380	538	142
Bi	2	20	< 1	---	---	---
U	< 1	< 1	< 1	---	---	---

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Table 19. Percent relative standard deviation from the triplicate preparation and analysis of a blood reference material.

Element	IAEA A-13 Rep1	IAEA A-13 Rep2	IAEA A-13 Rep3	Mean	SD	%RSD
Li	< 1	< 1	< 1	---	---	---
Be	< 1	< 1	< 1	---	---	---
Na	14000	13000	16000	14333	1528	11
Mg	100	100	100	---	---	---
Al	1	2	2	2	0.6	35
K	2000	2000	3000	2333	577	25
Ca	300	300	300	300	0.	0
Ti	< 0.1	0.5	0.1	---	---	---
V	< 0.1	< 0.1	< 0.1	---	---	---
Cr	< 1	2	2	---	---	---
Mn	< 0.1	< 0.1	< 0.1	---	---	---
Fe	2000	2000	2000	2000	0	0
Co	< 0.1	< 0.1	< 0.1	---	---	---
Ni	< 1	< 1	< 1	---	---	---
Cu	5	5	5	5	0.0	0
Zn	10	10	10	10	0.0	0
Ga	< 0.1	< 0.1	< 0.1	---	---	---
Ge	< 0.1	< 0.1	< 0.1	---	---	---
As	< 0.1	< 0.1	< 0.1	---	---	---
Rb	3	2	3	2.67	0.6	22
Sr	< 1	< 1	< 1	---	---	---
Y	< 1	< 1	< 1	---	---	---
Zr	< 1	< 1	< 1	---	---	---
Nb	< 1	< 1	< 1	---	---	---
Mo	< 0.1	< 0.1	< 0.1	---	---	---
Ru	< 1	< 1	< 1	---	---	---
Pd	< 0.1	< 0.1	< 0.1	---	---	---
Ag	< 0.1	< 0.1	< 0.1	---	---	---
Cd	< 0.1	< 0.1	< 0.1	---	---	---
In	< 1	< 1	< 1	---	---	---
Sn	< 0.1	< 0.1	< 0.1	---	---	---
Sb	< 0.1	< 0.1	< 0.1	---	---	---
Te	< 0.1	< 0.1	< 0.1	---	---	---
Cs	< 1	< 1	< 1	---	---	---
Ba	< 1	< 1	< 1	---	---	---
La	< 0.1	< 0.1	< 0.1	---	---	---
Ce	< 0.1	< 0.1	< 0.1	---	---	---
Pr	< 0.1	< 0.1	< 0.1	---	---	---
Nd	< 0.1	< 0.1	< 0.1	---	---	---
Sm	< 0.1	< 0.1	< 0.1	---	---	---
Eu	< 0.1	< 0.1	< 0.1	---	---	---
Gd	< 0.1	< 0.1	< 0.1	---	---	---
Tb	< 0.1	< 0.1	< 0.1	---	---	---
Dy	< 0.1	< 0.1	< 0.1	---	---	---
Ho	< 0.1	< 0.1	< 0.1	---	---	---
Er	< 0.1	< 0.1	< 0.1	---	---	---
Tm	< 0.1	< 0.1	< 0.1	---	---	---
Yb	< 0.1	< 0.1	< 0.1	---	---	---
Lu	< 0.1	< 0.1	< 0.1	---	---	---
Hf	< 0.1	< 0.1	< 0.1	---	---	---
Ta	< 0.1	< 0.1	< 0.1	---	---	---
W	< 0.1	< 0.1	< 0.1	---	---	---
Re	< 0.1	< 0.1	< 0.1	---	---	---
Os	< 0.1	< 0.1	< 0.1	---	---	---
Ir	< 0.1	< 0.1	< 0.1	---	---	---
Pt	< 0.1	< 0.1	< 0.1	---	---	---
Au	< 0.1	< 0.1	< 0.1	---	---	---
Tl	< 0.1	< 0.1	< 0.1	---	---	---
Pb	< 1	< 1	< 1	---	---	---
Bi	< 1	< 1	< 1	---	---	---
U	< 1	< 1	< 1	---	---	---

Table 20. Percent relative standard deviation from the triplicate preparation and analysis of a bird egg sample.

Element	CERC# 18820 Rep1	CERC# 18820 Rep2	CERC# 18820 Rep3	Mean	SD	%RSD
Li	< 1	< 1	< 1	---	---	---
Be	< 1	< 1	< 1	---	---	---
Na	5000	5000	5000	5000	0	0
Mg	500	500	500	500	0	0
Al	< 0.1	< 0.1	< 0.1	---	---	---
K	5000	5000	5000	5000	0	0
Ca	2000	2000	2000	2000	0	0
Ti	2	3	3	3	1	22
V	0.2	0.2	0.2	0	0	0
Cr	3	3	2	3	1	22
Mn	1	1	1	1	0	0
Fe	80	70	70	73	6	8
Co	6	7	6	6	1	9
Ni	< 1	< 1	< 1	---	---	---
Cu	7	8	7	7	1	8
Zn	70	80	70	73	6	8
Ga	< 0.1	< 0.1	< 0.1	---	---	---
Ge	< 0.1	< 0.1	< 0.1	---	---	---
As	0.1	< 0.1	0.1	---	---	---
Rb	7	7	7	7	0	0
Sr	9	9	8	9	1	7
Y	< 1	< 1	< 1	---	---	---
Zr	< 1	< 1	< 1	---	---	---
Nb	< 1	< 1	< 1	---	---	---
Mo	0.1	0.1	< 0.1	0	0	0
Ru	< 1	< 1	< 1	---	---	---
Pd	< 0.1	< 0.1	< 0.1	---	---	---
Ag	< 0.1	< 0.1	< 0.1	---	---	---
Cd	2	< 0.1	< 0.1	---	---	---
In	< 1	< 1	< 1	---	---	---
Sn	0.2	0.1	< 0.1	---	---	---

Element	CERC# 18820 Rep1	CERC# 18820 Rep2	CERC# 18820 Rep2	Mean	SD	%RSD
Sb	< 0.1	< 0.1	< 0.1	---	---	---
Te	< 0.1	< 0.1	< 0.1	---	---	---
Cs	< 1	< 1	< 1	---	---	---
Ba	9	9	9	9	0	0
La	< 0.1	< 0.1	< 0.1	---	---	---
Ce	< 0.1	< 0.1	< 0.1	---	---	---
Pr	< 0.1	< 0.1	< 0.1	---	---	---
Nd	< 0.1	< 0.1	< 0.1	---	---	---
Sm	< 0.1	< 0.1	< 0.1	---	---	---
Eu	< 0.1	< 0.1	< 0.1	---	---	---
Gd	< 0.1	< 0.1	< 0.1	---	---	---
Tb	< 0.1	< 0.1	< 0.1	---	---	---
Dy	< 0.1	< 0.1	< 0.1	---	---	---
Ho	< 0.1	< 0.1	< 0.1	---	---	---
Er	< 0.1	< 0.1	< 0.1	---	---	---
Tm	< 0.1	< 0.1	< 0.1	---	---	---
Yb	< 0.1	< 0.1	< 0.1	---	---	---
Lu	< 0.1	< 0.1	< 0.1	---	---	---
Hf	< 0.1	< 0.1	< 0.1	---	---	---
Ta	< 0.1	< 0.1	< 0.1	---	---	---
W	0.2	0.3	0.3	0	0	22
Re	< 0.1	< 0.1	< 0.1	---	---	---
Os	< 0.1	< 0.1	< 0.1	---	---	---
Ir	< 0.1	< 0.1	< 0.1	---	---	---
Pt	< 0.1	< 0.1	< 0.1	---	---	---
Au	< 0.1	< 0.1	< 0.1	---	---	---
Tl	< 0.1	< 0.1	< 0.1	---	---	---
Pb	2	< 1	< 1	---	---	---
Bi	< 1	< 1	< 1	---	---	---
U	< 1	< 1	< 1	---	---	---

Table 21. Percent relative standard deviation from the triplicate preparation and analysis of a fish sample.

Element	CERC# 18826 Rep1	CERC# 18826 Rep2	CERC# 18826 Rep3	Mean	SD	%RSD
Li	< 1	< 1	< 1	---	---	---
Be	< 1	< 1	< 1	---	---	---
Na	5000	5000	5000	5000	0	0
Mg	2000	2000	2000	2000	0	0
Al	10	9	10	10	1	6
K	10000	11000	11000	10667	577	5
Ca	64000	61000	63000	62667	1528	2
Ti	8	9	9	9	1	7
V	0.3	0.2	0.2	0	0	25
Cr	2	2	2	2	0	0
Mn	20	20	20	20	0	0
Fe	70	80	80	77	6	8
Co	< 0.1	< 0.1	< 0.1	---	---	---
Ni	< 1	< 1	< 1	---	---	---
Cu	2	2	2	2	0	0
Zn	90	90	90	90	0	0
Ga	0.3	0.3	0.3	0	0	0
Ge	< 0.1	< 0.1	< 0.1	---	---	---
As	0.1	0.3	0.3	0	0	49
Rb	10	10	10	10	0	0
Sr	100	90	100	97	6	6
Y	< 1	< 1	< 1	---	---	---
Zr	< 1	< 1	< 1	---	---	---
Nb	< 1	< 1	< 1	---	---	---
Mo	< 0.1	< 0.1	< 0.1	---	---	---
Ru	< 1	< 1	< 1	---	---	---
Pd	< 0.1	< 0.1	< 0.1	---	---	---
Ag	< 0.1	< 0.1	< 0.1	---	---	---
Cd	< 0.1	< 0.1	< 0.1	---	---	---
In	< 1	< 1	< 1	---	---	---
Sn	10	10	10	10	0	0

Element	CERC# 18826 Rep1	CERC# 18826 Rep2	CERC# 18826 Rep2	Mean	SD	%RSD
Sb	< 0.1	< 0.1	< 0.1	---	---	---
Te	< 0.1	< 0.1	< 0.1	---	---	---
Cs	< 1	< 1	< 1	---	---	---
Ba	4	4	4	4	0	0
La	< 0.1	< 0.1	< 0.1	---	---	---
Ce	< 0.1	< 0.1	< 0.1	---	---	---
Pr	< 0.1	< 0.1	< 0.1	---	---	---
Nd	< 0.1	< 0.1	< 0.1	---	---	---
Sm	< 0.1	< 0.1	< 0.1	---	---	---
Eu	< 0.1	< 0.1	< 0.1	---	---	---
Gd	< 0.1	< 0.1	< 0.1	---	---	---
Tb	< 0.1	< 0.1	< 0.1	---	---	---
Dy	< 0.1	< 0.1	< 0.1	---	---	---
Ho	< 0.1	< 0.1	< 0.1	---	---	---
Er	< 0.1	< 0.1	< 0.1	---	---	---
Tm	< 0.1	< 0.1	< 0.1	---	---	---
Yb	< 0.1	< 0.1	< 0.1	---	---	---
Lu	< 0.1	< 0.1	< 0.1	---	---	---
Hf	< 0.1	< 0.1	< 0.1	---	---	---
Ta	< 0.1	< 0.1	< 0.1	---	---	---
W	< 0.1	< 0.1	< 0.1	---	---	---
Re	< 0.1	< 0.1	< 0.1	---	---	---
Os	< 0.1	< 0.1	< 0.1	---	---	---
Ir	< 0.1	< 0.1	< 0.1	---	---	---
Pt	< 0.1	< 0.1	< 0.1	---	---	---
Au	< 0.1	< 0.1	< 0.1	---	---	---
Tl	< 0.1	< 0.1	< 0.1	---	---	---
Pb	< 1	< 1	< 1	---	---	---
Bi	< 1	< 1	< 1	---	---	---
U	< 1	< 1	< 1	---	---	---

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Table 22. Percent relative standard deviation from the triplicate preparation and analysis of a bird liver sample.

Element	CERC# 18812 Rep1	CERC# 18812 Rep2	CERC# 18812 Rep3	Mean	SD	%RSD
Li	< 1	< 1	< 1	---	---	---
Be	< 1	< 1	< 1	---	---	---
Na	6000	6000	6000	6000	0	0
Mg	700	700	800	733	58	8
Al	4	3	4	4	1	16
K	9000	9000	9000	9000	0	0
Ca	500	500	500	500	0	0
Ti	300	200	300	267	58	22
V	< 0.1	< 0.1	< 0.1	---	---	---
Cr	1	1	1	1	0	0
Mn	10	10	10	10	0	0
Fe	300	400	400	367	58	16
Co	0.1	0.1	0.1	0	0	0
Ni	< 1	< 1	< 1	---	---	---
Cu	20	20	20	20	0	0
Zn	200	200	200	200	0	0
Ga	< 0.1	< 0.1	< 0.1	---	---	---
Ge	< 0.1	< 0.1	< 0.1	---	---	---
As	< 0.1	< 0.1	< 0.1	---	---	---
Rb	6	7	6	6	1	9
Sr	< 1	< 1	< 1	---	---	---
Y	< 1	< 1	< 1	---	---	---
Zr	< 1	< 1	< 1	---	---	---
Nb	< 1	< 1	< 1	---	---	---
Mo	2	2	2	2	0	0
Ru	< 1	< 1	< 1	---	---	---
Pd	< 1	< 1	< 1	---	---	---
Ag	< 0.1	< 0.1	< 0.1	---	---	---
Cd	< 0.1	< 0.1	< 0.1	---	---	---
In	< 1	< 1	< 1	---	---	---
Sn	< 0.1	< 0.1	< 0.1	---	---	---

Element	CERC# 18812 Rep1	CERC# 18812 Rep2	CERC# 18812 Rep2	Mean	SD	%RSD
Sb	< 0.1	< 0.1	< 0.1	---	---	---
Te	< 0.1	< 0.1	< 0.1	---	---	---
Cs	< 1	< 1	< 1	---	---	---
Ba	< 1	< 1	< 1	---	---	---
La	< 0.1	< 0.1	< 0.1	---	---	---
Ce	< 0.1	< 0.1	< 0.1	---	---	---
Pr	< 0.1	< 0.1	< 0.1	---	---	---
Nd	< 0.1	< 0.1	< 0.1	---	---	---
Sm	< 0.1	< 0.1	< 0.1	---	---	---
Eu	< 0.1	< 0.1	< 0.1	---	---	---
Gd	< 0.1	< 0.1	< 0.1	---	---	---
Tb	< 0.1	< 0.1	< 0.1	---	---	---
Dy	< 0.1	< 0.1	< 0.1	---	---	---
Ho	< 0.1	< 0.1	< 0.1	---	---	---
Er	< 0.1	< 0.1	< 0.1	---	---	---
Tm	< 0.1	< 0.1	< 0.1	---	---	---
Yb	< 0.1	< 0.1	< 0.1	---	---	---
Lu	< 0.1	< 0.1	< 0.1	---	---	---
Hf	< 0.1	< 0.1	< 0.1	---	---	---
Ta	< 0.1	< 0.1	0.1	---	---	---
W	< 0.1	< 0.1	< 0.1	---	---	---
Re	< 0.1	< 0.1	< 0.1	---	---	---
Os	< 0.1	< 0.1	< 0.1	---	---	---
Ir	< 0.1	< 0.1	< 0.1	---	---	---
Pt	< 0.1	< 0.1	< 0.1	---	---	---
Au	< 0.1	< 0.1	< 0.1	---	---	---
Tl	< 0.1	< 0.1	< 0.1	---	---	---
Pb	< 1	< 1	< 1	---	---	---
Bi	< 1	< 1	< 1	---	---	---
U	< 1	< 1	< 1	---	---	---

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Table 23. . ercent relative standard deviation from the triplicate preparation and analysis of a vole sample.

Element	CERC# 18839 Rep1	CERC# 18839 Rep2	CERC# 18839 Rep3	Mean	SD	%RSD
Li	1	1	1	1	0	0
Be	< 1	< 1	< 1	---	---	---
Na	5000	5000	5000	5000	0	0
Mg	2000	2000	2000	2000	0	0
Al	1000	2000	1000	1333	577	43
K	10000	12000	12000	11333	1155	10
Ca	43000	32000	45000	40000	7000	18
Ti	50	60	50	53	6	11
V	3	3	3	3	0	0
Cr	3	4	3	3	1	17
Mn	40	50	50	47	6	12
Fe	800	900	800	833	58	7
Co	1	1	1	1	0	0
Ni	1	2	1	1	1	43
Cu	10	20	20	17	6	35
Zn	100	100	100	100	0	0
Ga	1	1	1	1	0	0
Ge	< 0.1	< 0.1	< 0.1	---	---	---
As	0.2	< 0.1	< 0.1	---	---	---
Se						
Rb	10	10	10	10	0	0
Sr	50	40	50	47	6	12
Y	< 1	< 1	< 1	---	---	---
Zr	< 1	< 1	< 1	---	---	---
Nb	< 1	< 1	< 1	---	---	---
Mo	2	2	2	2	0	0
Ru	< 1	< 1	< 1	---	---	---
Pd	< 0.1	< 0.1	< 0.1	---	---	---
Ag	< 0.1	< 0.1	< 0.1	---	---	---
Cd	< 0.1	< 0.1	< 0.1	---	---	---
In	< 1	< 1	< 1	---	---	---
Sn	< 0.1	< 0.1	< 0.1	---	---	---

Element	CERC# 18839 Rep1	CERC# 18839 Rep2	CERC# 18839 Rep2	Mean	SD	%RSD
Sb	< 0.1	< 0.1	< 0.1	---	---	---
Te	< 0.1	< 0.1	< 0.1	---	---	---
Cs	< 1	< 1	< 1	---	---	---
Ba	20	20	20	20	0	0
La	0.8	0.9	0.8	1	0	7
Ce	2	2	2	2	0	0
Pr	0.2	0.2	0.2	0	0	0
Nd	0.6	0.8	0.7	1	0	14
Sm	0.1	0.2	0.1	0	0	43
Eu	< 0.1	< 0.1	< 0.1	---	---	---
Gd	0.1	0.2	0.1	0	0	43
Tb	< 0.1	< 0.1	< 0.1	---	---	---
Dy	0.1	0.1	0.1	0	0	0
Ho	< 0.1	< 0.1	< 0.1	---	---	---
Er	< 0.1	< 0.1	< 0.1	---	---	---
Tm	< 0.1	< 0.1	< 0.1	---	---	---
Yb	< 0.1	< 0.1	< 0.1	---	---	---
Lu	< 0.1	< 0.1	< 0.1	---	---	---
Hf	< 0.1	< 0.1	< 0.1	---	---	---
Ta	0.2	< 0.1	< 0.1	---	---	---
W	< 0.1	< 0.1	< 0.1	---	---	---
Re	< 0.1	< 0.1	< 0.1	---	---	---
Os	< 0.1	< 0.1	< 0.1	---	---	---
Ir	< 0.1	< 0.1	< 0.1	---	---	---
Pt	< 0.1	< 0.1	< 0.1	---	---	---
Au	< 0.1	< 0.1	< 0.1	---	---	---
Tl	< 0.1	< 0.1	< 0.1	---	---	---
Pb	< 1	< 1	< 1	---	---	---
Bi	< 1	< 1	< 1	---	---	---
U	< 1	< 1	< 1	---	---	---

Table 24. Percent relative standard deviation from the triplicate preparation and analysis of an eagle egg sample.

Element	CERC# 19861 Rep1	CERC# 19861 Rep2	CERC# 19861 Rep3	Mean	SD	%RSD
Li	< 1	< 1	< 1	---	---	---
Be	< 1	< 1	< 1	---	---	---
Na	11000	11000	11000	11000	0	0
Mg	600	600	600	600	0	0
Al	3	2	10	5	4	87
K	5000	5000	5000	5000	0	0
Ca	6000	6000	6000	6000	0	0
Ti	3	1	2	2	1	50
V	< 0.1	< 0.1	< 0.1	---	---	---
Cr	1	1	1	1	0	0
Mn	0.4	0.5	0.8	1	0	37
Fe	70	50	80	67	15	23
Co	0.6	0.5	0.6	1	0	10
Ni	< 1	< 1	< 1	---	---	---
Cu	6	6	6	6	0	0
Zn	60	60	60	60	0	0
Ga	< 0.1	< 0.1	< 0.1	---	---	---
Ge	< 0.1	< 0.1	< 0.1	---	---	---
As	< 0.1	< 0.1	< 0.1	---	---	---
Rb	7	7	7	7	0	0
Sr	2	2	2	2	0	0
Y	< 1	< 1	< 1	---	---	---
Zr	< 1	< 1	< 1	---	---	---
Nb	< 1	< 1	< 1	---	---	---
Mo	0.2	0.2	0.2	0	0	0
Ru	< 1	< 1	< 1	---	---	---
Pd	< 0.1	< 0.1	< 0.1	---	---	---
Ag	< 0.1	< 0.1	< 0.1	---	---	---
Cd	< 0.1	< 0.1	< 0.1	---	---	---
In	< 1	< 1	< 1	---	---	---
Sn	0.1	0.2	0.2	0.2	0.1	35

Element	CERC# 19861 Rep1	CERC# 19861 Rep2	CERC# 19861 Rep2	Mean	SD	%RSD
Sb	< 0.1	< 0.1	< 0.1	---	---	---
Te	< 0.1	< 0.1	< 0.1	---	---	---
Cs	< 1	< 1	< 1	---	---	---
Ba	< 1	< 1	< 1	---	---	---
La	< 0.1	< 0.1	< 0.1	---	---	---
Ce	< 0.1	< 0.1	< 0.1	---	---	---
Pr	< 0.1	< 0.1	< 0.1	---	---	---
Nd	< 0.1	< 0.1	< 0.1	---	---	---
Sm	< 0.1	< 0.1	< 0.1	---	---	---
Eu	< 0.1	< 0.1	< 0.1	---	---	---
Gd	< 0.1	< 0.1	< 0.1	---	---	---
Tb	< 0.1	< 0.1	< 0.1	---	---	---
Dy	< 0.1	< 0.1	< 0.1	---	---	---
Ho	< 0.1	< 0.1	< 0.1	---	---	---
Er	< 0.1	< 0.1	< 0.1	---	---	---
Tm	< 0.1	< 0.1	< 0.1	---	---	---
Yb	< 0.1	< 0.1	< 0.1	---	---	---
Lu	< 0.1	< 0.1	< 0.1	---	---	---
Hf	< 0.1	< 0.1	< 0.1	---	---	---
Ta	< 0.1	< 0.1	< 0.1	---	---	---
W	0.2	0.1	0.1	0	0	43
Re	< 0.1	< 0.1	< 0.1	---	---	---
Os	< 0.1	< 0.1	< 0.1	---	---	---
Ir	< 0.1	< 0.1	< 0.1	---	---	---
Pt	< 0.1	< 0.1	< 0.1	---	---	---
Au	< 0.1	< 0.1	< 0.1	---	---	---
Tl	< 0.1	< 0.1	< 0.1	---	---	---
Pb	< 1	< 1	< 1	---	---	---
Bi	< 1	< 1	< 1	---	---	---
U	< 1	< 1	< 1	---	---	---

Table 4 Percent relative standard deviation from the triplicate preparation and analysis of a fish sample.

Element	CERC# 19871 Rep1	CERC# 19871 Rep2	CERC# 19871 Rep3	Mean	SD	%RSD
Li	< 1	< 1	< 1	---	---	---
Be	< 1	< 1	< 1	---	---	---
Na	4000	1000	5000	3333	2082	62
Mg	2000	800	2000	1600	693	43
Al	500	100	300	300	200	67
K	12000	7000	14000	11000	3606	33
Ca	38000	14000	54000	35333	20133	57
Ti	20	4	20	15	9	63
V	1	0.1	0.5	1	0	85
Cr	2	1	2	2	1	35
Mn	40	10	50	33	21	62
Fe	600	100	300	333	252	75
Co	0.3	< 0.1	0.1	---	---	---
Ni	< 1	< 1	< 1	---	---	---
Cu	4	< 1	4	---	---	---
Zn	90	100	90	93	6	6
Ga	0.5	0.1	0.5	0	0	63
Ge	< 0.1	< 0.1	< 0.1	---	---	---
As	0.4	0.8	0.2	0	0	65
Rb	10	5	10	8	3	35
Sr	50	20	80	50	30	60
Y	< 1	< 1	< 1	---	---	---
Zr	< 1	< 1	< 1	---	---	---
Nb	< 1	< 1	< 1	---	---	---
Mo	< 0.1	< 0.1	< 0.1	---	---	---
Ru	< 1	< 1	< 1	---	---	---
Pd	< 0.1	< 0.1	< 0.1	---	---	---
Ag	< 0.1	< 0.1	< 0.1	---	---	---
Cd	< 0.1	< 0.1	< 0.1	---	---	---
In	< 1	< 1	< 1	---	---	---
Sn	7	6	6	6.3	0.6	9

Element	CERC# 19871 Rep1	CERC# 19871 Rep2	CERC# 19871 Rep2	Mean	SD	%RSD
Sb	< 0.1	< 0.1	< 0.1	---	---	---
Te	< 0.1	< 0.1	< 0.1	---	---	---
Cs	< 1	< 1	< 1	---	---	---
Ba	8	2	8	6	3	58
La	0.2	< 0.1	0.2	---	---	---
Ce	0.4	< 0.1	0.3	---	---	---
Pr	< 0.1	< 0.1	< 0.1	---	---	---
Nd	0.2	< 0.1	0.1	---	---	---
Sm	< 0.1	< 0.1	< 0.1	---	---	---
Eu	< 0.1	< 0.1	< 0.1	---	---	---
Gd	< 0.1	< 0.1	< 0.1	---	---	---
Tb	< 0.1	< 0.1	< 0.1	---	---	---
Dy	< 0.1	< 0.1	< 0.1	---	---	---
Ho	< 0.1	< 0.1	< 0.1	---	---	---
Er	< 0.1	< 0.1	< 0.1	---	---	---
Tm	< 0.1	< 0.1	< 0.1	---	---	---
Yb	< 0.1	< 0.1	< 0.1	---	---	---
Lu	< 0.1	< 0.1	< 0.1	---	---	---
Hf	< 0.1	< 0.1	< 0.1	---	---	---
Ta	< 0.1	< 0.1	< 0.1	---	---	---
W	< 0.1	< 0.1	< 0.1	---	---	---
Re	< 0.1	< 0.1	< 0.1	---	---	---
Os	< 0.1	< 0.1	< 0.1	---	---	---
Ir	< 0.1	< 0.1	< 0.1	---	---	---
Pt	< 0.1	< 0.1	< 0.1	---	---	---
Au	< 0.1	< 0.1	< 0.1	---	---	---
Tl	< 0.1	< 0.1	< 0.1	---	---	---
Pb	< 1	< 1	< 1	---	---	---
Bi	< 1	< 1	< 1	---	---	---
U	< 1	< 1	< 1	---	---	---

304950

Table 26. Percent relative standard deviation from triplicate preparation and analysis of samples for mercury, arsenic, and selenium.....(con'td).....

BID[a]	Ele.	Matrix	Rep 1	Rep 2	Rep 3	Mean	Units	SD[b]	%RSD[c]	PSOP[d]	Prep. Init.	ISOP[e]	Oper. Init.
01/11/00	As	Swallow	- 0.01	0.06	0.01	0.02	ug/g	0.0360	187.[f]	P.256	MJW	P.208	MJW
01/11/00	As	Fish	1.52	1.42	1.59	1.51	ug/g	0.0870	5.8	P.256	MJW	P.208	MJW
01/11/00	As	Sediment	15.2	14.2	14.5	14.7	ug/g	0.5040	3.4	P.256	MJW	P.208	MJW
10/27/99	Hg	Blood	0.14	0.12	0.15	0.14	ug/g	0.0153	11.	P.281h	MJW	P.198	MJW
10/27/99	Hg	Blood	0.15	0.12	0.13	0.13	ug/g	0.0148	11.	P.281h	MJW	P.198	MJW
11/12/99	Hg	Egg	0.23	0.22	0.22	0.23	ug/g	0.0080	3.6	P.281h	MJW	P.198	MJW
11/12/99	Hg	Fish	1.20	1.23	1.18	1.21	ug/g	0.0253	2.1	P.281h	MJW	P.198	MJW
11/29/99	Hg	Liver	2.39	2.39	2.39	2.39	ug/g	0.0029	0.1	P.510	MJW	P.198	MJW
11/29/99	Hg	Vole	0.01	0.02	0.02	0.02	ug/g	0.0062	36.[f]	P.510	MJW	P.198	MJW
12/28/99	Hg	Egg	1.85	1.85	1.84	1.85	ug/g	0.0031	0.2	P.510	RHW	P.198	MJW
12/28/99	Hg	Fish	0.47	0.46	0.49	0.47	ug/g	0.0134	2.8	P.510	RHW	P.198	MJW
01/10/00	Hg	Sediment	0.06	0.06	0.06	0.06	ug/g	0.0033	5.6	P.281h	JWA	P.198	MJW

[a]BID = Block Initiation Date: a date assigned to each member of a group of samples that will identify the sample as a member of the group or "block."

[b]SD = standard deviation.

[c]%RSD = percent relative standard deviation.

[d]PSOP = standard operating procedure used for chemical preparation of sample.

[e]ISOP = standard operating procedure used for instrumental analysis of sample.

[f]one or more replicate concentrations < the method detection limit; see Table 40.

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Table 27. Relative percent difference for duplicates preparation and analysis of samples for mercury, arsenic, and selenium.

BID[a]	Element	Matrix	Dup 1	Dup 2	Mean	Units	Diff.[b]	RPD[c]	PSOP[d]	Prep Init.	ISOP[e]	Operator Init.
11/19/99	Se	Fish	1.27	1.19	1.23	ug/g	0.085	6.9	P.256	MJW	P.207	MJW
11/19/99	Se	Fish	1.63	1.58	1.60	ug/g	0.053	3.3	P.256	MJW	P.207	MJW
11/19/99	Se	Fish	1.75	1.89	1.82	ug/g	0.144	7.9	P.256	MJW	P.207	MJW
11/19/99	Se	Fish	0.98	1.12	1.05	ug/g	0.140	13.	P.256	MJW	P.207	MJW
11/19/99	Se	Fish	1.29	1.13	1.21	ug/g	0.159	13.	P.256	MJW	P.207	MJW
11/19/99	Se	Fish	1.20	1.21	1.20	ug/g	0.004	0.4	P.256	MJW	P.207	MJW
11/19/99	Se	Fish	1.80	1.78	1.79	ug/g	0.016	0.9	P.256	MJW	P.207	MJW
11/19/99	Se	Fish	1.39	1.65	1.52	ug/g	0.261	17.	P.256	MJW	P.207	MJW
11/19/99	Se	Fish	1.49	1.71	1.60	ug/g	0.216	13.	P.256	MJW	P.207	MJW
11/19/99	Se	Fish	1.87	2.03	1.95	ug/g	0.166	8.5	P.256	MJW	P.207	MJW
11/19/99	Se	Fish	2.07	2.20	2.13	ug/g	0.128	6.0	P.256	MJW	P.207	MJW
11/19/99	Se	Fish	1.81	2.20	2.00	ug/g	0.386	19.	P.256	MJW	P.207	MJW
12/1/99	Se	Liver	6.73	7.17	6.95	ug/g	-0.444	6.4	P.256	RHW	P.207	MJW
1/11/00	Se	Eel	0.84	0.77	0.81	ug/g	0.073	9.0	P.256	MJW	P.207	MJW
12/1/99	As	Liver	-0.03	-0.09	-0.06	ug/g	0.058	102.[f]	P.256	RHW	P.208	MJW
1/11/00	As	Eel	0.81	0.75	0.78	ug/g	0.068	8.7	P.256	MJW	P.208	MJW

[a]BID = Block Initiation Date: a date assigned to each member of a group of samples that will identify the sample as a member of the group or block.

[b]Diff = Dup 1 - Dup 2.

[c]RPD = relative percent difference, calculated as Diff/Mean X 100; acceptance criteria +/- 10%.

[d]PSOP = standard operating procedure used for chemical preparation of sample.

[e]ISOP = standard operating procedure used for instrumental analysis of sample.

[f]one or more duplicate concentrations < the method detection limit; see Table 40.

304952

Table 28. Recovery of elements spiked into blanks, whole blood, or reference blood material prior to acid digestion.

a. Digestion Blank

Element	Spike Conc (ug/L)	Bkgd Conc (ug/L)	Spk/Bkgd Ratio	Total Conc (ug/mL)	% Recovery
Mg	100000.	277.	361.	108732.	108.
Al	1000.	72.	14.	1358.	129.
Ca	100000.	572.	175.	108686.	108.
Mn	1000.	0.0	∞	1120.	112.
Fe	500.	1519.	0.3	---	---
Ni	1000.	2.7	375.	1116.	111.
Cu	1000.	1.3	750.	1100.	110.
Zn	10000.	2.7	3750.	13282.	133.
Pb	1000.	0.0	∞	1040.	104.

b. IAEA-A-13 (dried animal blood-low spike)

Element	Spike Conc (ug/g)	Bkgd Conc (ug/g)	Spk/Bkgd Ratio	Total Conc (ug/g)	% Recovery
Mg	495.	126.	4.	705.	117.
Al	9.9	1.731	6.	18.1	165.
K	990.	2334.	0.4	3208.	88.
Ca	495.	300.	2.	843.	110.
Fe	990.	1699.	0.6	2296.	60.
Ni	9.9	0.14	72.	10.8	108.
Cu	9.9	4.8	2.	15.9	112.
Zn	9.9	13.7	0.7	25.9	124.
Pb	9.9	0.23	43.	10.1	100.

c. IAEA-A-13 (dried animal blood-high spike)

Element	Spike Conc (ug/g)	Bkgd Conc (ug/g)	Spk/Bkgd Ratio	Total Conc (ug/mL)	% Recovery
Mg	2262.	126.	18.	2786.	118.
Al	45.2	1.731	26.	52.5	112.
K	4525.	2334.	2.	6647.	95.
Ca	2262.	300.	8.	2847.	113.
Fe	4525.	1699.	3.	5015.	73.
Ni	45.2	0.14	329.	50.7	112.
Cu	45.2	4.8	9.	54.2	109.
Zn	45.2	13.7	3.	70.8	126.
Pb	45.2	0.23	196.	48.1	106.

d. CERC# 20029 (whole blood)

Element	Spike Conc (ug/mL)	Bkgd Conc (ug/mL)	Spk/Bkgd Ratio	Total Conc (ug/g)	% Recovery
Mg	99300.	73647.	1.3	163113.6	90.
Al	993.	3082.	0.3	4322.	125.
Ca	99300.	100075.	0.99	156016.5	56.
Mn	993.	64.4	15.	1093.7	104.
Fe	497.	258784.	< 0.1	---	---
Ni	993.	63.5	16.	1122.8	107.
Cu	993.	547.	1.8	1488.3	95.
Zn	9930.	7270.	1.4	18145.2	110.
Pb	993.	71.4	14.	987.8	92.

304953

Table 29. Recovery of elements spiked into bird egg and fish samples prior to acid digestion.

a. 18820 low spike

Element	Spike Conc (ug/g)	Bkgd Conc (ug/g)	Spk/Bkgd Ratio	Total Conc (ug/g)	% Recovery
Be	3.98	0.00	∞	5.23	131.
Cr	3.98	2.7	1.5	6.85	105.
Co	3.98	6.6	0.60	11.6	127.
Ni	3.98	0.10	40.	4.90	121.
Zn	39.8	75.	0.53	129.	135.
Cd	3.98	0.56	7.1	4.77	106.
Ba	0.80	8.8	0.09	9.8	125.
Tb	3.98	0.00	∞	3.60	90.
Pb	3.98	0.65	6.1	4.76	103.

b. 18820 high spike

Element	Spike Conc (ug/g)	Bkgd Conc (ug/g)	Spk/Bkgd Ratio	Total Conc (ug/g)
Be	19.7	0.00	∞	26.
Cr	19.7	2.7	7.	23.6
Co	19.7	6.6	3.0	29.
Ni	19.7	0.10	199.	24.
Zn	197.	75.	2.6	343.
Cd	19.7	0.56	35.	24.0
Ba	3.95	8.8	0.4	13.9
Tb	19.7	0.00	∞	18.0
Pb	19.7	0.65	30.	23.2

c. 18826 low spike

Element	Spike Conc (ug/g)	Bkgd Conc (ug/g)	Spk/Bkgd Ratio	Total Conc (ug/g)	% Recovery
Be	3.99	0.003	1507.	5.44	136.
Cr	3.99	2.1	2.	7.07	124.
Co	3.99	0.046	87.	4.8	119.
Ni	3.99	- 0.27	15.	4.72	125.
Zn	39.9	89.	0.	151.	155.
Cd	3.99	0.03	133.	5.02	125.
Ba	0.80	4.2	0.	5.1	119.
Tb	3.99	0.00	∞	3.97	100.
Pb	3.99	0.13	30.	4.79	117.

d. 18826 high spike

Element	Spike Conc (ug/g)	Bkgd Conc (ug/g)	Spk/Bkgd Ratio	Total Conc (ug/g)
Be	19.9	0.003	7517.9	26.
Cr	19.9	2.1	9.3	24.7
Co	19.9	0.046	434.70	23.
Ni	19.9	- 0.27	74.	25.
Zn	199.	89.	2.	366.
Cd	19.9	0.03	664.6	23.7
Ba	3.98	4.2	1.0	10.2
Tb	19.9	0.00	∞	19.1
Pb	19.9	0.13	148.	23.5

304954

Table 30. Recovery of elements spiked into bird liver and vole samples prior to acid digestion.

a. 18812 low spike

Element	Spike Conc (ug/g)	Bkgd Conc (ug/g)	Spk/Bkgd Ratio	Total Conc (ug/g)	% Recovery
Be	2.01	0.003	750.	2.77	138.
Cr	2.01	1.4	1.5	3.58	110.
Co	2.01	0.107	18.7	2.4	112.
Ni	2.01	0.061	32.9	2.26	109.
Zn	201.	155.	1.3	399.	122.
Cd	2.01	0.021	97.8	2.34	115.
Ba	2.01	0.0	∞	2.96	147.
Tb	2.01	0.0007	3009.	1.76	88.
Tm	2.01	0.001	1504.	1.78	89.
Pb	2.01	0.042	48.2	2.24	110.

b. 18812 high spike

Element	Spike Conc (ug/g)	Bkgd Conc (ug/g)	Spk/Bkgd Ratio	Total Conc (ug/g)	% Recovery
Be	20.1	0.003	7503.	26.0	129.
Cr	20.1	1.4	14.6	22.4	105.
Co	20.1	0.107	187.	21.0	104.
Ni	20.1	0.061	329.	21.7	108.
Zn	2012.	155.	13.0	1970.	90.
Cd	20.1	0.021	978.	21.7	108.
Ba	20.1	0.0	∞	26.2	131.
Tb	20.1	0.0007	30090.	16.2	81.
Tm	20.1	0.001	15045.	16.9	84.
Pb	20.1	0.042	482.	20.3	101.

c. 18839 low spike

Element	Spike Conc (ug/g)	Bkgd Conc (ug/g)	Spk/Bkgd Ratio	Total Conc (ug/g)	% Recovery
Be	1.996	0.080	25.1	2.65	129.
Cr	1.996	3.40	0.6	5.43	102.
Co	1.996	1.17	1.7	3.11	97.
Ni	1.996	1.47	1.4	3.43	98.
Zn	199.6	117.	1.7	362.	123.
Cd	1.996	0.076	26.4	2.28	110.
Ba	1.996	21.8	0.09	---	---
Tb	1.996	0.021	97.1	1.80	89.
Tm	1.996	0.009	232.	1.75	87.
Pb	1.996	0.61	3.3	2.60	100.

d. 18839 high spike

Element	Spike Conc (ug/g)	Bkgd Conc (ug/g)	Spk/Bkgd Ratio	Total Conc (ug/g)	% Recovery
Be	19.61	0.080	246.	22.2	113.
Cr	19.61	3.40	5.8	22.9	99.
Co	19.61	1.17	16.7	21.2	102.
Ni	19.61	1.47	13.4	22.5	107.
Zn	1961.	117.	16.8	1818.	87.
Cd	19.61	0.076	260.	21.2	108.
Ba	19.61	21.8	0.90	45.9	123.
Tb	19.61	0.021	954.	16.1	82.
Tm	19.61	0.009	2279.	16.0	82.
Pb	19.61	0.61	32.3	21.4	106.

304955

Table 31. Recovery of elements spiked into a blank and eagle egg samples prior to acid digestion.

a. Blank spike ∞

Element	Spike Conc (ug/g)	Bkgd Conc (ug/g)	Spk/Bkgd Ratio	Total Conc (ug/g)	% Recovery
Be	25.	0.029	857.	30.6	122.
Cr	25.	0.4	66.	26.0	102.
Co	25.	0.004	6000.	25.3	101.
Ni	25.	0.069	361.	27.4	109.
Zn	2500.	0.6	3861.	2207.	88.
Cd	25.	0.0	∞	28.3	113.
Ba	25.	0.013	1875.	32.9	132.
Tb	25.	0.0	∞	17.0	68.
Tm	25.	0.0	∞	16.5	66.
Pb	25.	0.309	81.	25.6	101.

c. 19861 spike

Element	Spike Conc (ug/g)	Bkgd Conc (ug/g)	Spk/Bkgd Ratio	Total Conc (ug/g)	% Recovery
Be	25.2	0.01	2165.	31.1	124.
Cr	25.2	1.18	21.	27.7	105.
Co	25.2	0.56	45.	27.6	107.
Ni	25.2	0.06	446.	27.4	108.
Zn	2519.	59.5	42.	2372.	92.
Cd	25.2	0.0	∞	30.0	119.
Ba	25.2	0.1	427.	34.2	135.
Tb	25.2	0.0	∞	17.4	69.
Tm	25.2	0.0	∞	17.6	70.
Pb	25.2	0.03	961.	25.7	102.

304956

Table 32. Percent recoveries of mercury, arsenic, and selenium in digested spikes.

1 BID[a]	2 Ele.	3 Spike Form	4 Amt.[b] ug	5 Matrix	6 Total ug[c] Meas.	7 Bkgd.[d] ug	8 Spk/Bkdg[e]	9 Spk/Bkg[d] SD	10 % REC[f]	PSOP	Prep. Init.	ISOP	Oper. Init.
10/13/99	Se	SeMETH	1.	Fish	1.71	0.765	1.3	862.	95.	P.256	MJW	P.207	MJW
10/13/99	Se	Se+4	10.	Fish	11.8	0.751	13.	265.	111.	P.256	MJW	P.207	MJW
11/01/99	Se	Se+4	20.	Blood Blank	20.4	-0.030	- 667.	3914.	102.	P.256	MJW	P.207	MJW
11/01/99	Se	Se+4	100.	Blood	105.	0.050	2000.	4673.	105.	P.256	MJW	P.207	MJW
11/01/99	Se	SeMETH	200.	Blood	200.	0.054	3704.	8547.	100.	P.256	MJW	P.207	MJW
11/01/99	Se	SeMETH	5.	Blood	6.13	0.789	6.3	265.	107.	P.256	MJW	P.207	MJW
11/01/99	Se	SeMETH	200.	Blood	197.	0.561	357.	265.	98.	P.256	MJW	P.207	MJW
11/19/99	Se	Se+4	1.	Egg	1.88	0.826	1.2	37.	105.	P.256	MJW	P.207	MJW
11/19/99	Se	SeMETH	10.	Egg	11.5	0.809	12.	379.	107.	P.256	MJW	P.207	MJW
11/19/99	Se	Se+4	10.	Egg	10.4	0.616	16.	424.	98.	P.256	MJW	P.207	MJW
11/19/99	Se	SeMETH	200.	Egg	182.	0.622	322.	8403.	91.	P.256	MJW	P.207	MJW
11/19/99	Se	Se+4	1.	Fish	1.69	0.542	1.8	38.	115.	P.256	MJW	P.207	MJW
11/19/99	Se	SeMETH	10.	Fish	11.4	0.533	19.	391.	109.	P.256	MJW	P.207	MJW
11/19/99	Se	Se+4	10.	Fish	11.1	0.551	18.	219.	106.	P.256	MJW	P.207	MJW
11/19/99	Se	SeMETH	200.	Fish	202.	0.552	362.	4367.	101.	P.256	MJW	P.207	MJW
12/01/99	Se	Se+4	10.	Liver	15.	3.400	3.	139.	113.	P.256	RHW	P.207	MJW
12/01/99	Se	SeMETH	200.	Liver	206.	3.435	58.	2755.	101.	P.256	RHW	P.207	MJW
12/01/99	Se	Se+4	10.	Vole	11.	0.304	33.	637.	108.	P.256	RHW	P.207	MJW
12/01/99	Se	SeMETH	200.	Vole	207.	0.309	647.	12500.	103.	P.256	RHW	P.207	MJW
12/01/99	Se	Se+4	1.	Liver Blank	1.	-0.001	- 1000.	24.	112.	P.256	RHW	P.207	MJW
01/11/00	Se	Se+4	1.	Swallow	2.	0.870	1.	32.	109.	P.256	MJW	P.207	MJW
01/11/00	Se	SeMETH	10.	Swallow	12.	0.870	11.	318.	112.	P.256	MJW	P.207	MJW
01/11/00	Se	Se+4	1.	Fish	1.	0.364	3.	41.	110.	P.256	MJW	P.207	MJW
01/11/00	Se	SeMETH	10.	Fish	11.	0.365	27.	412.	104.	P.256	MJW	P.207	MJW
01/11/00	Se	Se+4	1.	Sediment	1.	0.093	11.	96.	97.	P.256	MJW	P.207	MJW
01/11/00	Se	SeMETH	10.	Sediment	10.	0.094	106.	952.	95.	P.256	MJW	P.207	MJW

304957

Table 32. Percent recoveries of mercury, arsenic, and selenium in digested spikes.....(con'td).....

1 BID[a]	2 Ele.	3 Spike Form	4 Amt.[b] ug	5 Matrix	6 Total ug[c] Meas.	7 Bkgd.[d] ug	8 Spk/Bkdg[e]	9 Spk/Bkg[d] SD	10 % REC[f]	PSOP	Prep. Init.	ISOP	Oper. Init.
11/01/99	As	As	2.	Blood	0.18	0.021	95.	76.	8.	P.256	MJW	P.208	MJW
11/01/99	As	As	10.	Blood	1.6	0.023	435.	347.	16.	P.256	MJW	P.208	MJW
11/01/99	As	As	1.	Blood	0.0	0.001	1000.	23.	0.	P.256	MJW	P.208	MJW
11/01/99	As	As	1.	Blood Blank	1.	0.019	53.	23.	87.	P.256	MJW	P.208	MJW
11/19/99	As	As+5	1.	Egg	1.	-0.013	77.	63.	108.	P.256	MJW	P.208	MJW
11/19/99	As	(CH3)4AsI	10.	Egg	10.95	-0.013	769.	645.	110.	P.256	MJW	P.208	MJW
11/19/99	As	As+5	2.	Egg	2.	-0.046	43.	33.	89.	P.256	MJW	P.208	MJW
11/19/99	As	As+5	10.	Egg	6.24	-0.046	217.	164.	63.	P.256	MJW	P.208	MJW
11/19/99	As	As+5	1.	Fish	1.1	0.072	14.	65.	106.	P.256	MJW	P.208	MJW
11/19/99	As	(CH3)4AsI	10.	Fish	10.8	0.070	143.	662.	107.	P.256	MJW	P.208	MJW
11/19/99	As	As+5	2.	Fish	2.	0.047	43.	65.	105.	P.256	MJW	P.208	MJW
11/19/99	As	As+5	10.	Fish	7.97	0.047	213.	326.	79.	P.256	MJW	P.208	MJW
12/01/99	As	As+5	1.	Liver	0.9	0.004	250.	24.	85.	P.256	MJW	P.208	MJW
12/01/99	As	(CH3)4AsI	10.	Liver	8.4	0.004	2500.	244.	84.	P.256	MJW	P.208	MJW
12/01/99	As	As+5	1.	Vole	1.	-0.025	40.	26.	99.	P.256	MJW	P.208	MJW
12/01/99	As	(CH3)4AsI	10.	Vole	8.	-0.025	400.	251.	82.	P.256	MJW	P.208	MJW
12/01/99	As	(CH3)4AsI	1.	Liver Blank	1.	0.017	59.	109.	103.	P.256	MJW	P.208	MJW
01/11/00	As	As+5	1.	Swallow	1.	0.010	100.	56.	93.	P.256	MJW	P.208	MJW
01/11/00	As	(CH3)4AsI	10.	Swallow	10.	0.010	1000.	562.	99.	P.256	MJW	P.208	MJW
01/11/00	As	As+5	1.	Fish	2.	0.749	1.	23.	87.	P.256	MJW	P.208	MJW
01/11/00	As	(CH3)4AsI	10.	Fish	11.	0.752	13.	231.	103.	P.256	MJW	P.208	MJW
01/11/00	As	As+5	1.	Sediment	8.	7.341	0.	4.	86.	P.256	MJW	P.208	MJW
01/11/00	As	(CH3)4AsI	10.	Sediment	18.	7.400	1.	39.	101.	P.256	MJW	P.208	MJW

304958

Table 32. Percent recoveries of mercury, arsenic, and selenium in digested spikes.....(con'td).....

1 BID[a]	2 Ele.	3 Spike Form	4 Amt.[b] ug	5 Matrix	6 Total ug[c] Meas.	7 Bkgd.[d] ug	8 Spk/Bkdg[e]	9 Spk/Bkg[d] SD	10 % REC[f]	PSOP	Prep. Init.	ISOP	Oper. Init.
10/27/99	Hg	Hg+2	0.	Blood	0.	0.026	8.	67.	85.	P.281h	MJW	P.198	MJW
10/27/99	Hg	CH3HgCl	2.	Blood	2.	0.029	69.	612.	95.	P.281h	MJW	P.198	MJW
10/27/99	Hg	CH3HgCl	2.	Blood	2.	0.137	15.	130.	95.	P.281h	MJW	P.198	MJW
10/27/99	Hg	Hg+2	0.	Blood Blank	0.	0.000	617.	1852.	98.	P.281h	MJW	P.198	MJW
11/12/99	Hg	Hg+2	1.	Egg	1.	0.113	9.	249.	92.	P.281h	MJW	P.198	MJW
11/12/99	Hg	CH3HgCl	10.	Egg	10.	0.114	88.	2463.	95.	P.281h	MJW	P.198	MJW
11/12/99	Hg	Hg+2	1.	Fish	2.	0.605	2.	79.	92.	P.281h	MJW	P.198	MJW
11/12/99	Hg	CH3HgCl	10.	Fish	10.	0.606	17.	787.	94.	P.281h	MJW	P.198	MJW
11/29/99	Hg	Hg+2	1.	Liver	2.	1.188	1.	690.	96.	P.510	MJW	P.198	MJW
11/29/99	Hg	CH3HgCl	10.	Liver	10.	1.188	8.	6897.	93.	P.510	MJW	P.198	MJW
11/29/99	Hg	Hg+2	1.	Vole	1.	0.009	111.	325.	100.	P.510	MJW	P.198	MJW
11/29/99	Hg	CH3HgCl	10.	Vole	10.	0.0	1111.	3185.	96.	P.510	MJW	P.198	MJW
12/28/99	Hg	Hg+2	10.	Egg Blank	10.	0.0	5000.	20492.	100.	P.510	RHW	P.198	MJW
12/28/99	Hg	CH3HgCl	1.	Egg	1.72	0.751	1.	787.	97.	P.510	RHW	P.198	MJW
12/28/99	Hg	Hg+2	10.	Egg	10.42	0.733	14.	8065.	97.	P.510	RHW	P.198	MJW
12/28/99	Hg	Hg+2	1.	Fish	1.19	0.200	5.	176.	99.	P.510	RHW	P.198	MJW
12/28/99	Hg	Hg+2	10.	Fish	10.1	0.186	54.	1890.	99.	P.510	RHW	P.198	MJW
01/10/00	Hg	CH3HgCl	1.	Sed Blank	1.	0.000	3333.	1183.	96.	P.281h	JWA	P.198	MJW
01/10/00	Hg	Hg+2	10.	Sed Blank	9.99	0.000	33333.	11834.	100.	P.281h	JWA	P.198	MJW
01/10/00	Hg	CH3HgCl	1.	Sediment	1.	0.030	33.	606.	99.	P.281h	JWA	P.198	MJW
01/10/00	Hg	Hg+2	10.	Sediment	9.87	0.031	323.	5848.	98.	P.281h	JWA	P.198	MJW

[a]BID = Block Initiation Date: a date assigned to each member of a group of samples that will identify the sample as a member of the group or "block."

[b]Amt ng = the absolute microgram (ng) amount of the spike in the form listed in column 3 which was added to a sample.

[c]Total ng Meas. = the microgram (ng) of the analyte in the sample spike measured by the instrument (spike + background).

[d]Bkgd (ng) = Mean background amount in µg; the mean amount in ng from three aliquots of sample taken through the preparation and analysis methodology.

[e]Spk/Bkgd = the ratio of the spike amount added (column 4) divided by the mean sample background concentration (column 7).

[f]%REC = Total µg Meas. (column 6) - Bkgd. µg (column 7) divided by the Amt. µg (column 4) X 100.

304959

Table 33. Percent recoveries of mercury, arsenic, and selenium in analysis spikes analyzed as matrix suppression or enhancement checks.

BID[a]	Ele.	Spike Type	Analysis Units	Spk. Amt. µg[b]	Vol.	Effec. Conc.[c]	Bkgd. Conc.[d]	Total Conc.[e]	%REC[f]	SOP	Prep. Init.	ISOP	Oper. Init.
10/13/99	Se	Water	ng/mL	0.06	12	5	4.36	9.48	102.	P.256	MJW	P.207	MJW
10/13/99	Se	Water	ng/mL	0.06	12	5	4.64	9.90	105.	P.256	MJW	P.207	MJW
11/01/99	Se	Blood	ng/mL	0.06	12	5	0.81	6.48	113.	P.256	MJW	P.207	MJW
11/01/99	Se	Blood	ng/mL	0.06	12	5	1.82	7.26	109.	P.256	MJW	P.207	MJW
11/01/99	Se	Blood	ng/mL	0.06	12	5	3.35	8.91	11[illegible]	P.256	MJW	P.207	MJW
11/01/99	Se	Blood	ng/mL	0.06	12	5	6.27	11.5	105.	P.256	MJW	P.207	MJW
11/01/99	Se	Blood	ng/mL	0.06	12	5	9.23	14.6	107.	P.256	MJW	P.207	MJW
11/19/99	Se	Egg	ng/mL	0.06	12	5	0.90	6.41	110.	P.256	MJW	P.207	MJW
11/19/99	Se	Fish	ng/mL	0.06	12	5	1.81	6.71	98.	P.256	MJW	P.207	MJW
11/19/99	Se	Fish	ng/mL	0.06	12	5	2.84	7.78	99.	P.256	MJW	P.207	MJW
12/01/99	Se	Liver	ng/mL	0.06	12	5	4.09	9.46	107.	P.256	RHW	P.207	MJW
12/01/99	Se	Vole	ng/mL	0.06	12	5	0.61	5.54	99.	P.256	RHW	P.207	MJW
01/11/00	Se	Swallow	ng/mL	0.06	12	5	5.02	10.30	106.	P.256	MJW	P.208	MJW
01/11/00	Se	Eagle Egg	ng/mL	0.06	12	5	3.00	8.13	103.	P.256	MJW	P.208	MJW
01/11/00	Se	Fish	ng/mL	0.06	12	5	4.92	9.95	101.	P.256	MJW	P.208	MJW
01/11/00	Se	Sediment	ng/mL	0.06	12	5	4.83	9.86	101.	P.256	MJW	P.208	MJW
01/11/00	Se	Sediment	ng/mL	0.06	12	5	0.55	5.26	94.	P.256	MJW	P.208	MJW
01/11/00	Se	Invert	ng/mL	0.06	12	5	2.52	7.50	100.	P.256	MJW	P.208	MJW
11/01/99	As	Blood	ng/mL	0.12	12	10	0.00	10.22	102.	P.256	MJW	P.208	MJW
11/01/99	As	Blood	ng/mL	0.12	12	10	0.10	10.78	107.	P.256	MJW	P.208	MJW
11/01/99	As	Blood	ng/mL	0.12	12	10	0.23	10.19	100.	P.256	MJW	P.208	MJW
11/01/99	As	Blood	ng/mL	0.12	12	10	0.39	10.51	101.	P.256	MJW	P.208	MJW
11/01/99	As	Blood	ng/mL	0.12	12	10	0.54	10.58	100.	P.256	MJW	P.208	MJW
11/19/99	As	Egg	ng/mL	0.12	12	10	0.09	10.5	104.	P.256	MJW	P.208	MJW
11/19/99	As	Fish	ng/mL	0.12	12	10	0.49	10.6	101.	P.256	MJW	P.208	MJW
11/19/99	As	Fish	ng/mL	0.12	12	10	2.11	11.63	95.	P.256	MJW	P.208	MJW
12/01/99	As	Liver	ng/mL	0.12	12	10	0.15	10.49	103.	P.256	RHW	P.208	MJW
12/01/99	As	Vole	ng/mL	0.12	12	10	0.20	10.99	108.	P.256	RHW	P.208	MJW

Table 33. Percent recoveries of mercury, arsenic, and selenium in analysis spikes analyzed as matrix suppression or enhancement checks.....(cont'd)...

BID[a]	Ele.	Spike Type	Analysis Units	Spk. Amt. µg[b]	Vol.	Effec. Conc.[c]	Bkgd. Conc.[d]	Total Conc.[e]	%REC[f]	SOP	Prep. Init.	ISOP	Oper. Init.
01/11/00	As	Swallow	ng/mL	0.12	12.	10.	-0.05	10.05	101.	P.256	MJW	P.208	MJW
01/11/00	As	Eagle Egg	ng/mL	0.12	12.	10.	0.17	10.57	104.	P.256	MJW	P.208	MJW
01/11/00	As	Fish	ng/mL	0.12	12.	10.	0.51	11.41	109.	P.256	MJW	P.208	MJW
01/11/00	As	Sediment	ng/mL	0.12	12.	10.	6.27	16.63	104.	P.256	MJW	P.208	MJW
01/11/00	As	Sediment	ng/mL	0.12	12.	10.	6.55	16.75	102.	P.256	MJW	P.208	MJW
01/11/00	As	Invert	ng/mL	0.12	12.	10.	2.30	12.95	107.	P.256	MJW	P.208	MJW
10/27/99	Hg	Blood Cells	ng/mL	0.12	12.	10.	0.46	10.48	100.	P.281h	MJW	P.198	MJW
10/27/99	Hg	Whole Blood	ng/mL	0.12	12.	10.	4.03	13.82	98.	P.281h	MJW	P.198	MJW
10/27/99	Hg	Blood Cells	ng/mL	0.12	12.	10.	8.92	18.63	97.	P.281h	MJW	P.198	MJW
11/12/99	Hg	Egg	ng/mL	0.12	12.	10.	0.74	10.26	95.	P.281h	MJW	P.198	MJW
11/12/99	Hg	Fish	ng/mL	0.12	12.	10.	1.49	10.87	94.	P.281h	MJW	P.198	MJW
11/29/99	Hg	Liver	ng/mL	0.12	12.	10.	6.07	16.13	101.	P.510	MJW	P.198	MJW
11/29/99	Hg	Vole	ng/mL	0.12	12.	10.	0.03	10.13	101.	P.510	MJW	P.198	MJW
12/28/99	Hg	Swallow	ng/mL	0.12	12.	10.	0.69	10.83	101.	P.510	RHW	P.198	MJW
12/28/99	Hg	Egg	ng/mL	0.12	12.	10.	5.65	15.48	98.	P.510	RHW	P.198	MJW
12/28/99	Hg	Eel	ng/mL	0.12	12.	10.	4.79	14.73	99.	P.510	RHW	P.198	MJW
12/28/99	Hg	Fish	ng/mL	0.12	12.	10.	3.75	13.66	99.	P.510	RHW	P.198	MJW
01/10/00	Hg	Invert	ng/mL	0.12	12.	10.	.09	9.52	94.	P.281h	JWA	P.198	MJW
01/10/00	Hg	Sediment	ng/mL	0.12	12.	10.	.21	9.96	98.	P.281h	JWA	P.198	MJW
01/10/00	Hg	Sediment	ng/mL	0.12	12.	10.	.03	9.85	98.	P.281h	JWA	P.198	MJW

[a]BID = Block Initiation Date: a date assigned to each member of a group of samples that will identify the sample as a member of the group or "block."

[b] Spk Amt. µg = the absolute microgram (µg) amount of the spike in the form listed in column 3 which was added to a sample.

[c]Effec. Conc. = the Spike Amt divided by the total solution volume.

[d]Bkgd. Conc. = the measured concentration of the sample prior to spiking.

[e]Total Conc. = the measured concentration of the spiked sample (spike + background).

[f]%REC = percent recovery.

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Table 34. Blank equivalent concentrations (ug/L) of elements in method blanks analyzed with eagle blood.

Element	BEC Blk 1	BEC Blk 2	BEC Blk 3
Li	2	< 1	2
Be	2	< 1	2
Na	800	300	300
Mg	500	200	< 100
Al	100	50	40
K	400	300	100
Ca	2000	100	< 100
Ti	10	10	2
V	2	< 0.1	< 0.1
Cr	10	20	8
Mn	< 0.1	< 0.1	< 0.1
Fe	600	3000	500
Co	< 0.1	2	< 0.1
Ni	< 1	6	2
Cu	4	< 1	< 1
Zn	6	4	< 1
Ga	< 0.1	< 0.1	< 0.1
Ge	< 0.1	< 0.1	< 0.1
As	< 0.1	4	2
Rb	< 0.1	< 0.1	< 0.1
Sr	8	< 1	< 1
Y	< 1	< 1	< 1
Zr	30	4	2
Nb	< 1	< 1	< 1
Mo	30	6	4
Ru	< 1	< 1	< 1
Pd	< 0.1	< 0.1	< 0.1
Ag	4	2	2
Cd	< 0.1	< 0.1	< 0.1
In	< 1	< 1	< 1
Sn	30	20	10

Element	BEC Blk 1	BEC Blk 2	BEC Blk 3
Sb	20	6	2
Te	< 0.1	< 0.1	< 0.1
Cs	< 1	< 1	< 1
Ba	< 1	< 1	< 1
La	< 0.1	< 0.1	< 0.1
Ce	< 0.1	< 0.1	< 0.1
Pr	< 0.1	< 0.1	< 0.1
Nd	< 0.1	< 0.1	< 0.1
Sm	< 0.1	< 0.1	< 0.1
Eu	< 0.1	< 0.1	< 0.1
Gd	< 0.1	< 0.1	< 0.1
Tb	< 0.1	< 0.1	< 0.1
Dy	< 0.1	< 0.1	< 0.1
Ho	< 0.1	< 0.1	< 0.1
Er	< 0.1	< 0.1	< 0.1
Tm	< 0.1	< 0.1	< 0.1
Yb	< 0.1	< 0.1	< 0.1
Lu	< 0.1	< 0.1	< 0.1
Hf	< 0.1	< 0.1	< 0.1
Ta	2	2	2
W	< 0.1	< 0.1	< 0.1
Re	< 0.1	< 0.1	< 0.1
Os	< 0.1	< 0.1	< 0.1
Ir	< 0.1	< 0.1	< 0.1
Pt	< 0.1	< 0.1	< 0.1
Au	10	6	8
Tl	< 0.1	< 0.1	< 0.1
Pb	< 1	< 1	< 1
Bi	< 1	< 1	< 1
U	< 1	< 1	< 1

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Table 35. Blank equivalent concentrations (ug/g dry weight) of elements in method blanks analyzed with bird eggs and fish.

Element	BEC Blk 1	BEC Blk 2	BEC Blk 3
Li	< 1	< 1	< 1
Be	< 1	< 1	< 1
Na	2	1	1
Mg	2	0.5	1
Al	< 0.1	< 0.1	< 0.1
K	4	3	0.5
Ca	8	3	0.2
Ti	< 0.1	< 0.1	< 0.1
V	< 0.1	< 0.1	< 0.1
Cr	< 1	< 1	< 1
Mn	< 0.1	0.2	< 0.1
Fe	20	20	20
Co	< 0.1	< 0.1	< 0.1
Ni	< 1	< 1	< 1
Cu	< 1	< 1	< 1
Zn	< 1	< 1	< 1
Ga	< 0.1	< 0.1	< 0.1
Ge	< 0.1	< 0.1	< 0.1
Rb	< 0.1	< 0.1	< 0.1
Sr	< 1	< 1	< 1
Y	< 1	< 1	< 1
Zr	< 1	< 1	< 1
Nb	< 1	< 1	< 1
Mo	0.2	< 0.1	< 0.1
Ru	< 1	< 1	< 1
Pd	< 0.1	< 0.1	< 0.1
Ag	< 0.1	< 0.1	< 0.1
Cd	< 0.1	< 0.1	< 0.1
In	< 1	< 1	< 1
Sn	0.2	< 0.1	< 0.1

Element	BEC Blk 1	BEC Blk 2	BEC Blk 3
Sb	0.2	< 0.1	< 0.1
Te	< 0.1	< 0.1	< 0.1
Cs	< 1	< 1	< 1
Ba	< 1	< 1	< 1
La	< 0.1	< 0.1	< 0.1
Ce	< 0.1	< 0.1	< 0.1
Pr	< 0.1	< 0.1	< 0.1
Nd	< 0.1	< 0.1	< 0.1
Sm	< 0.1	< 0.1	< 0.1
Eu	< 0.1	< 0.1	< 0.1
Gd	< 0.1	< 0.1	< 0.1
Tb	< 0.1	< 0.1	< 0.1
Dy	< 0.1	< 0.1	< 0.1
Ho	< 0.1	< 0.1	< 0.1
Er	< 0.1	< 0.1	< 0.1
Tm	< 0.1	< 0.1	< 0.1
Yb	< 0.1	< 0.1	< 0.1
Lu	< 0.1	< 0.1	< 0.1
Hf	< 0.1	< 0.1	< 0.1
Ta	< 0.1	< 0.1	< 0.1
W	< 0.1	< 0.1	< 0.1
Re	< 0.1	< 0.1	< 0.1
Os	< 0.1	< 0.1	< 0.1
Ir	< 0.1	< 0.1	< 0.1
Pt	< 0.1	< 0.1	< 0.1
Au	< 0.1	< 0.1	< 0.1
Tl	< 0.1	< 0.1	< 0.1
Pb	< 1	< 1	< 1
Bi	< 1	< 1	< 1
U	< 1	< 1	< 1

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Table 36. Blank equivalent concentrations (ug/g dry weight) of elements in method blanks analyzed with bird livers and voles.

Element	BEC Blk 1	BEC Blk 2	BEC Blk 3	Element	BEC Blk 1	BEC Blk 2	BEC Blk 3
Li	< 1	< 1	< 1	Sb	0.2	< 0.1	< 0.1
Be	< 1	< 1	< 1	Te	< 0.1	< 0.1	< 0.1
Na	0.8	0.3	< 0.1	Cs	< 1	< 1	< 1
Mg	1	< 0.1	< 0.1	Ba	< 1	< 1	< 1
Al	2	1	1	La	< 0.1	< 0.1	< 0.1
K	< 0.1	< 0.1	< 0.1	Ce	< 0.1	< 0.1	< 0.1
Ca	< 0.1	< 0.1	< 0.1	Pr	< 0.1	< 0.1	< 0.1
Ti	< 0.1	< 0.1	0.3	Nd	< 0.1	< 0.1	< 0.1
V	< 0.1	< 0.1	< 0.1	Sm	< 0.1	< 0.1	< 0.1
Cr	< 1	< 1	< 1	Eu	< 0.1	< 0.1	< 0.1
Mn	< 0.1	< 0.1	< 0.1	Gd	< 0.1	< 0.1	< 0.1
Fe	1	< 1	< 1	Tb	< 0.1	< 0.1	< 0.1
Co	< 0.1	< 0.1	< 0.1	Dy	< 0.1	< 0.1	< 0.1
Ni	< 1	< 1	< 1	Ho	< 0.1	< 0.1	< 0.1
Cu	< 1	< 1	< 1	Er	< 0.1	< 0.1	< 0.1
Zn	< 1	< 1	< 1	Tm	< 0.1	< 0.1	< 0.1
Ga	< 0.1	< 0.1	< 0.1	Yb	< 0.1	< 0.1	< 0.1
Ge	< 0.1	< 0.1	< 0.1	Lu	< 0.1	< 0.1	< 0.1
Rb	< 0.1	< 0.1	< 0.1	Hf	< 0.1	< 0.1	< 0.1
Sr	< 1	< 1	< 1	Ta	< 0.1	< 0.1	< 0.1
Y	< 1	< 1	< 1	W	< 0.1	< 0.1	< 0.1
Zr	< 1	< 1	< 1	Re	< 0.1	< 0.1	< 0.1
Nb	< 1	< 1	< 1	Os	< 0.1	< 0.1	< 0.1
Mo	0.1	< 0.1	< 0.1	Ir	< 0.1	< 0.1	< 0.1
Ru	< 1	< 1	< 1	Pt	< 0.1	< 0.1	< 0.1
Pd	< 0.1	< 0.1	< 0.1	Au	< 0.1	< 0.1	< 0.1
Ag	< 0.1	< 0.1	< 0.1	Tl	< 0.1	< 0.1	< 0.1
Cd	< 0.1	< 0.1	< 0.1	Pb	< 1	< 1	< 1
In	< 1	< 1	< 1	Bi	< 1	< 1	< 1
Sn	0.5	0.2	0.1	U	< 1	< 1	< 1

Table 37. Blank equivalent concentrations (ug/g dry weight) of elements in method blanks analyzed with nestlings, eggs, and prey samples.

Element	BEC Blk 1	BEC Blk 2	BEC Blk 3	Element	BEC Blk 1	BEC Blk 2	BEC Blk 3
Li	< 1	< 1	< 1	Sb	0.2	< 0.1	< 0.1
Be	< 1	< 1	< 1	Te	< 0.1	< 0.1	< 0.1
Na	20	30	10	Cs	< 1	< 1	< 1
Mg	1	0.4	0.1	Ba	< 1	< 1	< 1
Al	2	1	1	La	< 0.1	< 0.1	< 0.1
K	0.1	< 0.1	< 0.1	Ce	< 0.1	< 0.1	< 0.1
Ca	< 0.1	< 0.1	< 0.1	Pr	< 0.1	< 0.1	< 0.1
Ti	0.1	0.1	< 0.1	Nd	< 0.1	< 0.1	< 0.1
V	< 0.1	< 0.1	< 0.1	Sm	< 0.1	< 0.1	< 0.1
Cr	< 1	< 1	< 1	Eu	< 0.1	< 0.1	< 0.1
Mn	< 0.1	< 0.1	< 0.1	Gd	< 0.1	< 0.1	< 0.1
Fe	9	10	10	Tb	< 0.1	< 0.1	< 0.1
Co	< 0.1	< 0.1	< 0.1	Dy	< 0.1	< 0.1	< 0.1
Ni	< 1	< 1	< 1	Ho	< 0.1	< 0.1	< 0.1
Cu	< 1	< 1	< 1	Er	< 0.1	< 0.1	< 0.1
Zn	< 1	< 1	< 1	Tm	< 0.1	< 0.1	< 0.1
Ga	< 0.1	< 0.1	< 0.1	Yb	< 0.1	< 0.1	< 0.1
Ge	< 0.1	< 0.1	< 0.1	Lu	< 0.1	< 0.1	< 0.1
Rb	< 0.1	< 0.1	< 0.1	Hf	< 0.1	< 0.1	< 0.1
Sr	< 1	< 1	< 1	Ta	< 0.1	< 0.1	< 0.1
Y	< 1	< 1	< 1	W	< 0.1	< 0.1	< 0.1
Zr	< 1	< 1	< 1	Re	< 0.1	< 0.1	< 0.1
Nb	< 1	< 1	< 1	Os	< 0.1	< 0.1	< 0.1
Mo	0.4	0.1	< 0.1	Ir	< 0.1	< 0.1	< 0.1
Ru	< 1	< 1	< 1	Pt	< 0.1	< 0.1	< 0.1
Pd	< 0.1	< 0.1	< 0.1	Au	< 0.1	< 0.1	< 0.1
Ag	0.1	< 0.1	< 0.1	Tl	< 0.1	< 0.1	< 0.1
Cd	< 0.1	< 0.1	< 0.1	Pb	< 1	< 1	< 1
In	< 1	< 1	< 1	Bi	< 1	< 1	< 1
Sn	0.7	0.3	0.2	U	< 1	< 1	< 1

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Table 38. Blank equivalent concentrations (BEC, ug/g) of mercury, arsenic, and selenium for procedural blank solutions analyzed as part of a sample group or "block."

BID[a]	Ele.	Matrix	Soln. Units	Soln 1 Conc.	Soln 2 Conc.	Soln 3 Conc.	Dil. Vol.	Mean Conc.[b]	Sample Wgt (g)[c]	Mean BEC ug/g	BEC SD ug/g	PSOP	Prep. Init.	ISOP	Oper. Init.
10/13/99	Se	Fish	ng/mL	0.031	-0.006	0.012	100.	0.01233	0.5	0.0025	0.00370	P.256	MJW	P.207	MJW
11/01/99	Se	Blood	ng/mL	-0.040	-0.057	-0.092	100.	-0.06290	1.0	-0.0063	0.00266	P.256	MJW	P.207	MJW
11/01/99	Se	Blood	ng/mL	-0.080	-0.059	-0.083	400.	-0.07393	1.0	-0.0296	0.00510	P.256	MJW	P.207	MJW
11/19/99	Se	Egg & Fish	ng/mL	0.078	0.046	-0.016	500.	0.03613	0.5	0.0361	0.04777	P.256	MJW	P.207	MJW
11/19/99	Se	Egg & Fish	ng/mL	-0.016	0.016	0.002	100.	0.00040	0.5	0.0001	0.00325	P.256	MJW	P.207	MJW
12/01/99	Se	Liver & Vole	ng/mL	-0.034	0.001	-0.015	500.	-0.01597	0.5	-0.0160	0.01772	P.256	RHW	P.207	MJW
12/01/99	Se	Liver & Vole	ng/mL	-0.039	-0.028	0.037	100.	-0.01020	0.5	-0.0020	0.00817	P.256	RHW	P.207	MJW
01/11/00	Se	Bird & Sed	ng/mL	0.032	0.081	0.019	100.	0.04403	0.5	0.0088	0.00655	P.256	MJW	P.207	MJW
11/01/99	As	Blood	ng/mL	0.087	0.135	-0.076	400.	0.04863	1.0	0.0195	0.044356	P.256	MJW	P.208	MJW
11/01/99	As	Blood	ng/mL	0.025	0.060	-0.030	100.	0.01833	1.0	0.0018	0.004535	P.256	MJW	P.208	MJW
11/19/99	As	Egg & Fish	ng/mL	0.058	0.195	0.121	500.	0.12460	0.5	0.1246	0.068579	P.256	MJW	P.208	MJW
11/19/99	As	Egg & Fish	ng/mL	0.157	0.089	0.164	100.	0.13687	0.5	0.0274	0.00832	P.256	MJW	P.208	MJW
12/01/99	As	Liver & Vole	ng/mL	0.284	0.061	0.259	500.	0.20087	0.5	0.2009	0.122116	P.256	RHW	P.208	MJW
12/01/99	As	Liver & Vole	ng/mL	0.093	0.154	0.274	100.	0.17363	0.5	0.0347	0.018427	P.256	RHW	P.208	MJW
01/11/00	As	Bird & Sed	ng/mL	0.008	-0.074	0.028	100.	-0.01287	0.5	-0.0026	0.010821	P.256	MJW	P.208	MJW
10/27/99	Hg	Blood	ng/mL	0.019	0.020	0.010	20.	0.01620	1.0	0.0003	0.000108	P.281h	MJW	P.198	MJW
11/12/99	Hg	Egg & Fish	ng/mL	0.034	0.017	-0.003	100.	0.01600	0.5	0.0032	0.003666	P.281h	MJW	P.198	MJW
11/29/99	Hg	Liver & Vole	ng/mL	-0.012	-0.006	-0.009	100.	-0.00900	0.5	-0.0018	0.0006	P.510	MJW	P.198	MJW
12/28/99	Hg	Egg & Fish	ng/mL	0.016	0.019	0.026	100.	0.02030	0.4	0.0051	0.001228	P.510	RHW	P.198	MJW
01/10/00	Hg	Sed & Invert	ng/mL	0.000	-0.003	0.013	100.	0.00317	0.5	0.0006	0.00169	P.281h	JWA	P.198	MJW

[a]BID = Block Initiation Date: a date assigned to each member of a group of samples that will identify the sample as a member of the group or "block."

[b]Mean Conc. = the mean solution concentration of the procedural blanks for a block, n = 3.

[c]Sample Wgt. = weight (g) used for BEC calculation, except for blood, which is mL used for BEC calculation..

[d]BEC units for blood are ug/mL.

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Table 39. Instrument detection limit for mercury, arsenic, and selenium.

BID	Run Date[a]	Ele.	Std. Conc.[b]	Std SD 1[c]	Std SD 2	Std SD 3	IDL[d]	Units	SOP	Oper. Init.
10/13/99	09/14/99	Se	0.50	0.03039	0.05122	0.03185	0.113	ng/mL	E.059	MJW
11/01/99	09/14/99	Se	0.50	0.03039	0.05122	0.03185	0.113	ng/mL	E.059	MJW
11/19/99	09/14/99	Se	0.50	0.03039	0.05122	0.03185	0.113	ng/mL	E.059	MJW
12/01/99	09/14/99	Se	0.50	0.03039	0.05122	0.03185	0.113	ng/mL	E.059	MJW
01/11/00	09/14/99	Se	0.50	0.03039	0.05122	0.03185	0.113	ng/mL	E.059	MJW
11/01/99	12/17/99	As	1.00	0.07498	0.05348	0.07554	0.204	ng/mL	E.059	MJW
11/19/99	12/17/99	As	1.00	0.07498	0.05348	0.07554	0.204	ng/mL	E.059	MJW
12/01/99	12/17/99	As	1.00	0.07498	0.05348	0.07554	0.204	ng/mL	E.059	MJW
01/11/00	12/17/99	As	1.00	0.07498	0.05348	0.07554	0.204	ng/mL	E.059	MJW
10/27/99	01/03/00	Hg	0.25	0.00855	0.00886	0.01104	0.028	ng/mL	E.059	MJW
11/12/99	01/03/00	Hg	0.25	0.00855	0.00886	0.01104	0.028	ng/mL	E.059	MJW
11/29/99	01/03/00	Hg	0.25	0.00855	0.00886	0.01104	0.028	ng/mL	E.059	MJW
12/28/99	01/03/00	Hg	0.25	0.00855	0.00886	0.01104	0.028	ng/mL	E.059	MJW
01/10/00	01/03/00	Hg	0.25	0.00855	0.00886	0.01104	0.028	ng/mL	E.059	MJW

[a]date of 3rd consecutive day analysis, following which IDL was computed.

[b]concentration of low level standard used in analysis, in ppb.

[c]standard deviation from analysis of standard 7 consecutive times in one day.

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Table 40. Instrument detection limit, method detection limit, and limit of quantitation for the analytical run.

BID[a]	Ele.	Matrix	W/D/L[b]	Sample SD[c]	Blank SD[d]	LOD[e]	LOQ[f]	PSOP	Prep. Init.	ISOP	Oper. Init.	Units
10/13/99	Se	Fish	D	0.0034	0.0036	0.01	0.05	P.256	MJW	P.207	MJW	ug/g
11/01/99	Se	Blood	W	0.0139	0.0051	0.04	0.15	P.256	MJW	P.207	MJW	ug/g
11/19/99	Se	Egg & Fish	D	0.0312	0.0478	0.17	0.56	P.256	MJW	P.207	MJW	ug/g
12/01/99	Se	Liver & Vole	D	0.0307	0.0177	0.11	0.35	P.256	RHW	P.207	MJW	ug/g
01/11/00	Se	Bird	D	0.0059	0.0065	0.03	0.09	P.256	MJW	P.207	MJW	ug/g
11/01/99	As	Blood	W	0.0103	0.0444	0.14	0.45	P.256	MJW	P.208	MJW	ug/g
11/19/99	As	Egg & Fish	D	0.0346	0.0686	0.23	0.76	P.256	MJW	P.208	MJW	ug/g
12/01/99	As	Liver & Vole	D	0.0443	0.1221	0.39	1.29	P.256	RHW	P.208	MJW	ug/g
01/11/00	As	Bird	D	0.0040	0.0108	0.03	0.11	P.256	MJW	P.208	MJW	ug/g
10/27/99	Hg	Blood/Serum	W	0.0003	0.0001	0.001	0.003	P.281h	MJW	P.198	MJW	ug/g
10/27/99	Hg	Blood/Cells	W	0.0004	0.0001	0.001	0.004	P.281h	MJW	P.198	MJW	ug/g
11/12/99	Hg	Egg & Fish	D	0.0013	0.0037	0.01	0.04	P.281h	MJW	P.198	MJW	ug/g
11/29/99	Hg	Liver & Vole	D	0.0073	0.0006	0.02	0.07	P.510	MJW	P.198	MJW	ug/g
12/28/99	Hg	Egg & Fish	D	0.0004	0.0012	0.004	0.01	P.510	RHW	P.198	MJW	ug/g
01/10/00	Hg	Invert	D	0.0020	0.0017	0.008	0.03	P.281h	JWA	P.198	MJW	ug/g

[a]BID = Block Initiation Date: a date assigned to each member of a group of samples that will identify the sample as a member of the group or "block."

[b]W/D/L = wet, dry, or liquid (starting sample state).

[c]Sample SD = the standard deviation of low level sample concentrations.

[d]Blank SD = the standard deviation of procedural blank concentrations.

[e]LOD = limit of detection in units of µg/g dry weight calculated as:

$$3\,[SD_b^{\,2} + SD_s^{\,2}]^{1/2}$$

where SD_b = standard deviation of the method blanks (n=3) and SD_s = standard deviation of a low level sample (n=3).

[f]LOQ = limit of quantitation (µg/g dry weight) calculated as 3.3 X LOD. Values between LOD and LOQ have poorer accuracy and thus poorer reliability.

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