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U.S. Environmental Protection Agency

FINAL

Phase I Fish Tissue Sampling Data Evaluation Upper Columbia River Site CERCLA RI/FS

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Acronyms and Abbreviations

ACG	analytical concentration goal
A&R	approach and rationale
AFDW	ash-free dry weight
ANOVA	analysis of variance
ARAR	applicable or relevant and appropriate requirement
ASB	arsenobetanine
ASL	Applied Sciences Laboratory
°C	degree Celsius
CCT	Confederated Tribes of the Colville Reservation (Colville Confederated Tribes)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program [USEPA]
CSM	conceptual site model
CV	coefficient of variation
DI	deionized
dioxin	dibenzo-p-dioxin
DMA	dimethylarsonic acid
DOI	U.S. Department of the Interior
DQO	data quality objective
Ecology	Washington State Department of Ecology
ESI	expanded site inspection
EVS	EVS Consultants
FSCA	fish sample collection area
furan	dibenzofuran
GPS	global positioning system
HQ	hazard quotient
HSCA	Hazardous Substances Control Act
ICP/AES	inductively coupled plasma/atomic emission spectroscopy
IEUBK	Integrated Exposure Uptake Biokinetic Model for Lead in Children
IRIS	Integrated Risk Information System
LDPE	low-density polyethylene
MELP	Ministry of Environment, Lands, and Parks, Province of British Columbia
µg/dL	micrograms per deciliter
µg/kg	micrograms per kilogram
mg/kg	milligrams per kilogram
MMA	monomethylarsonic acid
n	number of samples
NC	not calculated
PAH	polycyclic aromatic hydrocarbon
PARCC	precision, accuracy, representativeness, comparability, and

	completeness
PCB	polychlorinated biphenyl
PCOI	preliminary contaminant of interest
PCV	preliminary comparison value
pg/g	picograms per gram
PRC	preliminary remedial concentration
PRG	preliminary remediation goal
RfD	reference dose
QA	quality assurance
QAO	Quality Assurance Officer
QAPP	quality assurance project plan
QA/QC	quality assurance/quality control
QC	quality control
RfD	reference dose
RI/FS	remedial investigation/feasibility study
RSCC	Regional Sample Control Coordinator
SDG	sample delivery group
SIMS	Site Information Management System
STI	Spokane Tribe of Indians
TAL	Target Analyte List (USEPA)
TEF	toxicity equivalence factor
TOPO	Task Order Project Officer
TSR	target size range
UCR	Upper Columbia River
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VTSR	validated time of sample receipt
WDOH	Washington State Department of Health
WW	wet weight

SECTION 1

Introduction

This Phase I Fish Tissue Data Evaluation Report has been prepared to document the completion of the Phase I fish tissue sampling program for the Upper Columbia River (UCR) site. The UCR site is composed of an approximately 150-mile stretch of the Columbia River between the U.S.-Canada border and Grand Coulee Dam (Figure 1-1). The sampling program was conducted in September and October 2005 as part of Phase I of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Remedial Investigation/Feasibility Study (RI/FS) for the site being prepared under the direction of the U.S. Environmental Protection Agency (USEPA).

The overall objective of the RI/FS for the UCR is to identify site contamination, assess potential risk to human or ecological receptors, and develop remedial approaches to mitigate unacceptable risk. The Phase I fish tissue sampling program was designed to gather data to support (1) the human and ecological risk assessments, and (2) analyses to consider issuance of an updated fish advisory for Lake Roosevelt. The Phase I fish tissue sampling program was also designed to meet the following secondary objectives:

- Characterize the spatial patterns of tissue contaminants
- Establish baseline tissue contaminant levels for comparison with future surveys
- Correlate tissue concentrations with contaminant concentrations in sediment
- Compare tissue contaminant levels among fish species
- Compare tissue contaminant levels among river reaches
- Estimate the variation in tissue contaminant concentrations among individual fish of a species

The Phase I fish tissue sampling program was developed following the process described in the RI/FS Document and Data Gathering Task Summary (CH2M HILL, 2004a). The approach and rationale used for development of the program are described in the Phase I Fish Tissue Sampling Approach and Rationale Document (Fish Tissue A&R Document) (CH2M HILL, 2005a). Development of the Phase I fish tissue sampling program involved creation of a preliminary fish tissue conceptual site model (CSM), definition of fish tissue data quality objectives (DQOs), identification of data needs, assessment of existing data usability, and identification of data gaps. The Phase I fish tissue sampling program was developed in consideration of the specific data needs identified in the DQO process, the unique characteristics of the site, and comments received from participating stakeholders. The specific policies, organizations, objectives, and functional activities/procedures for the program are described in the Phase I Fish Tissue Sampling Quality Assurance Project Plan (Fish Tissue QAPP) (CH2M HILL, 2005b). The field activities associated with the program are described in the Phase I Fish Tissue Sampling Field Report (Fish Tissue Field Report) (CH2M HILL, 2006a).

After completing this Data Evaluation Report, the USEPA came to an agreement with Teck Cominco American, Inc. (Teck Cominco), under which Teck Cominco will complete the RI/FS and an ecological risk assessment under the supervision of USEPA. This Data Evaluation Report was prepared to facilitate information sharing among USEPA and the participating parties, to communicate preliminary Phase I findings to the public, and to provide context for subsequent RI/FS scoping documents and work plans. Because this report was prepared in advance of the initial RI/FS work plans, it does not substitute for the critical RI/FS work planning steps. Given this, the objective of the data evaluation was to present a preliminary analysis of the data that focuses on the nature and extent of fish tissue contaminants seen in the Phase I sampling and to present the data relative to the secondary objectives identified in the Fish Tissue A&R Document (CH2M HILL, 2005a) and, the Fish Tissue QAPP (CH2M HILL, 2005b) and presented above. Subsequent sampling that builds on the Phase I fish tissue study may be undertaken by Teck Cominco as part of completing the RI/FS and the ecological risk assessment under the supervision of the USEPA.

Additional and/or alternative analysis of the Phase I fish tissue data, such as assessment of potential human health and ecological risks posed by contaminants in fish from the UCR, are not addressed in this document. A site-specific human health risk assessment addressing consumption of targeted UCR fish species is being conducted by USEPA, and the ecological risk assessment to be conducted by Teck Cominco will be overseen by USEPA. The findings of the human health and ecological risk assessments will be presented in separate documents. Analysis of the Phase I fish tissue data to consider issuance of an updated fish advisory for Lake Roosevelt is being conducted by the Washington State Department of Health (WDOH).

1.1 Report Organization

Information presented in this report is intended to provide a preliminary summary of the nature and extent of contaminants in targeted fish species in the UCR, and to update the preliminary CSM for fish in the UCR. The preliminary CSM for fish is described in Section 4 of the Fish Tissue A&R Document (CH2M HILL, 2005a). This report is organized to present the following information:

- **Section 1: Introduction.** This section describes the purpose, scope, and organization of the Phase I Fish Tissue Data Evaluation Report. It also presents a brief description of the site and background events.
- **Section 2: Field and Analytical Program Overview.** This section summarizes the Phase I fish tissue field sampling and analytical program. It summarizes the objectives of the fish tissue sampling program, describes sampling and associated field activities and methodologies, and identifies the types and locations of samples collected. It also describes the analytical program and presents a usability assessment of the analytical data with respect to the procedures established within the Fish Tissue QAPP. Deviations from the QAPP are presented in detail in the UCR Fish Tissue Field Report (CH2M HILL, 2006a) and are summarized in this section.
- **Section 3: Data Evaluation Approach and Results.** This section presents the following information:

- Data evaluation approach, including a process for selecting preliminary contaminants of interest (PCOIs) to focus the data evaluation and data evaluation methods
- Analytical results by target species and analyte group
- Nature and Extent of PCOIs in targeted fish species, as follows:
  - Statistical comparisons between species and river reaches and correlations between select PCOIs and select target species
  - Comparison of study results to past studies

- **Section 4: Data Gaps and Recommendations.** This section summarizes the major study findings and lists data gaps identified for UCR fish tissue.
- **Section 5: References.** This section contains reference information for the documents cited in this report.
- **Appendix A: Preliminary Contaminant of Interest Comparison Value Results**
- **Appendix B: Analytical Results**
- **Appendix C: Estimated Whole Body Concentrations from Fillet and Offal Wild Rainbow Trout**
- **Appendix D: Estimated Whole Body Concentrations from Largescale Suckers**
- **Appendix E: Comparison of Preliminary Contaminant of Interest Concentrations by River Reach**
- **Appendix F: Data Validation Reports**

The appendices are provided in electronic format on a CD attached to this document.

1.2 Site Background

The UCR site is located in north-central Washington and extends from the U.S.-Canada international border south and west to Grand Coulee Dam, a distance of approximately 150 miles downriver (Figure 1-1). The UCR site includes both a free-flowing reach of the Columbia River and Franklin D. Roosevelt Lake (Lake Roosevelt), a large reservoir maintained behind Grand Coulee Dam. The transition between the free-flowing river and Lake Roosevelt occurs within approximately the first 15-mile stretch south of the U.S.-Canada border and 132 miles upriver from Grand Coulee Dam when the reservoir is full.

Previous investigations by federal and state agencies have identified the presence of contamination within the U.S. portion of the UCR and surrounding upland areas from Grand Coulee Dam to the Canadian border (U.S. Geological Survey [USGS] 1994 and 2000; Washington State Department of Ecology [Ecology] 1989, 1991, and 1994). Other studies have evaluated contaminant source areas and effects north of the Canadian border [Ministry of Environment, Lands, and Parks, Province of British Columbia (MELP) 1992; Teck Cominco 2001)]. Potential sources of contamination include mining and milling operations, smelting operations, pulp and paper production, sewage treatment plants, and other industrial activities. Contaminants found by the studies are documented in the A&R Document (CH2M HILL, 2005a) and include heavy metals such as cadmium, copper, lead, mercury, and zinc, as well as organic contaminants such as polychlorinated dibenzo-p-dioxins (dioxins), polychlorinated dibenzofuran (furans), and polychlorinated biphenyls (PCBs).

In August 1999, the Confederated Tribes of the Colville Indian Reservation (CCT) petitioned USEPA to conduct an assessment of hazardous substance contamination at the Upper Columbia River. The petition expressed concerns about possible risks to people's health and the environment from contamination in the river. In December 2000, USEPA completed a preliminary assessment (USEPA, 2000a). Based on a review of available information and existing data, USEPA determined that further data collection was warranted. In 2001, USEPA conducted an expanded site inspection (ESI) at the UCR and collected sediment samples to assess contaminant concentrations in river sediment and to determine whether further detailed investigation such as an RI/FS was warranted (USEPA, 2003c). The results of the investigation showed that widespread contamination is present in the lake and river sediment and that an RI/FS was necessary to evaluate possible risks to human health and the environment.

The RI/FS process was initiated in April 2004 with collection and review of existing site characterization information. This information was the basis for developing the preliminary CSM, both for contaminated sediment as presented in the Phase I Sediment Sampling Approach and Rationale Document (Sediment A&R Document) (CH2M HILL, 2004b) and for fish tissue as presented in the Fish Tissue A&R Document (CH2M HILL, 2005a). This information was also used to prioritize the initial RI data collection efforts. The top-priority data collection efforts for Phase I of the RI were determined to be: (1) further assessment of contamination within sediment, and (2) further evaluation of contamination within fish tissue. The sediment sampling program was conducted in April and May 2005, and the fish tissue sampling program was conducted in September and October 2005. This report presents an evaluation of the fish tissue data. A separate report presents an evaluation of the sediment data (CH2M HILL, 2006b).

FIGURE 1-1
Upper Columbia River and Vicinity
Upper Columbia River RI/FS

SPK31010224, FIGURE 1-1 (EPA BASEMAP 11X17).MXD

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SECTION 2
Field and Analytical Program Overview

This section summarizes the Phase I fish tissue sampling program conducted in the fall of 2005. It summarizes the DQOs for the sampling program, describes the types of samples collected and their locations, lists the analyses conducted on each sample, presents a review of the data validation and data usability, and describes the sample and data management programs. The proposed approach and methods are described in detail in the Fish Tissue A&R Document (CH2M HILL, 2005a) and, the Fish Tissue QAPP (CH2M HILL, 2005b). Details of the field program, including deviations in approach and methods from the QAPP, can be found in the Fish Tissue Field Report (CH2M HILL, 2006a).

2.1 Phase I Fish Tissue Study Design

The Phase I fish tissue sampling program was designed to provide information to support an assessment of potential risks to human and ecological receptors in the UCR. During project planning, USEPA's DQO process (USEPA, 2000b) was used to identify specific Phase I data needs for the human and ecological risk assessments and to establish decision rules for the collection and evaluation of fish tissue data. The Phase I fish tissue sampling program was then designed in consideration of the specific data needs identified in the DQO process, the unique site characteristics, and comments received from affected landowners, land managers, and regulators, including CCT, the Spokane Tribe of Indians (STI), U.S. Department of the Interior (DOI) agencies, Washington State Department of Ecology (Ecology), and WDOH. The Phase I fish tissue sampling program planning process, including the DQO process, and a detailed rationale for the sampling design are described in the Fish Tissue A&R document (CH2M HILL, 2005a) and the Fish Tissue QAPP (CH2M HILL, 2005b). The DQOs are summarized in Table 2-1.

The sampling design was as follows:

- The site was divided into three reaches (upper, middle, and lower) based on physical characteristics and historical contaminant distribution.
- Fish were collected from two distinct fish sample collection areas (FSCAs) located in each reach (a total of six FSCAs were sampled).
- Five of six FSCAs were co-located with the sediment sampling focus areas to allow for comparison of contaminant concentrations in fish to those in sediments.
- Targeted fish species were collected at each of the six selected FSCAs.
- Five composite samples (each composed of five individuals) were targeted for collection and analysis for each species from each FSCA.

- Whole body samples were analyzed for all species from all FSCAs. At one FSCA within each reach, for a total of three FSCAs, fillet and offal were analyzed separately for selected target species.
- Analytes included PCB aroclors, PCB congeners, dioxins and furans, Target Analyte List (TAL) metals, organic arsenic species, percent lipids, and percent moisture.

The following sections provide a brief summary of the target species, sample types, and target sample locations.

2.1.1 Target Species and Tissue Types

The following fish species and tissue types were targeted for collection during the Phase I fish tissue sampling program:

- Walleye *(Sander vitreus)* – Fillet and offal at three FSCAs and whole body at three FSCAs
- Rainbow trout *(Oncorhynchus mykiss)* – Fillet and offal at three FSCAs and whole body at three FSCAs
- Lake whitefish (*Coregonus clupeaformis*) – Whole body only
- Largescale sucker *(Catostomas macrocheilus)* – Whole body only
- Burbot (*Lota lota)* – Whole body only

Rainbow trout were identified in the field by experienced biologists as either wild fish or hatchery fish, based on morphological characteristics (i.e., fin erosion and/or dorsal fin ray deformation), and assigned to composite samples separately.

Alternative species were considered if sufficient numbers of individuals in the target size range (TSR) could not be collected. Potential alternate species and TSRs are detailed in the Fish Tissue QAPP. Mountain whitefish (*Prosopium williamsoni*) were collected at the most upstream FSCA because lake whitefish were not available due to habitat conditions.

During the sampling, the presence of sediment and slag was noted in the guts of largescale suckers collected from upstream sites. Slag was not observed in the guts of this species from sites downstream; however, a microscopic examination was not performed. Slag was not observed in the guts of other species. However, these observations were based on the unaided eye and not microscopic analysis. It was recognized that the potential for the presence of copious deposits of slag in the guts of large-scale suckers could add to the uncertainties in the tissue measurements and the future use of those data. The decision was made to conduct a pilot study to assess the relative impact of slag and/or sediment in the guts of largescale suckers on their overall whole body measurements. To assess the contribution of sediment/slag to the whole body tissue measurements of largescale suckers, measurements were made of the metal concentrations in the gutless whole body and in gut tissue and contents (hereafter referred to as “gut/gut contents”), and of the ash-free dry weight (AFDW) of the gut/gut contents. A Fish Tissue QAPP Addendum (CH2M HILL, 2006c) was prepared outlining procedures and analysis.

2.1.2 Sample Types

Individual species and tissue-specific samples were designed to consist of a composite of five individual fish of a similar size. At a minimum, three fish were to be used only if availability warranted adjusting the sample size. The objective of selecting a compositing approach was to collect samples that are representative of the average tissue concentration over the sample area. A compositing approach allowed for more individual fish to be analyzed, while controlling analytical costs. Increasing the number of individuals per composite sample within each sample area increases the representativeness of the estimate of the average tissue concentration for that sample area, and provides an estimate of long–term consumption exposures.

Compositing was done using the following approach, which is consistent with the statistical assumptions used to design the study presented in the Fish Tissue A&R Document (CH2M HILL, 2005a). More details on the compositing approach are presented in Section 3.2.2 of the Fish Tissue Field Report. Individuals of a given species collected from a given FSCA were randomly assigned to one of the five composites planned for collection at each FSCA. Fish were collected from three or more locations within the FSCA depending on habitat availability and optimal collection conditions. The individual fish collected within each FSCA were pooled by species. A random number generator was used to assign individuals of a given species to a sample composite at a given FSCA.

Of the fish captured, only the individuals within a size range that satisfied the following quality assurance (QA) requirements were kept. Composite sample acceptability requirements stipulate that individual fish for a composite sample be of similar size, and that the smallest individual in a composite be no less than 75 percent of the total length (size) of the largest individual in the same composite. Further, USEPA guidance (USEPA, 2000c) suggests that the relative difference between the average length of individuals within any composite sample and the average length of all individuals in all composite samples should not exceed 10 percent.

2.1.3 Target Sample Locations

Five composite samples for each target species and tissue type were planned for collection within each of the six fish sampling areas (Figure 2-1). At FSCAs 1, 3, and 6, both fillet and offal were targeted for analysis for walleye and rainbow trout and whole body samples were analyzed for all other species. At FSCAs 2, 4, and 5, whole body samples were analyzed for all species. Thus, a total of 180 composite samples were planned for collection (see Table 2-2). The inclusion of laboratory duplicates resulted in a total of 198 targeted composite samples.

To address the potential for overestimating the contribution of metals to largescale sucker whole body measurements, the gut (i.e., esophagus, stomach, and intestines) and gut contents were removed, producing both a "gut/gut contents" sample and a "gutless whole body" sample, from each individual in two randomly selected composite largescale sucker samples (five individuals) from FSCA 1 and from one each randomly selected composite from FSCAs 3 and 6. A total of 20 individual largescale suckers were processed. The "gut/gut contents" samples were analyzed for TAL metals, lipids, moisture and AFDW. The "gutless whole body" samples were analyzed for metals, lipids, and moisture.

2.2 Field Methods

2.2.1 Fish Collection and Handling

Because the target species selected for tissue analysis are found in different habitats within the UCR sampling areas, three different collection methods were necessary. Detailed methods are presented in the Fish Tissue QAPP and the Fish Tissue Field Report.

Target fish species were collected using the following equipment:

- Gill nets
- Boat electrofishing
- Burbot traps

Gill nets were constructed of monofilament mesh, with floats on the top horizontal line and weights on the bottom line, and were 200 feet long and 10 feet high, with 3- and 4-inch (stretch) mesh. The ends of the gill nets were weighted with one or more concrete or lead anchors attached by a short line (about 1 m) to keep the net near but above the bottom. An inflated buoy was attached to each end to mark the locations of the net at the water surface. Nets were generally deployed in the late afternoon or evening and retrieved the following morning. In some cases, the nets were re-deployed in the morning and picked up in the afternoon on the same day or the morning of the following day. A global positioning system (GPS) unit on board each vessel was used to document the location of each end of each gill net set upon deployment.

Electrofishing boats and operators were provided by the U. S. Fish and Wildlife Service (USFWS), STI, and CCT. Electrofishing was conducted in littoral or shoreline areas using generator settings that produced approximately 5 amperes. Settings were adjusted by the boat operator as necessary to fish effectively while limiting fish mortality. Electrofishing was conducted from dusk until approximately midnight. Long-handled nets were used that allowed the netters to reach stunned fish about 10 to 12 feet from the boat or under the water. Electrofishing was the primary method used to collect all species except lake whitefish and burbot, although both of these species were occasionally collected using electrofishing. At downstream locations, where burbot were found in shallow coves, electrofishing was very effective for this species. All stunned fish of the target species were netted. If they were clearly outside the TSR, they were returned to the water; otherwise, they were held in the live well until the electrofishing transect was completed.

Because burbot are predaceous fish found at or near the bottom in deep water, electrofishing and gill netting are not generally effective fishing methods in most locations. The burbot traps were constructed of a conical steel frame wrapped in nylon netting, with an opening that allowed fish to enter but not escape. Traps were baited with fresh fish cut into pieces and placed in a mesh bag inside the trap, and lowered to the bottom with a line attached to a surface buoy. Traps were deployed in a variety of locations at depths that ranged from approximately 20 to 100 feet. Burbot were caught across that depth range.

After collection using electrofishing and gill netting gear, fish were transferred to the live well on board the vessel. When all fish from a gillnet or electrofishing transect were collected, the sampling crews counted and sorted the fish by species and measured each individual for comparison to the TSR. Because burbot traps usually held only one or two fish, burbot were not placed in the live well but were transferred immediately to a cooler filled with wet ice. For all collection methods, fish that were within the TSR were euthanized by a blow to the head using a heavy plastic stick. Each fish was identified using pre-labeled plastic tags attached to the fish with a nylon cable tie passed through the fish's mouth and out the gill opening under the operculum. After the tags were secured, each fish was placed into a cooler with ice and held onboard the vessel for the remainder of the morning or nighttime sampling activity.

At the end of each daily collection event, the tagged fish in coolers with ice were transported from the collection area to the onshore processing facility at the Kettle Falls Marina. The labeled fish coolers were filled with ice, sealed with signed custody seals, and locked in the processing station until the onshore processing was completed. Signed and dated copies of all field forms and notebooks were left with the coolers.

A detailed description of sample handling and processing is presented in the Fish Tissue QAPP. The tagged fish were processed for shipment to the laboratory at the onshore processing facility using the following procedures:

1. The fish tag numbers and species identification were checked against the collection forms.
2. Each fish was rinsed with a spray of site water, which was collected from the FSCA at the time of fish collection, to remove any ice, blood, or dirt from the body surface, then placed on heavy-duty aluminum foil, shiny side out.
3. The total length (i.e., anterior-most part of the fish to the tip of the compressed lobes of the caudal fin) of each fish was measured to the nearest millimeter.
4. Each fish was weighed to the nearest 2 grams using a laboratory balance that was calibrated daily and had been tared to the weight of the foil.
5. An external examination was performed to check for signs of disease, deformities, and/or abnormalities. The results were recorded on the external exam forms that are provided as an appendix to the Fish Tissue Field Report (CH2M HILL, 2006a).
6. Sex was determined by internal examination of the gonads. The results are provided in the Fish Tissue Field Report (CH2M HILL, 2006a).
7. Walleye and rainbow trout from FSCAs 1, 3, and 6 were filleted using a disposable scalpel. Scales were removed before filleting. Fillets from both species were removed and wrapped in aluminum foil separately from the offal.
8. Otoliths were removed from all species except the largescale suckers. The otoliths were removed by cutting into the skull of the fish with a disposable scalpel blade. Both otoliths were removed and placed into a small plastic vial with the fish identification information. For determining the age of rainbow trout, several scales were taken in addition to otoliths. For the largescale suckers, the opercula were removed to be used for age determination instead of otoliths. The results are provided in the Fish Tissue Field Report (CH2M HILL, 2006a).

9. Each fish (whole body or fillet and offal) was wrapped in aluminum foil, and a second identification label was placed on the aluminum foil. The fish was then placed inside a transparent low-density polyethylene (LDPE) bag and held in a –20 degree Celsius (ºC) freezer onsite until being shipped to the laboratory for homogenization.

The following are deviations from the original plan:

- The QAPP specified that filleting and otolith removal be done at an offsite laboratory. However, trials with store-bought rainbow trout showed that freezing and thawing of the samples made offsite processing difficult, thus compromising the integrity of the sample homogenization process. Based on this trial, the filleting and otolith removal procedure was moved to the onsite processing facility.
- The onsite processing followed the procedure specified in Section 3.4.1.2 of the QAPP, with the following exceptions:
  - All processing surfaces were covered with aluminum foil that was disposed of between each fish.
  - Otolith removal and filleting was done using disposable stainless steel scalpels and disposable forceps.

2.2.2 Collection Summary

Fish sampling was conducted in two separate events because of differences in habitat requirements for different species and differences in sampling gear/boat requirements. The first sampling event occurred between September 6 and September 16, 2005, and used gillnets that were set in deep water to fish primarily for lake whitefish. This time period preceded the fall spawning period for lake whitefish. Because of the riverine nature of FSCA 1, gill netting was impractical, so boat electrofishing was used. Although the sampling event was designed to collect lake whitefish, an opportunistic approach was taken such that, if sufficient numbers of other target species were collected, they were kept. The sampling was done by two boat crews provided by the Spokane Tribal Natural Resources Department.

The second sampling event was designed to collect all target species and used a combination of gill nets, electrofishing, and burbot traps. Sampling took place between October 12 and October 21, 2005. Sampling was done by crews from the USFWS, USEPA, and the CCT Natural Resources Department. Gill netting and electrofishing were conducted by the USFWS and CCT crews, and burbot trapping was conducted by the USEPA crew.

Tables 2-3 and 2-4 summarize the locations where fish sampling was done, by FSCA and by date and gear types. The tables also indicate whether any of the target species of the TSR were caught and kept at a particular sample location. Figures 2-1 to 2-7 show the distribution of sample locations with each FSCA. During the September sampling event, 316 fish were collected and kept (Table 2-3), and, during the October event, 495 fish were collected and kept (see Table 2-4). Composite samples were constructed only from individual fish captured in a single sampling event.

The number of individual fish of a given species collected at a FSCA in some instances exceeded the minimum target number of 25 needed to prepare the five composite samples.

In an effort to optimize the number of samples within the study design, in some cases more than 25 individuals were retained for further processing at an FSCA. In all cases, individual fish were randomly selected from those collected, and delivered to the onshore processing facility. In some cases, all the individuals in excess of 25 were retained for further processing; in others, up to 35 individuals were retained and the remainder discarded.

Deviations in collection from the Fish Tissue QAPP are detailed in the Fish Tissue Field Report. The deviations in collection are summarized as follows:

- The TSR for rainbow trout, largescale suckers, and lake whitefish was increased to account for the average size individual for each species that was being collected.
- Mountain whitefish were collected as an alternative species to lake whitefish at FSCA 1 due to habitat limitations.

2.2.3 Post-Collection Methods

Processed samples were shipped to the Applied Sciences Laboratory (ASL) for post-collection processing prior to shipment to the analytical laboratories. Individual samples were homogenized and composites were prepared in accordance with the study design. In addition, selected samples of largescale sucker were dissected to remove the gut and gut contents prior to homogenization. Detailed methods are presented in the Fish Tissue QAPP, the Supplemental Fish Tissue QAPP, and the Fish Tissue Field Report.

Laboratory processing and compositing used the following process:

1. Samples (i.e., whole body fish, fillets, or offal) were allowed to thaw for about 10 minutes for ease of cutting.
2. Fish were placed on a plastic cutting board and cut into 4-inch-wide pieces using a heavy, pivoting stainless steel blade.
3. Fish were homogenized using a Robot Coupe Blixer 7.
4. The homogenized sample was placed into pre-cleaned glass jars, labeled, and placed in the freezer.
5. The laboratory equipment was decontaminated using the following procedures as specified in the Fish Tissue QAPP. All pieces of the S-blade unit, the 7-quart stainless steel bowl, cutting board, spatulas, and cutting utensils were washed in the following order:
    - Scrub with warm water and phosphate-free detergent
    - Rinse with copious amounts of cold water
    - Rinse with copious amounts of deionized (DI) water
    - Rinse three times with pesticide-grade MeOH
    - Rinse three times with 1+3 nitric acid
    - Rinse three times with Type II Millipore water
    - Allow to drip dry

The largescale sucker samples randomly selected for dissection to produce "gut/gut contents" and "gutless whole body" samples were processed using the following procedure:

1. To remove the gut from each fish, the selected individuals were taken out of the freezer in groups of about five and individually placed inside two plastic garbage bags in a cooler of warm water to slightly thaw the tissue.
2. The frozen gastrointestinal tract and its contents, hereafter referred to as the gut/gut contents, was broken off at each end and cleanly pulled out of the body cavity. (The gastrointestinal tract consisted of the stomach, pyloric caeca, and intestine. In some cases the sample contained portions of the liver; however, every effort was made to minimize this situation.)
3. The gut/gut contents were removed from the fish body cavity and placed on a clean piece of aluminum foil and weighed and recorded.
4. The gut/gut contents were placed in a clean, decontaminated stainless steel cup and homogenized. (The gutless body samples were processed using the general homogenization procedure described above for all whole body fish, fillet, or offal samples.)
5. Following homogenization, the gut/gut contents sample was poured into two 4-ounce jars, one to be archived and another to be submitted for metals analysis. The jar for archiving was immediately frozen. The jar for metals analysis was sampled for AFDW determination prior to being frozen.
6. AFDW was measured for each homogenized gut/gut contents sample.

The method that was used to randomly assign individual samples (i.e., whole body, fillet, or offal) from a FSCA into composite samples by species is as follows. The method was designed to avoid or minimize inclusion of fish outside the TSR where possible, randomly distribute 25 fish into 5 composites of 5 individuals, and meet the QA requirements specified in the Fish Tissue QAPP. In this methodology, each composite sample was checked to ensure that the smallest individual was not less than 75 percent of the length of the largest, and that the mean length of fish in each composite sample was not more than 10 percent larger or 10 percent smaller than the mean length of all composite samples for that species. Occasional but small deviations from the former rule were unavoidable because the size distributions in some locations exceeded the TSR. Composites that had minor deviations were identified in the Fish Tissue Field Report (CH2M HILL, 2006a).

A randomizer application (www.randomizer.net) was used to select a randomly organized list of 25 individuals from the total number (25 or more) available, and the list was then sequentially grouped into 5 composites of 5 individuals. The following procedure was used to randomly assign individual samples to composites:

1. List individuals from an FSCA by field tag number and length in millimeters.
2. Sort by size.
3. Identify any individuals outside the TSR.
4. If at least 25 individuals are within the TSR, proceed to step 5; if not, proceed to step 8.

5. Sequentially number individuals within the TSR (e.g., 1 through >/= 25).
6. Use the randomizer application (www.randomizer.net) to select a randomly organized list of 25 numbers from the total number available (e.g., 25 randomly drawn from 30 individuals within the TSR).
7. Sequentially group the randomly organized list into five composites. Proceed to step 14.
8. If 25 individuals within the TSR are not available, the most extreme individuals are eliminated, retaining only enough outside the TSR to total 25 individuals. If individuals larger and smaller than the TSR are present in the sample, it may be necessary to balance the number of individuals above and below the TSR used in the composite to minimize deviation from the mean length of all species collected from all FSCAs.
9. Use randomizer to produce a randomly organized set of numbers from 1 to 25.
10. Sequentially group the randomly organized list into five composites.
11. Calculate the mean length of fish and the ratio of the smallest fish to the largest for each composite sample.
12. If the smallest is less than 75 percent of the largest, repeat (up to three times) steps 9 through 11.
13. If repeating steps 9 through 11 consistently fails to produce acceptable composite groupings, consult USEPA Task Order Project Officer (TOPO), Quality Assurance Officer (QAO), and/or risk assessors.
14. Calculate mean size of individuals in each composite, and compare largest and smallest mean across all composites, within and among FSCAs.
15. If mean length of any composite varies by more than +/-10 percent of the grand mean, consult USEPA TOPO, QAO, and/or risk assessors.

Details of the actual assignment of individual fish to composites are presented in the Fish Tissue Field Report.

2.2.4 Fish Tissue Composites Submitted for Analysis

Table 2-5 presents a summary of the Phase I fish tissue composites that were submitted for chemical analysis. A total of 165 fish tissue composites and 15 QA replicates were prepared and submitted for chemical analysis. In addition, two randomly selected composites of largescale suckers from FSCA 1 and one each from FSCAs 3 and 6 were selected for further processing into gutless and gut/gut contents samples. A total of 20 individual fish were submitted as gutless and as gut/gut contents for chemical analysis. The total composites prepared following sampling represented 85 percent of the targeted number. The QA replicates represented 83 percent of the target.

The following are deviations from the original plan:

- Three whole body composites of walleye were prepared from FSCA 5.

- Two whole body walleye composites were added to FSCA 6 to give a total of 10 for the lower reach. This was done in accordance with the study design in the A&R Document and the Fish Tissue QAPP.
- Four five-fish whole body composites and one three-fish whole body composite of wild rainbow trout were prepared at FSCA 2.
- One four-fish fillet composite and one four-fish offal composite of wild rainbow trout were prepared at FSCA 6.
- An additional whole body wild rainbow trout composite was prepared from FSCA 5, giving a total of six (i.e., one wild and five hatchery).
- A three-fish whole body composite of lake whitefish from each collection period (September and October) was prepared at FSCA 6.
- Five mountain whitefish composites were prepared as an alternative to lake whitefish at FSCA 1.
- Five largescale sucker composite samples were available from FSCA 1; however, two were randomly selected, and the fish were submitted individually as gutless and as gut/gut contents for analysis.
- Only four largescale sucker composites were prepared from FSCA 4.
- Five largescale sucker composite samples were available from FSCAs 3 and 6; however, one was randomly selected, and the fish were submitted individually as gutless and as gut/gut contents for analysis.
- No whole body burbot composites were prepared from FSCA 1.
- Three three-fish whole body burbot composites were prepared at FSCA 2.
- Four whole body burbot composites were prepared at FSCA 4.

2.3 Analytical Program

Following collection, onshore processing, and processing at the ASL, the samples were packaged and sent under chain of custody via FedEx overnight delivery to the USEPA Region 10 Manchester Laboratory for analysis and further distribution. The following analyses were performed:

- **TAL Metals:** Aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, uranium, vanadium, and zinc.
- **PCB Aroclors:** 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268.
- **Dioxins and Furans:** Tetra- through octa-chlorinated dibenzo-p-dioxins and chlorinated dibenzofurans.
- **PCB Congeners:** 209 congeners.

- **Arsenic Speciation:** Inorganic arsenic (As+3 and AS+5), ASB + Cation, dimethylarsonic acid (DMA), monomethylarsonic acid (MMA), and unknown (assumed to be arsenal sugars).
- **Percent lipids.**
- **Percent moisture.**

The analytical suite conducted on each sample type is listed in Table 2-6. Chemical analyses were conducted by Contract Laboratory Program (CLP) laboratories and the USEPA Region 10 Manchester Laboratory.

PCB congeners were analyzed initially on a subset of samples using high-resolution methods. Depending on the results and the risk analysis, other archived samples, as well as future samples, may be analyzed for only the most common and key congeners (e.g., PCBs 126 and 169).

2.3.1 Phase I Fish Tissue Chemical Data QA/QC Program

The objective of the Phase I fish tissue data collection and analyses was to generate data of known quality appropriate for project needs in terms of end decisions. This objective was accomplished through the following cycle:

- The DQO process identified project data needs and decision rules and was documented as an appendix to the Fish Tissue QAPP.
- The QAPP defined organization, functional activities, procedures, and policy that were implemented to obtain project-specific data of known and appropriate quality.
- Detailed laboratory analytical procedures and quality assurance/quality control (QA/QC) procedures were followed, including documentation (Table 2-7).
- Laboratory and field QA/QC was performed through audits by the USEPA QA Officer.
- Data quality and usability review outside the laboratory were documented in data validation reports.
- Individual data points were qualified by applying data validation report flags to the project database.
- An overall assessment of data quality was performed to evaluate the usability of the data within the context of the project objectives.

The following subsections describe the analytical methodology, the data validation methodology, and the overall data quality evaluation findings. Information about QA/QC samples is provided in this report in Appendix B. Data quality evaluation reports for the individual method and sample results are provided as Appendix F.

2.3.2 Analytical Program/Methodology

A listing of analytes and associated methods is provided in Table 2-7. In addition, for each analytical parameter and method, the standard USEPA analytical method references are provided in the Fish Tissue QAPP. These documents identify the following method-specific QC requirements:

- Method-specific QC procedure
- Level of effort (frequency of QC checks) for each QC procedure
- Quantitative acceptance limits for QC data
- Corrective action requirements for the laboratories for QC data that are outside the acceptance limits
- Documentation

These requirements, as detailed for each analytical method in the Fish Tissue QAPP, were followed by the laboratory as the project analytical requirements.

2.3.3 Data Quality Assessment and Quality Control Data

DQOs are prescribed in the Fish Tissue QAPP in terms of precision, accuracy, representativeness, comparability, and completeness (PARCC) parameters. The following is a description of the assessment for each parameter. PARCC objectives for the project are shown in Table 2-7. Associated data for the PARCC parameters are provided in the laboratory data package.

2.3.3.1 Accuracy

Accuracy measurement data include laboratory control sample and matrix spike recovery data for both organic and inorganic analytical parameters, as well as surrogate recovery data for organic parameters. The accuracy data were provided to the project team (data users) for consideration during data evaluation because these data need to be applied to whole sites. Over 90 percent of the data are within the criteria, thus meeting project goals.

2.3.3.2 Precision

Precision measurement data include laboratory and field duplicate data expressed as relative percent deviation. The validation reports also detail duplicates outside control limits, if any. The duplicate data were provided to the project team (data users) for consideration during data evaluation because these data need to be applied to whole sites. Over 90 percent of the data are within the criteria, thus meeting project goals.

2.3.3.3 Representativeness

Representativeness is a measure of how closely the measured results reflect the actual concentration or distribution of the chemical compounds in the sampled media. Representativeness is assessed in both qualitative and quantitative terms. The project report discusses the qualitative aspects of representativeness in terms of design of the field sampling plan, sampling techniques, sample handling protocols, and associated documentation. Quantitative measures of representativeness include field and laboratory blank measurements to identify whether contamination was introduced through field or laboratory operations. Field duplicate measurements are used to establish variability.

Laboratory and trip blank measurements were detailed on a sample- and parameter-specific basis in the validation reports. All qualifications as a result of laboratory and trip blank effects were incorporated into the project sample/analyte-specific data. Field blank results are summarized in the database and were provided to data users on a sitewide basis.

Field duplicate results are listed in Appendix B.

2.3.3.4 Comparability

Comparability expresses the confidence with which one data set can be compared to another. Comparability of data has been established through use of the following:

- Standard analytical methods and QC procedures established in the Fish Tissue QAPP and USEPA CLP and Manchester Regional Laboratory protocols
- Consistent reporting units for a specified procedure

2.3.3.5 Completeness

This QA/QC analysis assesses completeness as a measure of the amount of valid data obtained from the analytical measurements. Field activity completeness was assessed within the context of the overall sampling design and meets project goals. Data completeness was found to be above 90 percent at large and meets project goals.

2.4 Sample Management and Recordkeeping

A sample is physical evidence collected from a hazardous waste site, from the immediate environment, or from another source. Because of the potential evidentiary nature of samples, the possession of samples must be traceable from the time the samples are collected until they are introduced as evidence. Field notebooks, sampling records, chain-of-custody forms, and other field documents were used to record information about each sample collected during the Phase I sediment sampling event.

2.4.1 Field Notebooks

A bound field notebook was maintained by each sampling field team leader. The field notebook provides a daily record of significant events, observations, and measurements during the field investigation. All entries were signed and dated.

2.4.2 Field Documents

Field documents including sample custody seals, chain-of-custody records, and packing lists were obtained from the Regional Sample Control Coordinator (RSCC) in USEPA's Quality Assurance Office. Chain-of-custody procedures were used to maintain and document sample collection and possession. After sample packaging, one or more of the following chain-of-custody forms was completed, as necessary, for the appropriate samples:

- Organic traffic report and chain-of-custody record; Forms II Lite forms as applicable
- Inorganic traffic report and chain-of-custody record; Forms II Lite forms as applicable
- USEPA Region 10 Chain-of-Custody Record
- Overnight shipping courier air bill

Copies of the above forms were filled out and distributed in accordance with the instructions for sample shipping and documentation. Completed field QA/QC summary forms were sent to the RSCC at USEPA's Region 10 Quality Assurance Office at the conclusion of the sampling event. The sampling records and other data from the sampling event are provided in the Fish Tissue Field Report.

2.5 Data Management Program

Data obtained during the Phase I sampling program were managed according to the processes described in the project-specific data management plan prepared for the UCR site (CH2M HILL, 2004a) and according to the procedures described in the Fish Tissue QAPP.

Following receipt of validated data, the data and validation qualifiers were input into the site information management system (SIMS) database to facilitate queries and report preparation. The data are stored in SIMS with all laboratory and independent validator qualifiers included. Laboratory data from ASCII or equivalent files, provided by the USEPA Region 10 CLP Project Officer, were adapted to files compatible with the project database, as described in the project-specific data management plan. The SIMS database continues to be maintained in a manner that is compatible with, and provided to, USEPA or others at USEPA's request.

TABLE 2-1
Phase I Remedial Investigation Data Quality Objectives for Fish Tissue Contaminants
Upper Columbia River RI/FS

Problem Statement	Identify the Decision	Inputs to Decisions	Study Boundaries	Decision Rule	Acceptable Limits on Decision Errors	Optimized Sampling Design
Human Health Risk Assessment						
Contaminants are likely present in edible fish at concentrations that pose unacceptable risk to some people who consume fish from the UCR.	Determine whether measures are needed to reduce fish contaminant concentrations, and/or reduce exposure to people consuming fish from the UCR depending on the levels of contamination and the intensity of consumption.	Demographic information. Fish consumption information (intake rates and body parts). USEPA IRIS and other toxicological databases and literature values. Chemical analysis of Phase I fish tissue samples (analytes listed in Table 2-6). Length, weight, and age of each fish analyzed.	Decisions will be made using a variety of spatial boundaries as determined by the conceptual exposure model and the patterns of contaminant concentrations in fish tissue from the Columbia River between the U.S.-Canada Border and Grand Coulee Dam).	If calculated cancer risk or HI estimates are above regulatory risk targets and uncertainties are acceptable, a remedial action alternative may need to be developed; otherwise, no further evaluation is necessary for human health reasons.	Decision is to be made using quantitative and qualitative data.	Sample design described for Phase I Fish Tissue QAPP.
Aquatic Risk Assessment						
Determine whether measures are needed to prevent exposure of fish or bioaccumulation of site contaminants from the UCR to contaminant concentrations that pose unacceptable risk to fish.	If the lines of evidence indicate that fish are not potentially at risk, with low uncertainty, then no further action may be taken. If the lines of evidence indicate that fish are not potentially at risk, with moderate to high uncertainty, then additional data collection may be necessary. If the lines of evidence indicate that fish are potentially at risk, with moderate to high uncertainty, then additional data collection may be necessary. If the lines of evidence indicate that fish are potentially at risk, with low uncertainty, then remedial action alternatives will need to be developed.	Toxicological databases and literature. Chemical analysis of Phase I fish tissue samples (analytes listed in Table 2-6).	Decisions will be made using a variety of spatial boundaries as determined by the conceptual exposure model and the pattern of contaminant concentrations in fish tissue across the site (note that the Phase I study area is bounded by the U.S.-Canada Border and Grand Coulee Dam).	If representative PCOI concentrations are above protective concentrations, a remedial action alternative may need to be developed; otherwise, no further evaluation is necessary for aquatic risk reasons.	Decision is to be made using quantitative and qualitative data.	Sample design described for Phase I Fish Tissue QAPP.

TABLE 2-1
Phase I Remedial Investigation Data Quality Objectives for Fish Tissue Contaminants
Upper Columbia River RI/FS

Problem Statement	Identify the Decision	Inputs to Decisions	Study Boundaries	Decision Rule	Acceptable Limits on Decision Errors	Optimized Sampling Design
Wildlife Risk Assessment						
Contaminants may be present in fish and invertebrates at concentrations that pose unacceptable risk to wildlife (birds and mammals) in the UCR site.	If the lines of evidence indicate that wildlife communities are not potentially at risk, with low uncertainty about the result, then no further action may be taken. If the lines of evidence indicate that wildlife communities are not potentially at risk, with moderate to high uncertainty about the result, then additional data collection may be necessary. If the lines of evidence indicate that wildlife communities are potentially at risk, with moderate to high uncertainty about the result, then additional data collection may be necessary. If the lines of evidence indicate that wildlife communities are potentially at risk, with low uncertainty about the result, then remedial action alternatives will need to be developed.	Wildlife home ranges and migration patterns. Habitat maps. Chemical analysis of Phase I fish tissue samples (analytes listed in Table 2-6). Benthic tissue analytical data (if available) or modeled data.	Decisions will be made using a variety of spatial boundaries as determined by the conceptual exposure model and the pattern of contaminant concentrations in fish tissue across the site (note that the Phase I study area is bounded by the U.S.-Canada Border and Grand Coulee Dam.	If representative PCOI concentrations are above protective concentrations, a remedial action alternative will need to be developed; otherwise, no further evaluation is necessary.	Decision is to be made using quantitative and qualitative data.	Sample design described for Fish Tissue QAPP.

PCOI = potential contaminant of interest
IRIS = Integrated Risk Information System

TABLE 2-2
Targeted Fish Sampling Locations and Composite Number
Upper Columbia River RI/FS

		Number of Composite Samples									
		Walleye			Rainbow Trout			Lake Whitefish	Large-Scale Sucker	Burbot	
River Reach	Sample Location (FSCA)	Whole Body	Fillet[b]	Offal[b]	Whole Body	Fillet[b]	Offal[b]	Whole Body	Whole Body	Whole Body	Total
Upper	1[a]	0	5[d]	5[d]	0	5[d]	5[d]	5[d]	5[d, e]	5[d]	35
Upper	2[a]	5[d]	0	0	5[d]	0	0	5	5	5	25
Middle	3[a]	0	5	5	0	5	5	5	5[e]	5	35
Middle	4[a]	5	0	0	5	0	0	5	5	5	25
Lower	5	5	0	0	5	0	0	5	5	5	25
Lower	6[a]	0	5	5	0	5	5	5	5[e]	5	35
QA Replicates[d]		2	2	2	2	2	2	2	2	2	18
	Total	17	17	17	17	17	17	32	32	32	198

[a] FSCA falls within sediment sample focus area.

[b] Fillet and offal to be taken from the same five individuals for each composite.

[c] For rainbow trout, composites to be noted as composed of wild, hatchery, or mixed-origin individuals.

[d] Three QA replicate samples to be formed from one composite sample at the indicated FSCA.

[e] Two replicates from FSCA 1 to be randomly selected and individuals analyzed individually as gutless whole body and as gut/gut content samples. One replicate from FSCAs 3 and 6 to be randomly selected and individuals analyzed individually as gutless and as gut samples.

TABLE 2-3
Summary of September Phase I Fish Tissue Sampling Event
Upper Columbia River RI/FS

Date	Crew	FSCA	Gear	Individuals Collected by Species						
				Walleye	Rainbow (Wild)	Rainbow (Hatchery)	Lake Whitefish	Mountain Whitefish	Largescale Sucker	Burbot
9/6/2005	STI-1	1	E	14	4			8	5	
9/7/2005	STI -1	1	E	12	10			9	9	
9/7/2005	STI -2	2	N	3						
9/8/2005	STI -1	1	E		12			8	3	
9/8/2005	STI -2	2	N				1			
9/9/2005	STI -2	2	N	9			1			
9/10/2005	STI -1	3	N	14			15			
9/10/2005	STI -2	3	N	25			35			
9/12/2005	STI -2	4	N	23			12			
9/12/2005	STI -1	4	N				2			
9/13/2005	STI -1	5	N				28			
9/13/2005	STI -2	5	N	2						
9/14/2005	STI -2	4	N				1			
9/14/2005	STI -1	6	N	29			1			
9/15/2005	STI -1	4	N				20			
9/15/2005	STI -2	6	N				1			

STI-1 = Spokane Tribal Biologist Crew 1
STI-2 = Spokane Tribal Biologist Crew 2

E = electrofishing
N = gill netting

TABLE 2-4
Summary of October Phase I Fish Tissue Sampling Event
Upper Columbia River RI/FS

Date	Crew	FSCA	Gear	Individuals Collected by Species						
				Walleye	Rainbow (Wild)	Rainbow (Hatchery)	Lake Whitefish	Mountain Whitefish	Largescale Sucker	Burbot
10/12/2005	FWS	2	E	10	4				2	1
10/12/2005	CCT	2	E	22	4	2				1
10/13/2005	FWS	2	E		3		1		3	
10/13/2005	CCT	2	E		12	1			9	1
10/13/2005	CCT	2	N				9		1	1
10/13/2005	EPA	2	T							3
10/14/2005	EPA	2	T							4
10/14/2005	CCT	2	N				20		1	1
10/14/2005	CCT	3	E		2	6			3	2
10/14/2005	FWS	3	E		6	7			12	1
10/15/2005	FWS	3	E		2	4			12	1
10/15/2005	EPA	3	T							12
10/15/2005	CCT	4	E			1			1	7
10/15/2005	EPA	4	E			1				4
10/16/2005	EPA	3	T							9
10/16/2005	FWS	4	E		1	26				
10/16/2005	CCT	4	E		1				24	10
10/16/2005	CCT	5	E						2	
10/17/2005	EPA	4	T							1
10/17/2005	FWS	5	E	2		4			24	5

TABLE 2-4
Summary of October Phase I Fish Tissue Sampling Event
Upper Columbia River RI/FS

Date	Crew	FSCA	Gear	Individuals Collected by Species						
				Walleye	Rainbow (Wild)	Rainbow (Hatchery)	Lake Whitefish	Mountain Whitefish	Largescale Sucker	Burbot
10/17/2005	CCT	5	E	1	5	22			1	
10/17/2005	CCT	6	E			1			1	
10/18/2005	CCT	5	E	1						1
10/18/2005	EPA	5	T							12
10/18/2005	FWS	6	E		3	14			30	15
10/19/2005	FWS	1	E					7	11	
10/19/2005	FWS	2	E						4	
10/19/2005	CCT	5	N	8						
10/19/2005	CCT	5	E	3						
10/19/2005	EPA	5	T							9
10/19/2005	FWS	6	E			6				
10/20/2005	CCT	6	N	16	1	1	1			6
10/20/2005	EPA	6	T							4
10/21/2005	CCT	6	N				2			

STI-1 = Spokane Tribal Biologist Crew 1
STI-2 = Spokane Tribal Biologist Crew 2
CCT = Colville Confederated Tribal Biologist Crew
FWS = U.S. Fish and Wildlife Service Crew
EPA = U.S. Environmental Protection Agency Crew

E = electrofishing
N = gill netting
T = burbot trap

TABLE 2-5
Summary of Fish Tissue Composite Samples Submitted for Chemical Analysis
Upper Columbia River RI/FS

FSCA	Walleye		Rainbow Trout			Lake Whitefish		Mountain Whitefish		Largescale Sucker		Largescale Sucker Gut[e]		Burbot	
				Wild	Hatchery										
	Planned	Actual	Planned	Actual	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
FSCA1	5F/5O	5F/5O	5F/5O	5F/5O	0	5WB	0	0	5WB[d]	5WB	3WB	0	2	5WB	0
FSCA 2	5WB	5WB	5WB	5WB[a]	0	5WB	5WB	0	0	5WB	4WB	0	0	5WB	3WB[f]
FSCA 3	5F/5O	5F/5O	5F/5O	2F/2O	3F/3O	5WB	5WB	0	0	5WB	4WB	0	1	5WB	5WB
FSCA 4	5WB	5WB	5WB	0	5WB	5WB	5WB	0	0	5WB	5WB	0	0	5WB	4WB
FSCA 5	5WB	3WB	5WB	1WB	5WB	5WB	5WB	0	0	5WB	5WB	0	0	5WB	5WB
FSCA 6	5F/5O	5F/5O + 2WB	5F/5O	1F/1O[b]	4F/4O	5WB	2WB[c]	0	0	5WB	4WB	0	1	5WB	5WB
Total	45	45	45	22	24	30	22	0	5	30	25	0	4	30	22
QA Rep	2	2	2	3	3	2	2	0	1	2	3	0	1	2	2

[a] Four 5-fish composites and one 3-fish composite were formed.

[b] One 4-fish fillet composite and one 4-fish offal composite were formed.

[c] A 3-fish composite from each collection period (September and October) was formed.

[d] Mountain whitefish were used as a substitute for lake whitefish at this FSCA because of habitat limitations.

[e] Individual largescale suckers from a randomly selected composite were dissected to remove the gut and gut contents. The gutless whole body and gut/gut content samples were analyzed individually.

[f] Three 3-fish composites were formed.

TABLE 2-6
Summary of Analytical Program by Fish Species and Tissue Type
Upper Columbia River RI/FS

	Analyte						
Target Species	**TAL Metals**	**Inorganic Arsenic**	**PCB Aroclors**	**PCB Congeners**	**Dioxin/Furan Congeners**	**Percent Lipids**	**Percent Moisture**
Walleye							
Fillet	15	3	15	3	15	15	15
Offal	15	3	15	3	15	15	15
Whole Body	17	5	17	3	17	17	17
Wild Rainbow Trout							
Fillet	9	3	9	2	9	9	9
Offal	9	3	9	2	9	9	9
Whole Body	8	3	9	2	9	9	9
Hatchery Rainbow Trout							
Fillet	8	2	8	2	8	8	8
Offal	8	2	8	2	8	8	8
Whole Body	12	2	12	2	12	12	12
Lake Whitefish							
Whole Body	24	2	24	5	24	24	24
Mountain Whitefish							
Whole Body	7	3	7	1	7	7	7
Largescale Sucker							
Whole Body	29	4	29	6	29	29	29
Gutless[a]	22	6	NA	NA	NA	NA	NA
Gut/Contents[a]	22	6	NA	NA	NA	NA	NA
Burbot							
Whole Body	24	4	24	5	24	24	24
Total	229	51	185	38	185	185	185

[a] Individual largescale suckers were analyzed as gut/gut contents and as gutless whole body samples.

Note: The number of analyses listed for each sample type includes a duplicate QA sample.

NA = not analyzed

TABLE 2-7
Analytical Program Objectives, Procedures, and Criteria
Upper Columbia River RI/FS

Analytes[a]	Target Detection Limit[b]	Analytical Precision (Relative Percent Deviation)[c]	Analytical Accuracy (Percent Recovery[c]	Overall Complete-ness (%)	Method	Reference
TAL Metals and Uranium		±20%	75 – 125%	90	CLP/ ILM05.3/SW846-6000/7000	CLP/ MEL
PCBs (Aroclors)		±50%	50 – 150%	90	CLP/ OLM04.3/SW8082	CLP/ MEL
PCBs (congeners)		±20%	25 – 150%	90	Method 1668A	CLP/ MEL
Inorganic Arsenic		±20%	75 – 125%	90	MEL	MEL
Dioxins/ Furans (tetra through octa)		±20%	75 – 125%	90	Method 1613B	CLP/ MEL
% Lipids	0.1%	NA	NA	90	Bligh and Dyer[d] modified by MEL	CLP/ MEL
% Moisture	0.1%	NA	NA	90	PSEP[e]	CLP/ MEL

[a] Specific analytes are shown in Table 2-4 of the Fish Tissue QAPP, as well as data tables in this report.

[b] Detection limits are shown in the data tables in this report.

[c] Detection limits, precision, accuracy, and methods were fish-tissue- and laboratory-specific. The laboratories targeted the analytical concentration goals (ACGs) shown in Table 2-3 of the QAPP.

[d] Bligh and Dyer, 1959.

[e] Puget Sound Estuary Program (PSEP), 1997.

Notes: CLP indicates USEPA CLP methodology and QA/QC.
MEL indicates USEPA Region 10 Manchester Environmental Laboratory methodology and QA/QC.

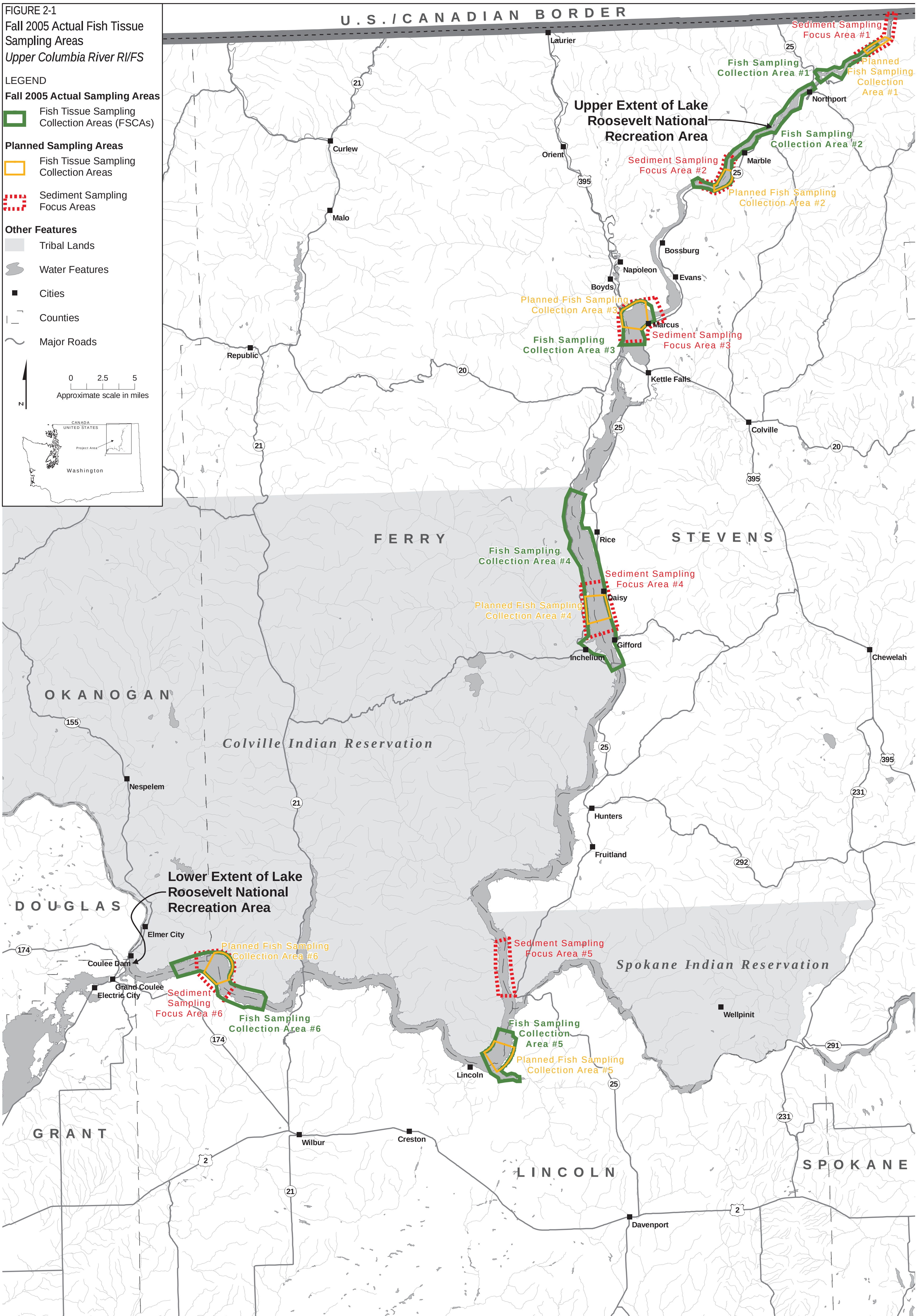


FIGURE 2-1
Fall 2005 Actual Fish Tissue Sampling Areas
Upper Columbia River RI/FS

SECTION 3

Data Evaluation

This report was prepared to facilitate information sharing, communicate preliminary Phase I findings, and provide context for subsequent RI/FS scoping documents and work plans. Because this report was prepared in advance of the initial RI/FS work plans, it does not substitute for these critical steps. Given this, the objective of the data evaluation was to present the nature and extent of fish tissue contaminants seen in the Phase I sampling and to present the data relative to the secondary objectives identified in the Fish Tissue A&R Document (CH2M HILL, 2005a) and the Fish Tissue QAPP (CH2M HILL, 2005b). As noted in Section 1, the evaluation was also designed to support the planned human health and ecological risk assessments as well as consideration of an updated fish advisory for Lake Roosevelt.

The scope and limitations of the Phase I fish tissue data evaluation are summarized in Section 1. The analytical results are presented in full to allow for maximum usability of the Phase I data by all potential users. The full analytical data are supplemented by details on fish length, weight, and age as presented in the Fish Tissue Field Report (CH2M HILL, 2006a). The data evaluation did not directly address potential human health or ecological risks associated with contaminants in fish. Those evaluations will be addressed as part of the human health risk assessment being conducted by USEPA and an ecological risk assessment that will be conducted by Teck Cominco and overseen by USEPA. Updating of fish consumption advisories based on these data will done by the WDOH.

3.1 Data Evaluation Scope and Approach

This section describes the data evaluation scope and approach in detail. In addition, this section describes the process used to focus the evaluation on PCOIs. The sections following this scope and approach summarize the data by species and evaluate the fish tissue data consistent with the DQOs in order to characterize the nature and extent of contaminants in representative fish species from Lake Roosevelt.

3.1.1 Scope of Data Evaluation

For the purposes of bounding the scope of the data analysis presented in this document, a process was used that evaluated the fish tissue results against comparison values (CVs) that were adapted from published risk-based CVs. The purpose of the comparison was to identify PCOIs, which became the focus of the data evaluation. The CVs were used to illustrate broad trends and patterns in the data. It should be emphasized that the PCOI identification process did not involve an assessment of risk, site-specific or otherwise, or identification of PCOIs. Nor did the PCOI selection process entail consideration of the CVs as applicable or relevant and appropriate requirements (ARARs). These important steps will occur in subsequent stages of the RI/FS. Rather, the process constituted an initial evaluation of the large body of fish tissue analytical data generated during the Phase I Fish Tissue program in order to identify chemicals of possible interest. Site-specific PCOIs for UCR fish tissue will be identified as part of the human health risk assessment being conducted by USEPA and an ecological risk assessment that will be conducted by Teck Cominco and overseen by USEPA.

The CVs used to identify PCOIs for further evaluation were obtained primarily from USEPA Region 3 Preliminary Remediation Goals (PRGs) (USEPA, 2003a, updated 2006). The assumed target risk was 1x10-6 for carcinogens or a hazard quotient (HQ) of 0.1 for noncarcinogens based on a fish consumption rate of 280 grams per day (every day for 30 years). The rationale, methods, formulas and citations used for selection of the CVs are sufficient to reproduce the results during subsequent analysis. For example, 280 grams (10 ounces) per day represents the 95th percentile for adult consumers of fish from a large, national survey of limited duration (USEPA, 2002). Both the ingestion rate and the exposure frequency were increased to adjust the Region 3 human health-based fish PRGs downward to derive the more protective initial CVs. The consumption rate(s) used to assess human health risk will be identified in the human health risk assessment work plan.

The adjustments for noncarcinogenic compounds were made using the following equation:

$$CV_{NC} = PRC_{NC} \text{ x ER x } 350/365 \text{ x } 54/280 \text{ g-day}$$

Where:

CV_{NC} = Comparison value for noncarcinogens
PRC_{NC} = Region 3 preliminary remedial concentration (PRC) in fish for noncarcinogenic compounds
ER = Exceedance ratio of 0.1

The adjustments for carcinogenic compounds were made using the following equation:

$$CVC = PRC_{C} \text{ x RV x } 350/365 \text{ x } 54/280 \text{ g-day}$$

Where:

CV_{C} = Comparison value for carcinogens
PRC_{C} = Region 3 PRC in fish for carcinogenic compounds
RV = Risk value of $1\text{x}10^{-6}$

The CVs used for dioxin/furan and PCB congeners were further adjusted as follows. For dioxin/furan and the “dioxin-like” PCB congeners (i.e., PCB 77, 81, 105, 114, 118, 123, 126, 156, 169, and 189), the Region 3 PRC for 2,3,7,8-TCDD was adjusted using the formula given above and the resulting value was then further adjusted based on the World Health Organization’s updated toxicity equivalence factors (TEFs) for dioxin and dioxin-like compounds (van den Berg et al., 2006). The non-dioxin-like PCB congeners were calculated based on the reference dose (RfD) for Aroclor 1254.

The CV for iron was based on Stifelman et al. (2005). Lead was calculated using the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) lead model assuming a child (0 to 84 months) fish ingestion rate of 280 grams/day, resulting in 5.035 percent of the population with blood lead levels above 10 micrograms per deciliter (µg/dL). The ecological CVs were based on Dyer et al., 2000. These CVs were supplemented by those presented in Windward (2004).

The CVs for all of the Phase I fish tissue analytes are listed in Table 3-1. These CVs were selected to help focus the data evaluation on the objectives presented in Section 1.

The data were compared by analyte for each fish species and tissue type. The minimum and maximum detected values for each analyte were compared to both the human health and ecological CVs listed in Table 3-1. The number of samples with detected values greater than the CVs and the exceedance ratios for the minimum and maximum detected values for each species and tissue type are presented in Appendix A. Table 3-2 lists the analytes by species and tissue type for which at least one sample exceeded either the human health or ecological CVs. Table 3-3 lists the maximum exceedance ratio for each of these analytes by species and tissue type.

Seventeen metals had at least one sample with detected values that exceeded the CVs. Table 3-4 lists the metals that most frequently exceeded the CVs. The following metals most often exceeded their CVs:

- Total Mercury. Mercury exceeded both the human health and ecological CVs for all species and tissue types for all samples except for five whole body hatchery rainbow trout and 13 whole body lake whitefish samples. The maximum exceedance ratio (i.e., the maximum detected concentration for a given species/CV) of 166.8 was seen in a walleye fillet sample.
- Arsenic. Arsenic exceeded the human health CV for all species and tissue types for all samples. The maximum exceedance ratio of 246 was seen in a burbot whole body sample.
- Selenium. Selenium exceeded its CVs for all species and tissue types. The exceedances were primarily for the human health value. The maximum exceedance ratio of 9.7 was seen in a mountain whitefish whole body sample.
- Chromium. Chromium exceeded the ecological CV for all species and tissue types. The maximum exceedance ratio of 17 was seen in a largescale sucker whole body sample.
- Copper. Copper exceeded CVs for wild rainbow trout, largescale sucker , mountain whitefish, and burbot whole body samples. The maximum exceedance ratio was 12.9, seen in a largescale sucker whole body sample for the ecological CV.
- Zinc. Zinc exceeded CVs for all species and tissue types except walleye fillets. The exceedances were for both the human health and ecological CVs. The maximum exceedance ratio of 17 was seen in a largescale sucker whole body sample.
- Aluminum. Aluminum exceeded CVs for all species and tissue types except fillet samples for hatchery rainbow trout. The exceedances were all for the ecological CV. The maximum exceedance ratio of 64 was seen in a walleye fillet sample.
- Lead. Lead exceeded CVs for all species and tissue types except wild rainbow trout fillets and hatchery rainbow trout fillets and whole body samples. The exceedances were for both the human health and ecological CVs. The maximum exceedance ratio of 278 was seen in a largescale sucker whole body sample.

- Cadmium. Cadmium exceeded CVs for all species and tissue types except fillet samples for walleye, wild rainbow trout, and hatchery rainbow trout. The exceedances were all for the human health CVs. The maximum exceedance ratio of 19 was seen in a largescale sucker whole body sample.

Iron and nickel exceeded either the human health or ecological CV in about half the species and tissue types. Barium, uranium, and vanadium exceeded CVS in a small number of samples.

Three PCB aroclors exceeded CVs for at least one species and tissue type (see Table 3-2). Aroclors 1254 and 1260 exceeded the criteria for most species and tissue types (see Table 3-4). Maximum exceedance ratios of CVs for Aroclor 1254 and 1260 were 189 and 216, respectively. Both maximum ratios were for a largescale sucker whole body sample. Aroclor 1016 was detected and exceeded the CV in two of the whole body mountain whitefish samples. To allow for comparisons with historical PCB data, the PCB aroclor evaluation was based on total PCBs. Total PCBs were calculated as the sum of the aroclors. For aroclors that were reported as nondetects, one-half the reported detection limit was used.

Fourteen dioxin/furan congeners exceeded at least one CV (see Table 3-2). Only 2,3,7,8 TCDF exceeded CVs for all species and tissue types. A maximum exceedance ratio of 2287.5 times the CV was seen for a largescale sucker sample. Two additional congeners, 1,2,3,6,7,8,HxCDD and 1,2,3,7,8,PeCDF, exceeded the criteria for about half of the species and tissue types. Based on the above results the following analytes were selected as PCOIs for the purpose of this data evaluation:

- Aluminum
- Arsenic
- Cadmium
- Chromium
- Copper
- Iron
- Lead
- Nickel
- Selenium
- Uranium
- Zinc
- Mercury
- Total PCBs
- 2,3,7,8 TCDF

Although barium generally did not exceed its CV, it did show some unique intraspecies patterns and was included as a PCOI to help to illustrate potential differences in species-specific exposure and accumulation.

PCB congener results were compared to their corresponding values (listed in Table 3-1) to help identify, based on frequency of detection and exceedance of CVs, the congeners that, at a minimum, should be considered during the planning of the human health and ecological risk assessments. In accordance with the study design, PCB congener analysis was conducted on only a subset of the total samples in an attempt to identify a subset of PCB congeners of greatest interest for future risk analysis. Because of the limited number of samples, PCB congeners were not included in the full data evaluation presented in this report.

A total of 114 PCB congeners exceeded CVs for at least one species and tissue type (Table 3-5). Twenty-seven congeners exceeded CVs in all 13 species/tissue types, 23 congeners exceeded for 10 to 12 species/tissue types, and 13 congeners exceeded for 6 to 9 species/tissue types (Table 3-6). The largest number of PCB congeners exceeding CVs, 101, was in the walleye and largescale sucker. The second most, 107, was in mountain whitefish. The lowest number exceeding CVs, 36, was in walleye fillets. PCB congener exceedance ratios were greatest in largescale sucker whole body samples (Table 3-7). For the largescale sucker, 57 congeners had exceedance ratios greater than 10, and 10 had exceedance ratios greater than 100. The maximum exceedance ratio of 599 times the CV was seen for PCB congener 169.

PCB congeners will be further assessed as part of the human health risk assessment being conducted by USEPA, and in an ecological risk assessment that will be conducted by Teck Cominco and overseen by USEPA to determine which congeners are the most relevant for future analysis.

3.1.2 Data Evaluation Approach and Comparisons to DQOs

The results of the data evaluation, which was designed to support the DQOs presented in the Fish Tissue A&R Document and the Fish Tissue QAPP, are presented in Section 3.2 and summarized in Section 2.0. The full analytical results are presented in Appendix B (included as electronic version only on attached disk) to allow users of this document to perform additional types of data analysis beyond the scope of this report. The following data evaluations are provided in this report:

- Inorganic/organic arsenic speciation by species. The results of the arsenic speciation will support refinement of arsenic exposure in the human health risk assessment
- Percent metals associated with the gut/gut contents of largescale suckers. The results of the gut/gut contents evaluation will help to define the uncertainties of the tissue measurements and the future use of those data for this species.
- Comparisons of PCOI concentrations by fish collection areas for each target species. This spatial presentation of the data will support refinement of the CSM and help determine how data should be aggregated during the risk assessments.
- Sitewide comparison by species for each PCOI. A sitewide comparison by species can be used for risk assessment planning and to further prioritize pathways.
- Comparisons of PCOI concentrations between species within a fish collection area. This spatial presentation of the data will support refinement of the CSM and help determine how data should be aggregated during the risk assessments.
- Comparisons of PCOI concentrations in fillet samples by fish collection area. This spatial presentation of the data will support refinement of the CSM and help determine how data should be aggregated during the risk assessments.

- Statistical comparison of PCOI concentrations by species between site reaches. This spatial presentation of the data will support refinement of the CSM and help determine how data should be aggregated during the risk assessments. This evaluation also meets the secondary objectives of developing baseline data for the UCR.
- Comparison of PCOIs in largescale suckers to PCOIs in sediment. This evaluation will support refinement of the CSM and help determine how data should be aggregated during the risk assessments.

3.2 Detailed Analytical Results by Species

This section presents the full analytical results for all tissue types, including a summary of the data validation/data quality, evaluation of the arsenic speciation results, a summary of the estimated whole body concentrations from fillet and offal samples, and the contribution of metals from the gut/gut contents in largescale suckers. These groupings represent the three basic types of analytical data that will be used for the data evaluation described in Section 3.1.3.

3.2.1 Data Validation and Findings

3.2.1.1 Data Validation Methodology

All data (100 percent) were evaluated independently of the laboratory by project chemists. All sample data were reviewed for the QC specifications identified in the Fish Tissue QAPP and USEPA CLP statements of work for each specific parameter and were flagged in accordance with the QAPP and USEPA functional validation guidelines as referenced in data validation reports that are available on request.

3.2.1.2 Reporting

Sample- and parameter-specific data validation reports are based on review of the individual laboratory sample delivery groups (SDGs). The SDG-based reports are organized by analytical groups as follows:

- Mercury
- Metals
- PCB Aroclors and Lipids
- PCB Congeners
- Dioxins and Furans
- Arsenic Speciation

The cover of each report identifies individual samples included in the SDG.

Each report has subsections that correspond to the internal QC check requirements for that specific method as identified in the QAPP. If laboratory data were found to deviate from the specifications, the subsection provides quantitative details for the QC data deviation and the associated affected samples and provides flags according to defined conventions.

The individual SDG reports provide a summary table at the end of each section where flags are applied, and the report is followed by flagged data sheets. The reports list all flags and their appropriate classifications as well as the reason for the flags. The data validation report for each analyte group can be found in Appendix F (included as electronic version only on attached disk).

3.2.1.3 Data Flagging Conventions, Data Validation Findings, and Overall Summaries

USEPA data validation functional guidelines and QAPP criteria were used to determine flagging conventions. Sample- and analyte-specific data validation findings/qualifying flags for laboratory internal quality control data are provided at the end of each validation report. Data validation flags were entered into the project database.

The following QC samples were conducted on each analysis batch:

- Laboratory controls
- Instrument blanks
- Matrix spikes/matrix spike duplicates
- Laboratory duplicates
- Serial dilutions

Samples in an analysis batch were flagged if any of the concurrent QC samples did not meet the performance standards specified in the Fish Tissue QAPP and USEPA CLP statements of work.

The following subsections present a summary of the validation reports by analyte. Based on the data validation reports, the data meet and exceed project quality goals.

Mercury

Timeliness: Sample dates ranged from 9/6/05 thru 10/22/05. Analyses were conducted between 1/17/06 and 3/14/06. The holding time for all samples (less than 180 days) was acceptable.

Blanks: Instrument blanks were prepared and analyzed in accordance with the method requirements. All blank values were acceptable, and were either nondetect or below a concentration that could affect sample results.

Matrix Spike Analysis: Matrix spike analyses were conducted for 15 samples representing 15 analysis groups. Percent recoveries were acceptable (78 to 122 percent) and met the recovery criterion (75 to 125 percent).

Duplicate Sample Analysis: Duplicate analyses were conducted for 15 samples representing 15 analysis groups. The relative percent difference was acceptable (≤17 percent) for all samples and was within the criterion (±20 percent).

Inductively Coupled Plasma/Atomic Emission Spectroscopy (ICP/AES) Serial Dilutions: A 5-fold serial dilution was analyzed for three samples. Percent differences (≤9 percent) met the control limits (≤10 percent).

Assessment Summary: All results were reported on a wet weight basis. No data were qualified for this review.

TAL Metals

Timeliness: Sample dates ranged from 9/6/05 thru 10/22/05. Sample digestion and analyses were conducted between 3/27/06 and 5/1/06. The holding time for all samples (less than one year) was acceptable.

Blanks: Instrument blanks were prepared and analyzed in accordance with the method requirements. All blank values were acceptable and were either nondetect or below a concentration that could affect sample results, with the exception of cobalt. Affected samples were qualified U (not detected) for cobalt.

Matrix Spike Analysis: Matrix spike analyses were conducted for 17 samples representing 17 analysis groups. Percent recoveries were outside the acceptable recovery criterion for the following analytes in at least one sample analysis group:

- Antimony,
- Chromium
- Copper
- Iron
- Lead
- Manganese,
- Nickel
- Zinc

Samples in the corresponding analysis group were qualified J (the identification of the analyte is acceptable; the reported value is an estimate) for the relevant metals. The remaining percent recoveries were acceptable and met the recovery criterion (75 to 125 percent).

Duplicate Sample Analysis: Duplicate analyses were conducted for 17 samples representing 17 analysis groups. Duplicate results were not within the control limits for the following analytes in at least one sample analysis group:

- Barium
- Calcium
- Copper
- Lead
- Manganese
- Nickel
- Zinc

Samples in the corresponding analysis group were qualified J for the relevant metals. For all other samples, the relative percent difference was acceptable and was within the criterion (±20 percent).

ICP-AES Serial Dilutions: A five-fold serial dilution was analyzed for 17 samples representing 17 analysis groups. Percent differences met the control limits (≤10 percent).

Assessment Summary: The table on the following page summarizes TAL metals results that were qualified by sample.

PCB Aroclors and Percent Lipids

Timeliness: Sample dates ranged from 9/10/05 thru 9/17/05. Analyses were conducted between 1/6/06 and 3/8/06. The holding time for all samples (less than 6 months) was acceptable.

Blanks: Laboratory method and homogenization proof blanks were prepared and analyzed in accordance with the method requirements. All blank values were acceptable, and none of the samples were qualified on this basis.

Matrix Spike Analysis: Matrix spike analyses were conducted for PCB aroclors in five samples. Percent recoveries were acceptable and met the recovery criterion, with the exception of samples WE4W15 and MW1W45. The amount of Aroclor 1254/1260 in sample MW1W45 was greater than four times the amount of the spike. The data associated with this sample were not qualified. Because the detected aroclor (1254/1260) in sample WE4W15 was already qualified due to peak co-elutions, no further qualification is warranted.

Duplicate Sample Analysis: Duplicate analyses were conducted for three samples. The relative percent difference was acceptable (≤21 percent) for all samples and was within the criterion (±50 percent).

Duplicate Field Samples: Field duplicates were analyzed for five samples. There were acceptable levels of variability between the lipids and aroclor duplicate values. No data were qualified on this basis.

Analytical limitations of PCB Aroclor results: The quatitation limits (QLs) or detection limits, which are based on the lowest concentration level of the Aroclors in the initial calibrations (ICALs), the amount of sample extracted and the final extract volume were about twice the project analytical concentration goals (ACGs) listed in Table 2-3 of the QAPP.

Non-detects reported for all Aroclors, except 1254 and 1260, in all species and tissue types tested. The detection limits varied by species and tissue type. The discrepancies in the reporting limits can be attributed to the varying % lipids for each species and tissue type. The ranges of detection limits by Aroclor are as follows:

- 1016 – 1.3 to 49 ug/kg WW
- 1208 – 9.7 to 49 ug/kg WW
- 1221 – 1.3 to 49 ug/kg WW
- 1232 – 2.6 to 98 ug/kg WW
- 1242 – 1.4 to 49 ug/kg WW
- 1248 – 1.3 to 49 ug/kg WW
- 1254 – 1.3 to 49 ug/kg WW
- 1262 – 9.7 to 49 ug/kg WW
- 1268 – 9.7 to 49 ug/kg WW

The laboratory reported combined results for Aroclors 1254 and 1260 as 1254/1260 because the peaks for Aroclors 1254 and 1260 overlapped. The concentrations of the Aroclors 1260 mixed with 1254 detected in most of the samples were qualified estimated, "J", due to the co-eluting peaks used in the calculations. PCB results from samples with poor chromatographic separations due to the interfering oily peaks were qualified estimated, "J", with a possible high bias. This result is expected because of differences between the initial Aroclor composition and the final composition in the fish tissues attributable to various processing including weathering and metabolism.

Assessment Summary: All samples were analyzed in accordance with the method specifications. No significant problems were found with these data. However, the data are limited by detection limits as discussed above. The data, as qualified, are acceptable and can be used for all purposes.

Metal	Sample Numbers
Samples Qualified J due to Low Matrix Spike Recovery	
Antimony	LS3G40914, LS6G60734
Aluminum	LS4W25, LS3W40520, LS1W45
Chromium	LS1W10040, LS2W15, LS3W40486
Manganese	LS1G10040, LS3G40486, LS3G40915, LS1G50769, LS1G50775, LS6G50727, LS6G50744, LS4W25, LS3W40520, LS1W45
Lead	LS1W10040, LS2W15, LS3W40486, LS3W40504
Copper	MW1W45, LS1W10040, LS2W15, LS3W40486, LS3W40504
Iron	LS6W35, LS1W50769, MW1W45, MW1W45
Samples Qualified J due to High Matrix Spike Recovery	
Zinc	MW1W45, MW1W45
Aluminum	LS1W10040, LS2W15, LS3W40486, LS3W40504
Nickel	LS3G40914, LS6G50734, LS6G60734
Samples Qualified J due to High Relative Percent Difference for Duplicate Sample Comparison	
Barium	LS4W25, LS3W40520, LS1W45, LS6W35, LS1W50769
Calcium	LS4W25, LS3W40520, LS1W45, LS6W35, LS1W50769, BB2W13, RW1F15, RW1F25, RW1F35, RW1F45, RW1F55, RW1F65, RW1O15, RW1O25, RW1)35, RW1O45, RW1O55, RW1O65, RW2W53, RW2W15
Lead	LS4W25, LS3W40520, LS1W45, LS1W10040, LS2W15, 05141025-6
Manganese	LS4W25, LS3W40520, LS1W45, LS6W35, LS1W50769, LS1G10040, LS1G10041, LS1G10051, LS1G10056, LS1G10089, LS3G40486, LS3G40504, LS3G40520, LS3G40915, LS1G50769, LS1G50770, LS1G 50771, LS1G50778, LS1G50775, LS1G60778, LS6G50727, LS6G50727, LS6G50744
Copper	MW1W45, MW1W45, LS1W10040, LS2W15, LS3W40486, LS3W40504
Zinc	LS1W10040, LS2W15, LS3W40486, LS3W40504
Nickel	LS1G10040, LS1G10041, LS1G10051, LS1G10056, LS1G10089, LS3G40486, LS3G40504, LS3G40520, LS3G40915, LS1G50769, LS1G50770, LS1G 50771, LS1G50778, LS1G50775, LS1G60778, LS6G50727, LS6G50744
Samples Qualified J due to High Recovery for Laboratory Control	
Magnesium	BB2W13, RW1F15, RW1F25, RW1F35, RW1F45, RW1F55, RW1F65, RW1O15, RW1O25, RW1)35, RW1O45, RW1O55, RW1O65, RW2W53, RW2W15
Zinc	BB2W13
Samples Qualified J due to Low Recovery for Laboratory Control	
Sodium	MW1W45, MW1W45
Samples Qualified U due To Detection In Sample Preparation Blank	
Cobalt	RW1F15, RW1F25, RW1F35, RW1F45, RW1F55, RW1F65, RW1O15, RW1O25, RW1)35, RW1O45, RW1O55, RW1O65, RW2W53, RW2W15

Dioxins and Furans

Timeliness: All samples were stored at -20 °C while on storage and arrived at the lab still frozen. The holding time for all samples (1 year from the date of sample collection, 10 days from validated time of sample receipt [VTSR], and 30 days from extraction) was acceptable.

Method Blanks: The required frequency of analysis of laboratory blanks was met (see Table 2-7). Trace levels of some target compounds were detected in the method blank. Samples with detection concentrations <5 times the value in their respective blanks were qualified as nondetects (U).

Assessment Summary: All samples were analyzed in accordance with the method specifications. No significant problems were found with these data. The data, as qualified, are acceptable and can be used for all purposes.

PCB Congeners

Timeliness: All samples were stored at -20 °C while on storage and arrived at the lab still frozen. The holding time for all samples (1 year from the date of sample collection, 10 days from VTSR, and 30 days from extraction) was acceptable.

Method Blanks: The required frequency of analysis of laboratory blanks (see Table 2-7) was met. Trace levels of some target compounds were detected in the method blank. Samples with detection concentrations <5 times the value in their respective blanks were qualified as nondetects (U).

Assessment Summary: All samples were analyzed in accordance with the method specifications. The data, as qualified, are acceptable and can be used for all purposes.

Arsenic Speciation

Timeliness: Sample dates ranged from 9/6/05 thru 10/22/05. Analyses were conducted between 3/1/06 and 4/18/06. No holding time for arsenic species in tissue samples has been established.

Blanks: The blanks did not contain detectable levels of any of the arsenic species, except for trace levels of As+3. No samples contained As+3 at reportable levels; therefore, no qualification was required.

Matrix Spikes: Matrix spike analyses were conducted for eight samples. All matrix spike recoveries were within the acceptable limits (75 to 125 percent).

Duplicates: Duplicate analyses were conducted for nine samples. The relative percent difference was acceptable for all samples and was within the criterion (±20 percent).

Assessment Summary:

- Total Arsenic—All procedures met laboratory requirements; therefore, no qualification was necessary based on the analysis of the total arsenic in the sample extracts.
- Results for As^{+3} and As^{+5} were summed and reported as "inorganic arsenic." This is because the sample preparation and handling processes in this method do not always preserve the individual inorganic species; As+3 and As+5 interconvert over time.

- Arsenobetanine (AsB) and other cationic species are not separated by this column, but elute together as one peak at the beginning of each chromatogram. Therefore, these results were reported together as “AsB + Cations.” The “AsB + Cations” concentration was estimated based on calibration standards containing AsB. Because other cations eluting with this peak may have response factors different from those of AsB, all results reported as “AsB + Cations” were qualified J, estimated.
- The “unknown species” listed in the report are likely to be anionic arsenosugars. An estimated concentration for these species was provided using a predetermined response factor, and the results were qualified J. Further identification and quantitation of the arsenosugars is not possible because standards are not available.

3.2.1.4 Data Storage and Documentation

Backup information for the data evaluation and validation findings includes the following:

- Laboratory hard copy packages, assembled in SDG units, that include all QC data. These packages are stored at USEPA offices as well as at the laboratories.
- An electronic database, which includes all sample concentration data with validation flags and a subset of laboratory QC data.
- Chain-of-custody forms and tracking records.

Laboratory bench records and sample custody logs maintained by the laboratory. Backup information is available from USEPA per request.

3.2.2 Analytical Results for All Tissue Types

The detailed analytical results are provided in Appendix B. The results are presented by composite in three tables for each species per FSCA, as follows:

- TAL metals, Hg, arsenic speciation, percent moisture, and percent lipids
- PCB aroclors, percent moisture, and percent lipids
- Dioxin/furan congeners, percent moisture, and percent lipids

For the purposes of this evaluation and presentation, calculation of summary statistics was done using one-half the reported detection limit for those values reported as nondetected. Total PCBs were calculated as the sum of the aroclors. For aroclors that were reported as nondetects, one-half the reported detection limit was used.

Because of the limited sample size analyzed for PCB congeners, these results are summarized by species for all FSCAs.

Table 3-8 and Figures 3-1 to 3-15 present a sitewide summary of the results for whole body samples by species for each of the PCOIs. The summaries include the estimated whole body samples for walleye, wild rainbow trout, hatchery rainbow trout, and largescale sucker. The methods for calculation are presented in Sections 3.2.2 and 3.2.3. Key results are as follows:

- Burbot contained three to five times as much total arsenic as the other target species (Figure 3-2).

- Largescale sucker and burbot had mean concentrations of barium two to four times higher than the other target species (Figure 3-3). It is unknown whether these differences are due to life history strategies, feeding habits, or unique physiologies.
- Largescale suckers had the highest mean concentrations of cadmium, chromium, copper, iron, lead, nickel, and uranium (Figures 3-4, 3-6, 3-7, 3-8, 3-9, and 3-11). There was a high degree of variability around the mean for all these metals.
- Selenium concentrations were similar across species, with slightly elevated concentrations in mountain whitefish (see Figure 3-10).
- Mean zinc concentrations in wild and hatchery rainbow trout, mountain whitefish, and largescale sucker were about twice the concentrations in the other target species (Figure 3-12). However, zinc in individual largescale sucker composites was highly variable.
- Mean mercury concentrations were elevated in walleye, largescale sucker, and burbot relative to the other target species (Figure 3-13).
- Mean total PCB concentrations were similar for walleye, wild and hatchery rainbow trout, lake whitefish and burbot. Mean total PCBs in largescale suckers were about 2.5 times higher than in the other target species, with the exception of mountain whitefish (Figure 3-14).
- Mean 2,3,7,8 TCDF concentrations were generally lower in walleye and wild and hatchery rainbow trout than in the other target species. Lake and mountain whitefish, largescale sucker, and burbot had about two times the mean 2,3,7,8 TCDF concentrations found in the other species, with the lake whitefish having the highest mean concentration (Figure 3-15).

Table 3-9 and Figures 3-16 to 3-22 present a sitewide summary of the results of the fillet analysis. Key results are as follows:

- Concentrations were similar in fillet samples across species for nine PCOIs: aluminum, barium, cadmium, chromium, copper, iron, selenium, uranium, and zinc. Figure 3-16 shows the relationship for zinc.
- Arsenic and lead concentrations in fillets from walleye and wild rainbow trout were about twice the concentrations for hatchery rainbow trout (Figures 3-17 and 3-18).
- Mean nickel concentrations in walleye fillets were about three to four times higher than in wild and hatchery rainbow trout fillets (Figure 3-19).
- Mean mercury concentrations in walleye fillets were about two times those seen in wild and hatchery rainbow trout fillets (Figure 3-20).
- Wild rainbow trout fillets had about two times the concentration of total PCBs as did walleye fillets. Hatchery rainbow trout fillets were intermediate (Figure 3-21).
- 2,3,7,8 TCDF concentrations were about five times greater in wild rainbow trout fillets than in fillets from either walleye or hatchery rainbow trout (Figure 3-22).

Total arsenic was detected in samples from all species and tissue types. Because the current understanding of the adverse health effects of arsenic is based primarily on epidemiological studies of people ingesting inorganic arsenic in drinking water, arsenic speciation was conducted on a subset of samples to determine the ratios of inorganic to organic arsenic in the target species. Table 3-10 presents the arsenic species results by species and tissue type. The arsenic speciation results did not, for most species and samples, meet the analytical concentration goals (ACGs) presented in the QAPP (CH2M HILL, 2005b). Therefore, the results should not be interpreted as quantitative. The following approach was used to present the results in an informative manner.

For illustrative purposes, the relative percent of total arsenic for each arsenic species is given. For arsenic species that were nondetects, the detection limit was used to calculate the relative percent of total arsenic. Doing this assumes that the percent is no greater than that of the detection limit, but may in fact be less or even zero. The relative percentage was calculated as follows:

1. For each sample, total arsenic (*u*g/g) was determined.
2. The sample was extracted in accordance with the methods, and total arsenic (*u*g/g) was determined in the extract.
3. The extract was then analyzed for the following As species (μg/g):
   - Dimethylarsonic acid (DMA)
   - Monomethylarsonic acid (MMA)
   - Inorganic As as As^{+3} + As^{+5}
   - Arsenobetanine (AsB) + cation
   - Unknown species (anionic arsenosugars)

The relative percent for an arsenic species is the concentration of that species in the extract divided by the total arsenic in the extract. In cases where the value was listed as nondetect, the detection limit was used.

Inorganic arsenic (As+3 and AS+5) ranged from an average 1.4 percent in burbot whole body samples to an average of 30.4 percent in wild rainbow trout whole body samples (Figure 3-23). There was no dominant organic arsenic species seen except in burbot, where over 90 percent of the organic arsenic was in the form of DMA. The high percentage of organic arsenic measured in burbot, in general, is consistent with that reported for marine species (USEPA, 2003b, and Greene and Crecelius, 2006). This may be due to the unique taxonomy of the burbot, being the only freshwater representative of the marine cod family, and/or different exposure pathways.

As a bounding estimate on the relative percentage of inorganic arsenic present in fillets, ratios were calculated by dividing the inorganic arsenic detection limit by the mass of total elemental arsenic. The true ratio is unknown, but could be as high as shown in Figure 3-24 or as low as zero.

The percentage of inorganic to organic arsenic in fillets ranged from an average of 13.1 percent in walleye to 19.6 percent in wild rainbow trout (Figure 3-24). The inorganic arsenic was below detection limits in all of the fillet samples, and the percent inorganic is based on the assumption that the inorganic arsenic is at the detection limit. Arsenic speciation could not be conducted on the hatchery rainbow trout fillet samples because the total arsenic determination was below detection.

The percentage of inorganic to organic arsenic in fillets ranged from an average of 13.1 percent in walleye to 19.6 percent in wild rainbow trout (Figure 3-24). The inorganic arsenic was below detection limits in these fillet samples, and the percent inorganic is based on the assumption that the inorganic arsenic is at the detection limit. Arsenic speciation could not be conducted on the hatchery rainbow trout fillet samples because the total arsenic determination was below detection.

3.2.3 Estimated Whole Body Results from Fillet and Offal Analysis

As specified in the Fish Tissue A&R Document and the Fish Tissue QAPP, the results from the fillet and offal samples were used to estimate a whole body concentration. The estimated whole body concentration for a given analyte was calculated using the following equation:

$$C_{EW} = ((C_f * W_f) + (C_o * W_o))/(W_f+W_o)$$

Where:

C_{EW} = Estimated mean whole body composite concentration of analyte in wet weight

C_f = Concentration in wet weight of analyte in fillet composite

W_f = Mean wet weight of fillet tissue

C_o = Concentration in wet weight of analyte in offal composite

W_o = Mean wet weight of offal tissue

The estimated whole body concentrations obtained from the measured fillet and offal concentrations are presented in Appendix C for walleye and wild and hatchery rainbow trout. The results are summarized by composite in three tables per species per FSCA, as follows:

- Table series 1, which includes TAL metals, Hg, arsenic speciation, percent moisture, and percent lipids
- Table series 2, which includes PCB aroclors, PCB congeners, percent moisture, and percent lipids (because of the limited sample sized analyzed for PCB congeners, these results are summarized by species for all FSCAs)
- Table series 3, which includes dioxin/furan congeners, percent moisture, and percent lipids

3.2.4 Results of Largescale Sucker Gut/Gut Contents Analysis

During the sampling, the presence of sediment and slag was noted in the guts of largescale suckers collected from upstream sites. Individual largescale suckers collected from FSCAs 1, 3, and 6 were selected to assess the contribution of slag to the whole body tissue measurements. Five individual largescale suckers from the upstream portion of FSCA 1 and five from a downstream portion, termed FSCA 1A, were selected for gut/gut contents and gutless whole body for TAL metals analysis. The upstream fish were collected between river mile 739 and 741. The downstream (FSCA 1A) fish were collected from a site just upstream from the Northport Public Boat Ramp at river mile 735.5. In addition, five largescale suckers each from FSCA3 and FSCA 6 were analyzed as gut/gut contents and gutless whole body for TAL metals. A subset was analyzed for arsenic speciation. Because of limits on sample mass, mercury analysis was not completed. The largescale sucker gut analysis was completed to estimate the relative impact of slag (which was visually apparent as a significant mass in some fish collected from the northern reach of the site) and to help understand how it might best be addressed in future data collection and analysis.

3.2.4.1 Methods

A portion of the gut/gut content from each fish was used to determine ash-free dry weight (AFDW). AFDW is a measure of the amount of inorganic matter in a sample. The higher the percent AFDW of the sample, the lower the amount of inorganic matter in the sample. For the largescale sucker samples, those with lower percent AFDW have more inorganic matter in the gut/gut contents. The inorganic matter is assumed to be sediment. The results of the gutless whole body, gut/gut contents analysis and percent AFDW can be used to assess the potential contribution of slag to the analysis of whole body largescale sucker samples. Table 3-11 summarizes the potential conclusions that can be drawn from these data.

The analytical results from the gut/gut contents and gutless whole body samples were used to calculate an estimated whole body concentration for each analyte using the following equation:

$$C_{EW} = (C_{G/GC} * W_{G/GC}) + (C_{GWB} * W_{GWB})/(W_{G/GC}+W_{GWB})$$

Where:

C_{EW} = Estimated whole body concentration of analyte in wet weight

$C_{G/GC}$ = Concentration in wet weight of analyte in gut/cut content sample

$W_{G/GC}$ = Total wet weight of gut/gut contents

C_{GWB} = Concentration in wet weight of analyte in gutless whole body sample

W_{GWB} = Total wet weight of gutless whole body

The percent of an analyte associated with the gut/gut contents was calculated using the following equation:

$$\%_{G/GC} = ((C_{G/GC} * W_{G/GC})/ (C_{G/GC} * W_{G/GC}) + (C_{GWB} * W_{GWB})) * 100$$

Where:

$\%_{G/GC}$ = Percent of estimated whole body concentration of analyte in wet weight associated with the gut/gut contents

$C_{G/GC}$ = Concentration in wet weight of analyte in gut/cut content sample

$W_{G/GC}$ = Wet weight of gut/gut contents sample

C_{GWB} = Concentration in wet weight of analyte in gutless whole body sample

W_{GWB} = Wet weight of gutless whole body sample

3.2.4.2 Results

Tables 3-12 to 14 present the results of the analysis of the gut/gut contents and gutless whole body analysis of the individual largescale suckers from FSCAs 1, 3, and 6. Estimated whole body concentrations and percent metals associated with the gut/gut contents are also presented. Mean concentrations of metals in gut/gut contents, gutless whole body, estimated whole body, and percent associated with gut/gut contents are given by FSCA in Table 3-15.

The results presented in Table 3-15 indicate two general patterns of the potential influence of metals found in the gut/gut contents of largescale suckers on whole body metal measurements (Figures 3-25 to 3-28). The first pattern consists of a large difference in metals concentrations in the gut/gut contents compared to the gutless whole body. This pattern occurred for most of the metals. The second pattern consists of metals concentrations that are higher in the gut/gut contents than in the gutless whole body, but with a difference that is relatively small. This pattern occurred for selenium and cadmium. The gut/gut contents results also show that sediment/slag in the gut may account for higher percentages of inorganic arsenic measured in largescale suckers.

High Relative Concentration Difference in Gut/Gut Contents vs. Gutless Whole Body

Most of the metals can be characterized by the pattern seen in Figures 3-25, 3-26, and 3-27. These figures represent three variations of that overall pattern. This pattern is characterized by having high metals concentrations in the gut/gut contents relative to the gutless whole body at the most upstream collection area, FSCA1. The percent of the estimated whole body metals associated with the gut/gut contents tended to be high. The mean AFDW of the gut/gut contents was lower at the upstream location, indicating the presence of a greater amount of sediment in the gut/gut contents samples. Metals concentration in the gut/gut contents declined dramatically downstream. This decline is evident even at the downstream portion (i.e., FSCA 1a) of FSCA 1. The AFDW increased downstream, indicating lower amounts of sediment in the gut/gut contents samples.

Figure 3-25 shows the overall pattern for arsenic. Arsenic, chromium, nickel and uranium are characterized by having a moderate (i.e., 4- to 5-fold) difference in gut/gut contents concentrations relative to gutless whole body at FSCA 1. The relative difference declined downstream. The contribution of sediment to the gut/gut contents measurement for arsenic is illustrated in Figure 3-29 by comparing the percent AFDW to percent arsenic associated with the gut/gut contents for individual samples. The percent arsenic associated with the gut and the potential bias of whole body measurements increased as the percent AFDW of the gut/gut contents decreased, indicating the presence of sediment. For these metals the influence of sediment in the gut/gut contents on whole body measurements is possible at upstream sites, but the potential contribution to the overall concentration would be small.

Figure 3-26 shows the overall pattern for zinc. Zinc, aluminum, barium, copper, iron, and manganese all are characterized by large (i.e., 20- to 50-fold) differences in gut/gut contents concentrations relative to gutless whole body at FSCA 1. The relative difference declined downstream. The contribution of sediment to the gut/gut contents measurement for zinc is illustrated in Figure 3-30. The relationship between percent zinc associated with the gut and percent AFDW of the gut/gut contents is more pronounced than zinc, suggesting an even greater potential influence of sediment on whole body zinc measurements. For these metals the influence of sediment in the gut/gut contents on whole body measurements is possible at upstream sites, but the potential contribution to the overall concentration would be great.

Figure 3-27 shows the pattern for lead. The lead pattern is similar to the arsenic pattern in that the relative difference in gut/gut contents concentrations relative to gutless whole body at FSCA 1 is moderate (i.e., 4- to 5-fold) and the difference declined downstream. Lead is unique in that, downstream, the gutless whole body concentrations were greater than the gut/gut contents concentrations. This pattern suggests that there is a potential for sediment in the gut to bias high any whole body lead measurements from the most upstream locations. In addition, it appears that lead has a greater potential to be taken up and stored in tissues other than the digestive tract. The contribution of sediment to the gut/gut contents measurement for lead is illustrated in Figure 3-31. The relationship between percent lead associated with the gut and percent AFDW of the gut/gut contents is poor, suggesting little influence of sediment on the lead measurements in the gut/gut contents samples and a low potential bias of lead whole body measurements.

Small Relative Concentration Difference in Gut/Gut Contents vs. Gutless Whole Body

The second overall pattern is seen in selenium (Figure 3-28) and cadmium. This pattern is characterized by generally higher concentrations in the gut/gut contents relative to the gutless whole body; however, the relative difference is small. There is no spatial trend or trend relative to AFDW. The patterns suggest that the presence of sediment in the gut is likely not biasing whole body measurements. The low percent of the metal associated with the gut/gut contents indicates that most of the metal is stored in tissues other than the digestive tract. The contribution of sediment to the gut/gut contents measurement for selenium is illustrated in Figure 3-32. There is no apparent relationship between percent selenium associated with the gut and percent AFDW of the gut/gut contents, suggesting little influence of sediment on the selenium measurements in the gut contents samples and no potential bias of selenium whole body measurements.

Arsenic Speciation

Arsenic speciation was conducted on gut/gut contents and gutless whole body samples from two largescale suckers from FSCA 1, and one each from FSCAs 1a, 3, and 6. The results are presented in Table 3-16. In gutless whole body samples, inorganic arsenic (As+3 and AS+5) ranged from about 13 percent at FSCA 1a to about 28 percent at FSCA 3, with an average of 19 percent inorganic arsenic (Figure 3-33). In the gut/gut contents samples, inorganic arsenic comprised about 70 percent and 60 percent at FSCA 1 and FSCA 1a, respectively. The ratio dropped to about 20 percent at FSCAs 3 and 6 (Figure 3-34). Total arsenic was four to eight times higher in the gut/gut contents samples from fish collected at FSCA 1 and FSCA 1a. The lower percent AFDW of samples from these areas (see Figure 3-25) suggests that the presence of sediment in the sample may account for the higher percentages of inorganic arsenic.

With the exception of the individuals from FSCA 1 and FSCA 1a, these results are consistent with those seen for the whole body largescale sucker composite samples presented in Tables 3-14 and 3-15. Generally, around 20 percent of the total arsenic measured in a largescale sucker is organic species; however, in upstream locations the presence of sediment in the gut may bias high the percent inorganic arsenic estimates for whole body samples.

3.3 Nature and Extent of Contaminants in Fish (CSM Update)

The overall results showed some differences in the concentrations of PCOIs in the target species and in the target tissue types. In order to better characterize the nature and extent of contaminants in the target species, the PCOI concentrations were compared among FSCAs within a species for both whole body and fillet samples and between species within a fish collection area. This spatial presentation of the data will support refinement of the CSM and help determine how data could be aggregated during the risk assessments.

Statistical comparison of PCOI concentrations by species between site reaches is presented to support refinement of the CSM and help determine how data should be aggregated during the risk assessments. This evaluation also meets the secondary objectives of developing baseline data for the UCR. Statistical comparisons of PCOIs in largescale sucker whole body samples to PCOIs in sediment are presented. The results from the Phase I fish tissue analysis are also compared to historical tissue sampling where species and tissue types are comparable.

3.3.1 Evaluation of Trends by Species and Locations

The trends in PCOI concentrations in target species were explored by comparing the mean concentrations of PCOIs in target species between FSCAs and among target species within an FSCA. The results are presented separately for the targeted tissue types, whole body and fillet. The trends discussed are general patterns and may or may not be statistically significant. Statistical comparisons consistent with the study design are presented in Section 3.3.2.

3.3.1.1 Whole Body Tissue

Table 3-17 and Figures 3-35 to 3-49 present the mean whole body concentrations by target species and FSCA. For many of the target species, there were no apparent trends among FSCAs for the PCOIs. The following is a summary by species.

For walleye, mercury concentrations generally showed an increase downstream from FSCA 3. No apparent trends were noted for arsenic or other metals. Total PCBs were lower at FSCA 1 than at the other collection areas, but no other trend was noted. No trend was noted for 2,3,7,8 TCDF.

Wild rainbow trout showed no apparent trend for arsenic, mercury, or other metals. However, wild rainbow trout samples were limited at the middle and lower collection areas. Total PCBs showed a slight downstream decrease, but, as previously noted, the downstream samples are limited. 2,3,7,8 TCDF was slightly higher at FSCA 2 than at other collection areas.

For hatchery rainbow trout, aluminum, copper, and uranium were higher at FSCA 3 than at the other collection areas, but no upstream/downstream trend was noted. Mercury was higher at FSCA 6. No trends are apparent for total PCBs and 2,3,7,8 TCDF.

No trends were observed for arsenic, mercury, other metals or total PCBs in lake whitefish. For 2,3,7,8 TCDF, concentrations generally increased downstream, following a slight decline between FSCA 2 and FSCA 3.

Largescale suckers showed the most pronounced trends in PCOI concentrations. Eight metals (i.e., aluminum, barium, chromium, copper, iron, nickel, uranium, and zinc) were substantially higher at FSCA 1, declining at FSCA 2 and showing no apparent trend downstream from there. However, there was high variability in the individual composite concentrations for these metals at this FSCA. The high variability, along with the results of the largescale sucker gut/gut contents analysis, suggests that the higher concentrations observed at FSCA 1 could be from sediment and slag in the gut of some of the largescale suckers collected from this area. Lead is a notable exception. Lead was highest at FSCA 1 but showed a consistent decreasing downstream trend. The high variability seen in the individual composite lead concentrations indicates that the lead may be biased high at FSCA 1 due to the sediment and/or slag in the gut; however, when this was considered, the increasing downstream trend still was apparent. Mercury showed a slight increasing trend downstream. Total PCBs and 2,3,7,8 TCDF tended to have higher concentrations in the more downstream FSCAs.

In burbot, both arsenic and mercury showed increasing downstream trends between FSCA 4 and FSCA 6. No apparent pattern was noted for the other metals, total PCBs, or 2,3,7,8 TCDF.

The between-species patterns within an FSCA were generally similar to the trend seen in the overall species mean concentrations.

3.3.1.2 Fillet Tissue

Table 3-18 and Figures 3-50 to 3-64 present the mean fillet concentrations by target species and FSCA. For many of the target species, there were no apparent trends among FSCAs for the PCOIs. The following is a summary by species.

For walleye fillets, mercury and arsenic concentrations generally showed a downstream increase. Lead showed a slight increase downstream. Conversely, nickel showed a slight decrease downstream. No apparent trends were noted for the other metals. Total PCBs in walleye fillets increased about 5-fold between FSCA 1 and FSCA 6. 2,3,7,8 TCDF also showed a slight downstream increase in concentrations.

Wild rainbow trout fillets showed no apparent trend for arsenic, mercury, or the other metals. However, wild rainbow trout samples were limited at the middle and lower collection areas. Total PCBs showed a slight downstream decrease, but, as previously noted, the downstream samples are limited. No trend in 2,3,7,8 TCDF was observed.

No trends were observed for any of the PCOIs in the fillet samples from hatchery rainbow trout.

3.3.2 Statistical Comparisons

The UCR Phase I fish tissue study was designed to allow for the following statistical comparisons:

- Compare fish contaminant levels among river reaches
- Characterize the variation in contaminant concentrations among individual fish of a species

- Correlate tissue concentrations with contaminant concentrations in sediment

Detailed discussion of the sampling design and statistical considerations were presented in the Fish Tissue A&R Document (CH2M HILL, 2005a) and the Fish Tissue QAPP (CH2M HILL, 2005b).

3.3.2.1 Fish Tissue Comparisons

For the purposes of the statistical design, the site was stratified into the three reaches shown in Figure 3-1 of the QAPP:

- Upper Reach – FSCA 1 and FSCA 2
- Middle Reach – FSCA 3 and FSCA 4
- Lower Reach – FSCA 5 and FSCA 6

Methods

Within each river reach, mean fish tissue PCOI concentrations were calculated as the arithmetic average of composite sample values, $\left(C_i\right)$, as follows (Zar, 1996):

$$\hat{\bar{C}} = \frac{\sum_{i=1}^{n} C_i}{n}$$

with associated sampling variance

$$\widehat{\text{Var}}\left(\hat{\bar{C}}\right) = \frac{s_{C_i}^2}{n}$$

Where:

$$s_{C_i}^2 = \frac{\sum_{i=1}^{n}\left(C_i - \hat{\bar{C}}\right)^2}{(n-1)}$$

Asymptotic $(1-\alpha)$ 100 percent confidence intervals for mean concentrations were calculated as follows:

$$\hat{\bar{C}} \pm Z_{1-\frac{\alpha}{2}} \sqrt{\widehat{\text{Var}}\left(\hat{\bar{C}}\right)}$$

Where:

$Z_{0.975}$ = 1.96 for a 95 percent confidence interval

For each species, the mean whole body concentration was calculated for each PCOI by reach. For walleye, wild rainbow trout, and hatchery rainbow trout, the mean whole body calculation included the estimated whole body concentrations from the paired fillet and offal samples (see Section 3.2.2). For the largescale sucker, the estimated whole body concentrations were based on the paired gut/gut contents and gutless whole body concentrations (see Section 3.2.3). Field duplicates were averaged prior to calculating the reach mean. Nondetect values were assumed to be half the detection limit.

The variability in PCOI concentrations in individual fish was estimated using the following approach. Within a sampling area, fish were randomly assigned to the replicate composite samples. When fish are randomly selected within a locale for compositing, the expected value of the observed concentration (C) is the mean (μ) of the individual fish concentrations; that is,

$$E(C) = \mu$$

If several composites are created randomly and analyzed, their observed variability $\left(s_C^2\right)$ has the expected value:

$$E\left(s_C^2\right) = \frac{\sigma^2}{k}$$

Where:

σ^2 = variance in individual fish concentrations
k = number of fish forming the composite

Hence, an estimator of σ^2, the fish-to-fish variability, is:

$$\hat{\sigma}^2 = k \cdot s_C^2$$

Where:

$$s_C^2 = \frac{\sum_{i=1}^{n}\left(C_i - \bar{C}\right)^2}{(n-1)}$$

And where:

$$\bar{C} = \frac{\sum_{i=1}^{n} C_i}{n},$$

n = number of composite samples formed at a locale

Hence, although individual fish tissues were not analyzed, careful compositing preserved some of the information on fish-to-fish variability in contaminant concentrations (i.e., σ^2).

Mean PCOI concentrations were compared between reaches using a one-way analysis of variance (i.e., ANOVA) and the F-test comparing among-reach and within-reach variability. The three river reaches provide 2 degrees of freedom for between-reach comparisons. One of those degrees of freedom was used to test for a linear trend in mean concentrations. Using orthogonal polynomial coefficients for a linear trend (Snedecor and Cochran, 1982), the contrast was tested using a two-tailed F-test. Thus, the analysis examined for the presence of both an upriver and downriver trend in increasing concentrations. Due to the limited sample size (i.e., five replicates from one FSCA), no comparisons were possible for the mountain whitefish. If the data were not normally distributed, the nonparametric Kruskal-Wallis test was used (Zar, 1996).

As part of the study design, power calculations based on historical fish tissue contaminant data were used, along with other criteria (i.e., availability of fish and budget), to select the targeted number of composite samples. Power calculations are used to determine the probability of rejecting the null hypothesis:

$$\mathrm{H_o} : \mu_1 = \mu_0$$

at a significance level of αwhen it is false. For the purposes of this evaluation, a two-tailed alternative was considered:

$$\mathrm{H_a} : \mu_1 \neq \mu_0$$

Power calculations were done based on the results of the Phase I fish tissue sampling. The power curves were expressed as a function of the coefficient of variation (CV), with:

$$\mathrm{CV} = \frac{s}{\bar{x}}$$

among the replicate composite samples (Table 3-19). By using observed CV values taken from Table 3-19, the power $(1-\beta)$ to detect a relative difference for a specific sample size n can be read directly from the charts in Figure 3-65. Sample sizes generally were n = 10 per reach.

Five of the six FSCAs (FSCAs 1, 2, 3, 4 and 6) were co-located with areas designated as sediment focus areas (Focus Areas 1, 3, 5, 7 and 11) (see Figure 2-1). Higher-density sediment sampling was conducted at sediment Focus Areas 1, 3, 5, 7 and 11. These five areas permitted examination of the correlation between concentrations of contaminants observed in fish tissues and sediment. At each FSCA, the mean sediment concentration of a PCOI was calculated from the sediment samples collected below elevation 1290 and located between the most upstream and downstream point where fish were collected at that given FSCA. For this report, sediment/tissue relationships were explored for the largescale sucker only. It was assumed that the largescale sucker has the most direct link to sediment because of its feeding habits. The mean largescale sucker tissue concentration of each PCOI was calculated for each FSCA and compared to the mean sediment concentration for the FSCA. Pearson product–moment correlations were computed from:

$$r = \frac{\mathrm{Cov}(x_i, y_i)}{\sqrt{s_{x_i}^2 \cdot s_{y_i}^2}}$$

Where:

x_i = mean fish concentration at the *i*th area $(i = 1, \ldots, 5)$

y_i = mean sediment concentration at the *i*th area $(i = 1, \ldots, 5)$

The test of significance of the hypothesis $\mathrm{H_o} : \rho = 0$ was based on a student's *t*-test with $n-2$ degrees of freedom (Zar, 1996).

Results

The results of river reach comparisons performed for each species show the following:

- Mean concentrations $(\bar{x})$ of PCOIs by river reach (upper, middle, and lower)
- Standard error of the mean $\left(S\hat{E}(\bar{x})\right)$
- Minimum and maximum composite value
- Estimate of between-fish variability $(\hat{\sigma})$

Figures showing the species relationships and between-reach comparisons are provided in Appendix E.

Table 3-20 presents the results for walleye whole body samples by reach. Table 3-21 presents the results of the statistical comparisons between reaches using the F-test and linear trend analysis. There was no significant difference (P>0.1) in the mean whole body walleye concentrations between reaches for aluminum, barium, chromium, iron, and zinc. All other PCOIs showed a significant difference (P>0.1) in mean concentrations between reaches and the highest mean concentration in the middle reach, with the exception of mercury, total PCBs, and 2,3,7,8 TCDF, which showed an increasing downstream trend.

The results by reach for wild and hatchery rainbow trout are presented in Tables 3-22 and 3-23, respectively. Because both wild and hatchery rainbow trout were not caught at all FSCAs, an alternate comparison approach was used. Wild rainbow trout were compared between the upper and middle reaches. Hatchery rainbow trout were compared between the middle and lower reaches. In the middle reach, where both wild and hatchery rainbow trout sample size was sufficient, mean PCOI concentrations were compared between the wild and hatchery fish. The results of the statistical comparisons are presented in Table 3-24.

For the comparison of whole body wild rainbow trout, the mean concentrations of lead and total PCBs were significantly different (P>0.1) between the upper and middle reaches. All other PCOIs showed no significant difference (P>0.1) in mean concentrations. For the whole body hatchery rainbow trout, aluminum, cadmium, copper, lead, nickel, selenium, and mercury showed significant differences (P>0.1) in mean concentrations between the middle and lower reaches. All other PCOIs were not significantly different (P>0.1). For the comparison of whole body wild and hatchery rainbow trout in the middle reach, the mean concentrations of arsenic and selenium were significantly different (P>0.1). All other PCOIs showed no significant difference (P>0.1) in mean concentrations.

Table 3-25 presents the results for lake whitefish whole body by reach, and Table 3-26 presents the results of the statistical comparisons. There was no significant difference (P>0.1) in the mean lake whitefish whole body concentrations between reaches for aluminum, arsenic, copper, iron, uranium, and zinc. All other PCOIs showed a significant difference (P>0.1) in mean concentrations between reaches. The observed pattern between reaches varied by PCOI. Of the PCOIs with mean differences, barium and arsenic were characterized by having the highest concentrations in the middle reach; chromium, nickel, and total PCB showed an increasing trend downstream. Mercury and 2,3,7,8 TCDF had the highest mean concentration in the lower reach. Selenium was unique in that it was characterized by a decreasing trend downstream.

The results for the mountain whitefish are presented in Table 3-27. Because mountain whitefish was collected only at FSCA 1, no statistical comparisons were possible.

The results by reach for largescale sucker are presented in Table 3-28; Table 3-29 presents the results of the statistical comparisons. There was no significant difference (P>0.1) in the mean largescale sucker whole body concentrations between reaches for aluminum, arsenic, barium, chromium, nickel, total PCBs, and 2,3,7,8 TCDF. All other PCOIs showed a significant difference (P>0.1) in mean concentrations between reaches. The observed pattern between reaches varied by PCOI. Of the PCOIs with mean differences, copper, iron, and zinc were characterized by having the highest concentrations in the upper reach and similar concentrations in the middle and lower reaches. Cadmium, lead, and uranium showed an increasing downstream trend. Mercury increased from the upper to the middle reaches and was the same in the lower reach. Selenium decreased from the middle to lower reaches.

Table 3-30 presents the results for burbot whole body by reach; Table 3-31 presents the results of the statistical comparisons. There was no significant difference (P>0.1) in the mean burbot whole body concentrations between reaches for chromium, copper, lead, nickel, uranium, zinc, total PCBs, and 2,3,7,8 TCDF. All other PCOIs showed a significant difference (P>0.1) in mean concentrations between reaches. The observed pattern between reaches varied by PCOI. Of the PCOIs with mean differences, aluminum, barium, cadmium, iron, and mercury were characterized by increasing downstream concentrations. Arsenic increased between the middle and lower reaches. Selenium decreased downstream.

The results of the walleye fillet and offal samples by reach are presented in Tables 3-32 and 3-33, respectively. The statistical comparisons by tissue type are provided in Tables 3-34 and 3-35. For walleye fillets, there was a significant difference (P>0.1) in the mean walleye fillet concentrations between reaches for arsenic, zinc, mercury, total PCBs, and 2,3,7,8 TCDF. Mercury and 2,3,7,8 TCDF increased downstream, while arsenic and total PCBs were characterized by increases between the upper and middle reaches. Zinc declined between the upper and middle reaches. All other PCOIs showed no significant difference (P>0.1) in mean concentrations between reaches.

There was a significant difference (P>0.1) in the mean walleye offal concentrations between reaches for aluminum, arsenic, copper, lead, mercury, total PCBs, and 2,3,7,8 TCDF. Aluminum, mercury, total PCBs, and 2,3,7,8 TCDF increased downstream. Arsenic was highest in the middle reach, copper increased between the middle and lower reaches, and lead declined between the middle and lower reaches. All other PCOIs showed no significant difference (P>0.1) in mean concentrations between reaches.

The results of the wild and hatchery rainbow trout fillet samples by reach are presented in Tables 3-36 and 3-37, respectively. The results of the wild and hatchery rainbow trout offal samples by reach are presented in Tables 3-38 and 3-39, respectively. Statistical comparisons by tissue type are in Table 3-40 and 3-41. The statistical comparisons were the same as those reported for the whole body comparisons with this species. For the comparison of wild rainbow trout fillets, the mean concentrations of arsenic and zinc were significantly different (P>0.1) between the upper and middle reaches. All other PCOIs showed no significant difference (P>0.1) in mean concentrations. For the hatchery rainbow trout, aluminum, cadmium, nickel, mercury, and 2,3,7,8 TCDF showed no significant difference (P>0.1) in mean concentrations. All other PCOIs were significantly different (P>0.1) between the middle and lower reaches. In the comparison of wild and hatchery rainbow trout in the middle reach, the mean concentrations of barium, chromium, iron, uranium, zinc, and total PCBs were significantly different (P>0.1). All other PCOIs showed no significant difference (P>0.1) in mean concentrations.

In the comparison of wild rainbow trout offal, the mean concentrations of chromium, zinc, mercury, total PCBs, and 2,3,7,8 TCDF showed no significant difference (P>0.1) in mean concentrations. All other PCOIs were significantly different (P>0.1) between the upper and middle reaches. For the hatchery rainbow trout, aluminum, nickel, uranium, zinc, and 2,3,7,8 TCDF showed no significant difference (P>0.1) in mean concentrations. All other PCOIs were significantly different (P>0.1) between the middle and lower reaches. In the comparison of wild and hatchery rainbow trout offal in the middle reach, the mean concentrations of cadmium, lead, selenium and total PCBs were significantly different (P>0.1). All other PCOIs showed no significant difference (P>0.1) in mean concentrations.

3.3.2.2 Comparison of Fish Tissue With Sediment

Table 3-42 compares PCOI concentrations in sediment to PCOI fish tissue concentrations. Individual PCOI sediment/tissue relationships are presented in Figures 3-66 to 3-78. Copper, iron, and zinc had significant (P>0.1) correlations between sediment and largescale sucker tissue concentrations. Largescale sucker tissue concentrations for these PCOIs were lower in locations with lower sediment concentrations. There was also a downstream trend in both the sediment and tissue concentrations for these PCOIs.

3.3.3 Comparison to Past Studies

The Phase I fish tissue results were compared to previous data to access temporal trends in PCOI concentrations. A summary of all the historical fish tissue data from Lake Roosevelt was presented in the Fish Tissue A&R Document (CH2M HILL, 2005a). The historical studies sampled a variety of locations and tissue types. Studies that had the closest match in sample location and tissue type were chosen for this comparison. The selected studies had sampling areas that generally correspond to the three reaches (Upper River, Middle River, and Lower River) used to evaluate the current data. Results that correspond to those reaches in the historical studies and the current study were compared. The following studies were used:

- U.S. Geological Survey (USGS). 1995. *Concentrations of Mercury and Other Trace Elements in Walleye, Smallmouth Bass, and Rainbow Trout in Franklin D. Roosevelt Lake and the Upper Columbia River, Washington*. (USGS, 1995).

- EVS Consultants (EVS). 1998. *Assessment of Dioxins, Furans, and PCBs in Fish Tissue from Lake Roosevelt*. (EVS, 1998).
- Washington State Department of Ecology (Ecology). 1994. *Contaminant Trends in Lake Roosevelt*. (Ecology, 1994).

The USGS study measured a variety of trace elements and mercury in walleye, smallmouth bass, and rainbow trout fillets. Fish were collected from the following three sampling locations within the Phase I fish tissue study river reaches:

Upper Reach – Columbia River and Lake Roosevelt near Kettle Falls
Middle Reach – Lake Roosevelt and lower Spokane River
Lower Reach – Sanpoil River embayment

The EVS study reported dioxin/furan and PCB concentrations in fillets from walleye, rainbow trout, smallmouth bass, kokanee, lake whitefish, and white sturgeon. Fish were collected from the following three sampling locations within the Phase I fish tissue study river reaches:

Upper Reach– Northport area
Middle Reach– South of Kettle Falls
Lower Reach– Seven Bays area, lower Sanpoil River, or Spring Canyon area

The Ecology study measured a variety of contaminants in lake whitefish fillets and largescale sucker whole body samples. Trace elements were measured in largescale sucker samples from Northport, which corresponds to FSCA 1, and Kettle Falls, which corresponds to FSCA 3.

The mean concentrations of PCOIs were compared between these studies and the corresponding species and sample location from the Phase I fish tissue study. Table 3-43 compares the current data for selected trace elements and mercury for walleye and rainbow trout to the results from the USGS study. The comparison shows that, in the current UCR study, there were generally lower mercury concentrations in walleye and rainbow trout, both wild and hatchery. There were some differences in detection limits between the studies; overall, however, all other PCOIs appear to be comparable.

Table 3-44 compares the current UCR data for total PCBs and 2,3,7,8 TCDF for lake whitefish, walleye, and rainbow trout with data reported by EVS (1998). For rainbow trout, the comparisons in the Upper Reach are between wild rainbow trout, and in the Lower Reach, hatchery fish. The mean 2,3,7,8 TCDF concentrations in lake whitefish for the current UCR data are about half those reported in the 1998 study, whereas mean total PCB concentrations were slightly higher. The current UCR mean concentration of 2,3,7,8 TCDF measured in walleye fillets was similar to that seen in the 1998 study in the middle reach and lower in walleye from the lower reach. Total PCB concentrations in walleye fillets were lower in the upper reach, but three to four times higher in the middle and lower reaches in the current study compared to the 1998 data. Wild rainbow trout from the upper reach had about the same mean concentration of 2,3,7,8 TCDF during the current study as in 1998. The same was observed for hatchery rainbow trout collected from the lower reach. Total PCBs were similar in wild rainbow trout from the upper reach between the current and 1998 studies. The hatchery fish had a mean total PCB concentration in the current study that was about twice the concentration measured in 1998.

Comparisons of largescale sucker results from the current study to the 1994 Ecology results (Ecology, 1994) show the following (Table 3-45). Mean cadmium concentrations remain unchanged. They are similar between the Northport collection area (FSCA 1) and the Kettle Falls collection area (FSCA 3). Copper and zinc levels remain unchanged. Mean concentrations of these PCOIs are higher in the upstream station by a factor of about four to five. This was true during both studies. Mean concentrations of lead at the Northport station were lower during the current study. Mercury was lower in the current study at the Northport collection area and higher at the Kettle Falls area in the current study compared to the Ecology data.

The studies that were used for comparison were not designed to allow for detailed comparisons of trends over time with the current study. Therefore, the comparison allows only for identification of general trends. In summary, comparison of the current data to historical data from USGS, EVS Associates, and Ecology suggests the following:

- Mercury may be declining in walleye and rainbow trout (i.e., both wild and hatchery) fillets.
- 2,3,7,8 TCDF continues to decline in lake whitefish.
- Metals appear to be unchanged in walleye and rainbow trout fillets and in largescale sucker whole body, with the exception of lead in the Northport area.

3.3.4 Updated Conceptual Site Model

The Fish Tissue A&R Document (CH2M HILL, 2005a) presented a preliminary CSM focusing on contaminants in fish. The preliminary CSM indicates that a variety of contaminants (i.e., TAL metals and mercury, dioxins and furans, and PCBs) have been released into the UCR from various known and unknown sources. These contaminants have been transported via air, surface water, suspended particulates, or sediment, and have come to be distributed throughout the UCR. The sources, releases, and transport have been confirmed and are further refined in the Sediment Data Evaluation Report (CH2M HILL, 2006b). Fish in the UCR can be exposed to the contaminants through direct uptake (i.e., across gills, dermis, and/or gut) or through diet (i.e., feeding on suspended particulates, bed sediment, or biota that are exposed to contaminants). Fish can also act as a contaminated exposure medium for wildlife and humans.

A diverse fish community is present in the UCR. Over 25 species have been documented during recent fish population sampling. The most common species are walleye, largescale sucker, rainbow trout, lake whitefish, smallmouth bass, and burbot. Feeding studies show that the fish community is supported by both benthic and pelagic production. Pathways are present for fish to be exposed to contaminants that have been released into the UCR. They can be exposed via both surface water (i.e., surface water and suspended particulates) and sediment.

Historical data show that fish collected from the UCR have elevated concentrations of a number of slag-related metals (which include but are not limited to arsenic, cadmium, copper and zinc), mercury, dioxins and furans, and PCBs (CH2M HILL, 2005a). Slag-related metals, especially zinc, have been detected in various fish species in the UCR, most notably the largescale sucker. Mercury has been detected in several fish species, with the highest concentrations typically found in walleye. As with mercury, dioxins and furans, especially 2,3,7,8 TCDF, have been documented in several species, with the highest concentrations generally found in lake whitefish and rainbow trout. Past studies have shown that dioxins and furans have been associated with suspended particulates (USGS, 1994). The lake whitefish and rainbow trout both feed heavily on water column species and would have a high exposure to particulate-bound contaminants. PCBs have been found in various species in the UCR. Concentrations of PCBs are similar in kokanee, rainbow trout, sturgeon, walleye, and whitefish (EVS, 1998). There is little information on whether the primary source of PCB exposure is from bed sediment or from suspended particulates.

The results of the current study are consistent with the preliminary CSM, as suggested by the following conclusions:

- The metals cadmium, copper, lead, nickel, and uranium were greatest in the largescale sucker, with concentrations being greatest in the most upstream portions of the site. The gut/gut content analysis indicates that a portion of the whole body concentration may be from slag and or sediment in the gut. Zinc was also elevated in largescale suckers and mountain whitefish, particularly in the most upstream area (i.e., FSCA 1)
- Burbot contained about three to five times more arsenic than other species, suggesting either a greater exposure or higher rates of retention. Approximately 98 percent of the arsenic found in the burbot was in organic form, compared to approximately 70 percent for other species. The total arsenic in burbot increased downstream, suggesting increased sources or different exposure dynamics in the more lake-like portion of the reservoir.
- Mercury was detected in all target species, with the highest concentrations in walleye, burbot, and largescale suckers. The elevated concentrations in walleye and burbot are consistent with their feeding habits. Both walleye and burbot are higher trophic level consumers in the UCR system, feeding on fish. The source of mercury exposure is not clear for largescale suckers. There is a significant downstream increase in mercury concentrations, but not a significant relationship to sediment mercury concentrations. It is unclear whether the exposure is from sediment contact or food, or both.
- Total PCB concentrations were similar for walleye, wild and hatchery rainbow trout, lake whitefish and burbot. Largescale suckers contained about 2.5 times as much total PCB, suggesting that PCB exposure is greater from sediment, either directly or through diet, than from the water column.
- Lake whitefish, largescale sucker, and burbot had the highest concentrations of 2,3,7,8 TCDF. Generally, 2,3,7,8 TCDF concentrations were higher in the downstream samples for these species.

The current results presented above support the preliminary CSM and the assumption that UCR fish are exposed via surface water (i.e., surface water and suspended particulates), sediment, and diet. The results indicate that the exposure varies depending on species and location within the reservoir.

TABLE 3-1

Phase I Fish Tissue Comparison Levels Used to Identify Preliminary Contaminants of Interest

Upper Columbia River RI/FS

Analyte	Units	Region 3 PRG Fish Noncancer[a]	Region 3 PRG Fish Cancer 10E-6[a]	Ecological Risk Comparison Value
TAL Metals[b]				
Aluminum	mg/kg WW	25		4.4[e]
Antimony	mg/kg WW			0.03[g]
Arsenic	mg/kg WW		0.0039	1.6[e]
Barium	mg/kg WW	5.2		
Beryllium	mg/kg WW	0.05		0.1[g]
Cadmium	mg/kg WW	0.025		0.042[e]
Calcium	mg/kg WW			
Chromium	mg/kg WW	38		0.18[e]
Cobalt	mg/kg WW	0.5		
Copper	mg/kg WW	1.0		3.0[e]
Iron	mg/kg WW	15.2[c]		
Lead	mg/kg WW	0.05[d]		0.06[e]
Magnesium	mg/kg WW			
Manganese	mg/kg WW	3.5		
Nickel	mg/kg WW	0.5		0.39[e]
Potassium	mg/kg WW			
Selenium	mg/kg WW	0.13		0.56[e]
Silver	mg/kg WW	0.13		0.37[e]
Sodium	mg/kg WW			
Thallium	mg/kg WW	0.002		4.6[g]
Uranium	mg/kg WW	0.005		
Vanadium	mg/kg WW	0.025		
Zinc	mg/kg WW	7.5		20[e]
Mercury	µg/kg WW	2.5		60[e]
PCB Aroclors				
PCB-1016	µg/kg WW	0.8		440[e]
PCB-1221	µg/kg WW		0.3	440[e]
PCB-1232	µg/kg WW		0.3	440[e]
PCB-1242	µg/kg WW		0.3	440[e]
PCB-1248	µg/kg WW		0.3	440[e]
PCB-1254	µg/kg WW		0.3	440[e]
PCB-1260	µg/kg WW		0.3	440[e]
PCB-1254/1260	µg/kg WW		0.3	440[e]
PCB-1262	µg/kg WW		0.3	440[e]
PCB-1268	µg/kg WW		0.3	440[e]
Dioxins/Furans				
2,3,7,8-TCDD	pg/g WW		0.004	6[f]
1,2,3,7,8-PeCDD	pg/g WW		0.004	6[f]
1,2,3,6,7,8-HxCDD	pg/g WW		0.04	6[f]
1,2,3,4,7,8-HxCDD	pg/g WW		0.04	6[f]
1,2,3,7,8,9-HxCDD	pg/g WW		0.04	6[f]
1,2,3,4,6,7,8-HpCDD	pg/g WW		0.4	6[f]

TABLE 3-1
Phase I Fish Tissue Comparison Levels Used to Identify Preliminary Contaminants of Interest
Upper Columbia River RI/FS

Analyte	Units	Region 3 PRG Fish Noncancer[a]	Region 3 PRG Fish Cancer 10E-6[a]	Ecological Risk Comparison Value
OCDD	pg/g WW		13.3	6[f]
2,3,7,8-TCDF	pg/g WW		0.04	6[f]
1,2,3,7,8-PeCDF	pg/g WW		0.13	6[f]
2,3,4,7,8-PeCDF	pg/g WW		0.013	6[f]
1,2,3,6,7,8-HxCDF	pg/g WW		0.04	6[f]
1,2,3,4,7,8-HxCDF	pg/g WW		0.04	6[f]
2,3,4,6,7,8-HxCDF	pg/g WW		0.04	6[f]
1,2,3,4,6,7,8-HpCDF	pg/g WW		0.4	6[f]
1,2,3,4,7,8,9-HpCDF	pg/g WW		0.4	6[f]
OCDF	pg/g WW		13	6[f]
PCB Congeners				
PCB 1 - 73 PCB 78 - 80 PCB 82 - 104 PCB 106 - 112 PCB 120 - 122 PCB 127 - 155 PCB 158 - 167 PCB 170 - 188 PCB 190 - 209	pg/g WW	522		60[f]
PCB 77	pg/g WW		40	60[f]
PCB 81	pg/g WW		13.3	60[f]
PCB 126	pg/g WW		0.41	60[f]
PCB169	pg/g WW		0.13	60[f]
PCB 105,114,118,123,156,167,189	pg/g WW		113.3	60[f]

[a] For the purposes of selecting contaminats in fish tissue for evaluation and presentation, comparison values were derived from Region 3 RPC. Comparison values were derived based on an assumed target range of 1x10-6 for carcinogens or an and exceedance ration of 0.1 for noncarcinogens or ecological endpoints, unless otherwise noted. A fish consumption rate of 280 grams/day (every day for 30 years) was assumed for these estimates. However, the baseline risk assessment will evaluate a wider range of consumption rates.

[b] Potential human health comparison values for TAL metals were taken from USEPA Region 3 PRC tables modified using the assumptions listed in footnote [a] unless otherwise noted.

[c] Stifelman et al., 2005.

[d] Calculated using IEUBK lead model assuming child (0 to 84 months) fish ingestion rate of 280 grams/day, resulting in 5.035 percent of population with blood lead levels above 10 ug/dL.

[e] Dyer et al., 2000.

[f] Windward, 2004.

[g] Shepard personal communication, 2006

PCB = polychlorinated biphenyl
pg/g = picograms per gram
PRG = Preliminary Remediation Goal
TAL = Target Analyte List
µg/dL = micrograms per deciliter
WW = wet weight

TABLE 3-2
Summary of TAL Metals, PCB Aroclors, and Dioxins and Furans with at Least One Sample Exceeding Comparison Values
Upper Columbia River RI/FS

Analyte	Walleye			Wild Rainbow Trout			Hatchery Rainbow Trout			Largescale Sucker	Mountain Whitefish	Lake Whitefish	Burbot
	Fillet	Offal	Whole Body	Fillet	Offal	Whole Body	Fillet	Offal	Whole Body	Whole Body	Whole Body	Whole Body	Whole Body
TAL Metals													
Aluminum	x	x	x		x	x		x	x	x	x	x	x
Antimony										x			
Arsenic	x	x	x	x	x	x	x	x	x	x	x	x	x
Barium										x			x
Beryllium													
Cadmium		x	x		x	x		x	x	x	x	x	x
Calcium													
Chromium	x	x	x	x	x	x	x	x	x	x	x	x	x
Cobalt													
Copper					x	x		x		x	x		x
Iron		x			x	x		x	x	x	x	x	x
Lead	x	x	x		x	x		x		x	x	x	x
Magnesium													
Manganese					x			x		x	x	x	
Nickel		x	x		x			x		x			x
Potassium													
Selenium	x	x	x	x	x	x	x	x	x	x	x	x	x
Silver													
Sodium													
Thallium	x												
Uranium					x			x		x	x		x
Vanadium					x			x		x		x	x
Zinc	x	x	x	x	x	x	x	x	x	x	x	x	x
Mercury	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB Aroclors													
PCB-1016											x		
PCB-1221													
PCB-1232													
PCB-1242													
PCB-1248													
PCB-1254		x	x			x	x	x	x	x	x	x	x
PCB-1260		x	x			x	x	x	x	x		x	x
PCB-1254/1260		x	x	x	x	x	x	x	x	x		x	x
PCB-1262													
PCB-1268													
Dioxins/Furans													
2,3,7,8-TCDD					x					x	x	x	
1,2,3,7,8-PeCDD		x	x	x	x					x	x	x	
1,2,3,6,7,8-HxCDD		x	x		x	x					x	x	x
1,2,3,4,7,8-HxCDD		x										x	
1,2,3,7,8,9-HxCDD				x	x						x	x	x
1,2,3,4,6,7,8-HpCDD	x	x	x		x	x				x	x		x
OCDD	x										x	x	
2,3,7,8-TCDF	x	x	x	x	x	x	x	x	x	x	x	x	x
1,2,3,7,8-PeCDF			x		x	x				x	x	x	x
2,3,4,7,8-PeCDF			x	x		x				x		x	
1,2,3,6,7,8-HxCDF	x	x	x										
1,2,3,4,7,8-HxCDF	x	x	x										
2,3,4,6,7,8-HxCDF		x	x								x		
1,2,3,4,6,7,8-HpCDF											x		
1,2,3,4,7,8,9-HpCDF													
OCDF													

PCB = polychlorinated biphenyl
TAL = Target Analyte List

TABLE 3-3

Maximum Exceedance Ratios and Percent of Detects Exceeding Comparison Values for TAL Metals, PCB Aroclors, and Dioxins and Furans

Upper Columbia River RI/FS

	Walleye				Wild Rainbow Trout				Hatchery Rainbow Trout				Largescale Sucker		Mountain Whitefish		Lake Whitefish		Burbot	
Analyte	**Fillet**		**Whole Body**		**Fillet**		**Whole Body**		**Fillet**		**Whole Body**		**Whole Body**		**Whole Body**		**Whole Body**		**Whole Body**	
TAL Metals																				
Aluminum	63.7	100%	5.9	100%	--	--	2.1	100%	--	--	5.4	100%	31.4	84%	5.0	100%	1.8	100%	4.5	92%
Antimony	--	--	--	--	--	--	--	--	--	--	--	--	19.5	100%	--	--	--	--	--	--
Arsenic	45.9	100%	80.0	100%	25.8	100%	44.9	100%	20.7	100%	42.9	100%	85.5	100%	43.3	100%	79.9	100%	245.7	100%
Barium	--	--	--	--	--	--	--	--	--	--	--	--	2.2	4%	--	--	--	--	1.6	75%
Beryllium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	--	--	1.7	35%	--	--	2.6	100%	--	--	2.4	92%	19.1	100%	5.4	100%	1.3	13%	3.5	83%
Calcium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	5.0	100%	5.4	100%	4.0	100%	5.0	100%	2.9	100%	3.5	100%	17.0	100%	6.6	100%	5.2	100%	8.3	100%
Cobalt	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	--	--	--	--	--	--	2.0	88%	--	--	--	--	12.9	27%	2.7	71%	--	--	1.6	67%
Iron	--	--	--	--	--	--	2.0	100%	--	--	2.2	100%	70.2	82%	12.4	100%	1.5	46%	2.5	100%
Lead	1.3	40%	4.6	38%	--	--	2.4	100%	--	--	--	--	277.8	100%	9.2	100%	2.5	96%	4.0	96%
Magnesium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	--	--	--	--	--	--	--	--	--	--	--	--	7.8	92%	1.4	86%	1.1	4%	--	--
Nickel	--	--	1.1	29%	--	--	--	--	--	--	--	--	2.4	45%	--	--	--	--	1.1	4%
Potassium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	4.5	100%	6.3	100%	4.8	100%	5.3	100%	3.3	100%	4.2	100%	6.0	100%	9.7	100%	6.9	100%	6.7	100%
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	40.6	100%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Uranium	--	--	--	--	--	--	--	--	--	--	--	--	6.7	100%	2.5	71%	--	--	2.6	46%
Vanadium	--	--	--	--	--	--	--	--	--	--	--	--	13.4	176%	--	--	6.2	100%	7.5	100%
Zinc	1.0	7%	2.1	100%	1.2	56%	3.0	100%	1.1	50%	3.5	100%	16.7	100%	5.3	100%	1.9	100%	1.9	100%
Mercury	166.8	100%	85.2	100%	48.0	189%	27.8	100%	48.9	100%	30.1	100%	120.0	100%	33.6	100%	37.8	100%	96.8	100%
PCB Aroclors																				
PCB-1016	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16.5	100%	--	--	--	--
PCB-1221	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-1232	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-1242	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-1248	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-1254	--	--	50.0	100%	122.0	100%	36.7	100%	16.7	60%	26.3	100%	226.7	100%	194.0	100%	32.0	100%	32.0	100%
PCB-1260	--	--	73.3	100%	--	--	77.7	100%	19.3	100%	30.7	100%	260.0	100%	--	--	34.0	100%	34.0	100%
PCB-1254/1260	--	--	170.0	100%	--	--	53.3	100%	33.3	100%	40.0	100%	1369.7	100%		--	116.0	100%	116.0	100%
PCB-1262	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-1268	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dioxins/Furans																				
2,3,7,8-TCDD	--	--	--	--	--	--	--	--	--	--	--	--	56.0	100%	47.8	100%	228.0	100%	--	--
1,2,3,7,8-PeCDD	--	--	42.3	100%	67.5	100%	--	--	--	--	--	--	367.5	100%	68.5	100%	585.0	100%	--	--
1,2,3,6,7,8-HxCDD	--	--	6.6	100%	--	--	13.0	100%	--	--	--	--	--	--	13.6	100%	68.9	100%	10.5	100%
1,2,3,4,7,8-HxCDD	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	65.1	100%	--	--
1,2,3,7,8,9-HxCDD	--	--	--	--	1.9	100%	--	--	--	--	--	--	--	--	5.7	100%	39.3	100%	3.9	100%
1,2,3,4,6,7,8-HpCDD	3.35	14%	1.3	86%	--	--	1.9	80%	--	--	--	--	1.3	100%	7.3	71%	--	--	1.7	83%
OCDD	1.5	22%	--	--	--	--	--	--	--	--	--	--	--	--	1.1	100%	3.3	100%	--	--
2,3,7,8-TCDF	19.9	100%	65.5	100%	60.5	100%	116.8	100%	29.8	100%	39.5	100%	287.5	100%	150.0	100%	1192.9	100%	142.8	100%
1,2,3,7,8-PeCDF	--	--	1.5	100%	--	100%	1.6	100%	--	--	--	--	3.7	100%	1.4	100%	2.9	100%	2.2	100%
2,3,4,7,8-PeCDF	--	--	13.1	100%	11.7	100%	19.7	100%	--	--	--	--	36.9	100%	--	--	82.7	100%	--	--
1,2,3,6,7,8-HxCDF	2.4	100%	2.1	100%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-HxCDF	2.1	100%	2.2	100%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,6,7,8-HxCDF	--	--	1.6	100%	--	--	--	--	--	--	--	--	--	--	9.4	100%	--	--	--	--
1,2,3,4,6,7,8-HpCDF	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.2	25%	--	--	--	--
1,2,3,4,7,8,9-HpCDF	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
OCDF	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

PCB = polychlorinated biphenyl

TAL = Target Analyte List

TABLE 3-4
TAL Metal, PCB Aroclor, and Dioxin and Furan Analytes Most Frequently Exceeding Comparison Values
Upper Columbia River RI/FS

Number Species/Tissue Types Exceeded:		
13	**10 to 12**	**5 to 9**
TAL Metals		
Arsenic Chromium Mercury Selenium	Aluminum Cadmium Lead	Copper Iron Manganese Nickel Uranium Vanadium
PCB Aroclors		
	PCB-1254 PCB-1260 PCB-1254/1260	
Dioxins/Furans		
2,3,7,8-TCDF		1,2,3,7,8-PeCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 1,2,3,7,8-PeCDD

PCB = polychlorinated biphenyl
TAL = Target Analyte List

TABLE 3-5
Summary of PCB Congeners with at Least One Sample Exceeding Comparison Values
Upper Columbia River RI/FS

	Walleye			Wild Rainbow Trout			Hatchery Rainbow Trout			Largescale Sucker	Mountain Whitefish	Lake Whitefish	Burbot
Analyte	Fillet	Offal	Wholebody	Fillet	Offal	Whole Body	Fillet	Offal	Whole Body	Whole Body	Whole Body	Whole Body	Whole Body
PCB Congeners													
PCB 1													
PCB 2													
PCB 3													
PCB 4													
PCB 5													
PCB 6													
PCB 7													
PCB 8													
PCB 9													
PCB 10													
PCB 11		x									x	x	
PCB 12													
PCB 14													
PCB 15													
PCB 16													
PCB 17		x								x			
PCB 18		x								x	x	x	
PCB 19													
PCB 20		x	x	x	x	x	x	x	x	x	x	x	x
PCB 21		x								x			
PCB 22		x								x			
PCB 23													
PCB 24													
PCB 25												x	
PCB 26		x											
PCB 27													
PCB 31		x	x	x	x	x	x	x	x	x	x	x	x
PCB 32		x											
PCB 34													
PCB 35													
PCB 36													
PCB 37													
PCB 38													
PCB 39													
PCB 40		x						x		x	x	x	
PCB 41										x			
PCB 42		x	x							x	x	x	
PCB 43													
PCB 44	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 45		x											
PCB 46													
PCB 48		x			x			x		x	x	x	
PCB 49		x	x	x	x	x	x	x	x	x	x	x	x
PCB 50										x		x	
PCB 52	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 54													
PCB 55		x								x			
PCB 56		x								x	x	x	
PCB 57													
PCB 58													
PCB 59		x								x		x	
PCB 60		x	x		x	x		x		x	x	x	x
PCB 61	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 63		x								x			
PCB 64		x	x	x	x	x	x	x	x	x	x	x	x

TABLE 3-5
Summary of PCB Congeners with at Least One Sample Exceeding Comparison Values
Upper Columbia River RI/FS

Analyte	Walleye			Wild Rainbow Trout			Hatchery Rainbow Trout			Largescale Sucker	Mountain Whitefish	Lake Whitefish	Burbot
	Fillet	Offal	Wholebody	Fillet	Offal	Whole Body	Fillet	Offal	Whole Body	Whole Body	Whole Body	Whole Body	Whole Body
PCB 66	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 67													
PCB 68													
PCB 72		x											
PCB 73		x											
PCB 77		x			x					x		x	
PCB 78													
PCB 79		x								x	x	x	
PCB 80													
PCB 81													
PCB 82		x	x							x	x	x	
PCB 83		x			x			x		x	x	x	x
PCB 84		x	x		x	x		x		x	x	x	
PCB 85	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 86	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 88		x	x	x	x	x		x		x	x	x	
PCB 89										x			
PCB 90	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 92	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 93	x	x	x	x	x	x		x	x	x			x
PCB 94		x								x	x	x	
PCB 95							x						
PCB 96													
PCB 98										x			
PCB 99	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 103										x			
PCB 104													
PCB 105	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 106					x					x			
PCB 107		x			x	x				x	x	x	
PCB 109		x	x	x	x	x		x		x	x	x	x
PCB 110	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 111													
PCB 112		x	x		x	x		x		x	x	x	x
PCB 114		x	x		x	x				x	x	x	
PCB 118	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 120		x											
PCB 121													
PCB 122													
PCB 123		x								x			
PCB 126	x	x	x	x	x		x	x	x	x	x	x	x
PCB 127													
PCB 128	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 129	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 130		x	x	x	x	x		x	x	x	x	x	
PCB 131		x								x			
PCB 132	x	x	x	x	x	x	x	x	x	x	x	x	
PCB 133		x	x		x	x				x	x	x	
PCB 134		x			x	x		x		x	x	x	
PCB 135	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 136		x	x		x	x		x		x	x	x	
PCB 137		x	x	x	x	x		x		x	x	x	x
PCB 139		x	x		x	x				x	x	x	
PCB 141		x	x	x	x	x	x	x	x	x	x	x	x
PCB 142											x	x	
PCB 143		x	x		x	x		x		x			

TABLE 3-5
Summary of PCB Congeners with at Least One Sample Exceeding Comparison Values
Upper Columbia River RI/FS

Analyte	Walleye			Wild Rainbow Trout			Hatchery Rainbow Trout			Largescale Sucker	Mountain Whitefish	Lake Whitefish	Burbot
	Fillet	Offal	Wholebody	Fillet	Offal	Whole Body	Fillet	Offal	Whole Body	Whole Body	Whole Body	Whole Body	Whole Body
PCB 144	x	x	x	x	x	x	x	x	x	x			x
PCB 145													
PCB 146	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 147							x				x	x	x
PCB 148		x											
PCB 150													
PCB 152													
PCB 153	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 154		x			x	x				x	x		x
PCB 155													
PCB 156	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 158	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 159		x								x	x		
PCB 160													
PCB 161													
PCB 162		x			x	x				x	x		
PCB 164		x	x	x	x	x		x		x	x	x	x
PCB 165													
PCB 167		x	x	x	x	x		x		x	x	x	x
PCB 169			x	x					x	x	x		x
PCB 170	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 171	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 172	x	x	x	x	x	x		x		x	x	x	x
PCB 174	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 175		x								x			
PCB 176		x								x			
PCB 177	x	x	x	x	x	x	x	x	x	x	x	x	
PCB 178		x	x	x	x	x		x	x	x	x	x	x
PCB 179		x	x	x	x	x		x	x	x	x	x	
PCB 180	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 181					x					x			
PCB 182	x	x	x	x	x	x	x	x	x	x			
PCB 183		x					x			x	x	x	x
PCB 184													
PCB 186													
PCB 187	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 188													
PCB 189		x			x	x				x	x		
PCB 190		x	x	x	x	x		x		x	x	x	x
PCB 191		x				x				x	x		
PCB 192													
PCB 194	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 195		x	x	x	x	x		x		x	x	x	x
PCB 196	x	x	x	x	x	x	x	x	x	x	x	x	
PCB 197		x				x				x	x		
PCB 198	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 201		x	x		x	x				x	x	x	
PCB 202		x	x		x	x		x		x	x	x	x
PCB 203	x	x	x	x	x	x	x	x	x	x	x	x	x
PCB 204													
PCB 205		x								x			
PCB 206	x	x	x	x	x	x	x	x		x	x	x	x
PCB 207		x								x	x		x
PCB 208		x	x		x	x				x	x		x
PCB 209						x				x			x

PCB = polychlorinated biphenyl

TABLE 3-6
PCB Congener Analytes Most Frequently Exceeding Comparison Values
Upper Columbia River RI/FS

Number of Species/Tissue Types		
13	10 to 12	5 to 9
PCB Congeners		
PCB 13	PCB 20	PCB 40
PCB 44	PCB 31	PCB 42
PCB 52	PCB 93	PCB 48
PCB 61	PCB 107	PCB 60
PCB 66	PCB 109	PCB 83
PCB 85	PCB 126	PCB 84
PCB 86	PCB 130	PCB 88
PCB 90	PCB 132	PCB 107
PCB 92	PCB 137	PCB 112
PCB 99	PCB 141	PCB 114
PCB 105	PCB 144	PCB 133
PCB 110	PCB 164	PCB 134
PCB 118	PCB 167	PCB 136
PCB 128	PCB 172	PCB 139
PCB 129	PCB 178	PCB 143
PCB 135	PCB 179	PCB 154
PCB 146	PCB 182	PCB 162
PCB 153	PCB 190	PCB 169
PCB 156	PCB 170	PCB 183
PCB 158	PCB 171	PCB 189
PCB 170	PCB 195	PCB 201
PCB 171	PCB 196	PCB 202
PCB 174	PCB 206	PCB 208
PCB 180		
PCB 187		
PCB 194		
PCB 198		
PCB 203		

PCB = polychlorinated biphenyl

TABLE 3-7
Maximum Exceedance Ratios of Comparison Values for PCB Congeners
Upper Columbia River RI/FS

	Walleye		Wild Rainbow Trout		Hatchery Rainbow Trout		Largescale Sucker	Mountain Whitefish	Lake Whitefish	Burbot
Analyte	Fillet	Wholebody	Fillet	Whole Body	Fillet	Whole Body	Whole Body	Whole Body	Whole Body	Whole Body
PCB Congeners										
PCB 2	--	--	--	--	--	--	--	--	--	--
PCB 3	--	--	--	--	--	--	--	--	--	--
PCB 4	--	--	--	--	--	--	--	--	--	--
PCB 5	--	--	--	--	--	--	--	--	--	--
PCB 6	--	--	--	--	--	--	--	--	--	--
PCB 7	--	--	--	--	--	--	--	--	--	--
PCB 8	--	--	--	--	--	--	--	--	--	--
PCB 9	--	--	--	--	--	--	--	--	--	--
PCB 10	--	--	--	--	--	--	--	--	--	--
PCB 11	--	--	--	--	--	--	--	1.2	3.8	--
PCB 12	--	--	--	--	--	--	--	--	--	--
PCB 14	--	--	--	--	--	--	--	--	--	--
PCB 15	--	--	--	--	--	--	--	--	--	--
PCB 16	--	--	--	--	--	--	--	--	--	--
PCB 17	--	--	--	--	--	--	1.1	--	--	--
PCB 18	--	--	--	--	--	--	1.9	1.9	2.1	--
PCB 19	--	--	--	--	--	--	--	--	--	--
PCB 20	--	2.2	1.8	3.6	1.4	1.7	6.4	6.2	4.8	2.0
PCB 21	--	--	--	--	--	--	2.1	--	--	--
PCB 22	--	--	--	--	--	--	1.1	--	--	--
PCB 23	--	--	--	--	--	--	--	--	--	--
PCB 24	--	--	--	--	--	--	--	--	--	--
PCB 25	--	--	--	--	--	--	--	--	1.0	--
PCB 26	--	--	--	--	--	--	--	--	--	--
PCB 27	--	--	--	--	--	--	--	--	--	--
PCB 31	--	1.4	1.5	2.3	--	1.1	3.1	4.2	3.6	1.2
PCB 32	--	--	--	--	--	--	--	--	--	--
PCB 34	--	--	--	--	--	--	--	--	--	--
PCB 35	--	--	--	--	--	--	--	--	--	--
PCB 36	--	--	--	--	--	--	--	--	--	--
PCB 37	--	--	--	--	--	--	--	--	--	--
PCB 38	--	--	--	--	--	--	--	--	--	--
PCB 39	--	--	--	--	--	--	--	--	--	--
PCB 40	--	--	--	--	--	--	10.1	1.7	2.8	--
PCB 41	--	--	--	--	--	--	1.4	--	--	--
PCB 42	--	1.1	--	--	--	--	9.0	1.4	3.1	--
PCB 43	--	--	--	--	--	--	--	--	--	--
PCB 44	1.0	5.5	2.6	6.5	2.2	3.0	36.8	5.5	14.1	5.6
PCB 45	--	--	--	--	--	--	1.3	--	--	--
PCB 46	--	--	--	--	--	--	--	--	--	--
PCB 48	--	--	--	--	--	--	4.5	1.1	1.8	--
PCB 49	--	4.4	2.1	5.5	1.6	2.0	33.2	6.3	10.4	4.3
PCB 50	--	--	--	--	--	--	1.2	--	1.1	--
PCB 52	1.6	8.2	5.1	13.8	3.4	4.5	22.7	14.3	20.7	8.0
PCB 54	--	--	--	--	--	--	--	--	--	--
PCB 55	--	--	--	--	--	--	2.1	--	--	--
PCB 56	--	--	--	--	--	--	6.4	2.1	4.4	--
PCB 57	--	--	--	--	--	--	--	--	--	--
PCB 58	--	--	--	--	--	--	--	--	--	--
PCB 59	--	--	--	--	--	--	3.7	--	1.4	--
PCB 60	--	1.7	--	2.4	--	--	13.4	3.7	2.8	1.8
PCB 61	2.4	13.1	8.9	18.7	4.6	5.6	62.0	27.2	25.7	12.5
PCB 63	--	--	--	--	--	--	4.4	--	--	--
PCB 64	--	2.6	1.5	3.7	--	1.5	23.0	4.6	7.1	2.0
PCB 66	1.7	9.4	3.9	10.4	3.0	3.3	69.7	18.0	17.2	10.6
PCB 67	--	--	--	--	--	--	--	--	--	--
PCB 68	--	--	--	--	--	--	--	--	--	--
PCB 72	--	--	--	--	--	--	--	--	--	--
PCB 73	--	--	--	--	--	--	--	--	--	--
PCB 77	--	--	--	--	--	--	1.6	--	1.5	--
PCB 78	--	--	--	--	--	--	--	--	--	--
PCB 79	--	--	--	--	--	--	2.5	1.4	1.1	--
PCB 80	--	--	--	--	--	--	--	--	--	--
PCB 81	--	--	--	--	--	--	--	--	--	--
PCB 82	--	1.6	--	--	--	--	9.5	2.4	2.4	--
PCB 83	--	--	--	--	--	--	18.2	7.0	7.2	2.7
PCB 84	--	1.8	--	1.6	--	--	14.1	5.2	6.2	--
PCB 85	1.3	7.7	2.8	9.6	1.7	1.7	35.0	21.0	12.8	8.3
PCB 86	3.1	14.8	9.2	16.8	4.4	4.7	93.0	32.2	26.3	10.8
PCB 88	--	2.3	1.4	3.1	--	--	17.7	10.8	9.5	--
PCB 89	--	--	--	--	--	--	1.0	--	--	--
PCB 90	6.1	27.5	19.0	43.2	9.0	9.2	139.0	50.8	43.0	23.5
PCB 92	1.4	6.4	4.3	9.6	1.8	1.9	22.0	11.4	10.2	6.0
PCB 93	1.8	9.9	7.3	18.0	--	3.7	48.5	--	--	2.6
PCB 94	--	--	--	--	--	--	1.7	20.5	24.7	--
PCB 95	--	--	--	--	4.2	--	--	--	--	--
PCB 96	--	--	--	--	--	--	--	--	--	--
PCB 98	--	--	--	--	--	--	3.4	--	--	--
PCB 99	4.2	17.7	12.5	31.7	4.1	3.7	71.5	52.0	19.8	19.7
PCB 103	--	--	--	--	--	--	1.0	--	--	--
PCB 104	--	--	--	--	--	--	--	--	--	--
PCB 105	2.8	10.1	7.3	16.8	2.5	3.1	46.0	33.5	12.5	15.5
PCB 106	--	--	--	--	--	--	3.3	--	--	--
PCB 107	--	--	--	1.2	--	--	3.4	2.7	1.3	--

TABLE 3-7

Maximum Exceedance Ratios of Comparison Values for PCB Congeners

Upper Columbia River RI/FS

	Walleye		Wild Rainbow Trout		Hatchery Rainbow Trout		Largescale Sucker	Mountain Whitefish	Lake Whitefish	Burbot
Analyte	Fillet	Wholebody	Fillet	Whole Body	Fillet	Whole Body	Whole Body	Whole Body	Whole Body	Whole Body
PCB 109	--	3.5	2.6	4.8	--	--	11.9	7.5	3.6	2.2
PCB 110	5.2	25.3	20.2	36.7	9.2	9.0	120.5	90.7	82.7	12.2
PCB 111	--	--	--	--	--	--	--	--	--	--
PCB 112	--	1.2	--	--	--	--	10.7	2.2	2.3	1.9
PCB 114	--	0.4	--	1.1	--	--	3.5	16.3	28.1	--
PCB 118	8.1	28.7	20.5	34.8	7.3	8.6	127.5	88.8	144.7	234.5
PCB 120	--	--	--	--	--	--	--	--	--	--
PCB 121	--	--	--	--	--	--	--	--	--	--
PCB 122	--	--	--	--	--	--	--	--	--	--
PCB 123	--	--	--	--	--	--	3.6	--	--	--
PCB 126	6.9	70.0	23.3	--	11.3	25.9	185.4	146.8	45.7	59.0
PCB 127	--	--	--	--	--	--	--	--	--	--
PCB 128	2.4	10.8	5.8	8.2	2.0	2.8	28.8	11.0	7.1	10.8
PCB 129	20.8	88.7	43.0	99.5	15.4	18.0	296.7	149.3	66.5	66.3
PCB 130	--	4.2	2.4	5.9	--	1.1	17.2	8.7	4.2	--
PCB 131	--	--	--	--	--	--	1.3	--	--	--
PCB 132	1.9	8.3	3.7	8.3	1.7	3.1	43.3	21.7	12.6	--
PCB 133	--	1.7	--	2.1	--	--	4.7	3.5	1.3	1.4
PCB 134	--	--	--	1.1	--	--	10.8	1.9	1.9	--
PCB 135	3.1	16.5	7.6	24.8	3.0	4.5	55.0	23.8	20.8	9.6
PCB 136	--	2.8	--	2.0	--	--	12.2	4.8	4.6	--
PCB 137	--	4.1	3.0	5.9	--	--	12.6	12.3	3.1	3.1
PCB 139	--	1.2	--	1.6	--	--	4.1	3.1	1.2	1.4
PCB 141	--	8.3	4.0	13.3	1.4	2.0	35.5	13.8	6.6	9.0
PCB 142	--	--	--	--	--	--	--	68.5	35.5	--
PCB 143	--	2.1	--	2.7	--	--	5.1	--	--	--
PCB 144	5.0	24.5	16.4	41.8	--	10.7	146.2	--	--	1.1
PCB 145	--	--	--	--	--	--	--	--	--	--
PCB 146	3.2	12.7	7.4	18.8	2.4	3.3	49.0	19.5	9.7	8.0
PCB 147	--	--	--	--	6.5	--	--	3.6	2.4	4.7
PCB 148	--	--	--	--	--	--	--	--	--	--
PCB 150	--	--	--	--	--	--	--	--	--	--
PCB 152	--	--	--	--	--	--	--	--	--	--
PCB 153	21.5	85.7	46.5	136.8	16.5	21.0	343.3	221.7	53.3	70.0
PCB 154	--	--	--	1.0	--	--	2.4	2.0	--	1.4
PCB 155	--	--	--	--	--	--	--	--	--	--
PCB 156	1.8	6.0	3.9	10.2	1.3	1.2	20.0	20.8	4.3	7.4
PCB 158	1.2	6.2	2.8	6.2	1.1	1.2	22.0	6.1	4.0	5.6
PCB 159	--	--	--	--	--	--	1.1	1.1	--	--
PCB 160	--	--	--	--	--	--	--	--	--	--
PCB 161	--	--	--	--	--	--	--	--	--	--
PCB 162	--	--	--	1.4	--	--	2.2	1.8	--	--
PCB 164	--	2.9	1.6	4.5	--	--	10.1	4.9	2.6	1.0
PCB 165	--	--	--	--	--	--	--	--	--	--
PCB 167	--	1.9	1.5	1.9	--	--	8.7	6.8	1.5	1.3
PCB 169	--	73.7	35.7	--	--	63.9	599.2	181.5	--	65.1
PCB 170	4.7	16.2	7.4	35.7	3.6	3.9	68.3	53.3	9.0	12.9
PCB 171	1.5	5.2	2.1	10.4	1.2	1.3	21.8	13.6	3.6	4.7
PCB 172	1.0	3.3	1.8	7.1	--	--	21.7	9.3	1.9	2.0
PCB 174	1.6	5.7	3.9	14.0	1.7	2.7	40.0	20.5	7.0	1.9
PCB 175	--	--	--	--	--	--	3.4	--	--	--
PCB 176	--	--	--	--	--	--	6.6	--	--	--
PCB 177	2.0	7.9	3.9	18.5	2.1	2.8	43.2	18.7	7.9	--
PCB 178	--	5.1	1.6	4.5	--	1.1	17.3	3.4	3.6	3.7
PCB 179	--	5.4	1.1	4.1	--	1.4	17.7	4.2	5.6	--
PCB 180	13.2	42.5	21.2	101.7	9.3	9.8	268.3	146.3	22.5	40.0
PCB 181	--	--	--	--	--	--	20.5	--	--	--
PCB 182	4.5	16.4	7.0	34.2	--	4.5	92.0	--	--	--
PCB 183	--	--	--	--	3.2	--	1.4	43.2	11.6	13.1
PCB 184	--	--	--	--	--	--	--	--	--	--
PCB 186	--	--	--	--	--	--	--	--	--	--
PCB 187	5.9	27.7	11.7	30.2	5.9	7.4	116.3	10.8	18.2	9.4
PCB 188	--	--	--	--	--	--	--	--	--	--
PCB 189	--	--	--	1.0	--	--	2.0	1.5	--	--
PCB 190	--	3.6	1.8	7.0	--	--	9.1	10.8	2.2	2.8
PCB 191	--	--	--	1.7	--	--	4.0	2.1	--	--
PCB 192	--	--	--	--	--	--	--	--	--	--
PCB 194	1.5	6.0	3.7	15.8	1.4	1.0	35.7	23.0	2.5	4.4
PCB 195	--	3.5	1.4	6.5	--	--	16.1	7.7	1.7	3.3
PCB 196	1.6	6.5	2.4	11.8	1.2	1.5	26.7	13.6	2.9	7.1
PCB 197	--	--	--	1.2	--	--	6.8	2.1	--	--
PCB 198	3.0	12.0	5.1	21.3	2.7	3.1	49.0	25.5	6.0	8.6
PCB 201	--	1.3	--	2.3	--	--	7.8	2.1	1.0	--
PCB 202	--	2.8	--	3.5	--	--	10.6	4.2	1.9	2.4
PCB 203	2.7	7.9	3.8	14.3	1.8	1.4	37.7	19.3	3.8	8.2
PCB 204	--	--	--	--	--	--	--	--	--	--
PCB 205	--	--	--	--	--	--	1.9	--	--	--
PCB 206	1.4	4.3	1.9	5.0	1.0	--	19.5	8.3	1.4	7.2
PCB 207	--	--	--	--	--	--	2.7	1.0	--	1.2
PCB 208	--	1.2	--	1.4	--	--	6.4	1.9	--	1.6
PCB 209	--	--	--	--	--	--	2.7	--	--	1.2

PCB = polychlorinated biphenyl

TABLE 3-8
Summary Statistics for Whole Body by Species for all FSCAs
Upper Columbia River RI/FS

Constituent of Interest	Units	Species: Walleye Mean (± 1 SD) N	Wild Rainbow Trout Mean (± 1 SD) N	Hatchery Rainbow Trout Mean (± 1 SD) N	Lake Whitefish Mean (± 1 SD) N	Mountain Whitefish Mean (± 1 SD) N	Largescale Sucker Mean (± 1 SD) N	Burbot Mean (± 1 SD) N
Aluminum	mg/kg WW	8.55 (-14.09-31.19) 30	5.25 (3.09-7.41) 14	11.42 (2.22-20.62) 17	3.74 (1.73-5.75) 22	11.66 (3.73-19.59) 5	53.66 (11.09-96.23) 29	7.49 (3.74-11.24) 22
Arsenic	mg/kg WW	0.15 (0.1-0.2) 30	0.14 (0.12-0.16) 14	0.11 (0.09-0.13) 17	0.26 (0.22-0.3) 22	0.19 (0.12-0.26) 5	0.19 (0.14-0.24) 29	0.77 (0.64-0.9) 22
Barium	mg/kg WW	0.87 (0.78-0.96) 30	0.78 (0.43-1.13) 14	0.61 (0.22-1) 17	0.56 (0.44-0.68) 22	0.98 (0.38-1.58) 5	4.06 (1.01-7.11) 29	5.94 (4.81-7.07) 22
Cadmium	mg/kg WW	0.02 (0.01-0.03) 30	0.04 (0.03-0.05) 14	0.05 (0.04-0.06) 17	0.02 (0.01-0.03) 22	0.1 (0.06-0.14) 5	0.3 (0.24-0.36) 29	0.04 (0.02-0.06) 22
Chromium	mg/kg WW	0.53 (0.39-0.67) 30	0.73 (0.6-0.86) 14	0.5 (0.37-0.63) 17	0.76 (0.63-0.89) 22	0.98 (0.77-1.19) 5	1.38 (0.48-2.28) 29	0.4 (0.15-0.65) 22
Copper	mg/kg WW	0.36 (0.3-0.42) 30	1.27 (0.82-1.72) 14	0.86 (0.17-1.55) 17	0.64 (0.53-0.75) 22	1.16 (0.55-1.77) 5	2.3 (-1.82-6.42) 29	1.11 (0.91-1.31) 22
Iron	mg/kg WW	9.83 (8.45-11.21) 30	23.5 (17.18-29.82) 14	21.69 (11.88-31.5) 17	15.14 (11.92-18.36) 22	84.31 (27.49-141.13) 5	188.8 (-152.47-530.07) 29	25.62 (19.99-31.25) 22
Lead	mg/kg WW	0.05 (0-0.1) 30	0.09 (0.04-0.14) 14	0.04 (-0.03-0.11) 17	0.06 (0.04-0.08) 22	0.28 (0.11-0.45) 5	2.55 (0.26-4.84) 29	0.09 (0.06-0.12) 22
Nickel	mg/kg WW	0.39 (0.34-0.44) 30	0.21 (0.15-0.27) 14	0.18 (0.09-0.27) 17	0.21 (0.17-0.25) 22	0.23 (0.18-0.28) 5	0.64 (0.23-1.05) 29	0.3 (0.25-0.35) 22
Selenium	mg/kg WW	0.52 (0.4-0.64) 30	0.66 (0.57-0.75) 14	0.41 (0.32-0.5) 17	0.71 (0.59-0.83) 22	0.95 (0.65-1.25) 5	0.55 (0.46-0.64) 29	0.55 (0.43-0.67) 22
Uranium	mg/kg WW	0.0009 (0.0006-0.0012) 30	0.0026 (0.0016-0.004) 14	0.0021 (-0.0004-0.005) 17	0.002 (0.001-0.003) 22	0.0075 (0.003-0.012) 5	0.0192 (0.01-0.028) 29	0.005 (0.003-0.0067) 22
Zinc	mg/kg WW	12.6 (11.5-13.7) 30	23.7 (20.9-26.5) 14	23.7 (22.1-25.3) 17	12.7 (11.7-13.7) 22	24.3 (16.1-32.5) 5	32.2 (-0.3-64.7) 29	12.4 (11.6-13.2) 22
Mercury	ug/kg WW	179.9 (133.6-226.2) 30	61.4 (43.3-79.5) 14	92 (35.1-148.9) 17	63.2 (50.1-76.3) 22	80.4 (69.2-91.6) 5	190.9 (98.8-283) 29	179.4 (141.2-217.6) 22
Total PCBs	ug/kg WW	68.4 (46.9-89.9) 30	73.6 (57.7-89.5) 14	52.5 (48.9-56.1) 17	73.2 (61.6-84.8) 22	104.4 (90.5-118.3) 5	121 (46.2-195.8) 29	70.5 (60.6-80.4) 22
2,3,7,8 TCDF	ug/kg WW	0.0015 (0.0009-0.0021) 30	0.0019 (0.0007-0.0031) 14	0.0013 (0.001-0.0016) 17	0.0055 (0.0037-0.0073) 22	0.0051 (0.003-0.0072) 5	0.0032 (0.0007-0.0057) 29	0.0039 (0.0029-0.0049) 22

mg/kg WW = milligrams per kilogram wet weight
N = number of samples
PCB = polychlorinated biphenyl
SD = standard deviation

TABLE 3-9
Overall Summary Statistics for Walleye and Rainbow Trout Fillets
Upper Columbia River RI/FS

Analyte	Units	Walleye Fillet Mean (± 1 SD) N	Wild Rainbow Trout Fillet Mean (± 1 SD) N	Hatchery Rainbow Trout Fillet Mean (± 1 SD) N
TAL Metals				
Aluminum	mg/kg WW	1.26 (1.23-1.29) 14	1.9 (1.743-2.057) 9	1.8 (1.78-1.82) 8
Arsenic	mg/kg WW	0.11 (0.08-0.14) 15	0.085 (0.071-0.099) 9	0.04 (0.022-0.058) 8
Barium	mg/kg WW	0.042 (0.041-0.043) 15	0.064 (0.059-0.069) 9	0.06 (0.0593-0.0607) 8
Cadmium	mg/kg WW	0.005 (0.0049-0.0051) 15	0.009 (0-0.018) 9	0.006 (0.00593-0.00607) 8
Chromium	mg/kg WW	0.48 (0.339-0.621) 15	0.54 (0.421-0.659) 9	0.34 (0.256-0.424) 8
Copper	mg/kg WW	0.213 (0.191-0.235) 15	0.328 (0.301-0.355) 9	0.297 (0.2478-0.3462) 8
Iron	mg/kg WW	0.51 (-0.69-1.71) 15	0.33 (0.303-0.357) 9	0.297 (0.2478-0.3462) 8
Lead	mg/kg WW	0.016 (-0.003-0.035) 15	0.012 (0.0064-0.0176) 9	0.006 (0.00593-0.00607) 8
Nickel	mg/kg WW	0.11 (0.073-0.147) 15	0.027 (0.015-0.039) 9	0.041 (0.0008-0.0812) 8
Selenium	mg/kg WW	0.39 (0.323-0.457) 15	0.467 (0.4-0.534) 9	0.28 (0.204-0.356) 8
Uranium	mg/kg WW	0.0003 (0.00029-0.00031) 15	0.0006 (0.00056-0.00064) 9	0.0006 (0.00059-0.00061) 8
Zinc	mg/kg WW	6.6 (5.934-7.266) 15	7.7 (6.68-8.72) 9	7.3 (6.577-8.023) 8
Mercury	*u*g/kg WW	267.1 (199-335.2) 15	88 (70.6-105.4) 9	86.4 (65-107.8) 8
PCB Aroclor				
Total PCB	*u*g/kg WW	36.4 (14.7-58.1) 15	63.1 (49.6-76.6) 9	44 (40.8-47.2) 8
Dioxins/Furans				
2,3,7,8 TCDF	*u*g/kg WW	0.00034 (0.00011-0.00057) 15	0.00242 (0.00182-0.00302) 9	0.0004 (0.0004-0.0004) 8

mg/kg WW = milligrams per kilogram wet weight
N = number of samples
PCB = polychlorinated biphenyl
SD = standard deviation
TAL = Target Analyte List

TABLE 3-10
Percent Arsenic Species Associated with Fillet, Offal, and Whole Body Samples
Upper Columbia River RI/FS

Species	Composite ID	Total Arsenic ICP/MS Arsenic (u g/kg WW)		As-Species $As^{+}3$ and $As^{+}5$ (u g/kg WW)		% As as $As^{+}3$ + $As^{+}5$	As-Species ASB + Cation (u g/kg WW)		% AS as ASB + Cation	As-Species Dimethylarsonic Acid (DMA) (u g/kg WW)		% As as Dimethylarsonic Acid (DMA)	As-Species Monomethylarsonic Acid (MMA) u g/kg WW		% AS as Monomethylarsonic Acid (MMA)	As-Species Unknown (u g/kg WW)		% -As as Species Unknown	% Total As as Inorganic Species	% Total As as Organic Species
Walleye																				
	WE1F15	111		8.8	U	10.8%	46	J	56.8%	8.8	U	10.8%	8.8	U	10.8%	8.8	UJ	10.8%	10.8%	89.2%
	WE3F55	122		8.7	U	13.9%	23	J	36.3%	8.7	U	13.9%	8.7	U	13.9%	14	J	22.0%	13.9%	86.1%
	WE6F45	99		8.9	U	14.5%	8.9	UJ	14.5%	8.9	U	14.5%	8.9	U	14.5%	25	J	41.8%	14.5%	85.5%
	Average for Fillets					***13.1%***			***35.9%***			***13.1%***			***13.1%***			***24.9%***	***13.1%***	***86.9%***
	WE1O15	116		12	J	18.9%	18	J	28.6%	9.5	J	14.7%	12	U	18.9%	12	UJ	18.9%	18.9%	81.1%
	WE3O55	177		49		48.2%	13	UJ	12.2%	14	J	13.7%	13	U	12.2%	14	J	13.7%	48.2%	51.8%
	WE6O45	141		12	U	17.8%	12	UJ	17.8%	16	J	23.5%	12	U	17.8%	16	J	23.0%	17.8%	82.2%
	Average for Offal					***28.3%***			***19.5%***			***17.3%***			***16.3%***			***18.5%***	***28.3%***	***71.7%***
	WE2W55	91		11	U	14.9%	14	J	19.6%	11	U	14.9%	11	U	14.9%	26	J	35.8%	14.9%	85.1%
	WE2W55[a]	83		11	U	16.1%	9.0	J	13.7%	11	U	16.1%	11	U	16.1%	25	J	38.0%	16.1%	83.9%
	WE4W35	230		38		39.8%	11	UJ	11.3%	13	J	13.3%	11	U	11.3%	23	J	24.3%	39.8%	60.2%
	WE5W35	189		10	U	12.0%	30	J	34.9%	12	J	13.8%	10	U	12.0%	23	J	27.3%	12.0%	88.0%
	Whole Body Average					***20.7%***			***19.9%***			***14.5%***			***13.6%***			***31.3%***	***20.7%***	***79.3%***
Wild Rainbow Trout																				
	RW1F55	99		11	U	21.4%	7.5	J	14.6%	11	U	21.4%	11	U	21.4%	11	UJ	21.4%	21.4%	78.6%
	RW1F55[a]	101		11	U	20.9%	8.5	J	16.3%	11	U	20.9%	11	U	20.9%	11	UJ	20.9%	20.9%	79.1%
	RW3F25	68		10	U	16.4%	10	UJ	16.4%	10	U	16.4%	10	U	16.4%	22	J	34.4%	16.4%	83.6%
	Average for Fillets					***19.6%***			***15.8%***			***19.6%***			***19.6%***			***25.6%***	***19.6%***	***80.4%***
	RW1O35[a]	213		14	U	23.3%	9.7	J	16.5%	8.0	J	13.6%	14	U	23.3%	14	UJ	23.3%	23.3%	76.7%
	RW1O35[a]	228		14	U	18.6%	15	J	19.5%	18	J	24.5%	14	U	18.6%	14	UJ	18.6%	18.6%	81.4%
	RW3O25	215		21	J	23.1%	12	UJ	13.4%	12	J	13.7%	12	U	13.4%	32	J	36.5%	23.1%	76.9%
	Average for Offal					***21.7%***			***16.5%***			***17.3%***			***18.4%***			***26.1%***	***21.7%***	***78.3%***
	RW2W35	140		32		35.4%	19	J	21.4%	13	U	14.4%	13	U	14.4%	13	UJ	14.4%	35.4%	64.6%
	RW2W35[a]	148		38		39.6%	18	J	19.1%	13	U	13.8%	13	U	13.8%	13	UJ	13.8%	39.6%	60.4%
	RW5W15	175		13	U	16.1%	13	UJ	16.1%	18	J	22.7%	13	U	16.1%	23	J	29.0%	16.1%	83.9%
	Whole Body Average					***30.4%***			***18.9%***			***17.0%***			***14.7%***			***19.1%***	***30.4%***	***69.6%***
Hatchery Rainbow Trout																				
	RH3F25	60	U	NA		NC	NA		NC	NA		NC	NA		NC	-		NC	NC	NC
	RH6F45	60	U	NA		NC	NA		NC	NA		NC	NA		NC	-		NC	NC	NC
	Average for Fillets																			
	RH3O25	132		28		35.2%	11	UJ	14.0%	2.5	J	3.1%	11	U	14.0%	27	J	33.8%	35.2%	64.8%
	RH6O45	148		12	U	16.7%	12	UJ	16.7%	13	J	18.4%	12	U	16.7%	23	J	31.4%	16.7%	83.3%
	Average for Offal					***25.9%***			***15.4%***			***10.7%***			***15.4%***			***32.6%***	***25.9%***	***74.1%***
	RH4W35	126		11	U	19.5%	11	UJ	19.5%	3.1	J	5.2%	11	U	19.5%	21	J	36.2%	19.5%	80.5%
	RH5W25	106		11	U	24.4%	11	UJ	24.4%	3.9	J	8.3%	11	U	24.4%	8.7	J	18.5%	24.4%	75.6%
	Whole Body Average					***22.0%***			***22.0%***			***6.8%***			***22.0%***			***27.3%***	***22.0%***	***78.0%***
Mountain Whitefish																				
	MW1W25	169		14	U	21.2%	8.6	J	13.0%	16	J	23.3%	14	U	21.2%	14	UJ	21.2%	21.2%	78.8%
	MW1W45[a]	147		14	U	24.7%	8.8	J	15.1%	11	J	18.1%	14	U	24.7%	10	J	17.5%	24.7%	75.3%
	MW1W45	144		14	U	22.8%	7.7	J	12.2%	15	J	23.9%	14	U	22.8%	12	J	18.3%	22.8%	77.2%
	Whole Body Average					***22.9%***			***13.4%***			***21.8%***			***22.9%***			***19.0%***	***22.9%***	***77.1%***
Lake Whitefish																				
	LW2W45	261		14	U	21.9%	5.4	J	8.6%	13	J	20.3%	14	U	21.9%	17	J	27.3%	21.9%	78.1%
	LW3W25	283		13	U	19.5%	4.4	J	6.7%	19	J	28.1%	13	U	19.5%	17	J	26.2%	19.5%	80.5%
	LW3W25[a]	271		13	U	17.1%	8.5	J	10.8%	25	J	32.1%	13	U	17.1%	18	J	22.9%	17.1%	82.9%
	LW4W45	251		13	UJL	18.6%	13	UJL	18.6%	9.5	JL	13.2%	13	UJL	18.6%	22	JL	30.9%	18.6%	81.4%
	Whole Body Average					***19.3%***			***11.2%***			***23.4%***			***19.3%***			***26.8%***	***19.3%***	***80.7%***
Largescale Sucker																				
	LS1W45	164		12	J	20.5%	16	J	27.5%	8.7	J	14.8%	11	U	17.9%	11	J	19.2%	20.5%	79.5%
	LS2W25[a]	133		11	UJL	18.1%	15	JL	26.1%	7.8	JL	13.3%	11	UJL	18.1%	14	JL	24.3%	18.1%	81.9%
	LS2W35	143		11	UJL	17.2%	8.4	JL	13.4%	9.8	JL	15.5%	11	UJL	17.2%	23	JL	36.6%	17.2%	82.8%
	LS5W15	170		11	UJL	12.9%	13	J	16.0%	12	J	14.2%	11	UJL	12.9%	36	J	44.0%	12.9%	87.1%
	Whole Body Average					***17.2%***			***20.8%***			***14.5%***			***16.5%***			***31.0%***	***17.2%***	***82.8%***
Burbot																				
	BB3W35	668		8.5	UJL	1.6%	15	J	2.8%	487		92.4%	8.5	UJL	1.6%	8.5	UJ	1.6%	1.6%	98.4%
	BB3W35[a]	668		8.5	UJL	1.6%	15	J	2.9%	480	U	92.2%	8.5	UJL	1.6%	8.5	UJ	1.6%	1.6%	98.4%
	BB4W35	759		8.0	UJL	1.2%	12	J	1.8%	584		87.8%	8.0	UJL	1.2%	53	J	7.9%	1.2%	98.8%
	BB6W45	958		8.5	UJL	1.0%	9.3	J	1.1%	780		92.2%	8.5	UJL	1.0%	40	J	4.7%	1.0%	99.0%
	Whole Body Average					***1.4%***			***2.1%***			***91.2%***			***1.4%***			***4.0%***	***1.4%***	***98.6%***

ASB = arsenobetanine
ICP/MS = inductively coupled plasma/mass spectrometry
NA = not analyzed
NC = not calculated
μg/kg WW = micrograms per kilogram wet weight

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE 3-11
Summary of Possible Conclusions from the Largescale Sucker Gut/Gut Contents Analysis
Upper Columbia River RI/FS

Hypothetical Fish	Gutless Sucker Whole-Body Metals Concentration	Gut/Gut Contents Metals Concentration	% AFDW of Gut/Gut Contents	Conclusion
A	High	Low	High (ash weight low relative to dry weight)	Gut contents contained little sediment and would not bias the whole body metals measurements high.
B	High	Low	Low (ash weight high relative to dry weight)	Sediment was found in the gut contents but does not contain elevated metals and will not bias the whole body metals measurements high.
C	Low	High	High (ash weight low relative to dry weight)	Gut contents contained little sediment, and the elevated metals may be from the sediment and/or the gut tissue.
D	Low	High	Low (ash weight high relative to dry weight)	Sediment was found in the gut/gut contents. The elevated metals in the gut/gut contents may be from the sediment and/or the gut tissue.
E	High	High	High (ash weight low relative to dry weight)	Gut contents contained little sediment, and the elevated metals are associated with the gut tissue and other body parts
F	High	Low	Low (ash weight high relative to dry weight)	Sediment was found in the gut contents. Elevated metals do not appear to be associated with the gut tissue and/or contents.
G	Low	Low	High (ash weight low relative to dry weight)	Little sediment was found in the gut contents. Low overall metals concentrations.
H	Low	Low	Low (ash weight high relative to dry weight)	Sediment was found in the gut contents. Metals do not appear to be associated with the gut tissue and/or contents.

TABLE 3-12

Estimated TAL Metals Results for Individual Whole Body Largescale Sucker Samples--FSCA 1

Upper Columbia River RI/FS

Analyte	Units	LS1G10040[a] Primary Sample	LS1W10040[b] Primary Sample	LS1EW10040[c] Primary Sample	Associated with Gut/ Contents	LS1G10041 Primary Sample	LS1W10041 Primary Sample	LS1EW10041 Primary Sample	Associated with Gut/ Contents	LS1G10051 Primary Sample	LS1W10051 Primary Sample	LS1EW10051 Primary Sample	Associated with Gut/ Contents	LS1G10056 Primary Sample	LS1W10056 Primary Sample	LS1EW10056 Primary Sample	Associated with Gut/ Contents	LS1G10089 Primary Sample	LS1W10089 Primary Sample	LS1EW10089 Primary Sample	Associated with Gut/ Contents	LS1G50769 Primary Sample	LS1W50769 Primary Sample
Aluminum	mg/kg WW	2862.5	20.3 J	232.0	92%	1869.5	7.1 J	150.1	96%	744.1	112.7 J	137.8	21%	1410.5	6.8 J	94.5	93%	6486.0	8.2 J	400.6	98%	213.0	3.7 U
Antimony	mg/kg WW	1.901	0.113 U	0.246	57%	1.053	0.107 U	0.179	45%	1.544	0.106 U	0.163	38%	1.281	0.106 U	0.180	44%	2.181	0.115 U	0.240	55%	0.198	0.097 U
Arsenic	mg/kg WW	2.377	0.148	0.314	56%	1.685	0.200	0.314	41%	1.109	0.124	0.163	27%	1.488	0.183	0.264	35%	4.982	0.145	0.438	69%	0.605	0.102
Barium	mg/kg WW	241.8	2.6	20.5	88%	118.9	1.7	10.7	85%	44.9	3.2	4.9	37%	67.2	3.0	7.0	60%	606.3	2.2	38.8	95%	15.0	1.1 J
Beryllium	mg/kg WW	0.133	0.006 U	0.015	65%	0.081	0.005 U	0.011	55%	0.039	0.005 U	0.007	23%	0.067	0.005 U	0.009	46%	0.277	0.006 U	0.022	76%	0.010	0.005 U
Cadmium	mg/kg WW	1.603	0.273	0.372	32%	2.138	0.411	0.544	30%	2.264	0.343	0.419	21%	1.624	0.410	0.485	21%	2.538	0.382	0.513	30%	1.384	0.287
Calcium	mg/kg WW	7740.2	9657.0	9514.2	6%	6350.4	8905.0	8708.9	6%	8985.6	13992.0	13793.3	3%	5355.0	10592.4	10265.3	3%	21103.0	8244.6	9023.5	14%	17841.6	7725.6 J
Chromium	mg/kg WW	54.044 J	0.638 J	4.616	87%	99.144 J	0.658 J	8.218	93%	53.703 J	0.752 J	2.854	75%	37.800 J	0.628 J	2.949	80%	101.520 J	0.546 J	6.663	92%	3.189 J	0.470
Cobalt	mg/kg WW	8.748	0.052	0.700	93%	4.990	0.036	0.416	92%	1.931	0.058	0.132	58%	2.506	0.041	0.195	80%	18.894	0.035	1.178	97%	0.437	0.026
Copper	mg/kg WW	306.86	1.88 J	24.60	93%	163.62	0.92 J	13.41	94%	70.55	1.18 J	3.93	71%	82.60	0.77 J	5.88	88%	784.90	1.00 J	48.49	98%	24.73 U	0.61
Iron	mg/kg WW	25006.8	138.9	1991.2	94%	14061.6	29.6	1106.7	98%	4984.2	70.0	265.0	75%	7770.0	33.9	517.0	94%	66740.0	61.7	4100.9	99%	833.3	13.7 J
Lead	mg/kg WW	34.67	5.02 J	7.23	36%	21.74	7.26 J	8.37	20%	11.58	13.49 J	13.41	3%	14.39	6.33 J	6.84	13%	116.56	7.78 J	14.37	49%	2.38	3.18
Magnesium	mg/kg WW	1200.0	356.7	419.5	21%	884.5	331.5	374.0	18%	498.4	411.8	415.3	5%	854.0	368.6	398.9	13%	2016.3	327.6	429.9	28%	362.9	305.4
Manganese	mg/kg WW	503.8	8.7	45.6	82%	284.1	12.1	32.9	66%	100.4	15.4	18.8	21%	166.3	12.4	22.1	47%	1245.5	10.4	85.2	89%	26.1	4.5 J
Nickel	mg/kg WW	19.648	0.290	1.732	85%	64.152	0.301	5.203	95%	32.994	0.422	1.715	76%	20.160	0.355	1.592	79%	38.963	0.254	2.599	91%	1.804	0.240
Potassium	mg/kg WW	2725.1	3480.0	3423.8	6%	2527.2	3205.8	3153.7	6%	2804.5	3352.8	3331.0	3%	2789.5	3439.8	3399.2	5%	2914.0	3767.4	3715.7	5%	2120.2	3366.9
Selenium	mg/kg WW	1.099	0.551	0.592	14%	0.807	0.521	0.543	11%	1.046	0.681	0.696	6%	0.840	0.655	0.667	8%	1.499	0.519	0.578	16%	1.179	0.496
Silver	mg/kg WW	0.595	0.073 U	0.111	40%	0.680	0.069 U	0.115	45%	0.291	0.066 U	0.075	15%	0.172	0.066 U	0.072	15%	1.645	0.071 U	0.166	60%	0.081	0.060 U
Sodium	mg/kg WW	1309.9	1020.8	1042.3	9%	1500.1	1120.7	1149.8	10%	1449.6	1393.9	1396.1	4%	1585.5	1321.3	1337.8	7%	1856.5	1198.5	1238.3	9%	1609.4	986.6
Thallium	mg/kg WW	0.110	0.073 U	0.075	11%	0.081	0.069 U	0.069	9%	0.084	0.066 U	0.067	5%	0.084	0.066 U	0.067	8%	0.113	0.071 U	0.074	9%	0.081	0.060 U
Uranium	mg/kg WW	0.660	0.015	0.063	78%	0.389	0.027	0.055	54%	0.201	0.030	0.036	22%	0.306	0.018	0.036	53%	1.438	0.011	0.098	89%	0.101	0.008
Vanadium	mg/kg WW	6.916	0.113 U	0.620	83%	5.281	0.107 U	0.504	80%	2.797	0.106 U	0.212	52%	4.515	0.106 U	0.382	74%	11.468	0.115 U	0.802	87%	0.773	0.097 U
Zinc	mg/kg WW	1951.1	40.3 J	182.6	80%	1036.8	50.7 J	126.4	63%	331.3	54.6 J	65.6	20%	462.0	37.4 J	63.9	45%	5170.0	49.1 J	359.3	87%	58.1	22.9

[a] G indicates a gut/contents sample from an individual largescale sucker.

[b] W followed by a 5-digit numeric code indicates a whole body sample with the gut/contents removed from an individual largescale sucker.

[c] EW indicates estimated whole body. The estimated whole body concentration for the individual largescale sucker was calculated as a weighted average of the gut/contents and the gutless whole body concentrations.

mg/kg WW = milligrams per kilogram wet weight

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

TABLE 3-12

Estimated TAL Metals Results for Individual Whole Body Largescale Sucker Samples--FSCA 1

Upper Columbia River RI/FS

Analyte	Units	LS1EW50769 Primary Sample	Associated with Gut/ Contents	LS1G50770 Primary Sample	LS1W50770 Primary Sample	LS1EW50770 Primary Sample	Associated with Gut/ Contents	LS1G50771 Primary Sample	LS1W50771 Primary Sample	LS1EW50771 Primary Sample	Associated with Gut/ Contents
Aluminum	mg/kg WW	19.5	83%	449.8	5.1	38.7	88%	246.3	4.5	27.1	85%
Antimony	mg/kg WW	0.104	14%	0.176	0.099 U	0.105	13%	0.122	0.110 U	0.111	10%
Arsenic	mg/kg WW	0.140	33%	0.727	0.179	0.220	25%	0.808	0.180	0.239	32%
Barium	mg/kg WW	2.1	53%	16.9	2.3 J	3.4	37%	9.4	1.2 J	2.0	44%
Beryllium	mg/kg WW	0.005	15%	0.026	0.005 U	0.007	30%	0.013	0.006 U	0.006	19%
Cadmium	mg/kg WW	0.370	28%	1.678	0.255	0.362	35%	1.026	0.254	0.326	29%
Calcium	mg/kg WW	8493.0	16%	8926.8	8109.0 J	8170.7	8%	18767.7	10462.2 J	11238.4	16%
Chromium	mg/kg WW	0.676	36%	8.546 J	0.676	1.270	51%	3.476 J	0.592	0.862	38%
Cobalt	mg/kg WW	0.057	58%	0.450	0.033	0.065	53%	0.364	0.054	0.083	41%
Copper	mg/kg WW	2.44	77%	14.22	0.59	1.62	66%	13.94 U	0.81	2.04	64%
Iron	mg/kg WW	75.9	83%	1211.0	23.3 J	112.9	81%	728.2	21.8 J	87.8	77%
Lead	mg/kg WW	3.12	6%	4.95	6.76	6.62	6%	2.06	4.12	3.92	5%
Magnesium	mg/kg WW	309.7	9%	536.3	318.8	335.2	12%	417.1	346.9	353.4	11%
Manganese	mg/kg WW	6.1	32%	28.3	10.9 J	12.2	18%	21.7	5.4 J	6.9	29%
Nickel	mg/kg WW	0.359	38%	4.706	0.306	0.638	56%	1.963	0.338	0.490	37%
Potassium	mg/kg WW	3272.3	5%	2339.0	3595.5	3500.7	5%	1916.5	2961.0	2863.4	6%
Selenium	mg/kg WW	0.548	16%	1.453	0.587	0.652	17%	1.205	0.677	0.726	16%
Silver	mg/kg WW	0.062	10%	0.080	0.064 U	0.065	9%	0.076	0.068 U	0.068	10%
Sodium	mg/kg WW	1033.8	12%	1415.1	1060.8	1087.5	10%	1555.7	1221.1	1252.3	12%
Thallium	mg/kg WW	0.062	10%	0.080	0.064 U	0.065	9%	0.076	0.068 U	0.068	10%
Uranium	mg/kg WW	0.015	52%	0.110	0.010	0.018	46%	0.141	0.011	0.023	58%
Vanadium	mg/kg WW	0.148	40%	1.467	0.099 U	0.203	55%	1.066	0.110 U	0.199	50%
Zinc	mg/kg WW	25.6	17%	59.5	39.8	41.3	11%	39.4	21.0	22.7	16%

Analyte	LS1G50775 Primary Sample	LS1W50775 Primary Sample	LS1EW50775 Primary Sample	Associated with Gut/ Contents	LS1G50778 Primary Sample	LS1W50778 Primary Sample	LS1EW50778 Primary Sample	Associated with Gut/ Contents	LS1G50778 Field Duplicate	LS1W50778 Field Duplicate	LS1EW50778 Field Duplicate	Associated with Gut/ Contents
Aluminum	424.4	5.2	31.6	85%	294.5	4.0	32.4	89%	298.9	3.7 U	32.5	90%
Antimony	1.119	0.071 U	0.137	51%	0.124	0.103 U	0.105	12%	0.127	0.100 U	0.102	12%
Arsenic	1.017	0.100	0.158	41%	0.836 U	0.190	0.253	32%	0.824 U	0.189	0.251	32%
Barium	24.9	1.8 J	3.2	49%	17.5	2.1 J	3.6	47%	18.6	1.7 J	3.3	55%
Beryllium	0.019	0.003 U	0.004	27%	0.015	0.005 U	0.006	24%	0.016	0.005 U	0.006	25%
Cadmium	2.044	0.346	0.452	28%	1.345	0.232	0.341	39%	1.319	0.252	0.356	36%
Calcium	27772.0	9408.0 J	10563.6	17%	13769.4	11484.0 J	11707.4	11%	14391.8	8305.4 J	8900.3	16%
Chromium	4.637 J	0.326	0.598	49%	3.403 J	0.581	0.857	39%	3.265 J	0.634	0.891	36%
Cobalt	0.576	0.040	0.074	49%	0.350	0.037	0.068	51%	0.317	0.037	0.064	48%
Copper	25.86 U	0.74	2.32	70%	7.41 U	0.69	1.34	54%	7.35 U	0.71	1.36	53%
Iron	1391.2	44.0 J	128.7	68%	655.1	15.9 J	78.4	82%	675.2	14.9 J	79.4	83%
Lead	4.79	7.81	7.62	4%	2.24	3.93	3.77	6%	2.10	3.04	2.95	7%
Magnesium	594.7	318.7	336.1	11%	422.9	335.3	343.8	12%	421.6	306.5	317.8	13%
Manganese	43.5	9.9 J	12.0	23%	16.6	5.7 J	6.8	24%	16.9	4.5 J	5.7	29%
Nickel	2.266	0.288	0.412	35%	1.797	0.343	0.485	36%	1.813	0.314	0.461	38%
Potassium	2457.6	3417.6	3357.2	5%	2117.9	2851.2	2779.5	7%	2060.5	3013.0	2919.9	7%
Selenium	1.048	0.470	0.507	13%	1.495	0.681	0.761	19%	1.458	0.718	0.790	18%
Silver	0.131	0.044 U	0.050	17%	0.080	0.063 U	0.065	12%	0.079	0.060 U	0.062	12%
Sodium	1747.5	1278.7	1308.2	8%	1669.5	1248.7	1289.8	13%	1629.4	1215.7	1256.1	13%
Thallium	0.066	0.044 U	0.046	9%	0.080	0.063 U	0.065	12%	0.079	0.060 U	0.062	12%
Uranium	0.161	0.024	0.033	31%	0.112	0.012	0.022	51%	0.118	0.009	0.020	57%
Vanadium	1.449	0.104	0.188	48%	1.123	0.103 U	0.203	54%	1.163	0.102	0.206	55%
Zinc	74.4	29.0	31.8	15%	31.2	21.0	22.0	14%	32.0	21.2	22.3	14%

[a] G indicates a gut/contents sample from an individual largescale sucker.

[b] W followed by a 5-digit numeric code indicates a whole body sample with the gut/contents removed from an individual largescale sucker.

[c] EW indicates estimated whole body. The estimated whole body concentration for the individual largescale sucker was calculated as a weighted average of the gut/contents and the gutless whole body concentrations.

mg/kg WW = milligrams per kilogram wet weight

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

TABLE 3-13

Estimated TAL Metals Results for Individual Whole Body Largescale Sucker Samples--FSCA 3

Upper Columbia River RI/FS

Analyte	Units	LS3G40486[a] Primary Sample	LS3W40486[b] Primary Sample	LS3EW40486[c] Primary Sample	Associated with Gut/ Contents	LS3G40504 Primary Sample	LS3W40504 Primary Sample	LS3EW40504 Primary Sample	Associated with Gut/ Contents	LS3G40520 Primary Sample	LS3W40520 Primary Sample	LS3EW40520 Primary Sample	Associated with Gut/ Contents	LS3G40914 Primary Sample	LS3W40914 Primary Sample	LS3EW40914 Primary Sample	Associated with Gut/ Contents	LS3G40915 Primary Sample	LS3W40915 Primary Sample	LS3EW40915 Primary Sample	Associated with Gut/ Contents
Aluminum	mg/kg WW	609.0	4.3 J	38.1	89%	346.0	3.6 J	23.1	85%	183.3	15.3 J	27.3	48%	323.8	5.8 J	30.6	83%	65.3	4.5 J	8.3	49%
Antimony	mg/kg WW	0.116	0.095 U	0.097	7%	0.088	0.089 U	0.089	6%	0.117	0.101 U	0.103	8%	0.197	0.105 U	0.112	14%	0.147	0.101 U	0.104	9%
Arsenic	mg/kg WW	0.667	0.193	0.220	17%	0.394	0.212	0.222	10%	0.632 U	0.213	0.243	19%	0.497	0.118	0.148	26%	0.261	0.142	0.149	11%
Barium	mg/kg WW	10.1	4.1	4.4	13%	14.7	2.2	2.9	29%	5.5	1.5 J	1.8	22%	4.2	1.0 J	1.2	27%	1.3	2.3 J	2.2	4%
Beryllium	mg/kg WW	0.023	0.005 U	0.006	22%	0.013	0.005 U	0.005	15%	0.008	0.005 U	0.005	10%	0.012	0.005 U	0.006	16%	0.007	0.005 U	0.005	9%
Cadmium	mg/kg WW	1.076	0.201	0.250	24%	1.218	0.265	0.319	22%	0.891	0.114	0.170	37%	0.207	0.029	0.043	38%	0.440	0.104	0.125	22%
Calcium	mg/kg WW	3074	10968.7	10527.043	2%	8322	10604	10474.199	5%	10926.3	12428 J	12321.153	6%	407.316	9520.6 J	8809.448	0%	513.8	10626.6 J	9996.930	0%
Chromium	mg/kg WW	45.53 J	0.502 J	3.021	84%	4.7085	0.4338 J	0.677	40%	3.4615 J	0.364	0.584	42%	23.5872 J	0.4997	2.301	80%	1.9084 J	0.3738	0.469	25%
Cobalt	mg/kg WW	0.861	0.050	0.090	47%	0.241	0.027	0.039	35%	0.172	0.029	0.039	31%	0.388	0.016	0.045	67%	0.062	0.035	0.036	11%
Copper	mg/kg WW	12.673 U	0.502 J	1.183	60%	7.512 U	0.651 J	1.041	41%	6.923 U	0.494	0.951	52%	5.951 U	0.395	0.828	56%	5.689 U	0.454	0.780	45%
Iron	mg/kg WW	1081.7	11.3	71.2	85%	676.7	25.5	62.6	62%	304.0	11.2	32.0	68%	617.0	9.7	57.1	84%	146.4	15.6	23.8	38%
Lead	mg/kg WW	0.795	0.713 J	0.717	6%	1.940	4.338 J	4.202	3%	1.364	2.005 J	1.959	5%	0.655	0.118 J	0.160	32%	0.286	1.744 J	1.653	1%
Magnesium	mg/kg WW	504.6	333.8	343.4	8%	348.2	361.5	360.7	5%	295.3	384.8	378.4	6%	262.1	389.2	379.3	5%	145.7	373.8	359.6	3%
Manganese	mg/kg WW	46.7	4.5	6.9	38%	22.3	5.8	6.7	19%	19.0	6.8 J	7.6	18%	13.4	2.0 J	2.9	36%	3.1	5.9 J	5.7	3%
Nickel	mg/kg WW	30.160	0.377	2.043	83%	2.650	0.362	0.492	31%	2.062	0.338	0.461	32%	17.472	0.342	1.679	81%	0.697	0.320	0.344	13%
Potassium	mg/kg WW	2665.1	3388.5	3348.0	4%	2628.0	3735.5	3672.5	4%	2221.4	3458.0	3370.0	5%	1577.9	3550.5	3396.6	4%	2286.4	3497.7	3422.3	4%
Selenium	mg/kg WW	1.061	0.577	0.604	10%	0.944	0.769	0.779	7%	0.828	0.494	0.518	11%	0.819	0.421	0.452	14%	0.936	0.561	0.584	10%
Silver	mg/kg WW	0.073	0.060 U	0.061	7%	0.055	0.055 U	0.055	6%	0.075	0.062 U	0.063	8%	0.126	0.066 U	0.070	14%	0.092	0.061 U	0.063	9%
Sodium	mg/kg WW	1374.6	1229.9	1238.0	6%	1752.0	1368.9	1390.7	7%	1387.6	1084.2	1105.8	9%	961.0	836.3	846.1	9%	1247.8	1038.6	1051.7	7%
Thallium	mg/kg WW	0.073	0.060 U	0.061	7%	0.055	0.055 U	0.055	6%	0.075	0.062 U	0.063	8%	0.126	0.066 U	0.070	14%	0.092	0.061 U	0.063	9%
Uranium	mg/kg WW	0.058	0.019	0.021	15%	0.123	0.019	0.025	28%	0.050	0.024	0.026	14%	0.024	0.003	0.004	42%	0.010	0.022	0.022	3%
Vanadium	mg/kg WW	2.059	0.120	0.229	50%	1.097	0.118	0.174	36%	0.512	0.101 U	0.131	28%	1.201	0.105 U	0.191	49%	0.250	0.101 U	0.111	14%
Zinc	mg/kg WW	27.8	21.8 J	22.1	7%	25.8	24.1 J	24.2	6%	25.9	23.2	23.4	8%	15.7	13.3	13.4	9%	17.2	23.9	23.5	5%

[a] G indicates a gut/contents sample from an individual largescale sucker.

[b] W followed by a 5-digit numeric code indicates a whole body sample with the gut/contents removed from an individual largescale sucker.

[c] EW indicates estimated whole body. The estimated whole body concentration for the individual largescale sucker was calculated as a weighted average of the gut/contents and the gutless whole body concentrations.

mg/kg WW = milligrams per kilogram wet weight

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

TABLE 3-14

Estimated TAL Metals Results for Individual Whole Body Largescale Sucker Samples--FSCA 6

Upper Columbia River RI/FS

Analyte	Units	LS6G50727[a] Primary Sample	LS6W50727[b] Primary Sample	LS6EW50727[c] Primary Sample	Associated with Gut/ Contents	LS6G50732 Primary Sample	LS6W50732 Primary Sample	LS6EW50732 Primary Sample	Associated with Gut/ Contents	LS6G50734 Primary Sample	LS6W50734 Primary Sample	LS6EW50734 Primary Sample	Associated with Gut/ Contents
Aluminum	mg/kg WW	56.1	4.8 U	8.0	44%	29.4	3.7 U	5.0	29%	1253.2	13.6	112.6	89%
Antimony	mg/kg WW	0.102	0.125 U	0.123	5%	0.118	0.101 U	0.102	6%	0.212	0.120 U	0.127	13%
Arsenic	mg/kg WW	0.470	0.214	0.230	13%	0.248	0.199	0.201	6%	1.609	0.081	0.203	63%
Barium	mg/kg WW	2.8	2.0 J	2.0	9%	0.4	1.7 J	1.6	1%	17.3	2.6 J	3.7	37%
Beryllium	mg/kg WW	0.005	0.006 U	0.006	5%	0.006	0.005 U	0.005	6%	0.046	0.006 U	0.009	39%
Cadmium	mg/kg WW	1.984	0.301	0.405	30%	0.967	0.146	0.186	26%	0.690	0.240	0.276	20%
Calcium	mg/kg WW	2563.0	7840.0 J	7512.3	2%	167.3	11660.0 J	11089.9	0%	2209.0	7938.0 J	7480.8	2%
Chromium	mg/kg WW	1.255	0.813	0.840	9%	2.000	0.761	0.822	12%	22.302	0.551	2.287	78%
Cobalt	mg/kg WW	0.102	0.035	0.039	16%	0.064	0.023	0.025	13%	0.797	0.045	0.105	60%
Copper	mg/kg WW	3.863 U	0.608	0.810	30%	7.378 U	0.371	0.719	51%	4.179	0.551	0.840	40%
Iron	mg/kg WW	95.5	10.9 J	16.1	37%	102.1	10.1 J	14.6	35%	2086.8	28.2 J	192.5	87%
Lead	mg/kg WW	0.136	0.352	0.339	2%	0.070	0.292	0.281	1%	1.062	0.454	0.502	17%
Magnesium	mg/kg WW	173.3	289.3	282.1	4%	129.4	307.4	298.6	2%	908.0	293.2	342.3	21%
Manganese	mg/kg WW	10.6	2.4 J	2.9	23%	1.7	2.6 J	2.6	3%	47.6	6.2 J	9.5	40%
Nickel	mg/kg WW	0.470	0.211	0.227	13%	0.700	0.249	0.271	13%	11.204	0.421	1.282	70%
Potassium	mg/kg WW	2056.7	2921.6	2867.9	4%	2318.2	3206.5	3162.4	4%	1784.2	3074.8	2971.8	5%
Selenium	mg/kg WW	0.932	0.608	0.628	9%	0.948	0.477	0.500	9%	0.903	0.389	0.430	17%
Silver	mg/kg WW	0.063	0.077 U	0.076	5%	0.073	0.064 U	0.064	6%	0.133	0.075 U	0.079	13%
Sodium	mg/kg WW	1652.1	1072.0	1108.0	9%	1682.2	1179.3	1204.2	7%	945.2	1014.1	1008.6	7%
Thallium	mg/kg WW	0.063	0.077 U	0.076	5%	0.073	0.064 U	0.064	6%	0.133	0.075 U	0.079	13%
Uranium	mg/kg WW	0.010	0.011	0.011	6%	0.006	0.007	0.007	4%	0.098	0.014	0.021	37%
Vanadium	mg/kg WW	0.149	0.125 U	0.126	7%	0.130	0.101 U	0.102	6%	3.064	0.120 U	0.355	69%
Zinc	mg/kg WW	15.5	17.9	17.7	5%	16.8	18.8	18.7	4%	20.5	17.2	17.5	9%

Analyte	Units	LS6G50744 Primary Sample	LS6W50744 Primary Sample	LS6EW50744 Primary Sample	Associated with Gut/ Contents	LS6G50747 Primary Sample	LS6W50747 Primary Sample	LS6EW50747 Primary Sample	Associated with Gut/ Contents	LS6G5073 Field Duplicate
Aluminum	mg/kg WW	117.1	3.9 U	13.3	73%	149.9	4.0 U	11.1	66%	1102.1
Antimony	mg/kg WW	0.106	0.103 U	0.104	8%	0.120	0.106 U	0.107	5%	0.214
Arsenic	mg/kg WW	0.379	0.139	0.159	20%	0.349	0.150	0.159	11%	1.659
Barium	mg/kg WW	3.6	3.3 J	3.3	9%	3.6	2.6 J	2.7	7%	16.3
Beryllium	mg/kg WW	0.007	0.005 U	0.005	10%	0.006	0.005 U	0.005	6%	0.046
Cadmium	mg/kg WW	0.780	0.166	0.217	30%	1.018	0.150	0.192	26%	0.696
Calcium	mg/kg WW	1704.6	12566.4 J	11662.0	1%	735.4	10308.8 J	9844.5	0%	2295.2
Chromium	mg/kg WW	6.748	0.462	0.986	57%	5.579	0.952	1.176	23%	19.100
Cobalt	mg/kg WW	0.146	0.046	0.055	22%	0.159	0.027	0.033	23%	0.803
Copper	mg/kg WW	2.656	0.544	0.720	31%	5.896	0.354	0.622	46%	4.205
Iron	mg/kg WW	258.5	11.4 J	32.0	67%	351.9	11.7 J	28.2	61%	1979.5
Lead	mg/kg WW	0.165	0.517	0.488	3%	0.197	0.272	0.268	4%	1.017
Magnesium	mg/kg WW	174.0	318.2	306.2	5%	214.0	340.0	333.9	3%	866.7
Manganese	mg/kg WW	11.7	4.6 J	5.2	19%	8.8	2.4 J	2.8	16%	46.2
Nickel	mg/kg WW	3.848	0.299	0.595	54%	3.056	0.218	0.355	42%	9.363
Potassium	mg/kg WW	1861.8	2711.8	2641.1	6%	2149.3	3400.0	3339.3	3%	1728.1
Selenium	mg/kg WW	0.867	0.544	0.571	13%	1.176	0.299	0.342	17%	0.963
Silver	mg/kg WW	0.065	0.065 U	0.065	8%	0.076	0.065 U	0.066	6%	0.134
Sodium	mg/kg WW	1674.8	1487.8	1503.4	9%	1451.9	1292.0	1299.8	5%	941.6
Thallium	mg/kg WW	0.065	0.065 U	0.065	8%	0.076	0.065 U	0.066	6%	0.134
Uranium	mg/kg WW	0.016	0.010	0.011	13%	0.019	0.007	0.007	13%	0.095
Vanadium	mg/kg WW	0.352	0.103 U	0.124	24%	0.444	0.106 U	0.122	18%	2.841
Zinc	mg/kg WW	12.6	18.0	17.6	6%	17.0	18.2	18.1	5%	21.3

[a] G indicates a gut/contents sample from an individual largescale sucker.

[b] W followed by a 5-digit numeric code indicates a whole body sample with the gut/contents removed from an individual largescale sucker.

[c] EW indicates estimated whole body. The estimated whole body concentration for the individual largescale sucker was calculated as a weighted average of the gut/contents and the gutless whole body concentrations.

mg/kg WW = milligrams per kilogram wet weight

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

TABLE 3-15
Mean Concentration Gut/Gut Content Analysis for Largescale Sucker
Upper Columbia River RI/FS

Analyte	Units	FSCA 1			FSCA 1A			FSCA 3			FSCA 6		
		Mean Concentration	SD	N	Mean Concentration	SD	N	Mean Concentration	SD	N	Mean Concentration	SD	N
Gut/Gut Contents													
Aluminum	mg/kg WW	2674	2265	5	325	106	5	305	204	5	321	523	5
Arsenic	mg/kg WW	2.33	1.55	5	0.80	0.15	5	0.49	0.17	5	0.61	0.56	5
Barium	mg/kg WW	150	255	5	15.3	6.3	5	2.85	2.06	5	4.94	7.13	5
Cadmium	mg/kg WW	2.03	0.41	5	1.49	0.38	5	0.766	0.428	5	1.09	0.518	5
Chromium	mg/kg WW	69.2	29.1	5	4.65	2.25	5	15.8	18.7	5	7.6	8.6	5
Copper	mg/kg WW	281	296	5	17.23	7.86	5	7.75	2.85	5	4.8	1.9	5
Iron	mg/kg WW	23712	25254	5	963	320	5	565	362	5	579	850	5
Lead	mg/kg WW	39.7	43.8	5	3.28	1.45	5	1.1	0.65	5	0.326	0.414	5
Manganese	mg/kg WW	460	465	5	27.2	10.1	5	20.9	16.2	5	16.1	18	5
Nickel	mg/kg WW	35.1	18.2	5	2.5	1.2	5	10.6	12.9	5	3.86	4.36	5
Selenium	mg/kg WW	1.06	0.28	5	1.28	0.2	5	0.918	0.01	5	0.965	0.122	5
Uranium	mg/kg WW	0.6	0.5	5	0.125	0.03	5	0.053	0.04	5	0.030	0.04	5
Zinc	mg/kg WW	1790	1994	5	52.5	17.2	5	22.4	5.58	5	16.5	2.9	5
Gutless Whole Body													
Aluminum	mg/kg WW	31	46	5	4.48	0.68	5	6.71	4.89	5	6.00	4.29	5
Arsenic	mg/kg WW	0.16	0.03	5	0.15	0.05	5	0.18	0.04	5	0.16	0.05	5
Barium	mg/kg WW	2.36	0.838	5	2.28	1.1	5	1.9	0.5	5	1.7	1.6	5
Cadmium	mg/kg WW	0.364	0.058	5	0.275	0.044	5	0.143	0.092	5	0.200	0.068	5
Chromium	mg/kg WW	0.64	0.07	5	0.53	0.13	5	0.43	0.07	5	0.71	0.20	5
Copper	mg/kg WW	1.15	0.43	5	0.69	0.09	5	0.5	0.1	5	0.49	0.12	5
Iron	mg/kg WW	66.8	43.9	5	23.7	12	5	14.7	6.5	5	14.5	7.7	5
Lead	mg/kg WW	7.98	3.26	5	5.16	2.01	5	1.78	1.62	5	0.377	0.105	5
Manganese	mg/kg WW	11.8	2.5	5	7.27	2.89	5	4.5	1.9	5	3.64	1.68	5
Nickel	mg/kg WW	0.325	0.066	5	0.303	0.042	5	0.348	0.022	5	0.280	0.086	5
Selenium	mg/kg WW	0.585	0.077	5	0.582	0.098	5	0.564	0.130	5	0.463	0.123	5
Uranium	mg/kg WW	0.02	0.008	5	0.013	0.006	5	0.017	0.008	5	0.010	0.003	5
Zinc	mg/kg WW	46.4	7.2	5	26.7	8.0	5	21.2	4.6	5	18.0	0.59	5
Estimated Whole Body													
Aluminum	mg/kg WW	202	121	5	29.8	7.1	5	25.5	11.1	5	30.0	46.3	5
Arsenic	mg/kg WW	0.30	0.10	5	0.20	0.05	5	0.20	0.04	5	0.19	0.03	5
Barium	mg/kg WW	11.2	15.5	5	3.23	0.892	5	1.78	0.390	5	1.95	1.8	5
Cadmium	mg/kg WW	0.467	0.070	5	0.37	0.05	5	0.18	0.11	5	0.26	0.09	5

TABLE 3-15
Mean Concentration Gut/Gut Content Analysis for Largescale Sucker
Upper Columbia River RI/FS

Analyte	Units	FSCA 1			FSCA 1A			FSCA 3			FSCA 6		
		Mean Concentration	SD	N	Mean Concentration	SD	N	Mean Concentration	SD	N	Mean Concentration	SD	N
Chromium	mg/kg WW	5.06	2.35	5	0.85	0.26	5	1.41	1.17	5	1.22	0.61	5
Copper	mg/kg WW	19.2	18.2	5	1.95	0.46	5	0.96	0.16	5	0.74	0.09	5
Iron	mg/kg WW	1596	1549	5	96.8	23.1	5	49.3	20.4	5	56.7	76.3	5
Lead	mg/kg WW	10	3.57	5	5.01	1.98	5	1.74	1.55	5	0.375	0.112	5
Manganese	mg/kg WW	40.9	26.9	5	8.8	3.0	5	5.98	1.86	5	4.57	2.93	5
Nickel	mg/kg WW	2.57	1.53	5	0.477	0.105	5	1.004	0.795	5	0.546	0.435	5
Selenium	mg/kg WW	0.615	0.064	5	0.639	0.110	5	0.587	0.123	5	0.494	0.113	5
Uranium	mg/kg WW	0.056	0.025	5	0.022	0.007	5	0.020	0.009	5	0.011	0.006	5
Zinc	mg/kg WW	159	121	5	28.6	8.0	5	21.3	4.5	5	17.9	0.52	5
% Associated with Gut													
Aluminum		80%	33%	5	86%	3%	5	71%	21%	5	60%	24%	5
Arsenic		46%	17%	5	32%	6%	5	17%	7%	5	23%	23%	5
Barium		56%	24%	5	36%	15%	5	13%	11%	5	35%	26%	5
Cadmium		27%	5%	5	32%	5%	5	29%	8%	5	26%	4%	5
Chromium		85%	8%	5	42%	7%	5	54%	26%	5	36%	30%	5
Copper		89%	10%	5	66%	8%	5	51%	8%	5	39%	9%	5
Iron		92%	10%	5	78%	6%	5	67%	19%	5	57%	22%	5
Lead		24%	18%	5	5%	1%	5	9%	13%	5	5%	6%	5
Manganese		61%	27%	5	25%	6%	5	23%	14%	5	20%	13%	5
Nickel		85%	8%	5	40%	9%	5	48%	32%	5	38%	25%	5
Selenium		11%	4%	5	16%	2%	5	10%	3%	5	13%	4%	5
Uranium		59%	26%	5	48%	10%	5	20%	15%	5	15%	13%	5
Zinc		59%	27%	5	15%	2%	5	7%	2%	5	6%	2%	5
% AFDW		53%	11%	5	73%	12%	5	84%	11%	5	90%	6%	5

AFDW = ash-free dry weight
mg/kg WW = milligrams per kilogram wet weight
N = number of samples
SD = standard deviation

TABLE 3-16
Arsenic Speciation Gut/Gut Contents Analysis for Largescale Suckers
Upper Columbia River RI/FS

Species	Composite ID	Total Arsenic ICP/MS Arsenic (u g/kg WW)		As-Species $As^{+}3 + As^{+}5$ (u g/kg WW)		% As as $As^{+}3 + As^{+}5$	As-Species ASB + Cation (u g/kg WW)		% AS as ASB + Cation	As-Species Dimethylarsonic acid (DMA) (u g/kg WW)		% As as Dimethylarsonic acid (DMA)	As-Species Monomethylarsonic acid (MMA) (u g/kg WW)		% AS as Monomethylarsonic acid (MMA)	As-Species Unknown (u g/kg WW)		% -As as Species Unknown	% Total As as Inorganic Species	% Total As as Organic Species
Largescale Sucker Gut/Gut Contents																				
	LS1G10041	1,685		187		70.0%	13	UJ	5.0%	26	J	9.8%	13	U	5.0%	28	J	10.3%	70.0%	30.0%
	LS1G10051	1,109		118		65.6%	14	UJ	8.0%	18	J	9.9%	14	U	8.0%	15	J	8.6%	65.6%	34.4%
	LS1G50778	836		216		56.9%	22	J	5.8%	23	J	6.0%	30	J	7.9%	89	J	23.5%	56.9%	43.1%
	LS1G60778[a]	824		241		56.4%	13	UJ	3.0%	24	J	5.6%	29	J	6.8%	120	J	28.2%	56.4%	43.6%
	LS3G40915	261		15	J	21.0%	11	J	15.9%	17	J	23.6%	15	U	21.0%	13	J	18.5%	21.0%	79.0%
	LS6G50732	248		13	U	18.6%	3.5	J	5.0%	15	J	21.7%	13	U	18.6%	25	J	36.2%	18.6%	81.4%
	Average					48.1%			7.1%			12.8%			11.2%			20.9%	48.1%	51.9%
Largescale Sucker Gutless Whole Body																				
	LS1W10041	200		11	UJL	17.5%	17	JL	26.1%	14	JL	21.4%	11	UJL	17.5%	11	JL	17.5%	17.5%	82.5%
	LS1W10051	124		11	UJL	21.2%	7.7	JL	15.0%	11	UJL	21.2%	11	UJL	21.2%	11	UJL	21.2%	21.2%	78.8%
	LS1W50778	190		11	U	13.4%	39	J	48.2%	7.1	J	8.8%	11	U	13.4%	13	J	16.3%	13.4%	86.6%
	LS1W60778[a]	189		11	U	13.4%	37	J	46.9%	7.6	J	9.5%	11	U	13.4%	13	J	16.7%	13.4%	86.6%
	LS3W40915	142		11	U	27.7%	2.1	J	5.4%	4.8	J	12.2%	11	U	27.7%	11	J	27.0%	27.7%	72.3%
	LS6W50732	199		11	UJL	18.7%	3.7	J	6.4%	8.0	J	13.7%	11	UJL	18.7%	25	J	42.5%	18.7%	81.3%
	Average					18.7%			24.7%			14.5%			18.7%			23.5%	18.7%	

[a] Field duplicate.

ASB = arsenobetanine
μg/kg WW = micrograms per kilogram wet weight

J = The identification of the analyte is acceptable; the reported value is an estimate.
U = The analyte was not detected at or above the reported value.
UJL = The analyte was not detected at or above the reported value. The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

TABLE 3-17
Summary Statistics for Composites of Each Target Species by FSCA
Upper Columbia River RI/FS

Target Species	FSCA 1 Mean (± 1 SD) N	FSCA 2 Mean (± 1 SD) N	FSCA 3 Mean (± 1 SD) N	FSCA 4 Mean (± 1 SD) N	FSCA 5 Mean (± 1 SD) N	FSCA 6 Mean (± 1 SD) N
Aluminum (mg/kg WW)						
Walleye	27.6 (-27.4 - 82.7) 5	3.1 (1.0 - 5.2) 5	3.7 (3.1 - 4.4) 5	5.0 (3 - 7.1) 5	9.7 (-4.4 - 23.7) 3	4.3 (2.4 - 6.2) 7
Wild Rainbow Trout	5.3 (4.2 - 6.4) 5	4.2 (1.2 - 7.2) 5	7.7 (6.1 - 9.3) 2	NA	5.1 (5.1 - 5.1) 1	5.7 (5.7 - 5.7) 1
Hatchery Rainbow Trout	NA	NA	25.2 (13.9 - 36.5) 3	9.0 (3.7 - 14.3) 5	10.1 (2.2 - 18.0) 5	5.8 (5.3 - 6.3) 4
Lake Whitefish	NA	2.5 (1.3 - 3.8) 5	3.1 (1.3 - 4.9) 5	6.2 (4.9 - 7.4) 5	3.9 (2.1 - 5.8) 5	2.0 (1.93 - 2.03) 2
Mountain Whitefish	14.6 (8.7 - 20.5) 5	NA	NA	NA	NA	NA
Largescale Sucker	103.2 (35.0 - 171.4) 5	24.2 (11.5 - 36.7) 4	31.4 (14.3 - 48.4) 5	77.2 (59.3 - 95.1) 5	29.1 (0.7 - 57.6) 5	50.3 (28.2 - 72.4) 5
Burbot	NA	4.7 (3.8 - 5.6) 3	7.1 (3.2 - 11.1) 5	5.4 (4.8 - 6.0) 4	10.4 (4.8 - 16.1) 5	8.3 (6.2 - 10.3) 5
Arsenic (mg/kg WW)						
Walleye	0.09 (0.07 - 0.11) 5	0.12 (0.09 - 0.14) 5	0.15 (0.12 - 0.17) 5	0.24(0.20 - 0.28) 5	0.16 (0.12 - 0.19) 3	0.16 (0.13 - 0.18) 7
Wild Rainbow Trout	0.14 (0.12 - 0.16) 5	0.12 (0.1 - 0.15) 5	0.15 (0.15 - 0.16) 2	NA	0.18 (0.18 - 0.18) 1	0.14 (0.14 - 0.14) 1
Hatchery Rainbow Trout	NA	NA	0.1 (0.095 - 0.109) 3	0.10 (0.08 - 0.13) 5	0.14 (0.12 - 0.16) 5	0.1 (0.09 - 0.11) 4
Lake Whitefish	NA	0.23 (0.2 - 0.27) 5	0.26 (0.24 - 0.28) 5	0.25 (0.22 - 0.28) 5	0.28 (0.25 - 0.32) 5	0.25 (0.16 - 0.34) 2
Mountain Whitefish	0.15 (0.13 - 0.17) 5	NA	NA	NA	NA	NA
Largescale Sucker	0.26 (0.19 - 0.33) 5	0.16 (0.14 - 0.19) 4	0.17 (0.14 - 0.2.0) 5	0.19 (0.18 - 0.21) 5	0.18 (0.15 - 0.22) 5	0.2 (0.18 - 0.21) 5
Burbot	NA	0.73 (0.67 - 0.78) 3	0.62 (0.52 - 0.73) 5	0.8 (0.67 - 0.94) 4	0.83 (0.73 - 0.93) 5	0.84 (0.72 - 0.96) 5
Barium (mg/kg WW)						
Walleye	0.83 (0.77 - 0.9) 5	0.86 (0.8 - 0.93) 5	0.83 (0.76 - 0.89) 5	0.98 (0.9 - 1.05) 5	0.88 (0.75 - 1.0) 3	0.86 (0.78 - 0.94) 7
Wild Rainbow Trout	0.81 (0.64 - 0.98) 5	0.95 (0.43 - 1.5) 5	0.52 (0.45 - 0.59) 2	NA	0.38 (0.38 - 0.38) 1	0.77 (0.77 - 0.77) 1
Hatchery Rainbow Trout	NA	NA	1.26 (0.7 - 1.81) 3	0.41 (0.28 - 0.54) 5	0.55 (0.32 - 0.77) 5	0.47 (0.4 - 0.54) 4
Lake Whitefish	NA	0.5 (0.43 - 0.55) 5	0.55 (0.51 - 0.6) 5	0.68 (0.57 - 0.80) 5	0.6 (0.55 - 0.65) 5	0.33 (0.31 - 0.35) 2
Mountain Whitefish	1.5 (0.6 - 2.4) 5	NA	NA	NA	NA	NA
Largescale Sucker	8.7 (3.4 - 14.1) 5	2.7 (2.06 - 3.34) 4	2.34 (1.76 - 2.92) 5	3.7 (3.0 - 4.4) 5	3.34 (2.67 - 4.01) 5	3.29 (2.75 - 3.84) 5
Burbot	NA	4.96 (4.1 - 5.84) 3	5.26 (4.32 - 6.21) 5	5.92 (5.22 - 6.62) 4	6.64 (5.1 - 8.17) 5	6.51 (5.88 - 7.15) 5
Chromium (mg/kg WW)						
Walleye	0.5 (0.49 - 0.57) 5	0.5 (0.3 - 0.8) 5	0.5 (0.4 - 0.7) 5	0.56 (0.49 - 0.63) 5	0.47 (0.45 - 0.48) 3	0.55 (0.39 - 0.71) 7
Wild Rainbow Trout	0.8 (0.72 - 0.93) 5	0.8 (0.6 - 0.9) 5	0.65 (0.61 - 0.69) 2	NA	0.7 (0.7 - 0.7) 1	0.49 (0.49 - 0.49) 1
Hatchery Rainbow Trout	NA	NA	0.64 (0.45 - 0.83) 3	0.5 (0.44 - 0.54) 5	0.53 (0.45 - 0.62) 5	0.35 (0.32 - 0.37) 4
Lake Whitefish	NA	0.6 (0.5 - 0.7) 5	0.73 (0.61 - 0.85) 5	0.83 (0.78 - 0.88) 5	0.87 (0.81 - 0.93) 5	0.78 (0.58 - 0.97) 2
Mountain Whitefish	1.1 (1.0 - 1.2) 5	NA	NA	NA	NA	NA
Largescale Sucker	2.4 (0.7 - 4.1) 5	1.1 (0.7- 1.5) 4	0.9 (0.6 - 1.2) 5	1.4 (0.9 - 1.9) 5	0.89 (0.48 - 1.29) 5	1.6 (1.3 - 1.9) 5
Burbot	NA	0.4 (0.37 - 0.49) 3	0.4 (0.3 - 0.4) 5	0.33 (0.25 - 0.41) 4	0.56 (0.04 - 1.08) 5	0.36 (0.26 - 0.46) 5
Copper (mg/kg WW)						
Walleye	0.33 (0.31 - 0.34) 5	0.33 (0.29 - 0.38) 5	0.35 (0.29 - 0.40) 5	0.46 (0.38 - 0.54) 5	0.35 (0.3 - 0.39) 3	0.36 (0.33 - 0.39) 7
Wild Rainbow Trout	1.4 (0.9 - 1.7) 5	1.6 (1.3 - 1.9) 5	1.2 (1.0 - 1.3) 2	NA	0.56 (0.56 - 0.56) 1	0.43 (0.43 - 0.43) 1
Hatchery Rainbow Trout	NA	NA	2.2 (1.7 - 2.8) 3	0.66 (0.52 - 0.81) 5	0.6 (0.45 - 0.75) 5	0.4 (0.37 - 0.44) 4
Lake Whitefish	NA	0.68 (0.57 - 0.79) 5	0.60 (0.44 - 0.76) 5	0.68 (0.65 - 0.72) 5	0.63 (0.56 - 0.71) 5	0.5 (0.43 - 0.59) 2
Mountain Whitefish	1.3 (0.8 - 1.8) 5	NA	NA	NA	NA	NA
Largescale Sucker	9.0 (1.9 - 16.1) 5	1.3 (1.0 - 1.5) 4	0.87 (0.76 - 0.97) 5	0.81 (0.75 - 0.87) 5	0.72 (0.63 - 0.8) 5	0.94 (0.76 - 1.12) 5
Burbot	NA	1.1 (1.0 - 1.2) 3	1.2 (0.94 - 1.5) 5	1.1 (0.94 - 1.3) 4	1.0 (0.81 - 1.21) 5	1.1 (0.87 - 1.34) 5
Iron (mg/kg WW)						
Walleye	10.2 (9.4 - 11.1) 5	9.4 (8.2 - 10.7) 5	9.8 (8.0 - 11.7) 5	10.5 (9.0 - 12.0) 5	8.1 (7.2 - 9.0) 3	10.1 (8.9 - 11.2) 7
Wild Rainbow Trout	26.9 (18.6 - 35.3) 5	22.0 (16.8 - 27.3) 5	22.4 (18.3 - 26.6) 2	NA	17.2 (17.2 - 17.2) 1	22.0 (22.0 - 22.0) 1
Hatchery Rainbow Trout	NA	NA	36.6 (23.4 - 49.8) 3	18.4 (13.1 - 23.6) 5	20.1 (12.4 - 27.9) 5	16.6 (15.3 - 17.9) 4
Lake Whitefish	NA	14.1 (11.6 - 16.5) 5	14.5 (9.9 - 19.2) 5	17.0 (15.5 - 18.5) 5	15.1 (11.7 - 18.6) 5	14.6 (9.6 - 19.6) 2
Mountain Whitefish	102.6 (59.3 - 145.9) 5	NA	NA	NA	NA	NA
Largescale Sucker	728.8 (122.9 - 1334.7) 5	65.3 (44.9 - 85.7) 4	61.3 (33.0 - 89.5) 5	108.5 (80.9 - 136.1) 5	49.5 (8.7 - 90.3) 5	94.8 (60.4 - 129.2) 5
Burbot	NA	19.2 (16.7 - 21.8) 3	26.3 (17.6 - 35.0) 5	22.6 (21.1 - 24.1) 4	29.9 (26.4 - 33.3) 5	26.9 (24.0 - 29.9) 5

TABLE 3-17
Summary Statistics for Composites of Each Target Species by FSCA
Upper Columbia River RI/FS

Target Species	FSCA 1 Mean (+ 1 SD) N	FSCA 2 Mean (+ 1 SD) N	FSCA 3 Mean (+ 1 SD) N	FSCA 4 Mean (+ 1 SD) N	FSCA 5 Mean (+ 1 SD) N	FSCA 6 Mean (+ 1 SD) N
Lead (mg/kg WW)						
Walleye	0.035 (0.030 - 0.041) 5	0.039 (0.027 - 0.051) 5	0.044 (0.035 - 0.054) 5	0.122 (0.062 - 0.181) 5	0.072 (-0.008 - 0.153) 3	0.025 (0.012 - 0.039) 7
Wild Rainbow Trout	0.138 (0.101 - 0.175) 5	0.097 (0.073 - 0.121) 5	0.033 (0.032 - 0.034) 2	NA	0.008 (0.008 - 0.008) 1	0.025 (0.025 - 0.025) 1
Hatchery Rainbow Trout	NA	NA	0.162 (0.078 - 0.246) 3	0.012 (0.007 - 0.017) 5	0.01 (0.003 - 0.017) 5	0.017 (0.014 - 0.02) 4
Lake Whitefish	NA	0.067 (0.057 - 0.077) 5	0.077 (0.047 - 0.107) 5	0.067 (0.039 - 0.095) 5	0.048 (0.042 - 0.054) 5	0.056 (0.034 - 0.078) 2
Mountain Whitefish	0.335 (0.23 - 0.44) 5	NA	NA	NA	NA	NA
Largescale Sucker	6.223 (3.713 - 8.733) 5	3.911 (3.598 - 4.224) 4	2.722 (1.929 - 3.515) 5	1.461 (1.055 - 1.867) 5	0.653 (0.534 - 0.772) 5	0.623 (0.375 - 0.871) 5
Burbot	NA	0.067 (0.062 - 0.072) 3	0.101 (0.053 - 0.149) 5	0.095 (0.082 - 0.108) 4	0.088 (0.059 - 0.117) 5	0.085 (0.08 - 0.09) 5
Nickel (mg/kg WW)						
Walleye	0.43 (0.39 - 0.47) 5	0.38 (0.33 - 0.42) 5	0.38 (0.33 - 0.44) 5	0.40 (0.37 - 0.43) 5	0.35 (0.34 - 0.37) 3	0.40 (0.34 - 0.46) 7
Wild Rainbow Trout	0.22 (0.18 - 0.27) 5	0.22 (0.14 - 0.30) 5	0.2 (0.19 - 0.21) 2	NA	0.14 (0.14 - 0.14) 1	0.24 (0.24 - 0.24) 1
Hatchery Rainbow Trout	NA	NA	0.32 (0.24 - 0.42) 3	0.16 (0.13 - 0.19) 5	0.19 (0.15 - 0.23) 5	0.08 (0.07 - 0.1) 4
Lake Whitefish	NA	0.17 (0.16 - 0.18) 5	0.22 (0.16 - 0.27) 5	0.20 (0.17 - 0.24) 5	0.23 (0.19 - 0.27) 5	0.2.3 (0.21 - 0.25) 2
Mountain Whitefish	0.24 (0.19 - 0.29) 5	NA	NA	NA	NA	NA
Largescale Sucker	0.99 (0.085 - 1.89) 5	0.59 (0.38 - 0.79) 4	0.57 (0.32 - 0.83) 5	0.62 (0.46 - 0.77) 5	0.50 (0.34 - 0.66) 5	0.58 (0.56 - 0.60) 5
Burbot	NA	0.31 (0.30 - 0.32) 3	0.28 (0.24 - 0.33) 5	0.30 (0.24 - 0.35) 4	0.34 (0.27 - 0.40) 5	0.30 (0.26 - 0.34) 5
Selenium (mg/kg WW)						
Walleye	0.41 (0.40 - 0.43) 5	0.48 (0.45 - 0.52) 5	0.52 (0.41 - 0.62) 5	0.72 (0.61 - 0.83) 5	0.50 (0.39 - 0.61) 3	0.48 (0.39 - 0.57) 7
Wild Rainbow Trout	0.76 (0.7 - 0.8) 5	0.61 (0.59 - 0.64) 5	0.69 (0.67 - 0.72) 2	NA	0.53 (0.53 - 0.53) 1	0.54 (0.54 - 0.54) 1
Hatchery Rainbow Trout	NA	NA	0.51 (0.46 - 0.55) 3	0.46 (0.41 - 0.52) 5	0.38 (0.33 - 0.43) 5	0.29 (0.27 - 0.31) 4
Lake Whitefish	NA	0.73 (0.64 - 0.81) 5	0.73 (0.62 - 0.85) 5	0.81 (0.76 - 0.86) 5	0.69 (0.59 - 0.78) 5	0.46 (0.43 - 0.50) 2
Mountain Whitefish	1.0 (0.9 - 1.2) 5	NA	NA	NA	NA	NA
Largescale Sucker	0.56 (0.45 - 0.67) 5	0.60 (0.58 - 0.63) 4	0.66 (0.59 - 0.73) 5	0.53 (0.46 - 0.61) 5	0.45 (0.39 - 0.50) 5	0.53 (0.48 - 0.59) 5
Burbot		0.68 (0.59 - 0.78) 3	0.65 (0.52 - 0.77) 5	0.59 (0.56 - 0.62) 4	0.48 (0.43 - 0.53) 5	0.43 (0.40 - 0.47) 5
Uranium (mg/kg WW)						
Walleye	0.0009 (0.0007 - 0.0011) 5	0.0005 (0.0003 - 0.0007) 5	0.0011 (0.0008 - 0.0014) 5	0.001 (0.0008 - 0.0012) 5	0.0009 (0.0006 - 0.0012) 3	0.0011 (0.0007 - 0.0015) 7
Wild Rainbow Trout	0.003 (0.002 - 0.004) 5	0.003 (0.002 - 0.004) 5	0.002 (0.002 - 0.002) 2	NA	0.001 (0.001 - 0.001) 1	0.002 (0.002 - 0.002) 1
Hatchery Rainbow Trout	NA	NA	0.007 (0.004 - 0.01) 3	0.001 (0.001 - 0.001) 5	0.001 (0 - 0.002) 5	0.002 (0.002 - 0.002) 4
Lake Whitefish	NA	0.002 (0.002 - 0.002) 5	0.003 (0.001 - 0.005) 5	0.001 (0 - 0.002) 5	0.002 (0.001 - 0.003) 5	0.001 (0.001 - 0.001) 2
Mountain Whitefish	0.009 (0.006 - 0.012) 5	NA	NA	NA	NA	NA
Largescale Sucker	0.033 (0.019 - 0.047) 5	0.017 (0.015 - 0.019) 4	0.019 (0.015 - 0.023) 5	0.017 (0.014 - 0.02) 5	0.015 (0.012 - 0.018) 5	0.014 (0.011 - 0.017) 5
Burbot	NA	0.004 (0.003 - 0.005) 3	0.006 (0.003 - 0.009) 5	0.004 (0.003 - 0.005) 4	0.005 (0.004 - 0.006) 5	0.005 (0.004 - 0.006) 5
Zinc (mg/kg WW)						
Walleye	12.9 (12.6 - 13.2) 5	12.9 (12.0 - 13.8) 5	11.7 (11.0 - 12.4) 5	13.8 (12.2 - 15.4) 5	12.5 (11.4 - 13.6) 3	12.0 (11.5 - 12.5) 7
Wild Rainbow Trout	25.9 (23.4 - 28.3) 5	21.5 (20.4 - 22.5) 5	22.6 (22.3 - 22.9) 2	NA	21.8 (21.8 - 21.8) 1	28.3 (28.3 - 28.3) 1
Hatchery Rainbow Trout	NA	NA	22.8 (20.6 - 24.8) 3	23.1 (21.6 - 24.5) 5	23.8 (22.2 - 25.5) 5	25.0 (23.8 - 26.1) 4
Lake Whitefish	NA	12.6 (11.8 - 13.4) 5	13.5 (13.1 - 13.8) 5	11.9 (10.7 - 13.1) 5	13.2 (12.3 - 14.0) 5	12.3 (12.0 - 12.6) 2
Mountain Whitefish	29.9 (22.6 - 37.2) 5	NA	NA	NA	NA	NA
Largescale Sucker	85.5 (30.1 - 140.8) 5	25.6 (23.5 - 27.7) 4	20.6 (19.1 - 22.1) 5	22.3 (20.7 - 23.8) 5	19.3 (17.3 - 21.4) 5	18.6 (17.6 - 19.6) 5
Burbot	NA	12.1 (11.9 - 12.3) 3	12.5 (11.7 - 13.3) 5	12.3 (11.6 - 13.0) 4	12.7 (11.8 - 13.5) 5	12.4 (11.5 - 13.3) 5
Mercury (ug/kg WW)						
Walleye	158.3 (128.5 - 188.1) 5	134.9 (119.1 - 150.6) 5	172.5 (151.0 - 194.0) 5	164.2 (122.0 - 206.4) 5	204.7 (161.6 - 247.7) 3	233.4 (194.3 - 272.5) 7
Wild Rainbow Trout	70.6 (60.3 - 80.9) 5	42.7 (36.2 - 49.2) 5	62.7 (52.9 - 72.5) 2	NA	69.5 (69.5 - 69.5) 1	97.5 (97.5 - 97.5) 1
Hatchery Rainbow Trout	NA	NA	56.1 (51.9 - 60.2) 3	65.1 (56.9 - 73.4) 5	63.8 (58.7 - 68.9) 5	188.0 (155.4 - 220.5) 4
Lake Whitefish	NA	59.8 (52.9 - 66.7) 5	52.1 (49.5 - 54.7) 5	59.1 (49.4 - 68.7) 5	69.3 (63.4 - 75.1) 5	94.1 (93.5 - 94.7) 2
Mountain Whitefish	76.5 (68.5 - 84.5) 5	NA	NA	NA	NA	NA
Largescale Sucker	72.8 (-7.4 - 153.0) 5	191.7 (163.3 - 220.1) 4	215.8 (93.0 - 338.6) 5	256.8 (226.7 - 287.0) 5	227.2 (205.5 - 248.9) 5	181.4 (78.7 - 284.1) 5
Burbot	NA	138.0 (100.5 - 175.5) 3	163.3 (131.7 - 194.8) 5	189.5 (161.6 - 217.4) 4	189.2 (149.0 - 229.5) 5	202.4 (167.0 - 237.9) 5

TABLE 3-17
Summary Statistics for Composites of Each Target Species by FSCA
Upper Columbia River RI/FS

Target Species	FSCA 1 Mean (+ 1 SD) N	FSCA 2 Mean (+ 1 SD) N	FSCA 3 Mean (+ 1 SD) N	FSCA 4 Mean (+ 1 SD) N	FSCA 5 Mean (+ 1 SD) N	FSCA 6 Mean (+ 1 SD) N
Total PCBs (ug/kg WW)						
Walleye	28.9 (21.6 - 36.3) 5	86.3 (75.8 - 96.9) 5	62.8 (60.5 - 65.1) 5	74.6 (72.4 - 76.8) 5	68.6 (62.5 - 74.8) 3	83.5 (68.9 - 98.0) 7
Wild Rainbow Trout	88.7 (74.3 - 103.1) 5	72.4 (68.5 - 76.4) 5	57.8 (55.5 - 60.2) 2	NA	56.2 (56.2 - 56.2) 1	53.1 (53.1 - 53.1) 1
Hatchery Rainbow Trout	NA	NA	50.5 (47.0 - 54.0) 3	51.5 (50.9 - 52.2) 5	53.1 (48.0 - 58.3) 5	54.4 (50.9 - 57.9) 4
Lake Whitefish	NA	58.1 (48.5 - 67.6) 5	70.6 (66.3 - 74.9) 5	74.7 (68.6 - 80.8) 5	84.8 (79.7 - 90.0) 5	84.5 (81.1 - 87.4) 2
Mountain Whitefish	110.8 (104.5 - 117.2) 5	NA	NA	NA	NA	NA
Largescale Sucker	65.9 (4.2 - 127.6) 5	80.6 (24.3 - 137.3) 4	77.0 (32.1 - 121.9) 5	182.1 (121.2 - 243.1) 5	195.2 (142.1 - 248.3) 5	117.1 (46.6 - 187.5) 5
Burbot	NA	74.0 (62.2 - 85.8) 3	70.9 (63.6 - 78.2) 5	67.3 (57.7 - 76.8) 4	74.4 (58.6 - 90.2) 5	66.6 (63.0 - 70.2) 5
2,3,7,8 TCDF (ug/kg WW)						
Walleye	0.001 (0.0008 - 0.0012) 5	0.0012 (0.001 - 0.0014) 5	0.0012 (0.0011 - 0.0013) 5	0.002 (0.0014 - 0.0026) 5	0.0017 (0.0015 - 0.0019) 3	0.002 (0.0015 - 0.0025) 7
Wild Rainbow Trout	0.002 (0.001 - 0.003) 5	0.003 (0.002 - 0.004) 5	0.002 (0.002 - 0.002) 2	NA	0.001 (0.001 - 0.001) 1	0.001 (0.001 - 0.001) 1
Hatchery Rainbow Trout	NA	NA	0.001 (0.001 - 0.001) 3	0.001 (0.001 - 0.001) 5	0.001 (0.001 - 0.001) 5	0.001 (0.001 - 0.001) 4
Lake Whitefish	NA	0.005 (0.004 - 0.006) 5	0.003 (0.002 - 0.004) 5	0.006 (0.005 - 0.007) 5	0.007 (0.006 - 0.008) 5	0.008 (0.007 - 0.009) 2
Mountain Whitefish	0.004 (0.003 - 0.005) 5	NA	NA	NA	NA	NA
Largescale Sucker	0.001 (0 - 0.002) 5	0.005 (0 - 0.01) 4	0.002 (0.001 - 0.003) 5	0.004 (0.003 - 0.005) 5	0.004 (0.003 - 0.005) 5	0.004 (0.001 - 0.007) 5
Burbot	NA	0.005 (0.004 - 0.006) 3	0.003 (0.002 - 0.004) 5	0.004 (0.003 - 0.005) 4	0.003 (0.002 - 0.004) 5	0.004 (0.003 - 0.005) 5

Note: Mean and standard deviation are reported in mg/kg WW for all chemicals except mercury, total PCBs, and 2,3,7,8-TCDF, which are reported in ug/kg WW.

mg/kg = milligrams per kilogram
N = number of samples
NA = not analyzed
PCB = polychlorinated biphenyl
SD = standard deviation
ug/kg = micrograms per kilogram
WW = wet weight

TABLE 3-18
Summary Statistics for Fillet and Offal Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

Target Species	FSCA 1 Mean (± 1 SD) N	FSCA 3 Mean (± 1 SD) N	FSCA 6 Mean (± 1 SD) N
Aluminum			
Walleye Fillet	1.25 (1.2-1.3) 4	1.26 (1.23-1.28) 5	1.26 (1.25-1.28) 5
Walleye Offal	1.74 (1.65-1.83) 5	4.0 (1.9-6.1) 5	5.5 (3.8-7.4) 5
Wild Rainbow Trout Fillet	2.0 (1.9-2.1) 5	1.85 (1.8-1.9) 2	1.6 (1.6-1.6) 1
Wild Rainbow Trout Offal	4.8 (1.5-8.1) 5	11.2 (7.9-14.6) 2	8.2 (8.2-8.2) 1
Hatchery Rainbow Trout Fillet	NA	1.85 (1.8-1.9) 3	1.827 (1.82-1.834) 4
Hatchery Rainbow Trout Offal	NA	45.9 (25.4-66.4) 3	8.4 (7.4-9.3) 4
Arsenic			
Walleye Fillet	0.09 (0.07-0.11) 5	0.11 (0.1-0.12) 5	0.13 (0.1-0.16) 5
Walleye Offal	0.09 (0.05-0.13) 5	0.12 (0.07-0.17) 5	0.16 (0.13-0.19) 5
Wild Rainbow Trout Fillet	0.09 (0.07-0.11) 5	0.07 (0.06-0.08) 2	0.08 (0.08-0.08) 1
Wild Rainbow Trout Offal	0.2 (0.17-0.23) 5	0.22 (0.21-0.23) 2	0.2 (0.2-0.2) 1
Hatchery Rainbow Trout Fillet	NA	0.03 (0.029-0.031) 3	0.04 (0.01-0.07) 4
Hatchery Rainbow Trout Offal	NA	0.15 (0.135-0.165) 3	0.13 (0.107-0.153) 4
Barium			
Walleye Fillet	0.04 (0.039-0.041) 5	0.04 (0.039-0.041) 5	0.04 (0.039-0.041) 5
Walleye Offal	1.45 (1.35-1.55) 5	1.44 (1.31-1.57) 5	1.51 (1.37-1.65) 5
Wild Rainbow Trout Fillet	0.07 (0.068-0.072) 5	0.06 (0.058-0.062) 2	0.05 (0.05-0.05) 1
Wild Rainbow Trout Offal	1.5 (1.16-1.84) 5	0.87 (0.71-1.03) 2	1.42 (1.42-1.42) 1
Hatchery Rainbow Trout Fillet	NA	0.06 (0.059-0.061) 3	0.06 (0.06-0.06) 4
Hatchery Rainbow Trout Offal	NA	1.65 (0.6-2.7) 3	0.86 (0.72-1) 4
Cadmium			
Walleye Fillet	0.005 (0.0048-0.0052) 5	0.005 (0.0049-0.0051) 5	0.005 (0.0049-0.0051) 5
Walleye Offal	0.034 (0.028-0.04) 5	0.036 (0.024-0.048) 5	0.033 (0.03-0.036) 5
Wild Rainbow Trout Fillet	0.012 (0.001-0.023) 5	0.006 (0.006-0.006) 2	0.005 (0.005-0.005) 1
Wild Rainbow Trout Offal	0.035 (0.028-0.042) 5	0.082 (0.069-0.095) 2	0.086 (0.086-0.086) 1
Hatchery Rainbow Trout Fillet	NA	0.006 (0.0059-0.0061) 3	0.006 (0.0059-0.0061) 4
Hatchery Rainbow Trout Offal	NA	0.109 (0.099-0.119) 3	0.091 (0.074-0.108) 4
Chromium			
Walleye Fillet	0.45 (0.34-0.56) 5	0.53 (0.31-0.75) 5	0.45 (0.39-0.51) 5
Walleye Offal	0.59 (0.46-0.72) 5	0.56 (0.42-0.7) 5	0.71 (0.41-1.01) 5
Wild Rainbow Trout Fillet	0.57 (0.48-0.66) 5	0.41 (0.4-0.42) 2	0.44 (0.44-0.44) 1
Wild Rainbow Trout Offal	1.08 (0.94-1.22) 5	0.86 (0.78-0.94) 2	0.52 (0.52-0.52) 1

TABLE 3-18
Summary Statistics for Fillet and Offal Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

Target Species	FSCA 1 Mean (± 1 SD) N	FSCA 3 Mean (± 1 SD) N	FSCA 6 Mean (± 1 SD) N
Hatchery Rainbow Trout Fillet	NA	0.35 (0.2-0.5) 3	0.35 (0.32-0.38) 4
Hatchery Rainbow Trout Offal	NA	0.7 (0.33-1.07) 3	0.36 (0.34-0.38) 4
Copper			
Walleye Fillet	0.23 (0.21-0.25) 5	0.2 (0.17-0.23) 5	0.21 (0.2-0.22) 5
Walleye Offal	0.41 (0.39-0.43) 5	0.46 (0.38-0.54) 5	0.5 (0.47-0.53) 5
Wild Rainbow Trout Fillet	0.34 (0.32-0.36) 5	0.33 (0.32-0.34) 2	0.27 (0.27-0.27) 1
Wild Rainbow Trout Offal	2.38 (1.68-3.08) 5	1.9 (1.52-2.28) 2	0.58 (0.58-0.58) 1
Hatchery Rainbow Trout Fillet	NA	0.35 (0.3-0.4) 3	0.27 (0.25-0.29) 4
Hatchery Rainbow Trout Offal	NA	2.7 (0.7-4.7) 3	0.55 (0.5-0.6) 4
Iron			
Walleye Fillet	3.5 (2.7 - 4.4) 5	3.3 (2.0 - 4.6) 5	2.7 (2.3 - 3.1) 5
Walleye Offal	15.9 (14.7 - 17.1) 5	15.2 (12.4 - 18.1) 5	16.1 (13.6 - 18.6) 5
Wild Rainbow Trout Fillet	5.2 (4.4 - 6.0) 5	3.9 (3.7 - 4.1) 2	5.2 (5.2 - 5.2) 1
Wild Rainbow Trout Offal	49.6 (32.3 - 66.9) 5	39 (29.8 - 48.3) 2	38.4 (38.4 - 38.4) 1
Hatchery Rainbow Trout Fillet	NA	4.1 (3.3 - 4.9) 3	3.9 (3.4 - 4.4) 4
Hatchery Rainbow Trout Offal	NA	50.9 (23.8 - 78.0) 3	30.7 (29.7 - 31.7) 4
Lead			
Walleye Fillet	0.005 (0.0048 - 0.0052) 5	0.019 (-0.0009 - 0.0389) 5	0.024 (-0.002 - 0.05) 5
Walleye Offal	0.056 (0.046 - 0.066) 5	0.062 (0.038 - 0.086) 5	0.032 (0.024 - 0.04) 5
Wild Rainbow Trout Fillet	0.015 (0.01 - 0.02) 5	0.006 (0.006 - 0.006) 2	0.005 (0.005 - 0.005) 1
Wild Rainbow Trout Offal	0.265 (0.188 - 0.342) 5	0.052 (0.051 - 0.053) 2	0.039 (0.039 - 0.039) 1
Hatchery Rainbow Trout Fillet	NA	0.006 (0.006 - 0.006) 3	0.006 (0.006 - 0.006) 4
Hatchery Rainbow Trout Offal	NA	0.175 (-0.014 - 0.364) 3	0.021 (0.014 - 0.028) 4
Nickel			
Walleye Fillet	0.14 (0.1086 - 0.1714) 5	0.11 (0.0699 - 0.1501) 5	0.1 (0.0652 - 0.1348) 5
Walleye Offal	0.68 (0.612 - 0.748) 5	0.61 (0.526 - 0.694) 5	0.69 (0.632 - 0.748) 5
Wild Rainbow Trout Fillet	0.03 (0.015 - 0.045) 5	0.03 (0.016 - 0.044) 2	0.03 (0.03 - 0.03) 1
Wild Rainbow Trout Offal	0.41 (0.333 - 0.487) 5	0.34 (0.334 - 0.346) 2	0.44 (0.44 - 0.44) 1
Hatchery Rainbow Trout Fillet	NA	0.07 (0.012 - 0.128) 3	0.02 (0.013 - 0.027) 4
Hatchery Rainbow Trout Offal	NA	0.48 (0.287 - 0.673) 3	0.35 (0.282 - 0.418) 4
Selenium			
Walleye Fillet	0.4 (0.37 - 0.43) 5	0.4 (0.37 - 0.43) 5	0.4 (0.29 - 0.51) 5
Walleye Offal	0.5 (0.49 - 0.51) 5	0.6 (0.44 - 0.76) 5	0.5 (0.4 - 0.61) 5

TABLE 3-18
Summary Statistics for Fillet and Offal Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

Target Species	FSCA 1 Mean (± 1 SD) N	FSCA 3 Mean (± 1 SD) N	FSCA 6 Mean (± 1 SD) N
Wild Rainbow Trout Fillet	0.5 (0.43 - 0.57) 5	0.4 (0.36 - 0.44) 2	0.4 (0.4 - 0.4) 1
Wild Rainbow Trout Offal	1 (0.93 - 1.07) 5	0.9 (0.87 - 0.93) 2	0.7 (0.7 - 0.7) 1
Hatchery Rainbow Trout Fillet	NA	0.4 (0.34 - 0.46) 3	0.2 (0.16 - 0.24) 4
Hatchery Rainbow Trout Offal	NA	0.5 (0.34 - 0.66) 3	0.4 (0.39 - 0.41) 4
Uranium			
Walleye Fillet	0.0003 (0.00029 - 0.00031) 5	0.0003 (0.00029 - 0.00031) 5	0.0003 (0.0003 - 0.0003) 5
Walleye Offal	0.0012 (0.00091 - 0.0015) 5	0.0015 (0.001 - 0.002) 5	0.0013 (0.001 - 0.0017) 5
Wild Rainbow Trout Fillet	0.0007 (0.00068 - 0.00072) 5	0.0006 (0.00058 - 0.00062) 2	0.0006 (0.0006 - 0.0006) 1
Wild Rainbow Trout Offal	0.0046 (0.0034 - 0.0058) 5	0.003 (0.0025 - 0.0035) 2	0.003 (0.003 - 0.003) 1
Hatchery Rainbow Trout Fillet	NA	0.0006 (0.00059 - 0.00061) 3	0.0006 (0.0006 - 0.0006) 4
Hatchery Rainbow Trout Offal	NA	0.0073 (0.0003 - 0.01) 3	0.0018 (0.00092 - 0.0027) 4
Zinc			
Walleye Fillet	7.3 (6.9 - 7.7) 5	6.1 (5.5 - 6.7) 5	6.4 (6.3 - 6.5) 5
Walleye Offal	17.6 (17.1 - 18.1) 5	16.4 (15.1 - 17.7) 5	16.9 (15.9 - 17.9) 5
Wild Rainbow Trout Fillet	8.3 (8.0 - 8.6) 5	6.4 (6.3 - 6.5) 2	6.3 (6.3 - 6.3) 1
Wild Rainbow Trout Offal	44.1 (39.8 - 48.4) 5	37.1 (36.7 - 37.5) 2	49.7 (49.7 - 49.7) 1
Hatchery Rainbow Trout Fillet	NA	7.4 (6.6 - 8.2) 3	7.1 (6.6 - 7.6) 4
Hatchery Rainbow Trout Offal	NA	38.2 (35.2 - 41.2) 3	44 (42.5 - 45.8) 4
Mercury			
Walleye Fillet	227.2 (183.8-270.6) 5	240.6 (211.5-269.7) 5	333.6 (262.1-405.1) 5
Walleye Offal	100.8 (81.7-119.9) 5	115.8 (96.9-134.7) 5	161.8 (136.3-187.3) 5
Wild Rainbow Trout Fillet	86.1 (70.6-101.6) 5	76.1 (65.2-87) 2	120 (120-120) 1
Wild Rainbow Trout Offal	54.7 (48.4-61) 5	50.8 (41-60.6) 2	75.7 (75.7-75.7) 1
Hatchery Rainbow Trout Fillet	NA	66.8 (60.4-73.2) 3	99.9 (81.4-118.4) 4
Hatchery Rainbow Trout Offal	NA	48 (43.2-52.8) 3	65.2 (52.9-77.5) 4
Total PCBs			
Walleye Fillet	7 (5.9-8.1) 5	50.2 (46.3-54.1) 5	52.2 (51.1-53.3) 5
Walleye Offal	45.1 (31.6-58.6) 5	60.9 (55.7-66.1) 5	107 (81.6-132.4) 5
Wild Rainbow Trout Fillet	72.1 (66.5-77.7) 5	47 (46.6-47.4) 2	43.7 (43.7-43.7) 1
Wild Rainbow Trout Offal	92.9 (69.3-116.5) 5	54 (53.3-54.7) 2	51.4 (51.4-51.4) 1
Hatchery Rainbow Trout Fillet	NA	43.2 (38.6-47.8) 3	45.1 (42.6-47.6) 4
Hatchery Rainbow Trout Offal	NA	46.8 (44.9-48.7) 3	54.3 (49.3-59.3) 4

TABLE 3-18
Summary Statistics for Fillet and Offal Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

Target Species	FSCA 1 Mean (+ 1 SD) N	FSCA 3 Mean (+ 1 SD) N	FSCA 6 Mean (+ 1 SD) N
2,3,7,8 TCDF			
Walleye Fillet	0.0002 (0.00017-0.00023) 5	0.0003 (0.0002-0.0004) 5	0.0006 (0.0004-0.0008) 5
Walleye Offal	0.002 (0.0016-0.0024) 5	0.002 (0.0018-0.0022) 5	0.003 (0.002-0.004) 5
Wild Rainbow Trout Fillet	0.001 (0.0002-0.0018) 5	0.0008 (0.0007-0.0009) 2	0.0006 (0.0006-0.0006) 1
Wild Rainbow Trout Offal	0.0021 (0.0008-0.0034) 5	0.0014 (0.00134-0.00146) 2	0.0014 (0.0014-0.0014) 1
Hatchery Rainbow Trout Fillet	NA	0.0007 (0.0003-0.0011) 3	0.0007 (0.0004-0.001) 4
Hatchery Rainbow Trout Offal	NA	0.0016 (0.001-0.0022) 3	0.0022 (0.002-0.0024) 4

Note: Mean and standard deviation are reported in mg/kg WW for all chemicals except mercury, total PCBs, and 2,3,7,8-TCDF, which are reported in ug/kg WW.

mg/kg = milligrams per kilogram
N = number of samples
NA = not analyzed
PCB = polychlorinated biphenyl
SD = standard deviation
ug/kg = micrograms per kilogram
WW = wet weight

TABLE 3-19
Average Values of the Coefficient of Variation Among Composite Samples
Upper Columbia River RI/FS

Analyte	Walleye			Wild Rainbow Trout			Hatchery Rainbow Trout			Lake Whitefish	Largescale Sucker	Burbot
	Whole	Fillet	Offal	Whole	Fillet	Offal	Whole	Fillet	Offal			
Aluminum	0.633	0.443	0.792	0.479	0.088	0.577	0.484	0.554	0.750	0.366	0.551	0.328
Arsenic	0.223	0.370	0.362	0.120	0.355	0.704	0.131	1.273	0.592	0.158	0.161	0.134
Barium	0.091	0.393	0.160	0.315	0.162	0.156	0.337	0.556	0.596	0.184	0.276	0.161
Cadmium	0.245	0.400	0.620	0.302	1.348	0.127	0.188	0.556	0.523	0.266	0.172	0.286
Chromium	0.223	0.556	0.363	0.113	1.168	0.208	0.173	0.942	0.752	0.126	0.403	0.355
Copper	0.127	0.539	0.708	0.257	0.466	0.260	0.205	0.570	0.579	0.194	0.247	0.174
Iron	0.131	0.439	0.417	0.246	0.810	0.270	0.282	0.581	0.912	0.262	0.497	0.151
Lead	0.461	0.827	0.398	0.284	1.228	1.251	0.433	0.556	0.473	0.300	0.255	0.215
Nickel	0.101	0.240	0.254	0.218	0.090	1.176	0.213	0.636	0.195	0.156	0.408	0.146
Selenium	0.162	0.826	0.779	0.044	0.297	0.504	0.114	0.364	0.093	0.116	0.119	0.116
Uranium	0.313	NA	0.142	0.274	1.414	0.401	0.414	NA	0.148	0.312	0.230	0.268
Zinc	0.069	0.647	0.420	0.059	0.468	1.149	0.072	0.231	0.437	0.087	0.172	0.058
Mercury	0.187	0.277	0.099	0.223	0.159	0.353	0.113	0.439	1.226	0.087	0.176	0.200
Total PCB	0.106	0.084	0.207	0.101	0.043	0.140	0.076	0.083	0.062	0.077	0.358	0.134
2,3,7,8-TCDF	0.204	0.334	0.216	0.411	0.501	0.331	0.284	0.581	0.209	0.186	0.348	0.215

TABLE 3-20
Summary Statistics for COIs in Whole Body Walleye by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Aluminum (mg/kg WW)					
Upper	3.06	0.50	1.55	5.70	1.12
Middle	4.38	0.50	1.66	6.82	1.13
Lower	5.90	2.30	1.51	25.91	5.15
Arsenic (mg/kg WW)					
Upper	0.10	0.008	0.07	0.15	0.018
Middle	0.19	0.019	0.116	0.312	0.042
Lower	0.16	0.008	0.118	0.197	0.019
Barium (mg/kg WW)					
Upper	0.846	0.020	0.732	0.955	0.0449
Middle	0.899	0.033	0.744	1.055	0.0737
Lower	0.864	0.0280	0.782	1.025	0.0627
Cadmium (mg/kg WW)					
Upper	0.0234	0.00203	0.0166	0.0384	0.00453
Middle	0.0271	0.00236	0.0177	0.0416	0.00527
Lower	0.0204	0.00118	0.0141	0.0250	0.00264
Chromium (mg/kg WW)					
Upper	0.53	0.05	0.38	0.97	0.12
Middle	0.55	0.04	0.38	0.80	0.08
Lower	0.52	0.04	0.40	0.84	0.10
Copper (mg/kg WW)					
Upper	0.33	0.010	0.28	0.38	0.022
Middle	0.40	0.028	0.26	0.57	0.063
Lower	0.36	0.010	0.30	0.40	0.023
Iron (mg/kg WW)					
Upper	9.8	0.35	8.2	11.6	0.78
Middle	10.2	0.52	7.1	13.1	1.16
Lower	9.5	0.44	7.1	11.7	0.98
Lead (mg/kg WW)					
Upper	0.037	0.003	0.0231	0.055	0.0064
Middle	0.0828	0.0182	0.0317	0.2228	0.0406
Lower	0.0394	0.01438	0.0066	0.1618	0.0322
Nickel (mg/kg WW)					
Upper	0.037	0.003	0.0231	0.055	0.0064
Middle	0.0828	0.0182	0.0317	0.2228	0.0406

TABLE 3-20
Summary Statistics for COIs in Whole Body Walleye by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Lower	0.0394	0.01438	0.0066	0.1618	0.0322
Selenium (mg/kg WW)					
Upper	0.45	0.014	0.39	0.52	0.03
Middle	0.62	0.046	0.41	0.80	0.10
Lower	0.49	0.029	0.33	0.62	0.07
Uranium (mg/kg WW)					
Upper	0.0007	0.0001	0.0003	0.001	0.0002
Middle	0.0010	0.0001	0.0007	0.001	0.0002
Lower	0.0010	0.0001	0.0007	0.002	0.0003
Zinc (mg/kg WW)					
Upper	12.9	0.19	11.5	13.6	0.44
Middle	12.7	0.51	11.0	15.9	1.13
Lower	12.2	0.22	11.4	13.7	0.49
Mercury (*u*g/kg WW)					
Upper	146.585	8.1129	114.00	192.34	18.1409
Middle	168.351	10.0787	114.00	214.00	22.5367
Lower	224.793	12.7472	155.00	291.99	28.5037
Total PCB (*u*g/kg WW)					
Upper	57.6100	9.94048	22.3	103.5	22.2276
Middle	68.6700	2.08210	60.0	76.9	4.6557
Lower	79.0100	4.47840	61.5	110.8	10.0140
2,3,7,8 TCDF (*u*g/kg WW)					
Upper	0.00108	0.000068	0.0007	0.0014	0.000152
Middle	0.00164	0.0001881	0.0011	0.0026	0.0004206
Lower	0.00196	0.0001392	0.0014	0.0028	0.0003113

mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
WW = wet weight

TABLE 3-21
Results of Tests of Equal Concentration of COIs in Whole Body Walleye
Upper Columbia River RI/FS

Analyte	Equality of Means		Linear Trend		$\bar{\bar{x}}$	$\hat{SE}(\bar{\bar{x}})$
	F-test	p-value	F-test	p-value		
Aluminum	0.96	0.39	1.92	0.18	6.6	0.843
Arsenic	***12.63***	***0.0001***	***8.33***	***0.008***	NA	NA
Barium	0.94	0.40	0.20	0.66	0.778	0.037
Cadmium	***3.05***	***0.06***	1.21	0.28	NA	NA
Chromium	0.12	0.89	0.00	0.96	0.568	0.020
Copper	***4.24***	***0.03***	1.16	0.29	NA	NA
Iron	0.62	0.54	0.35	0.56	16.3	1.12
Lead	***3.67***	***0.040***	0.02	0.90	NA	NA
Nickel	0.38	0.69	0.74	0.40	0.292	0.015
Selenium	***7.51***	***0.002***	0.67	0.42	NA	NA
Uranium	***3.88***	***0.03***	***6.35***	***0.02***	NA	NA
Zinc	1.34	0.28	2.44	0.13	18.2	0.750
Mercury	***14.82***	***< .0001***	***27.81***	***< .0001***	NA	NA
Total PCB	***2.79***	***0.08***	***5.58***	***0.03***	NA	NA
2,3,7,8 TCDF	***10.02***	***0.0006***	***19.56***	***0.0001***	NA	NA

Notes:

Tests between river reach (upper, middle and lower) (F-test) and single degree of freedom contrast for a linear trend (F-test) in concentration. In the case of equality of means ($p > .10$), the grand mean $(\bar{\bar{x}})$ and associated standard $(\hat{SE}(\bar{\bar{x}}))$ error are reported.

Bold and italics indicate test was significantly different at $p>0.1$.

TABLE 3-22
Summary Statistics for COIs in Whole Body Wild Rainbow Trout by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Aluminum (mg/kg WW)					
Upper	4.77	0.63	2.21	9.26	1.41
Middle	7.65	1.11	6.54	8.76	2.48
Lower	5.69	0.00	5.69	5.69	0.00
Arsenic (mg/kg WW)					
Upper	0.135	0.007	0.10	0.18	0.016
Middle	0.152	0.005	0.148	0.157	0.010
Lower	0.143	0.000	0.143	0.143	0.000
Barium (mg/kg WW)					
Upper	0.831	0.115	0.382	1.738	0.2573
Middle	0.519	0.047	0.472	0.566	0.1061
Lower	0.771	0.0000	0.771	0.771	0.0000
Cadmium (mg/kg WW)					
Upper	0.0364	0.00440	0.0204	0.0657	0.00985
Middle	0.0488	0.00373	0.0451	0.0526	0.00833
Lower	0.0486	0.00000	0.0486	0.0486	0.00000
Chromium (mg/kg WW)					
Upper	0.77	0.04	0.58	1.00	0.08
Middle	0.65	0.03	0.62	0.68	0.06
Lower	0.48	0.00	0.48	0.48	0.00
Copper (mg/kg WW)					
Upper	1.37	0.125	0.56	1.94	0.278
Middle	1.16	0.125	1.04	1.29	0.280
Lower	0.43	0.000	0.43	0.43	0.000
Iron (mg/kg WW)					
Upper	23.8	2.13	17.2	40.4	4.75
Middle	22.4	2.93	19.5	25.3	6.56
Lower	22.0	0.00	22.0	22.0	0.00
Lead (mg/kg WW)					
Upper	0.107	0.014	0.0077	0.194	0.0323
Middle	0.0331	0.0010	0.0321	0.0341	0.0022
Lower	0.0249	0.00000	0.0249	0.0249	0.0000

TABLE 3-22
Summary Statistics for COIs in Whole Body Wild Rainbow Trout by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Nickel (mg/kg WW)					
Upper	0.214	0.020	0.138	0.369	0.044
Middle	0.200	0.006	0.194	0.206	0.014
Lower	0.240	0.000	0.240	0.240	0.000
Selenium (mg/kg WW)					
Upper	0.67	0.027	0.53	0.82	0.06
Middle	0.69	0.017	0.68	0.71	0.04
Lower	0.54	0.000	0.54	0.54	0.00
Uranium (mg/kg WW)					
Upper	0.0027	0.0003	0.0008	0.004	0.0007
Middle	0.0022	0.0001	0.0020	0.002	0.0003
Lower	0.0019	0.0000	0.0019	0.002	0.0000
Zinc (mg/kg WW)					
Upper	23.5	0.86	20.1	30.0	1.91
Middle	22.6	0.24	22.4	22.9	0.53
Lower	28.3	0.00	28.3	28.3	0.00
Mercury (*u*g/kg WW)					
Upper	78.3	4.37412	56.2	113.2	9.78084
Middle	57.9	1.65000	56.2	59.5	3.68951
Lower	53.1	0.00000	53.1	53.1	0.00000
Total PCB (*u*g/kg WW)					
Upper	78.2636	4.37	56.2	113.2	9.8
Middle	57.8500	1.65	56.2	59.5	3.7
Lower	53.1000	0.0	53.1	53.1	0.0
2,3,7,8 TCDF (*u*g/kg WW)					
Upper	0.00221	0.0004226	0.0009	0.0047	0.0009451
Middle	0.0015	0.0003	0.0012	0.0018	0.0006708
Lower	0.001	0.0	0.0010	0.0010	0.0

mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
WW = wet weight

TABLE 3-23
Summary Statistics for COIs in Whole Body Hatchery Rainbow Trout
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $\hat{SE}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Aluminum (mg/kg WW)					
Upper	--	--	--	--	--
Middle	15.06	3.92	4.51	33.95	8.76
Lower	8.18	2.02	4.70	23.54	4.52
Arsenic (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.103	0.006	0.085	0.127	0.013
Lower	0.119	0.009	0.083	0.162	0.020
Barium (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.727	0.190	0.283	1.578	0.4257
Lower	0.512	0.0568	0.355	0.877	0.1270
Cadmium (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.0552	0.00382	0.0381	0.0677	0.00854
Lower	0.0430	0.00355	0.0216	0.0567	0.00793
Chromium (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.55	0.05	0.41	0.77	0.10
Lower	0.45	0.04	0.31	0.63	0.09
Copper (mg/kg WW)					
Upper	--	--	--	--	--
Middle	1.24	0.306	0.54	2.57	0.683
Lower	0.51	0.050	0.36	0.86	0.112
Iron (mg/kg WW)					
Upper	--	--	--	--	--
Middle	25.2	4.39	14.9	45.2	9.81
Lower	18.6	1.95	14.7	33.8	4.37
Lead (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.0681	0.0318	0.0069	0.2111	0.0710
Lower	0.0130	0.00200	0.0068	0.0217	0.0045

TABLE 3-23
Summary Statistics for COIs in Whole Body Hatchery Rainbow Trout
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Nickel (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.220	0.036	0.122	0.388	0.081
Lower	0.141	0.021	0.068	0.242	0.046
Selenium (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.48	0.019	0.41	0.55	0.04
Lower	0.34	0.020	0.27	0.44	0.04
Uranium (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.0029	0.0013	0.0007	0.009	0.0028
Lower	0.0013	0.0002	0.0007	0.002	0.0004
Zinc (mg/kg WW)					
Upper	--	--	--	--	--
Middle	22.9	0.55	20.4	24.5	1.23
Lower	24.3	0.50	22.0	26.2	1.11
Mercury (*u*g/kg WW)					
Upper	--	--	--	--	--
Middle	61.745	2.8655	53.25	75.20	6.4074
Lower	118.956	22.8377	58.50	234.10	51.0668
Total PCB (*u*g/kg WW)					
Upper	--	--	--	--	--
Middle	51.1625	0.70405	48.0	54.5	1.57431
Lower	53.6889	1.42959	46.8	61.1	3.19667
2,3,7,8 TCDF (*u*g/kg WW)					
Upper	--	--	--	--	--
Middle	0.00125	0.000087	0.0009	0.0017	0.000194
Lower	0.00141	0.000087	0.0010	0.0018	0.000195

mg/kg = milligrams per kilogram
μg/kg = micrograms per kilogram
WW = wet weight
-- No samples collected at this location.

TABLE 3-24
One-Way Analysis of Variance Results for Rainbow Trout
Upper Columbia River RI/FS

	Upper vs Middle Wild		Middle vs Lower Hatchery		Middle Wild vs Hatchery	
	F-test	**p-value**	**F-test**	**p-value**	**F-test**	**p-value**
Aluminum	0.3	0.59	4.34	0.05	1.9	0.18
Arsenic	0.94	0.34	1.99	0.17	***7.6***	***0.01***
Barium	1.15	0.29	1.38	0.35	0.48	0.49
Cadmium	1.76	0.19	***4.19***	***0.05***	0.43	0.51
Chromium	1.69	0.20	2.71	0.11	1.12	0.30
Copper	0.27	0.61	***8.29***	***0.008***	0.04	0.84
Iron	0.05	0.83	2.61	0.12	0.17	0.68
Lead	***3.05***	***0.09***	***4.19***	***0.05***	0.64	0.43
Nickel	0.06	0.81	***4.69***	***0.04***	0.11	0.74
Selenium	0.17	0.69	***16.63***	***0.0004***	***14.53***	***.0008***
Uranium	0.13	0.73	2.77	0.11	0.24	0.63
Zinc	0.28	0.60	1.86	0.18	0.03	0.87
Mercury	0.03	0.87	***8.83***	***0.006***	0.00	0.98
Total PCB	***8.02***	***0.009***	0.31	0.58	0.81	0.37
2,3,7,8 TCDF	1.06	0.31	0.14	0.71	0.13	0.73

Notes:

Results show F-tests and p-values for tests of equal concentrations of COIs in rainbow trout between river reach and between hatchery and wild rainbow trout.

Bold and italics indicate test was significantly different at p>0.1.

TABLE 3-25
Summary Statistics for COIs in Whole Body Lake Whitefish by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Aluminum (mg/kg WW)					
Upper	2.5	0.57	1.9	4.8	1.27
Middle	4.6	0.69	1.7	7.8	1.55
Lower	3.6	0.69	1.9	6.0	1.54
Arsenic (mg/kg WW)					
Upper	0.23	0.017	0.18	0.27	0.039
Middle	0.26	0.007	0.22	0.29	0.017
Lower	0.28	0.016	0.18	0.31	0.036
Barium (mg/kg WW)					
Upper	0.49	0.03	0.4	0.6	0.06
Middle	0.62	0.03	0.5	0.9	0.08
Lower	0.55	0.05	0.3	0.7	0.10
Cadmium (mg/kg WW)					
Upper	0.016	0.0033	0.008	0.024	0.007
Middle	0.021	0.0018	0.015	0.032	0.004
Lower	0.012	0.0022	0.008	0.023	0.005
Chromium (mg/kg WW)					
Upper	0.62	0.04	0.52	0.72	0.08
Middle	0.78	0.03	0.65	0.94	0.07
Lower	0.85	0.03	0.64	0.92	0.08
Copper (mg/kg WW)					
Upper	0.68	0.05	0.5	0.8	0.11
Middle	0.64	0.04	0.4	0.9	0.08
Lower	0.61	0.03	0.5	0.7	0.08
Iron (mg/kg WW)					
Upper	14.1	1.09	11.1	17.3	2.45
Middle	15.8	1.11	10.6	22.4	2.49
Lower	15.0	1.29	10.6	19.4	2.88
Lead (mg/kg WW)					
Upper	0.067	0.005	0.058	0.08	0.01
Middle	0.072	0.009	0.041	0.12	0.02
Lower	0.050	0.004	0.038	0.07	0.01

TABLE 3-25
Summary Statistics for COIs in Whole Body Lake Whitefish by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Nickel (mg/kg WW)					
Upper	0.17	0.003	0.16	0.18	0.01
Middle	0.21	0.014	0.16	0.30	0.03
Lower	0.23	0.013	0.18	0.27	0.03
Selenium (mg/kg WW)					
Upper	0.72	0.039	0.62	0.86	0.09
Middle	0.77	0.030	0.59	0.87	0.07
Lower	0.64	0.048	0.44	0.84	0.11
Uranium (mg/kg WW)					
Upper	0.0022	0.0001	0.0018	0.003	0.0003
Middle	0.0021	0.0004	0.0007	0.005	0.0009
Lower	0.0019	0.0003	0.0008	0.003	0.0008
Zinc (mg/kg WW)					
Upper	12.6	0.35	11.9	13.8	0.78
Middle	12.7	0.37	10.7	13.9	0.83
Lower	13.0	0.31	11.7	13.8	0.70
Mercury (*u*g/kg WW)					
Upper	59.8	3.1	52.1	68.8	6.9
Middle	55.6	2.4	44.7	69.8	5.4
Lower	74.1	4.4	65.4	94.5	9.9
Total PCB (*u*g/kg WW)					
Upper	58.1	4.26	49.5	74.5	9.54
Middle	72.6	1.71	65.5	80.6	3.83
Lower	84.7	1.73	77.8	91.5	3.88
2,3,7,8 TCDF (*u*g/kg WW)					
Upper	0.0045	0.0003	0.0036	0.0049	0.0006
Middle	0.0047	0.0006	0.0021	0.0075	0.0013
Lower	0.0072	0.0004	0.0053	0.0084	0.0009

mg/kg = milligrams per kilogram
μg/kg = micrograms per kilogram
WW = wet weight

TABLE 3-26
Results of Tests of Equal Concentration of COIs in Whole Body Lake Whitefish
Upper Columbia River RI/FS

Analyte	Equality of Means		Linear Trend		$\bar{\bar{x}}$	$S\hat{E}(\bar{\bar{x}})$
	F-test	p-value	F-test	p-value		
Aluminum	2.19	0.14	0.58	0.46	3.7	0.428
Arsenic	1.75	0.20	***3.48***	***0.08***	0.256	0.008
Barium	***2.71***	***0.09***	0.20	0.66	NA	NA
Cadmium	***4.04***	***0.035***	0.50	0.49	NA	NA
Chromium	***7.79***	***0.003***	***15.12***	***0.001***	NA	NA
Copper	0.79	0.47	1.56	0.23	0.636	0.023
Iron	0.47	0.63	0.23	0.64	15.14	0.687
Lead	2.3	0.13	1.98	0.18	0.064	0.005
Nickel	***4.45***	***0.03***	***8.05***	***0.01***	NA	NA
Selenium	***4.04***	***0.03***	2.62	0.12	NA	NA
Uranium	0.23	0.80	0.41	0.53	0.002	0.0002
Zinc	0.18	0.84	0.32	0.58	12.73	0.203
Mercury	***10.15***	***0.001***	***8.8***	***0.008***	NA	NA
Total PCB	***26.4***	***< .0001***	***52.7***	***< .0001***	NA	NA
2,3,7,8 TCDF	***8.23***	***0.003***	***11.18***	***0.003***	NA	NA

Notes:

Tests between river reach (upper, middle and lower) (F-test) and single degree of freedom contrast for a linear trend (F-test) in concentration. In the case of equality of means (p > .10), the grand mean $(\bar{\bar{x}})$ and associated standard $(S\hat{E}(\bar{\bar{x}}))$ error are reported.

Bold and italics indicate test was significantly different at p>0.1.

TABLE 3-27
Summary Statistics for COIs in Whole Body Mountain Whitefish by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Aluminum (mg/kg WW)					
Upper	14.6	2.65	4.9	19.6	5.92
Middle	--	--	--	--	--
Lower	--	--	--	--	--
Arsenic (mg/kg WW)					
Upper	0.15	0.008	0.12	0.17	0.018
Middle	--	--	--	--	--
Lower	--	--	--	--	--
Barium (mg/kg WW)					
Upper	1.48	0.39	0.5	2.8	0.87
Middle	--	--	--	--	--
Lower	--	--	--	--	--
Cadmium (mg/kg WW)					
Upper	0.111	0.0084	0.092	0.130	0.019
Middle	--	--	--	--	--
Lower	--	--	--	--	--
Chromium (mg/kg WW)					
Upper	1.07	0.04	0.95	1.16	0.08
Middle	--	--	--	--	--
Lower	--	--	--	--	--
Copper (mg/kg WW)					
Upper	1.31	0.23	0.6	2.0	0.52
Middle	--	--	--	--	--
Lower	--	--	--	--	--
Iron (mg/kg WW)					
Upper	102.6	19.37	30.2	147.3	43.30
Middle	--	--	--	--	--
Lower	--	--	--	--	--
Lead (mg/kg WW)					
Upper	0.335	0.047	0.176	0.45	0.10
Middle	--	--	--	--	--
Lower	--	--	--	--	--

TABLE 3-27
Summary Statistics for COIs in Whole Body Mountain Whitefish by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Nickel (mg/kg WW)					
Upper	0.24	0.023	0.17	0.29	0.05
Middle	--	--	--	--	--
Lower	--	--	--	--	--
Selenium (mg/kg WW)					
Upper	1.03	0.062	0.84	1.22	0.14
Middle	--	--	--	--	--
Lower	--	--	--	--	--
Uranium (mg/kg WW)					
Upper	0.0089	0.0013	0.0046	0.012	0.0029
Middle	--	--	--	--	--
Lower	--	--	--	--	--
Zinc (mg/kg WW)					
Upper	29.9	3.25	20.1	40.1	7.27
Middle	--	--	--	--	--
Lower	--	--	--	--	--
Mercury (*u*g/kg WW)					
Upper	76.4	3.57	63.3	82.7	7.99
Middle	--	--	--	--	--
Lower	--	--	--	--	--
Total PCB (*u*g/kg WW)					
Upper	110.82	2.8	105	120.3	6.3
Middle	--	--	--	--	--
Lower	--	--	--	--	--
2,3,7,8 TCDF (*u*g/kg WW)					
Upper	0.0039	0.0006	0.0026	0.0060	0.0013
Middle	--	--	--	--	--
Lower	--	--	--	--	--

mg/kg = milligrams per kilogram
μg/kg = micrograms per kilogram
WW = wet weight
-- No samples collected at this location.

TABLE 3-28
Summary Statistics for COIs in Whole Body Largescale Sucker by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Aluminum (mg/kg WW)					
Upper	68.1	21.39	12.2	203.0	47.83
Middle	54.3	9.25	12.8	88.9	20.68
Lower	41.2	8.32	8.5	88.0	18.60
Arsenic (mg/kg WW)					
Upper	0.21	0.024	0.14	0.33	0.053
Middle	0.18	0.008	0.13	0.22	0.017
Lower	0.19	0.009	0.13	0.23	0.020
Barium (mg/kg WW)					
Upper	6.0	1.66	2.0	16.4	3.70
Middle	3.0	0.30	1.6	4.3	0.66
Lower	3.4	0.19	2.3	4.3	0.42
Cadmium (mg/kg WW)					
Upper	0.341	0.0282	0.203	0.467	0.063
Middle	0.301	0.0185	0.181	0.391	0.041
Lower	0.280	0.0060	0.244	0.301	0.013
Chromium (mg/kg WW)					
Upper	1.81	0.47	0.67	5.06	1.05
Middle	1.14	0.15	0.60	2.11	0.34
Lower	1.26	0.16	0.47	1.83	0.36
Copper (mg/kg WW)					
Upper	5.5	2.16	0.9	19.3	4.84
Middle	0.8	0.03	0.7	1.0	0.06
Lower	0.8	0.06	0.6	1.2	0.13
Iron (mg/kg WW)					
Upper	433.9	184.39	44.0	1596.1	412.30
Middle	84.9	11.46	29.4	130.6	25.62
Lower	74.1	13.41	19.3	151.0	29.99
Lead (mg/kg WW)					
Upper	5.20	0.720	3.214	10.04	1.61
Middle	2.09	0.282	1.089	3.47	0.63
Lower	0.66	0.048	0.432	0.95	0.11

TABLE 3-28
Summary Statistics for COIs in Whole Body Largescale Sucker by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Nickel (mg/kg WW)					
Upper	0.81	0.228	0.34	2.57	0.51
Middle	0.59	0.064	0.37	1.00	0.14
Lower	0.55	0.044	0.30	0.76	0.10
Selenium (mg/kg WW)					
Upper	0.58	0.028	0.36	0.64	0.06
Middle	0.60	0.031	0.45	0.73	0.07
Lower	0.49	0.022	0.36	0.62	0.05
Uranium (mg/kg WW)					
Upper	0.0257	0.0045	0.0142	0.058	0.010
Middle	0.0181	0.0011	0.0142	0.025	0.002
Lower	0.0150	0.0010	0.0092	0.019	0.002
Zinc (mg/kg WW)					
Upper	58.8	16.76	23.2	159.6	37.47
Middle	21.4	0.53	17.9	24.2	1.19
Lower	18.9	0.50	17.3	22.3	1.12
Mercury (*u*g/kg WW)					
Upper	161.51	21.24	77.10	222.00	47.50
Middle	262.56	9.19	216.00	300.00	20.55
Lower	227.60	5.76	203.00	258.00	12.87
Total PCB (*u*g/kg WW)					
Upper	181.07	72.59	83.50	615.00	162.33
Middle	143.94	21.04	75.00	241.50	47.05
Lower	173.48	16.38	121.83	247.50	36.63
2,3,7,8 TCDF (*u*g/kg WW)					
Upper	0.00364	0.00149	0.00092	0.01150	0.00333
Middle	0.00293	0.00033	0.00157	0.00428	0.00073
Lower	0.00450	0.00037	0.00345	0.00652	0.00083

mg/kg = milligrams per kilogram
μg/kg = micrograms per kilogram
WW = wet weight

TABLE 3-29
Results of Tests of Equal Concentration of COIs in Whole Body Largescale Sucker
Upper Columbia River RI/FS

Analyte	Equality of Means		Linear Trend		$\bar{\bar{x}}$	$S\hat{E}(\bar{\bar{x}})$
	F-test	p-value	F-test	p-value		
Aluminum	0.95	0.4	1.9	0.18	54.0	7.9
Arsenic	1.37	0.27	1.32	0.26	0.194	0.009
Barium	NA*	0.37*	4.05	0.055	4.1	0.564
Cadmium	***NA****	***0.1****	***5.12***	***0.03***	NA	NA
Chromium	1.51	0.24	1.82	0.19	1.4	0.167
Copper	***NA****	***<.0001****	***8.09***	***0.009***	NA	NA
Iron	***4.1***	***0.03***	***6.44***	***0.02***	NA	NA
Lead	***29.34***	***< .0001***	***56.73***	***< .0001***	NA	NA
Nickel	1.08	0.35	1.92	0.18	0.646	0.076
Selenium	***4.13***	***0.03***	***4.59***	***0.04***	NA	NA
Uranium	***4.51***	***0.02***	***8.62***	***0.007***	NA	NA
Zinc	***NA****	***<.0001****	***9.67***	***0.004***	NA	NA
Mercury	***NA****	***<.0001****	***14.76***	***0.0008***	NA	NA
Total PCB	0.26	0.77	0.02	0.89	164.973	21.5632
2,3,7,8 TCDF	1.11	0.35	0.58	0.45	0.00370	0.000451

* Nonparametric Kruskal-Wallis test used.

Notes:

Tests between river reach (upper, middle and lower) (F-test) and single degree of freedom contrast for a linear trend (F-test) in concentration. In the case of equality of means (P > .10), the grand mean $(\bar{\bar{x}})$ and associated standard $(S\hat{E}(\bar{\bar{x}}))$ error are reported.

Bold and italics indicate test was significantly different at p>0.1.

TABLE 3-30
Summary Statistics for COIs in Whole Body Burbot by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability ($\hat{\sigma}$)
Aluminum (mg/kg WW)					
Upper	4.7	0.53	3.7	5.5	1.2
Middle	6.4	0.98	3.8	13.5	2.2
Lower	9.3	1.31	5.3	19.8	2.9
Arsenic (mg/kg WW)					
Upper	0.725	0.032	0.668	0.780	0.073
Middle	0.704	0.048	0.452	0.941	0.108
Lower	0.835	0.033	0.676	0.958	0.074
Barium					
Upper	5.0	0.51	3.9	5.6	1.14
Middle	5.6	0.29	3.8	6.6	0.64
Lower	6.6	0.35	5.1	8.5	0.79
Cadmium (mg/kg WW)					
Upper	0.025	0.0029	0.020	0.030	0.006
Middle	0.037	0.0032	0.021	0.048	0.007
Lower	0.048	0.0056	0.023	0.088	0.013
Chromium (mg/kg WW)					
Upper	0.43	0.03	0.39	0.50	0.08
Middle	0.33	0.02	0.26	0.44	0.05
Lower	0.46	0.12	0.26	1.49	0.26
Copper (mg/kg WW)					
Upper	1.1	0.05	1.0	1.2	0.10
Middle	1.2	0.07	0.9	1.4	0.16
Lower	1.1	0.07	0.8	1.5	0.15
Iron (mg/kg WW)					
Upper	19.2	1.48	17.3	22.1	3.31
Middle	24.7	2.18	17.9	37.2	4.87
Lower	28.4	1.08	23.8	35.6	2.41
Lead (mg/kg WW)					
Upper	0.07	0.003	0.064	0.07	0.01
Middle	0.10	0.012	0.054	0.17	0.03
Lower	0.09	0.006	0.056	0.12	0.01

TABLE 3-30
Summary Statistics for COIs in Whole Body Burbot by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability ($\hat{\sigma}$)
Nickel (mg/kg WW)					
Upper	0.31	0.006	0.30	0.32	0.01
Middle	0.29	0.017	0.22	0.38	0.04
Lower	0.32	0.018	0.25	0.42	0.04
Selenium (mg/kg WW)					
Upper	0.68	0.055	0.58	0.77	0.12
Middle	0.62	0.031	0.52	0.83	0.07
Lower	0.46	0.016	0.39	0.52	0.03
Uranium					
Upper	0.0041	0.0005	0.0031	0.005	0.001
Middle	0.0052	0.0008	0.0033	0.011	0.002
Lower	0.0051	0.0003	0.0037	0.007	0.001
Zinc (mg/kg WW)					
Upper	12.1	0.13	11.8	12.3	0.30
Middle	12.4	0.25	11.3	13.5	0.56
Lower	12.5	0.27	11.2	13.6	0.60
Mercury (µg/kg)					
Upper	138.00	21.66	112.00	181.00	48.43
Middle	174.93	10.43	123.00	230.00	23.33
Lower	195.80	11.52	134.00	242.00	25.76
Total PCB (µg/kg)					
Upper	74.00	6.81	64.00	87.00	15.22
Middle	69.26	2.67	55.00	79.33	5.98
Lower	70.50	3.66	63.00	102.00	8.19
2,3,7,8 TCDF (µg/kg)					
Upper	0.0048533	0.0004544	0.0039700	0.0054800	0.00102
Middle	0.0038711	0.0003112	0.0027100	0.0057100	0.00070
Lower	0.0035720	0.0003248	0.0015900	0.0049300	0.00073

mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
WW = wet weight

TABLE 3-31
Results of Tests of Equal Concentration of COIs in Whole Body Burbot
Upper Columbia River RI/FS

Analyte	Equality of Means		Linear Trend		$\bar{\bar{x}}$	$S\hat{E}(\bar{\bar{x}})$
	F-test	p-value	F-test	p-value		
Aluminum	***2.91***	***0.08***	***4.18***	***0.06***	NA	NA
Arsenic	***3.06***	***0.07***	1.95	0.18	NA	NA
Barium	***4.21***	***0.03***	***6.15***	***0.02***	NA	NA
Cadmium	***3.51***	***0.05***	***6.11***	***0.02***	NA	NA
Chromium	0.58	0.57	0.02	0.89	0.403	0.054
Copper	0.71	0.5	0.14	0.71	1.11	0.432
Iron	***4.29***	***0.03***	***8.01***	***0.01***	NA	NA
Lead	1.58	0.23	1.21	0.29	0.089	0.006
Nickel	0.74	0.49	0.07	0.79	0.304	0.01
Selenium	***16.09***	***< .0001***	***20.55***	***0.0002***	NA	NA
Uranium	0.49	0.62	0.8	0.38	0.005	0.0004
Zinc	0.32	0.73	0.63	0.44	12.4	0.158
Mercury	***3.37***	***0.06***	***6.48***	***0.02***	NA	NA
Total PCB	0.24	0.79	0.27	0.61	70.4697	2.10686
2,3,7,8 TCDF	2.03	0.16	4.07	0.06	0.003869	0.000216

Notes:

River reach (upper, middle and lower) (F-test) and single degree of freedom contrast for a linear trend (F-test) in concentration. In the case of equality of means (p > .10), the grand mean $(\bar{\bar{x}})$ and associated standard $(S\hat{E}(\bar{\bar{x}}))$ error are reported.

Bold and italics indicate test was significantly different at p>0.1.

TABLE 3-32
Summary Statistics for COIs in Walleye Fillets by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\bar{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variabiilty $\hat{\sigma}$
Aluminum (mg/kg WW)					
Upper	1.25	0.02	1.21	1.30	0.05
Middle	1.26	0.01	1.22	1.29	0.03
Lower	1.27	0.01	1.25	1.30	0.02
Arsenic (mg/kg WW)					
Upper	0.09	0.009	0.06	0.11	0.021
Middle	0.11	0.006	0.10	0.13	0.012
Lower	0.13	0.013	0.10	0.18	0.029
Barium (mg/kg WW)					
Upper	0.0420	0.0006	0.0402	0.0434	0.0014
Middle	0.0418	0.0004	0.0406	0.0430	0.0009
Lower	0.0422	0.0003	0.0416	0.0432	0.0006
Cadmium (mg/kg WW)					
Upper	0.0052	0.00008	0.0050	0.0054	0.00018
Middle	0.0053	0.00005	0.0051	0.0054	0.00011
Lower	0.0053	0.00004	0.0052	0.0054	0.00008
Chromium (mg/kg WW)					
Upper	0.45	0.05	0.26	0.52	0.11
Middle	0.53	0.10	0.39	0.90	0.22
Lower	0.45	0.02	0.39	0.54	0.06
Copper (mg/kg WW)					
Upper	0.23	0.008	0.20	0.24	0.018
Middle	0.20	0.013	0.18	0.25	0.028
Lower	0.21	0.004	0.20	0.23	0.010
Iron (mg/kg WW)					
Upper	15.9	0.53	14.6	17.8	1.18
Middle	15.2	1.27	11.5	18.5	2.85

TABLE 3-32
Summary Statistics for COIs in Walleye Fillets by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\bar{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variabiilty $\hat{\sigma}$
Lower	16.1	1.13	12.9	19.7	2.54
Lead (mg/kg WW)					
Upper	0.005	0.381	0.0050	0.005	0.0002
Middle	0.019	0.585	0.0052	0.053	0.020
Lower	0.024	0.191	0.0053	0.062	0.026
Nickel (mg/kg WW)					
Upper	0.14	0.014	0.10	0.17	0.03
Middle	0.11	0.018	0.07	0.16	0.04
Lower	0.10	0.016	0.06	0.13	0.03
Selenium (mg/kg WW)					
Upper	0.36	0.012	0.32	0.39	0.03
Middle	0.41	0.015	0.37	0.44	0.03
Lower	0.39	0.050	0.30	0.57	0.11
Uranium (mg/kg WW)					
Upper	0.0003	0.0000	0.0003	0.000	0.0000
Middle	0.0003	0.0000	0.0003	0.000	0.0000
Lower	0.0003	0.0000	0.0003	0.000	0.0000
Zinc (mg/kg WW)					
Upper	7.3	0.19	6.7	7.7	0.43
Middle	6.1	0.27	5.2	6.7	0.61
Lower	6.4	0.06	6.2	6.6	0.14
Mercury (*u*g/kg WW)					
Upper	227.20	19.39	181.00	273.00	43.35
Middle	240.60	13.02	201.00	281.00	29.11
Lower	333.60	31.99	256.00	417.00	71.52
Total PCB (*u*g/kg WW)					
Upper	6.96	0.47	5.15	7.85	1.05
Middle	50.20	1.76	47.50	56.70	3.94

TABLE 3-32
Summary Statistics for COIs in Walleye Fillets by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variabiilty $\hat{\sigma}$
Lower	52.15	0.50	50.20	53.00	1.12
2,3,7,8 TCDF (*u*g/kg WW)					
Upper	0.000150	0.000014	0.000102	0.000178	0.00003
Middle	0.000295	0.000055	0.000149	0.000404	0.00012
Lower	0.000571	0.000096	0.000234	0.000796	0.00021

mg/kg = milligrams per kilogram
μg/kg = micrograms per kilogram
WW = wet weight

TABLE 3-33
Summary Statistics for of COIs in Walleye Offal by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\bar{x})$	Minimum Composite Value	Maximum Composite Value	Between Fish Variability $\hat{\sigma}$
Aluminum (mg/kg WW)					
Upper	1.74	0.04	1.64	1.83	0.09
Middle	4.00	0.94	1.72	6.04	2.09
Lower	5.58	0.80	3.50	8.25	1.79
Arsenic (mg/kg WW)					
Upper	0.09	0.016	0.03	0.12	0.035
Middle	0.18	0.022	0.12	0.25	0.049
Lower	0.16	0.013	0.13	0.19	0.029
Barium (mg/kg WW)					
Upper	1.45	0.04	1.30	1.56	0.10
Middle	1.44	0.06	1.26	1.59	0.13
Lower	1.51	0.06	1.41	1.75	0.14
Cadmium (mg/kg WW)					
Upper	0.034	0.0027	0.026	0.040	0.006
Middle	0.036	0.0056	0.024	0.054	0.012
Lower	0.034	0.0015	0.029	0.036	0.003
Chromium (mg/kg WW)					
Upper	0.59	0.06	0.46	0.81	0.13
Middle	0.56	0.06	0.37	0.72	0.14
Lower	0.71	0.13	0.39	1.17	0.30
Copper (mg/kg WW)					
Upper	0.41	0.011	0.38	0.45	0.024
Middle	0.46	0.037	0.34	0.54	0.083
Lower	0.50	0.013	0.47	0.54	0.028
Iron (mg/kg WW)					
Upper	5.2	0.36	4.1	6.3	0.80
Middle	4.0	0.26	3.4	5.0	0.58

TABLE 3-33
Summary Statistics for of COIs in Walleye Offal by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\bar{x})$	Minimum Composite Value	Maximum Composite Value	Between Fish Variability $\hat{\sigma}$
Lower	4.2	0.27	3.6	5.2	0.60
Lead (mg/kg WW)					
Upper	0.056	0.530	0.0446	0.066	0.0102
Middle	0.062	1.273	0.0372	0.089	0.024
Lower	0.032	1.135	0.0212	0.041	0.008
Nickel (mg/kg WW)					
Upper	0.68	0.030	0.61	0.78	0.07
Middle	0.61	0.037	0.53	0.73	0.08
Lower	0.69	0.026	0.61	0.75	0.06
Selenium (mg/kg WW)					
Upper	0.46	0.004	0.45	0.47	0.01
Middle	0.60	0.072	0.43	0.82	0.16
Lower	0.49	0.047	0.36	0.63	0.11
Uranium (mg/kg WW)					
Upper	0.0012	0.0001	0.0010	0.002	0.0003
Middle	0.0015	0.0002	0.0010	0.002	0.0005
Lower	0.0013	0.0002	0.0009	0.002	0.0004
Zinc (mg/kg WW)					
Upper	17.6	0.24	16.7	18.0	0.54
Middle	16.4	0.56	14.5	17.6	1.26
Lower	16.9	0.44	15.5	18.2	0.99
Mercury (*u*g/kg WW)					
Upper	100.80	8.52	78.00	127.00	19.04
Middle	115.80	8.44	86.00	135.00	18.87
Lower	161.80	11.39	132.00	191.00	25.47
Total PCB (*u*g/kg WW)					
Upper	45.13	6.01	33.25	65.70	13.45
Middle	60.94	2.34	54.10	68.00	5.23

TABLE 3-33
Summary Statistics for of COIs in Walleye Offal by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between Fish Variability $\hat{\sigma}$
Lower	106.98	11.36	84.90	150.00	25.41
2,3,7,8 TCDF (*u*g/kg WW)					
Upper	0.001602	0.000177	0.001050	0.002100	0.00039
Middle	0.001926	0.000072	0.001750	0.002100	0.00016
Lower	0.003188	0.000453	0.002140	0.004600	0.00101

mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
WW = wet weight

TABLE 3-34
Results of Tests of Equal Concentration of COIs in Walleye Fillets
Upper Columbia River RI/FS

Analyte	Equality of Means		Linear Trend		$\bar{\bar{x}}$	$S\hat{E}(\bar{\bar{x}})$
	F-test	p-value	F-test	p-value		
Aluminum	0.25	0.7849	0.42	0.53	1.29	0.008
Arsenic	***5.16***	***0.024***	***10.2989***	***0.0075***	NA	NA
Barium	0.16	0.86	0.14	0.72	0.042	0.0003
Cadmium	0.11	0.89	0.23	0.64	0.005	0.00003
Chromium	0.48	0.63	0.0	0.98	0.479	0.036
Copper	2.04	0.17	0.83	.38	0.213	0.006
Iron	1.12	0.36	1.95	0.19	3.163	0.243
Lead	1.28	0.31	2.33	0.15	0.016	0.005
Nickel	1.63	0.24	0.69	0.52	0.114	0.01
Selenium	0.55	0.59	0.43	0.52	0.389	0.017
Uranium	NA	NA	NA	NA	0.0003	0
Zinc	***10.18***	***0.003***	***9.4***	***0.01***	NA	NA
Mercury	***6.42***	***.013***	***10.83***	***.0065***	NA	NA
Total PCB	***547.01***	***< .0001***	***855.86***	***< .0001***	NA	NA
2,3,7,8 TCDF	***11.02***	***0.002***	***21.33***	***.0006***	NA	NA

Notes:

River reach (upper, middle and lower) (F-test) and single degree of freedom contrast for a linear trend (F-test) in concentration. In the case of equality of means ($p > .10$), the grand mean $\left(\bar{\bar{x}}\right)$ and associated standard $\left(S\hat{E}\left(\bar{\bar{x}}\right)\right)$ error are reported.

Bold and italics indicate test was significantly different at $p>0.1$.

TABLE 3-35
Results of Tests of Equal Concentration of COIs in Walleye Offal
Upper Columbia River RI/FS

Analyte	Equality of Means		Linear Trend		$\bar{\bar{x}}$	$S\hat{E}(\bar{\bar{x}})$
	F-test	p-value	F-test	p-value		
Aluminum	***7.35***	***0.008***	***14.56***	***0.003***	NA	NA
Arsenic	***7.15***	***0.009***	***8.1239***	***0.015***	NA	NA
Barium	0.53	0.60	0.56	0.47	1.47	0.031
Cadmium	0.10	0.90	0.01	0.94	0.034	0.002
Chromium	0.73	0.50	0.81	0.39	0.621	0.052
Copper	***3.47***	***0.06***	***6.82***	***0.02***	NA	NA
Iron	0.2	0.82	0.03	0.86	15.8	0.56
Lead	***5.07***	***0.02***	***5.71***	***0.03***	NA	NA
Nickel	1.81	0.21	0.08	0.79	0.66	0.019
Selenium	2.36	0.14	0.27	0.61	0.517	0.031
Uranium	0.96	0.41	0.03	0.88	0.001	0.0001
Zinc	2.0	0.18	1.21	0.29	17	0.270
Mercury	***11.08***	***.002***	***20.41***	***0.0007***	NA	NA
Total PCB	***18.14***	***0.0002***	***33.61***	***< .0001***	NA	NA
2,3,7,8 TCDF	***8.73***	***.005***	***15.64***	***0.002***	NA	NA

Notes:

River reach (upper, middle and lower) (F-test) and single degree of freedom contrast for a linear trend (F-test) in concentration. In the case of equality of means (p > .10), the grand mean $(\bar{\bar{x}})$ and associated standard $(S\hat{E}(\bar{\bar{x}}))$ error are reported.

Bold and italics indicate test was significantly different at p>0.1.

TABLE 3-36
Summary of Statistics for COIs in Wild Rainbow Trout Fillets by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\bar{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Aluminum (mg/kg WW)					
Upper	1.99	0.03	1.91	2.08	0.06
Middle	1.85	0.04	1.82	1.89	0.08
Lower	1.55	0.00	1.55	1.55	0.00
Arsenic (mg/kg WW)					
Upper	0.09	0.007	0.07	0.10	0.016
Middle	0.07	0.006	0.068	0.080	0.013
Lower	0.08	0.000	0.080	0.080	0.000
Barium (mg/kg WW)					
Upper	0.066	0.001	0.064	0.069	0.0024
Middle	0.062	0.001	0.061	0.063	0.0028
Lower	0.053	0.0000	0.053	0.053	0.0000
Cadmium (mg/kg WW)					
Upper	0.0117	0.00502	0.0064	0.0318	0.01123
Middle	0.0062	0.00010	0.0061	0.0063	0.00022
Lower	0.0053	0.00000	0.0053	0.0053	0.00000
Chromium (mg/kg WW)					
Upper	0.57	0.04	0.51	0.72	0.09
Middle	0.41	0.00	0.40	0.41	0.01
Lower	0.44	0.00	0.44	0.44	0.00
Copper (mg/kg WW)					
Upper	0.34	0.007	0.32	0.36	0.016
Middle	0.33	0.006	0.33	0.34	0.013
Lower	0.27	0.000	0.27	0.27	0.000
Iron (mg/kg WW)					
Upper	5.2	0.36	4.1	6.3	0.80
Middle	3.9	0.12	3.8	4.1	0.26

TABLE 3-36
Summary of Statistics for COIs in Wild Rainbow Trout Fillets by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\bar{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Lower	5.2	0.00	5.2	5.2	0.00
Lead (mg/kg WW)					
Upper	0.015	0.002	0.0064	0.018	0.0047
Middle	0.0062	0.0001	0.0061	0.0063	0.0002
Lower	0.0053	0.00000	0.0053	0.0053	0.0000
Nickel (mg/kg WW)					
Upper	0.027	0.007	0.020	0.053	0.015
Middle	0.029	0.010	0.019	0.039	0.022
Lower	0.033	0.000	0.033	0.033	0.000
Selenium (mg/kg WW)					
Upper	0.49	0.031	0.43	0.61	0.07
Middle	0.43	0.028	0.40	0.46	0.06
Lower	0.38	0.000	0.38	0.38	0.00
Uranium (mg/kg WW)					
Upper	0.0007	0.0000	0.0006	0.001	0.0000
Middle	0.0006	0.0000	0.0006	0.001	0.0000
Lower	0.0006	0.0000	0.0006	0.001	0.0000
Zinc (mg/kg WW)					
Upper	8.3	0.13	7.9	8.6	0.29
Middle	6.4	0.08	6.3	6.5	0.18
Lower	6.3	0.00	6.3	6.3	0.00
Mercury (*u*g/kg WW)					
Upper	86.06	6.90	65.40	108.00	15.43
Middle	76.10	7.70	68.40	83.80	17.22
Lower	120.00	0.00	120.00	120.00	0.00
Total PCB (*u*g/kg WW)					
Upper	72	2.6	68.725	82.1	5.6989
Middle	47	0.3	46.700	47.3	0.6708

TABLE 3-36
Summary of Statistics for COIs in Wild Rainbow Trout Fillets by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Lower	44	0.0	43.700	43.7	0.0
2,3,7,8 TCDF (*u*g/kg WW)					
Upper	0.000958	0.000366	0.000534	0.00242	0.000819
Middle	0.000763	0.000079	0.000684	0.000843	0.000178
Lower	0.000559	0.0	0.000559	0.000559	0.00

mg/kg = milligrams per kilogram
μg/kg = micrograms per kilogram
WW = wet weight

TABLE 3-37
Summary of Statistics for COIs in Hatchery Rainbow Trout Fillets by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\bar{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Aluminum (mg/kg WW)					
Upper	--	--	--	--	--
Middle	1.85	0.02	1.82	1.88	0.04
Lower	1.83	0.01	1.82	1.85	0.02
Arsenic (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.03	0.0003	0.030	0.031	0.001
Lower	0.04	0.006	0.030	0.056	0.014
Barium (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.062	0.001	0.061	0.063	0.0014
Lower	0.061	0.0002	0.061	0.062	0.0005
Cadmium (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.0062	0.00007	0.0061	0.0063	0.00015
Lower	0.0061	0.00003	0.0061	0.0062	0.00006
Chromium (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.35	0.09	0.27	0.53	0.19
Lower	0.34	0.01	0.30	0.36	0.03
Copper (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.34	0.028	0.32	0.40	0.063
Lower	0.27	0.008	0.24	0.28	0.018
Iron (mg/kg WW)					
Upper	--	--	--	--	--
Middle	4.1	0.47	3.4	5.0	1.04

TABLE 3-37
Summary of Statistics for COIs in Hatchery Rainbow Trout Fillets by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\bar{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Lower	4.0	0.16	3.6	4.4	0.36
Lead (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.0062	0.00007	0.0061	0.0063	0.0002
Lower	0.0061	0.00003	0.0061	0.0062	0.0001
Nickel (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.07	0.034	0.02	0.13	0.08
Lower	0.02	0.004	0.02	0.03	0.01
Selenium (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.36	0.033	0.32	0.43	0.07
Lower	0.23	0.011	0.21	0.26	0.02
Uranium (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.0006	0.0000	0.0006	0.001	0.0000
Lower	0.0006	0.0000	0.0006	0.001	0.0000
Zinc (mg/kg WW)					
Upper	--	--	--	--	--
Middle	7.4	0.45	6.5	8.0	1.01
Lower	7.1	0.27	6.4	7.7	0.60
Mercury (*u*g/kg WW)					
Upper	--	--	--	--	--
Middle	66.77	3.67	63.10	74.10	8.20
Lower	100.13	9.05	81.10	122.00	20.23
Total PCB (*u*g/kg WW)					
Upper	--	--	--	--	--
Middle	43.2000	2.6690	40.000	48.50	5.9680

TABLE 3-37
Summary of Statistics for COIs in Hatchery Rainbow Trout Fillets by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Lower	44.8563	1.3332	42.100	47.90	2.9810
2,3,7,8 TCDF (*u*g/kg WW)					
Upper	--	--	--	--	--
Middle	0.000725	0.000232	0.000363	0.00116	0.000520
Lower	0.000678	0.000205	0.000186	0.00119	0.000459

mg/kg = milligrams per kilogram
μg/kg = micrograms per kilogram
WW = wet weight
-- No samples collected at this location.

TABLE 3-38
Summary Statistics for COIs in Wild Rainbow Trout Offal by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\bar{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Aluminum (mg/kg WW)					
Upper	5.09	1.61	2.39	9.33	3.59
Middle	11.23	2.36	8.87	13.58	5.27
Lower	8.20	0.00	8.20	8.20	0.00
Arsenic (mg/kg WW)					
Upper	0.197	0.012	0.16	0.22	0.027
Middle	0.222	0.007	0.215	0.229	0.016
Lower	0.204	0.000	0.204	0.204	0.000
Barium (mg/kg WW)					
Upper	1.504	0.151	1.072	1.907	0.3372
Middle	0.874	0.111	0.763	0.985	0.2483
Lower	1.416	0.0000	1.416	1.416	0.0000
Cadmium (mg/kg WW)					
Upper	0.0348	0.00293	0.0278	0.0455	0.00654
Middle	0.0816	0.00905	0.0725	0.0906	0.02024
Lower	0.0856	0.00000	0.0856	0.0856	0.00000
Chromium (mg/kg WW)					
Upper	1.08	0.06	0.93	1.30	0.14
Middle	0.86	0.06	0.80	0.92	0.13
Lower	0.52	0.00	0.52	0.52	0.00
Copper (mg/kg WW)					
Upper	2.38	0.311	1.83	3.48	0.696
Middle	1.91	0.272	1.64	2.18	0.608
Lower	0.58	0.000	0.58	0.58	0.000
Iron (mg/kg WW)					
Upper	49.6	7.75	36.7	78.8	17.32

TABLE 3-38
Summary Statistics for COIs in Wild Rainbow Trout Offal by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\bar{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Middle	39.0	6.54	32.5	45.6	14.63
Lower	38.4	0.00	38.4	38.4	0.00
Lead (mg/kg WW)					
Upper	0.265	0.034	0.2010	0.387	0.0771
Middle	0.0516	0.0007	0.0509	0.0522	0.0015
Lower	0.0386	0.00000	0.0386	0.0386	0.0000
Nickel (mg/kg WW)					
Upper	0.407	0.034	0.313	0.488	0.077
Middle	0.344	0.004	0.340	0.348	0.009
Lower	0.442	0.000	0.442	0.442	0.000
Selenium (mg/kg WW)					
Upper	1.03	0.030	0.91	1.07	0.07
Middle	0.93	0.020	0.90	0.95	0.05
Lower	0.70	0.000	0.70	0.70	0.00
Uranium (mg/kg WW)					
Upper	0.0046	0.0005	0.0032	0.006	0.0012
Middle	0.0030	0.0003	0.0027	0.003	0.0007
Lower	0.0027	0.0000	0.0027	0.003	0.0000
Zinc (mg/kg WW)					
Upper	44.1	1.92	40.1	51.0	4.28
Middle	37.1	0.26	36.8	37.4	0.59
Lower	49.7	0.00	49.7	49.7	0.00
Mercury (ug/kg WW)					
Upper	54.74	2.83	47.80	64.00	6.32
Middle	50.80	6.90	43.90	57.70	15.43
Lower	75.70	0.00	75.70	75.70	0.00
Total PCB (ug/kg WW)					
Upper	91.86	10.99	72.20	132.40	24.57

TABLE 3-38
Summary Statistics for COIs in Wild Rainbow Trout Offal by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Middle	54.00	0.50	53.50	54.50	1.12
Lower	51.40	0.0	51.40	51.40	0.0
2,3,7,8 TCDF (ug/kg WW)					
Upper	0.00211	0.000581	0.001390	0.004420	0.00130
Middle	0.00141	0.000045	0.0013600	0.001450	0.000101
Lower	0.00137	0.0	0.0013700	0.001370	0.0

mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
WW = wet weight

TABLE 3-39
Summary Statistics for COIs in Hatchery Rainbow Trout Offal by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $\hat{SE}(\bar{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Aluminum (mg/kg WW)					
Upper	--	--	--	--	--
Middle	45.88	11.82	22.50	60.55	26.43
Lower	8.10	0.56	7.49	9.77	1.24
Arsenic (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.14	0.005	0.132	0.148	0.011
Lower	0.13	0.010	0.106	0.148	0.022
Barium (mg/kg WW)					
Upper	--	--	--	--	--
Middle	2.355	0.588	1.184	3.030	1.3142
Lower	0.844	0.0742	0.701	1.037	0.1659
Cadmium (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.1150	0.00682	0.1014	0.1229	0.01524
Lower	0.0871	0.00972	0.0656	0.1082	0.02174
Chromium (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.91	0.16	0.60	1.11	0.35
Lower	0.36	0.02	0.32	0.40	0.04
Copper (mg/kg WW)					
Upper	--	--	--	--	--
Middle	4.05	0.532	2.99	4.61	1.189
Lower	0.55	0.026	0.48	0.59	0.059
Iron (mg/kg WW)					
Upper	--	--	--	--	--
Middle	68.2	13.15	41.9	81.4	29.40

TABLE 3-39
Summary Statistics for COIs in Hatchery Rainbow Trout Offal by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Lower	30.4	1.10	27.3	32.1	2.45
Lead (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.3064	0.0905	0.1260	0.4095	0.2024
Lower	0.0215	0.00275	0.0148	0.0282	0.0061
Nickel (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.569	0.084	0.411	0.696	0.187
Lower	0.353	0.034	0.285	0.446	0.076
Selenium (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.65	0.024	0.60	0.68	0.05
Lower	0.35	0.010	0.32	0.37	0.02
Uranium (mg/kg WW)					
Upper	--	--	--	--	--
Middle	0.0117	0.0037	0.0044	0.016	0.0082
Lower	0.0016	0.0005	0.0007	0.003	0.0012
Zinc (mg/kg WW)					
Upper	--	--	--	--	--
Middle	38.0	1.60	36.2	41.2	3.58
Lower	44.5	0.86	42.1	45.7	1.92
Mercury (*u*g/kg WW)					
Upper	--	--	--	--	--
Middle	45.20	0.35	44.60	45.80	0.77
Lower	65.28	6.09	54.10	82.50	13.62
Total PCB (*u*g/kg WW)					
Upper	--	--	--	--	--
Middle	47.43	1.465	44.60	49.50	3.28

TABLE 3-39
Summary Statistics for COIs in Hatchery Rainbow Trout Offal by River Reach
Upper Columbia River RI/FS

Reach	Mean Concentration $\overline{X}$	Standard Error of the Mean $S\hat{E}(\overline{x})$	Minimum Composite Value	Maximum Composite Value	Between-Fish Variability $\hat{\sigma}$
Lower	55.15	1.932	50.20	59.55	4.32
2,3,7,8 TCDF (*u*g/kg WW)					
Upper	--	--	--	--	--
Middle	0.00108	0.000158	0.000795	0.001340	0.000353
Lower	0.00211	0.000174	0.001650	0.002460	0.000389

mg/kg = milligrams per kilogram
μg/kg = micrograms per kilogram
WW = wet weight
-- No samples collected at this location.

TABLE 3-40
One-Way Analysis of Variance Results for Rainbow Trout Fillets
Upper Columbia River RI/FS

	Upper vs Middle Wild		**Middle vs Lower Hatchery**		**Middle Wild vs Hatchery**	
	F-test	**p-value**	**F-test**	**p-value**	**F-test**	**p-value**
Aluminum	2.15	0.15	0.09	0.77	0.33	0.57
Arsenic	***13.85***	***0.004***	***33.49***	***0.0002***	1.32	0.28
Barium	0.02	0.89	***20.1***	***0.0012***	***9.85***	***0.01***
Cadmium	0	0.99	1.38	0.27	0.86	0.37
Chromium	0.44	0.52	**16.51**	**0.002**	***5.2***	***0.04***
Copper	0.25	0.63	**18.53**	**0.001**	0.11	0.75
Iron	0.07	0.79	**7,21**	**0.02**	***5.45***	***0.04***
Lead	0	0.99	**17.95**	**0.002**	***11.35***	***0.007***
Nickel	2.41	0.15	0.07	0.8	0.01	0.93
Selenium	2.01	0.19	***51.92***	***< .0001***	1.85	0.2
Uranium	0	1	***17.78***	***0.002***	***11.43***	***0.007***
Zinc	***5.11***	***0.047***	***12.13***	***0.006***	***20.3***	***0.001***
Mercury	0.49	0.5	2.06	0.18	0.66	0.43
Total PCB	0.91	0.36	***86.55***	***< .0001***	***47.23***	***< .0001***
2,3,7,8 TCDF	0	0.95	0.49	0.5	0.15	0.70

Notes:

Results show F-tests and p-values for tests of equal concentrations of COIs in rainbow trout fillets between river reach and between hatchery and wild rainbow trout fillets.

Bold and italics indicate test was significantly different at p>0.1.

TABLE 3-41
One-Way Analysis of Variance Results for Rainbow Trout Offal
Upper Columbia River RI/FS

	Upper vs Middle Wild		Middle vs Lower Hatchery		Middle Wild vs Hatchery	
	F-test	**p-value**	**F-test**	**p-value**	**F-test**	**p-value**
Aluminum	***15.93***	***0.003***	0.22	0.65	0.6	0.46
Arsenic	***17.59***	***0.002***	***21.11***	***0.001***	2.05	0.18
Barium	***10.05***	***0.01***	***3.7***	***0.08***	2.17	0.17
Cadmium	***7.67***	***0.02***	***34.78***	***0.0002***	***17.84***	***0.0018***
Chromium	0.12	0.74	***49.28***	***< .0001***	2.89	0.12
Copper	***14.53***	***0.003***	***19.61***	***0.001***	0.85	0.38
Iron	***4.38***	***0.06***	***3.51***	***0.09***	0.69	0.43
Lead	***10.67***	***0.009***	***18.03***	***0.0017***	***8.91***	***0.01***
Nickel	***7.67***	***0.02***	0.83	0.38	0.72	0.42
Selenium	***39.88***	***< .0001***	***437.1***	***< .0001***	***6.36***	***0.03***
Uranium	***10.22***	***0.01***	2.29	0.16	0.41	0.53
Zinc	0.11	0.75	0.03	0.86	***7.23***	***0.02***
Mercury	0.54	0.48	***3.52***	***0.09***	0.32	0.59
Total PCB	0.21	0.66	***12.11***	***0.006***	***8.28***	***0.02***
2,3,7,8 TCDF	0.18	0.68	0	0.99	0.97	0.35

Notes:

Results show F-tests and p-values for tests of equal concentrations of COIs in rainbow trout offal between river reach and between hatchery and wild rainbow trout offal.

Bold and italics indicate test was significantly different at p>0.1.

TABLE 3-42
Correlations Between Mean Analyte Concentration in Whole Body Largescale Sucker and Mean Analyte Concentration in Sediment Across all FSCAs
Upper Columbia River RI/FS

Analyte	Correlation Coefficient	p-value
Aluminum	0.386	0.521
Arsenic	0.682	0.204
Barium	0.776	0.123
Cadmium	-0.361	0.551
Chromium	0.709	0.18
Copper	***0.909***	***0.033***
Iron	***0.868***	***0.056***
Lead	0.617	0.268
Mercury	0.555	0.331
Nickel	-0.506	0.385
Selenium	0.003	0.996
Uranium	-0.525	0.363
Zinc	***0.864***	***0.059***

Bold and italics indicate test was significantly different at $p>0.1$.

TABLE 3-43
Comparisons of the Current UCR Mean Trace Metals Concentrations in Select Target Species to Data from the 1995 USGS Study
Upper Columbia River RI/FS

River Reach	Walleye		Wild Rainbow Trout		Hatchery Rainbow Trout	
	USGS (1995)	Current	USGS (1995)	Current	USGS (1995)	Current
Arsenic (mg/kg WW)						
Upper	<0.1	0.09	<0.1	0.09		
Middle	<0.1	0.11				
Lower	0.12	0.13	<0.1	0.08	<0.1	0.04
Cadmium (mg/kg WW)						
Upper	<0.03	0.0052	<0.03	0.0117		
Middle	<0.03	0.0053				
Lower	<0.03	0.0053	<0.03	0.0053	<0.03	0.0061
Copper (mg/kg WW)						
Upper	0.38	0.23	0.46	0.34		
Middle	0.32	0.2				
Lower	0.27	0.21	0.68	0.27	0.48	0.27
Lead (mg/kg WW)						
Upper	0.07	0.005	0.05	0.015		
Middle	<0.05	0.019				
Lower	<0.05	0.024	0.1	0.0053	0.07	0.0061
Selenium (mg/kg WW)						
Upper	0.37	0.36	<0.2	0.49		
Middle	0.23	0.41				
Lower	0.32	0.39	0.37	0.38	4.6	0.27
Mercury (ug/kg WW)						
Upper	310	273	200	108		
Middle	380	281				
Lower	390	417	202	83	135	122

mg/kg = milligrams per kilogram
ug/kg = micrograms per kilogram
WW = wet weight

TABLE 3-44
Comparisons of the Current UCR TCDF and Total PCB Concentrations in Select Target Species to Data from the 1998 EVS Study
Upper Columbia River RI/FS

River Reach	Lake Whitefish		Walleye		Rainbow Trout	
	EVS (1998)	Current	EVS (1998)	Current	EVS (1998)	Current
2,3,7,8 TCDF (ug/kg WW)						
Upper					0.0017	0.00096
Middle	0.0102	0.0047	0.0003	0.0003		
Lower			0.001	0.0006	0.001	0.00068
Total PCBs (ug/kg WW)						
Upper			15.5	6.96	87.6	75
Middle	60	72.6	15.3	50.2		
Lower			12.9	52.12	23.6	44.85

ug/kg = micrograms per kilogram
WW = wet weight

TABLE 3-45
Comparisons of the Current UCR Mean Trace Metals Concentrations in Largescale Sucker to Data from the 1994 Ecology Study
Upper Columbia River RI/FS

Contaminant of Interest	Largescale Sucker			
	Ecology (1994)		Current	
	Northport	Kettle Falls	FSCA 1	FSCA 3
Cadmium (mg/kg WW)	0.48	0.35	0.32	0.29
Copper (mg/kg WW)	10.4	1.23	8.9	0.87
Lead (mg/kg WW)	12	3	6.2	2.7
Zinc (mg/kg WW)	84.5	23.1	85.4	20.6
Mercury (*u*g/kg WW)	120	180	72.8	215.8

mg/kg = milligrams per kilogram
ug/kg = micrograms per kilogram
WW = wet weight

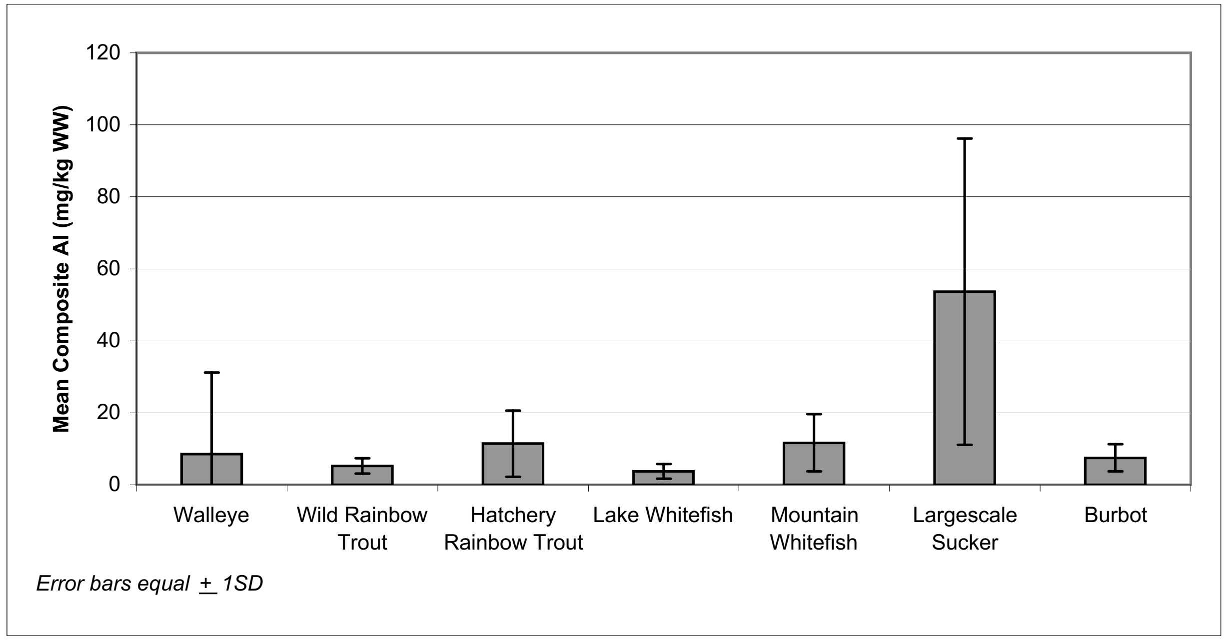


Figure 3-1 Comparison of Mean Aluminum Concentrations in Whole Body Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

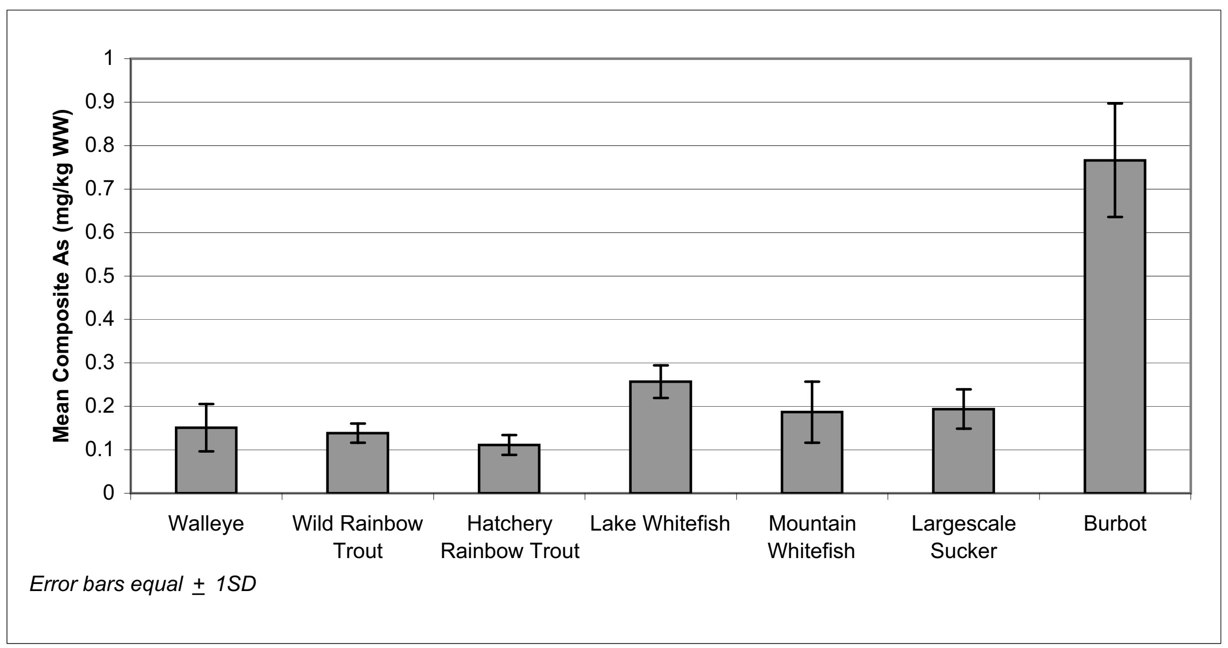


Figure 3-2 Comparison of Mean Arsenic Concentrations in Whole Body Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

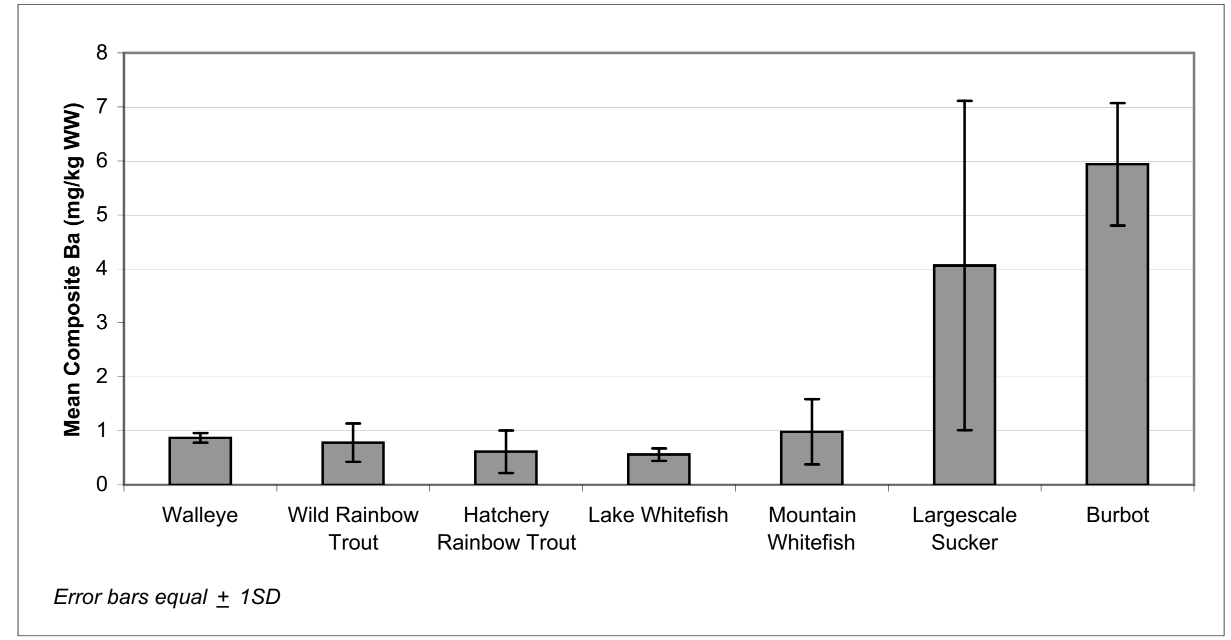


Figure 3-3 Comparison of Mean Barium Concentrations in Whole Body Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

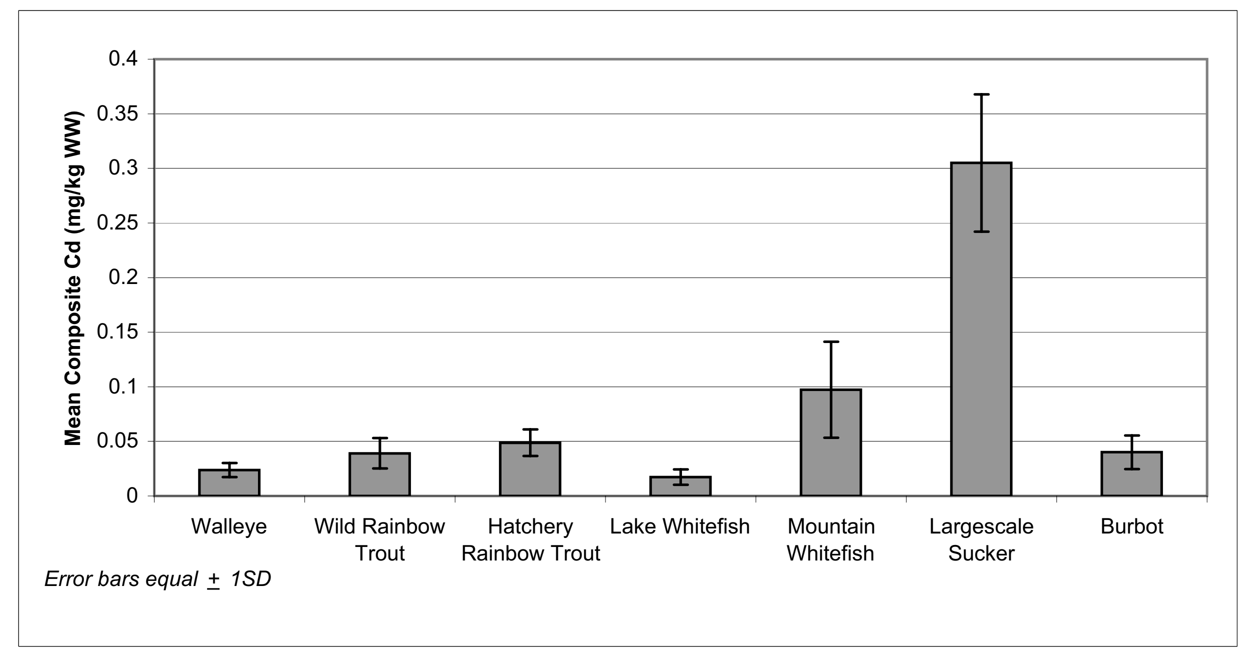


Figure 3-4 Comparison of Mean Cadmium Concentrations in Whole Body Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

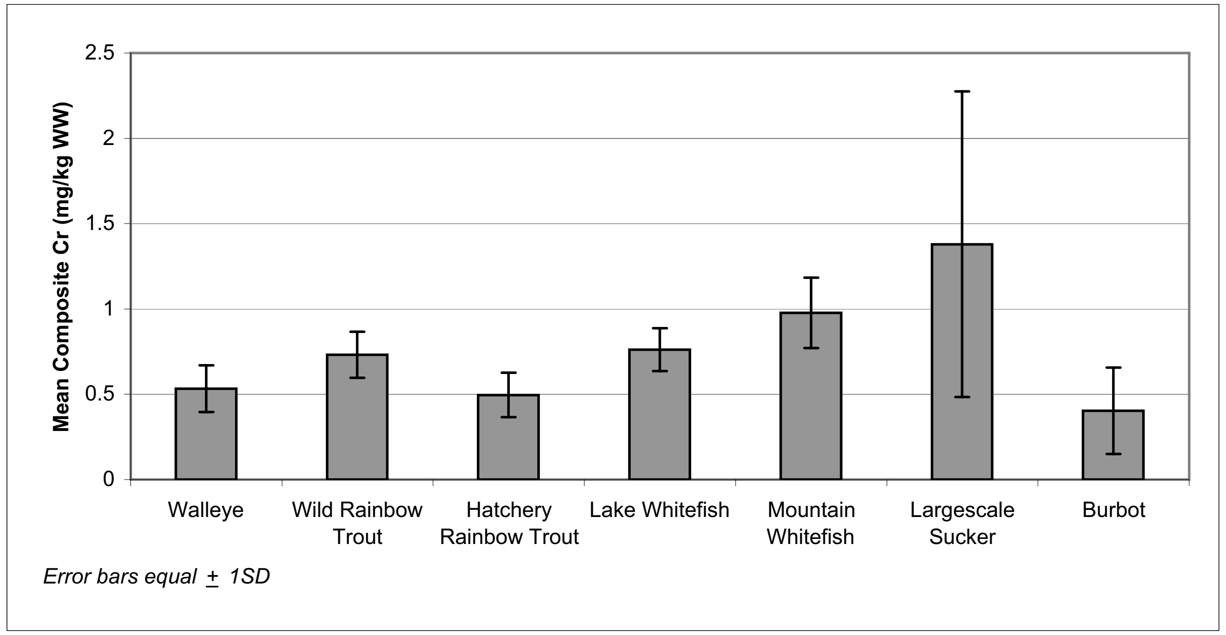


Figure 3-5 Comparison of Mean Chromium Concentrations in Whole Body Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

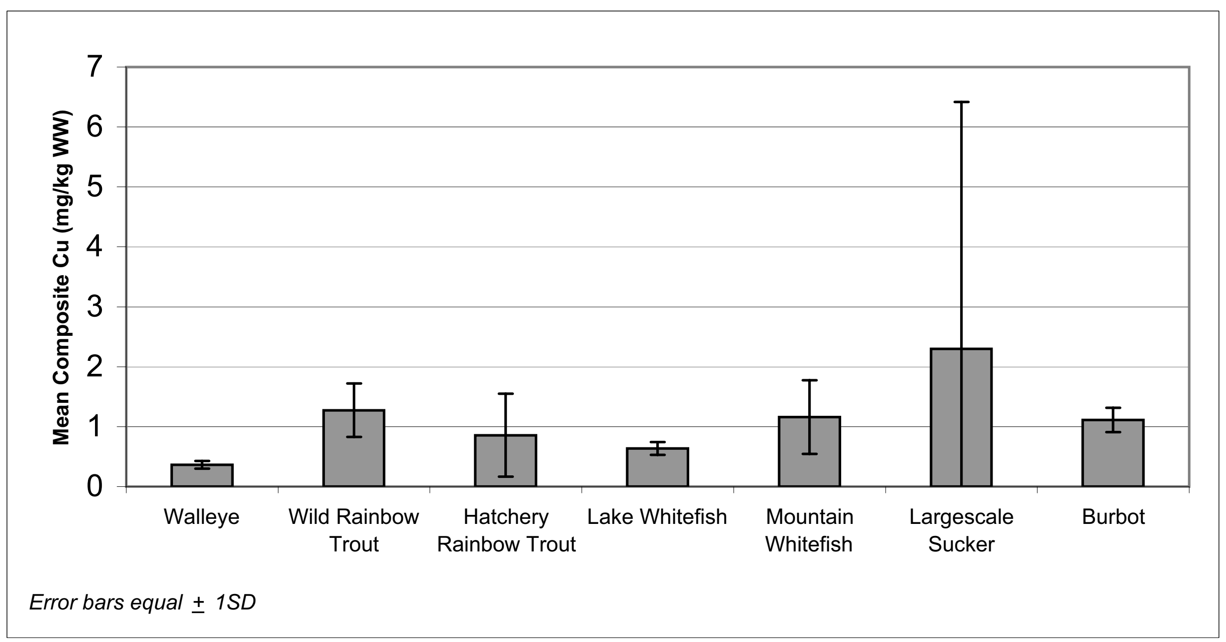


Figure 3-6 Comparison of Mean Copper Concentrations in Whole Body Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

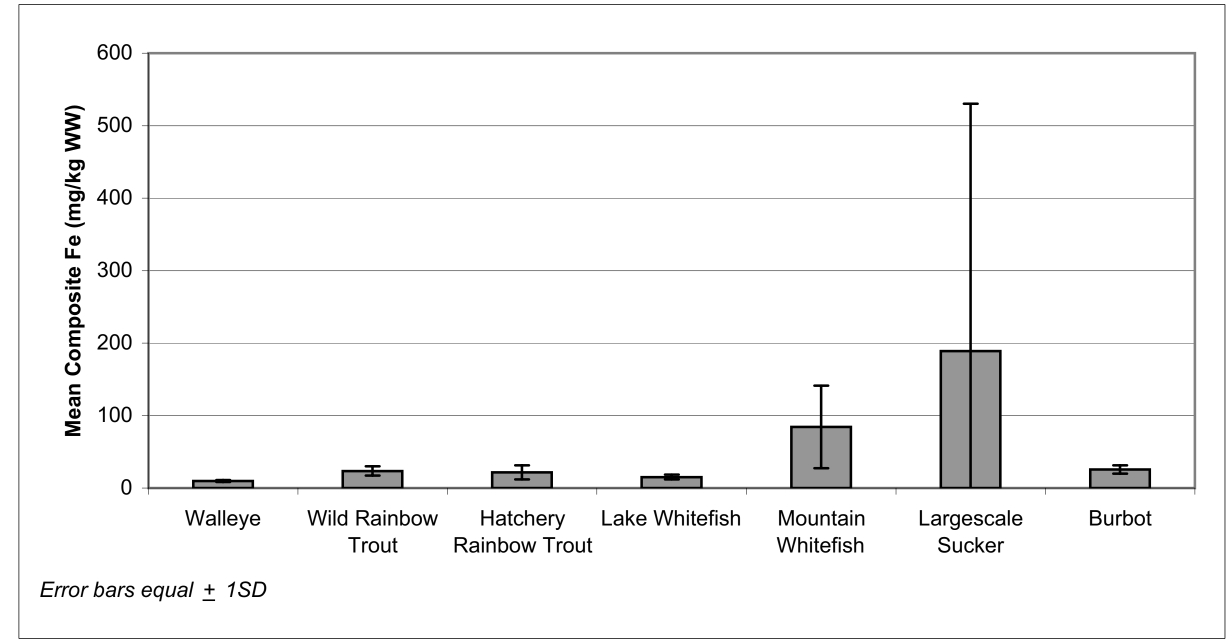


Figure 3-7 Comparison of Mean Iron Concentrations in Whole Body Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

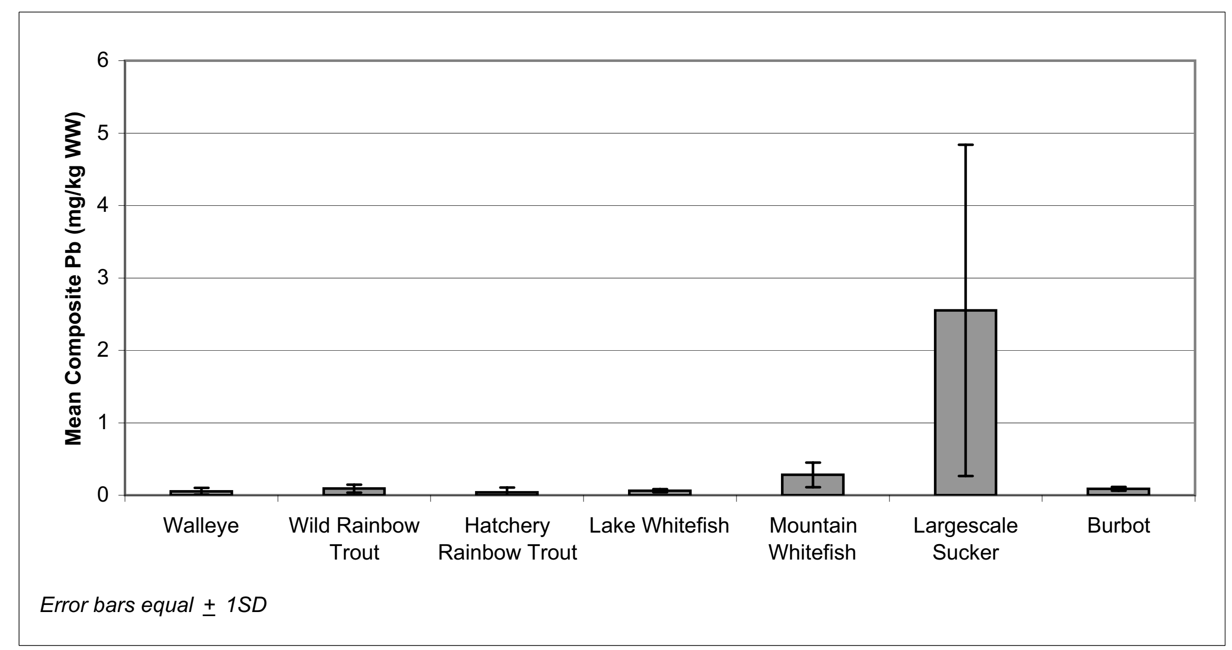


Figure 3-8 Comparison of Mean Lead Concentrations in Whole Body Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

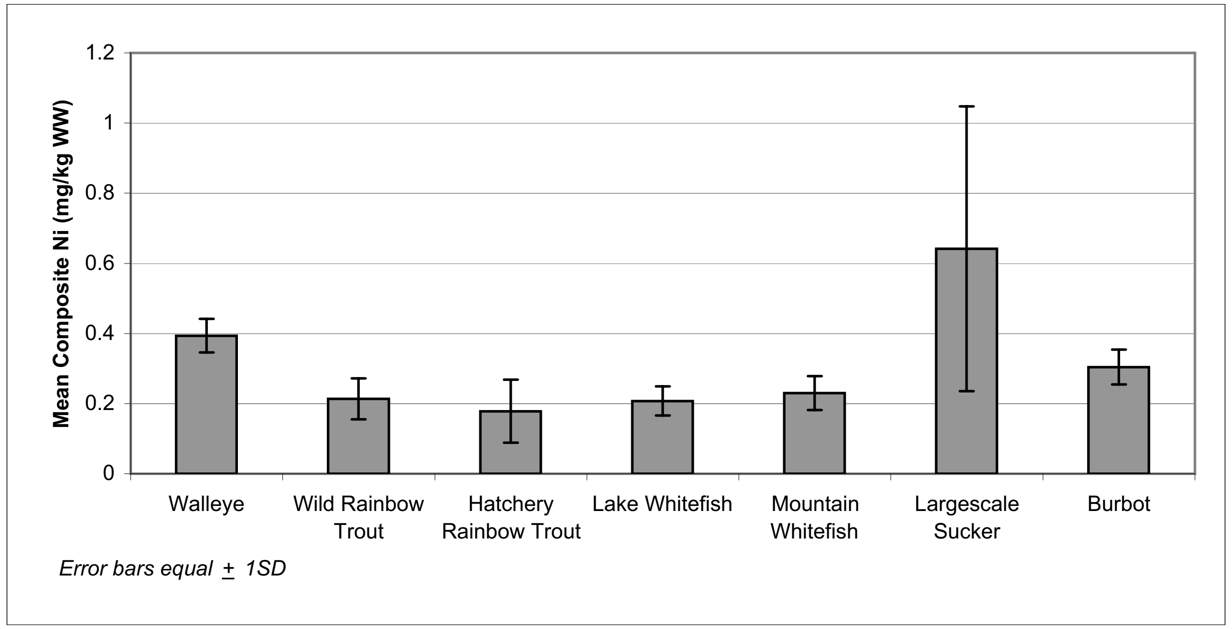


Figure 3-9 Comparison of Mean Nickel Concentrations in Whole Body Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

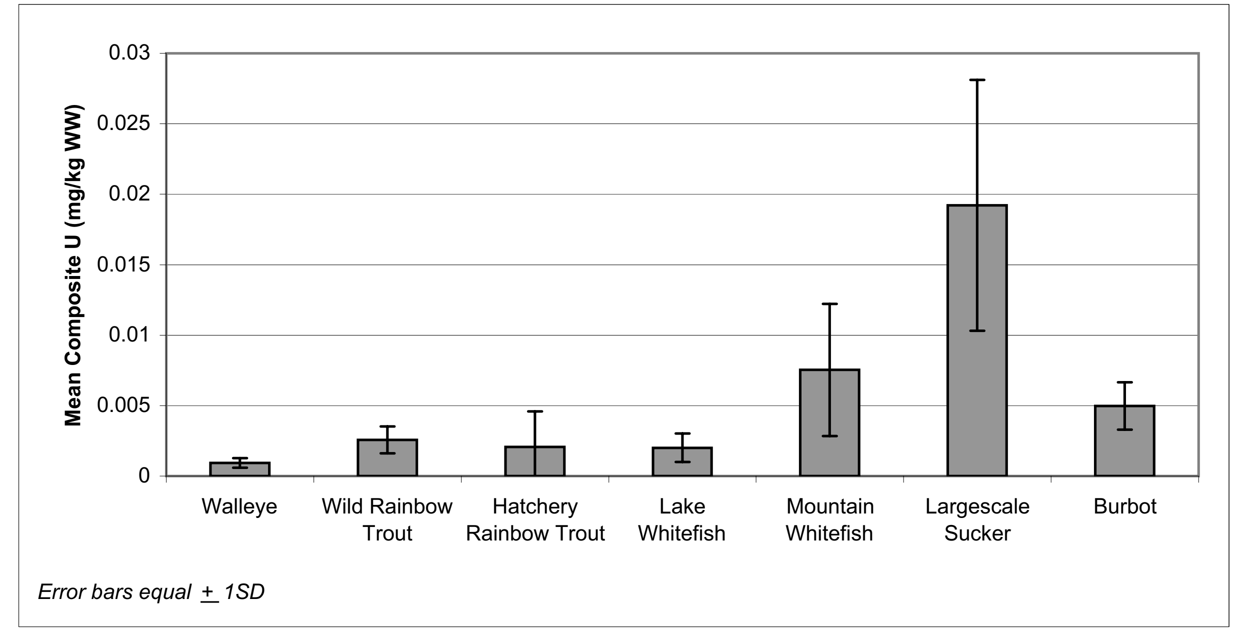


Figure 3-11 Comparison of Mean Uranium Concentrations in Whole Body Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

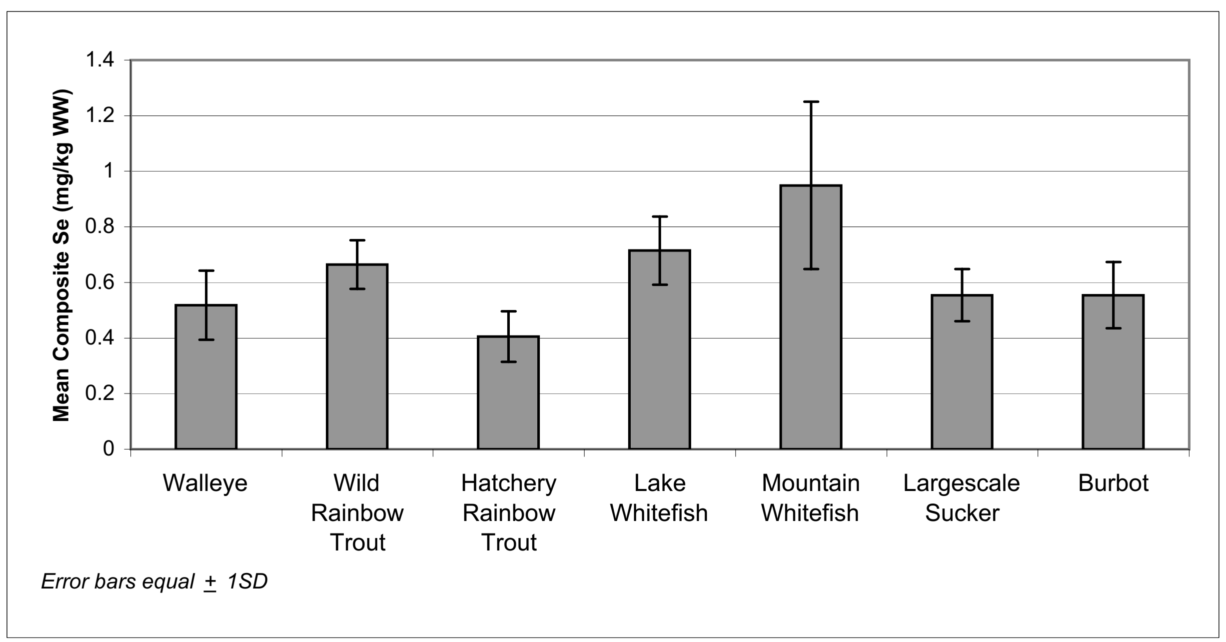


Figure 3-10 Comparison of Mean Selenium Concentrations in Whole Body Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

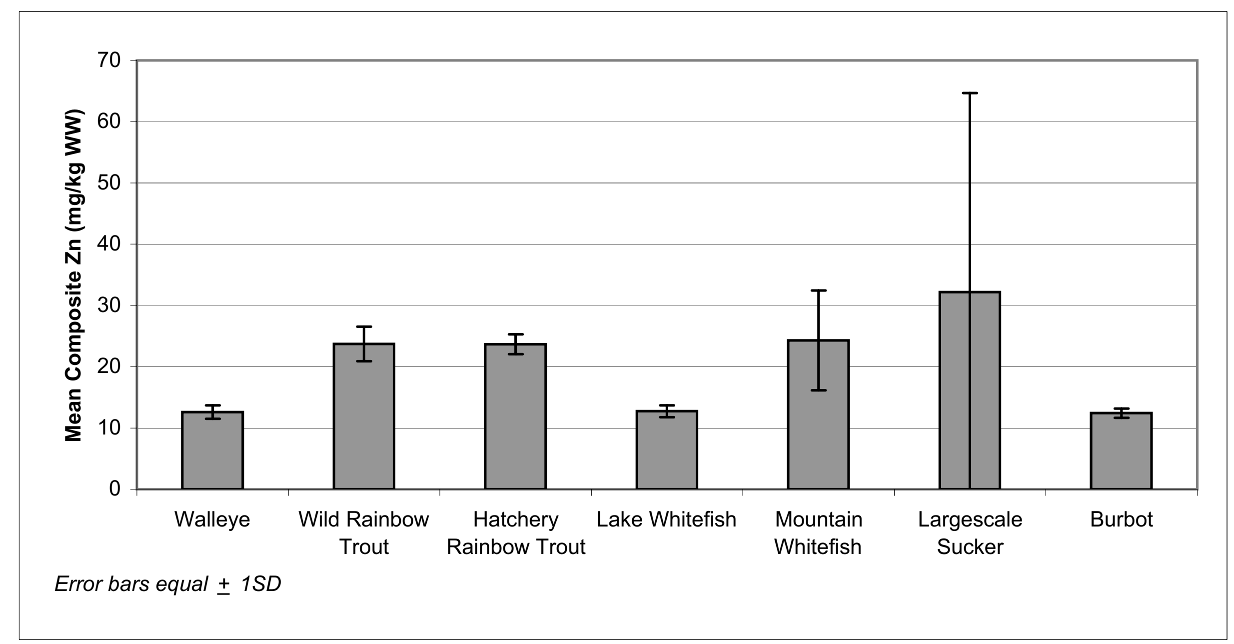


Figure 3-12 Comparison of Mean Zinc Concentrations in Whole Body Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

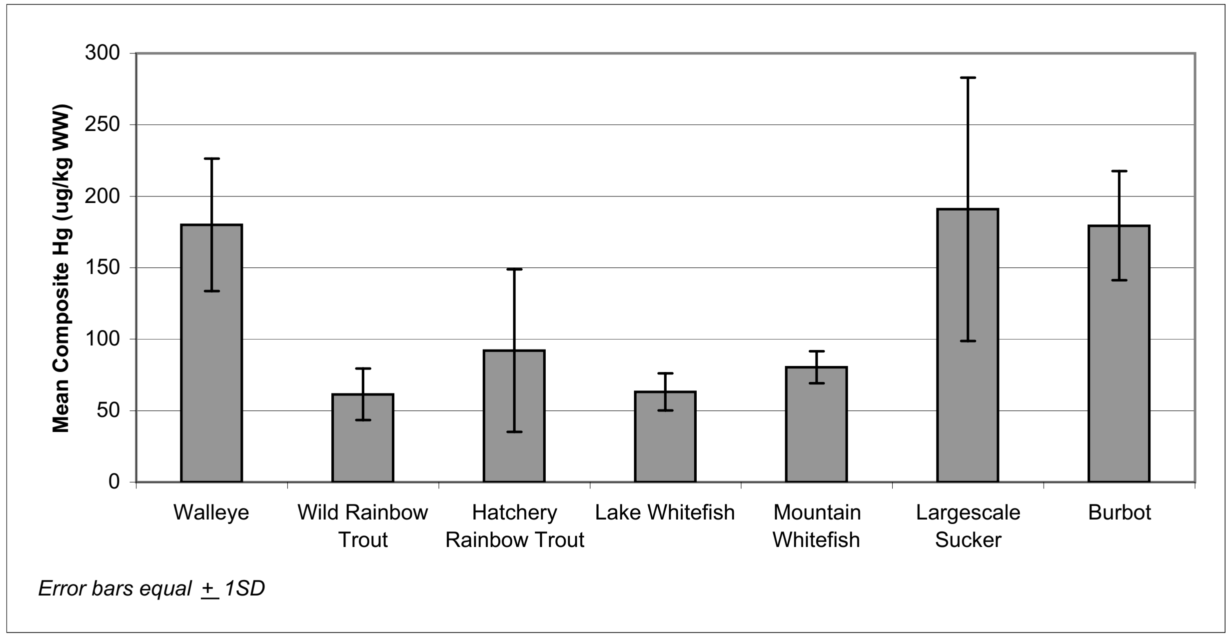


Figure 3-13 Comparison of Mean Mercury Concentrations in Whole Body Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

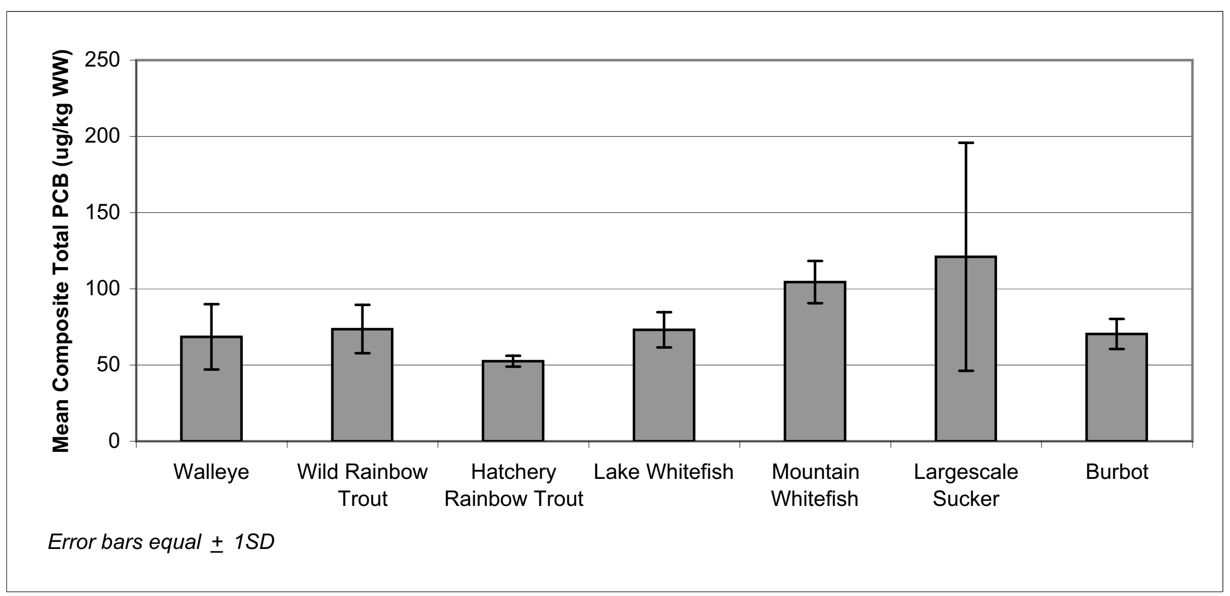


Figure 3-14 Comparison of Mean Total PCBs as Aroclor Concentrations in Whole Body Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

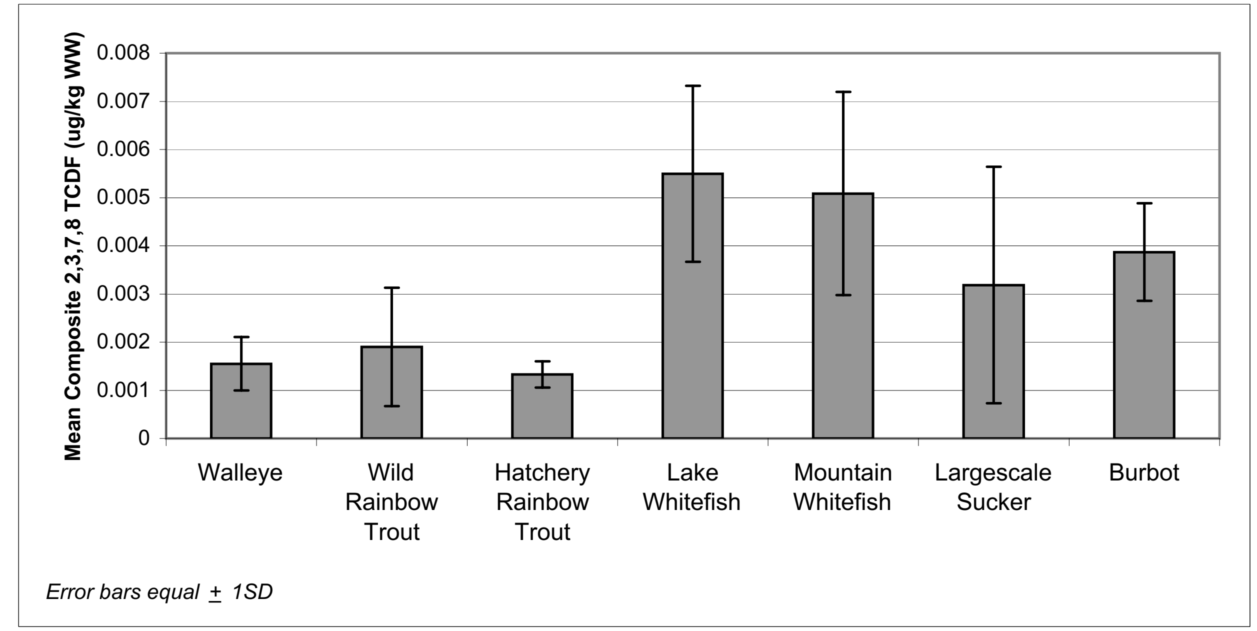


Figure 3-15 Comparison of Mean 2,3,7,8 TCDF Concentrations in Whole Body Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

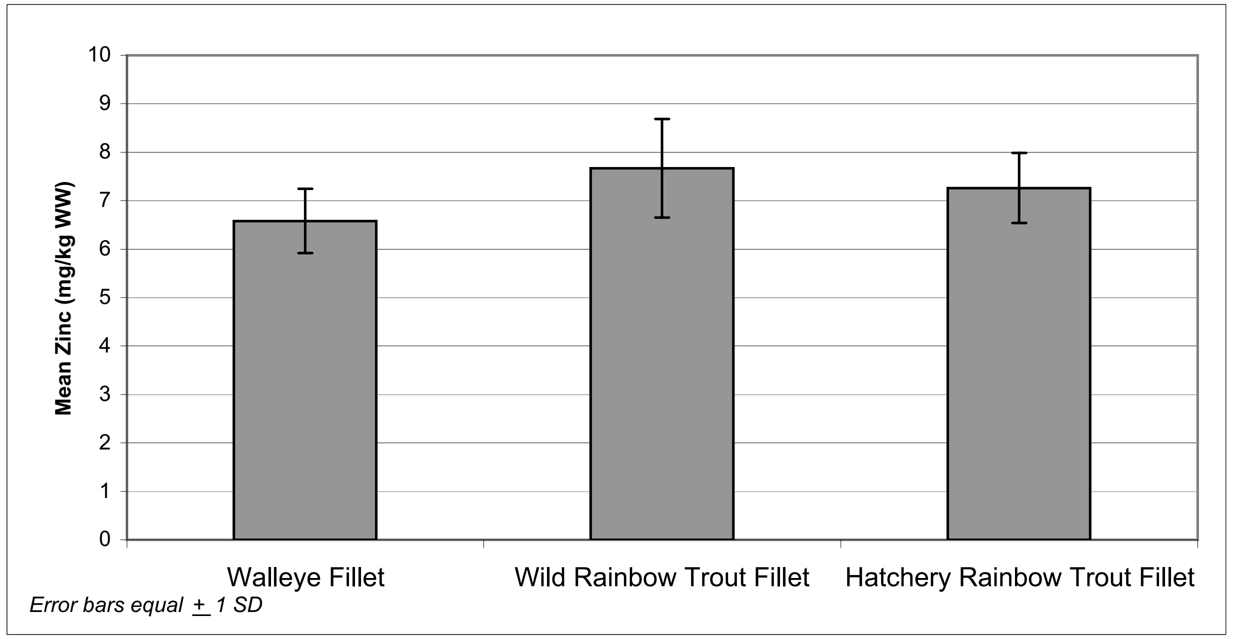


Figure 3-16 Comparison of Mean Zinc Concentrations in Fillet Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

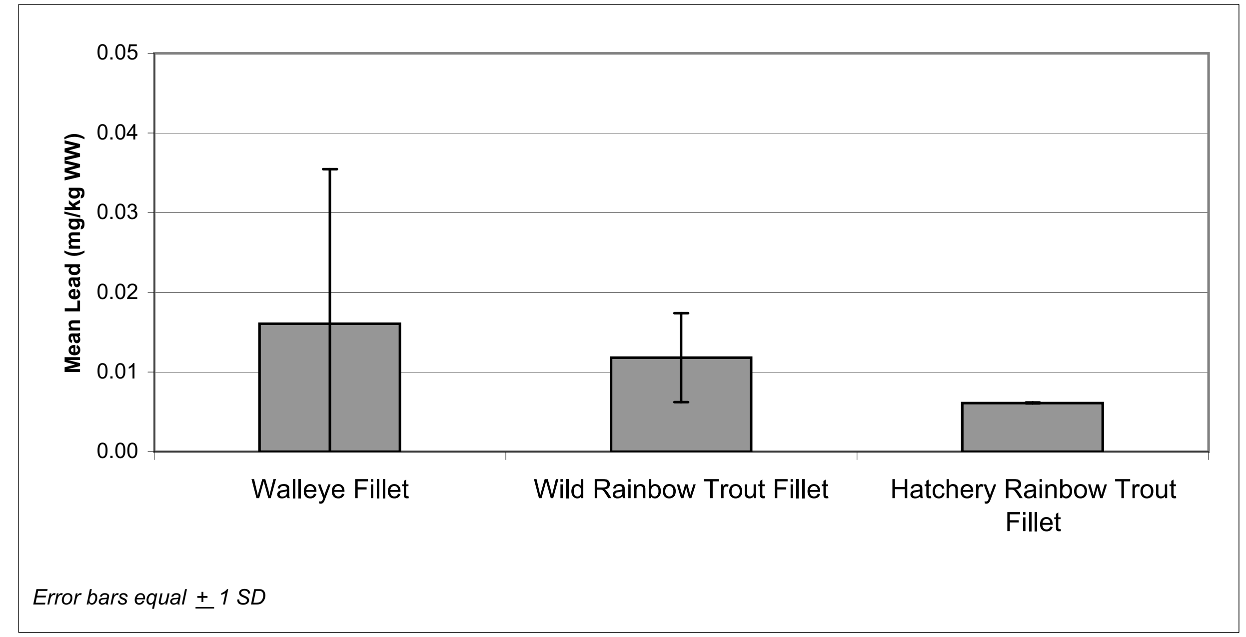


Figure 3-18 Comparison of Mean Lead Concentrations in Fillet Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

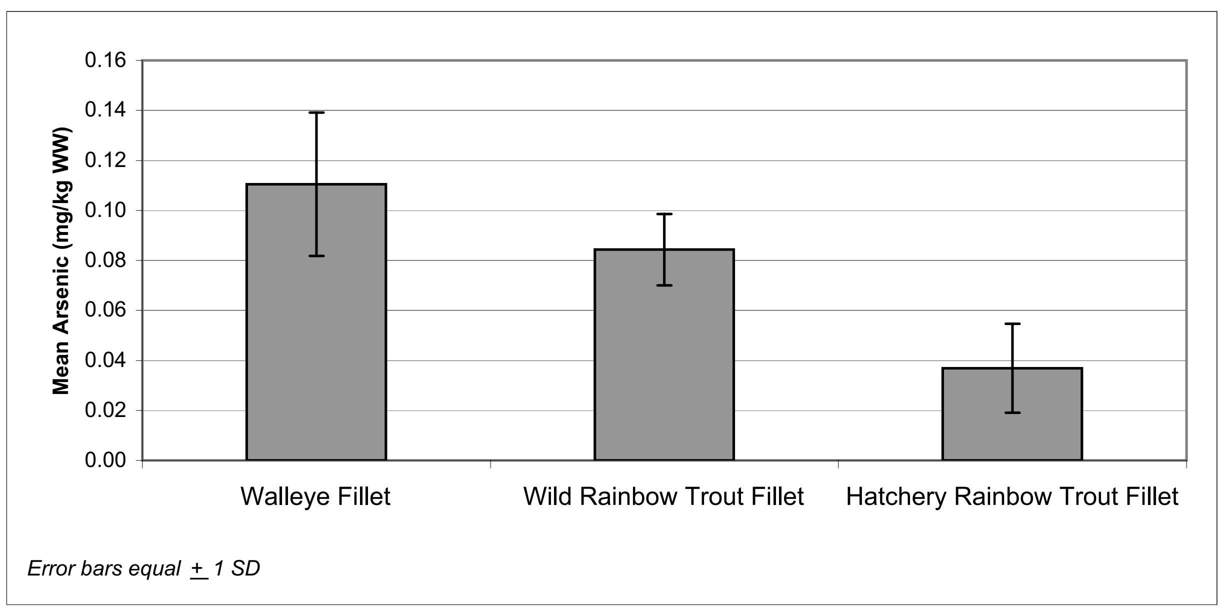


Figure 3-17 Comparison of Mean Arsenic Concentrations in Fillet Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

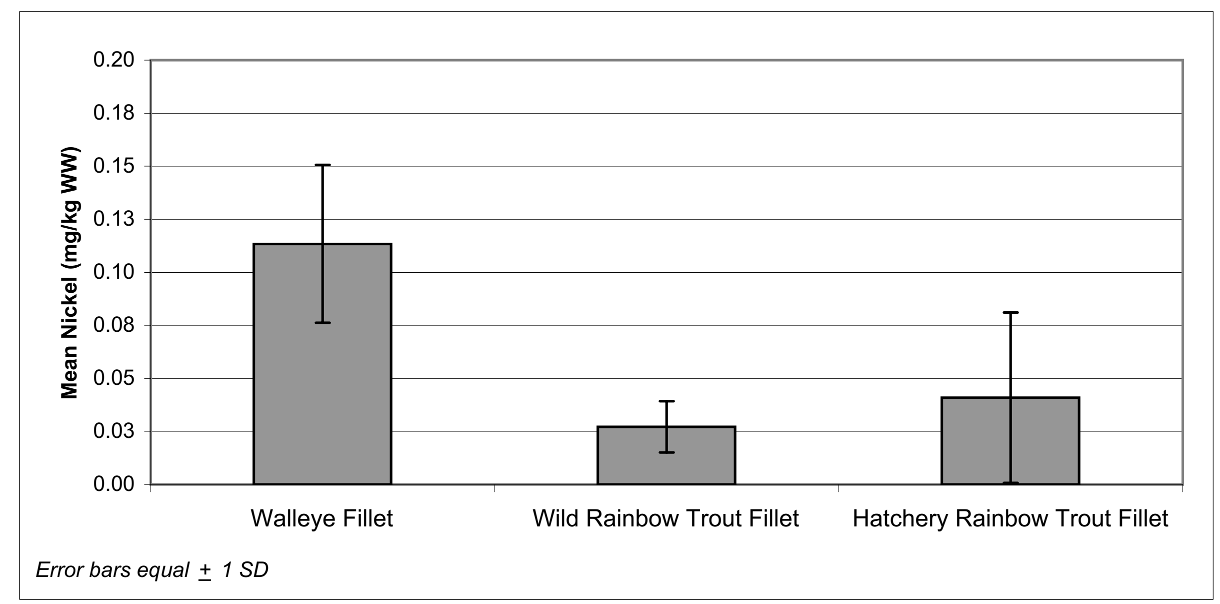


Figure 3-19 Comparison of Mean Nickel Concentrations in Fillet Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

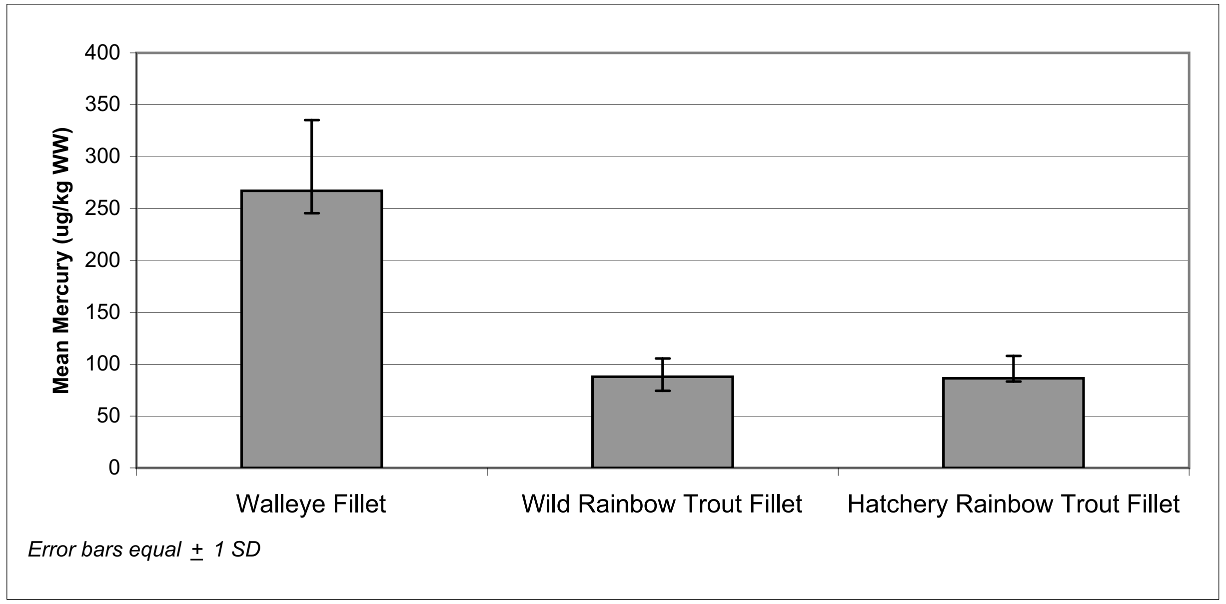


Figure 3-20 Comparison of Mean Mercury Concentrations in Fillet Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

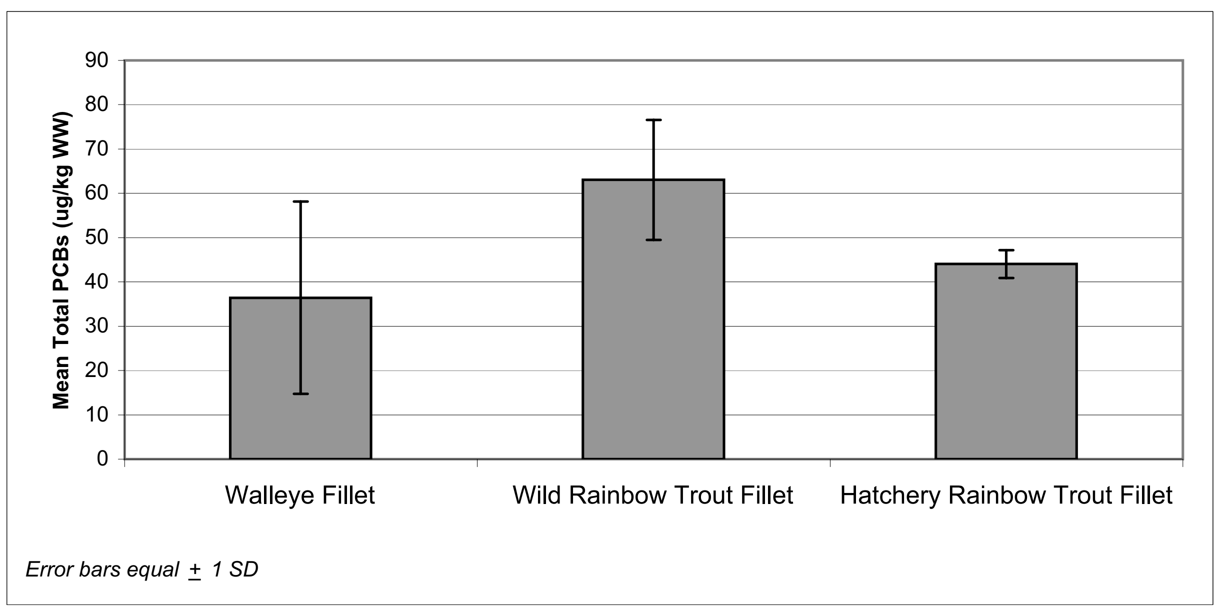


Figure 3-21 Comparison of Mean Total PCBs as Aroclor Concentrations in Fillet Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

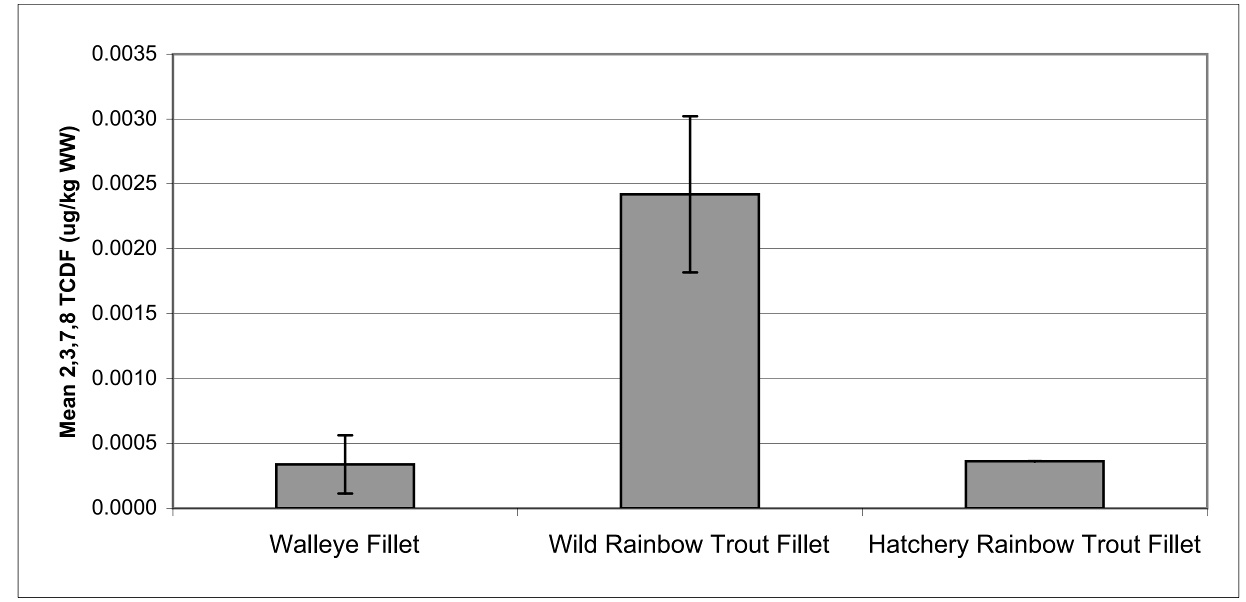


Figure 3-22 Comparison of Mean 2,3,7,8 TCDF Concentrations in Fillet Samples from Target Species Across all FSCAs
Upper Columbia River RI/FS

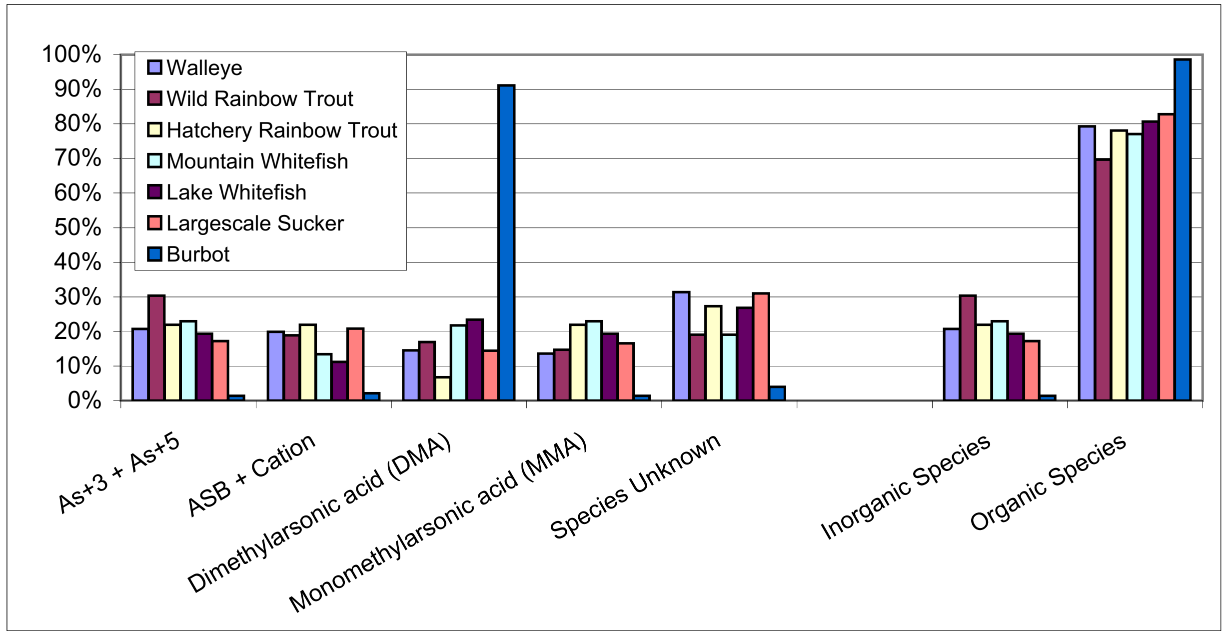


Figure 3-23 Comparison of Inorganic and Organic Arsenic Species in Whole Body Samples by Species
Upper Columbia River RI/FS

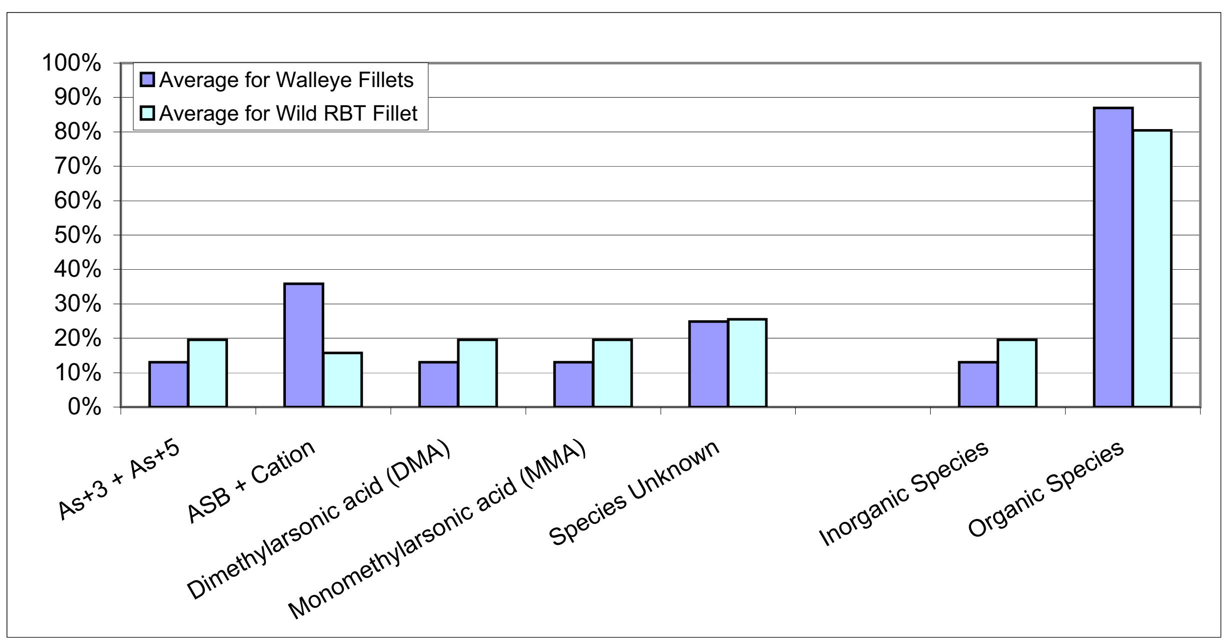
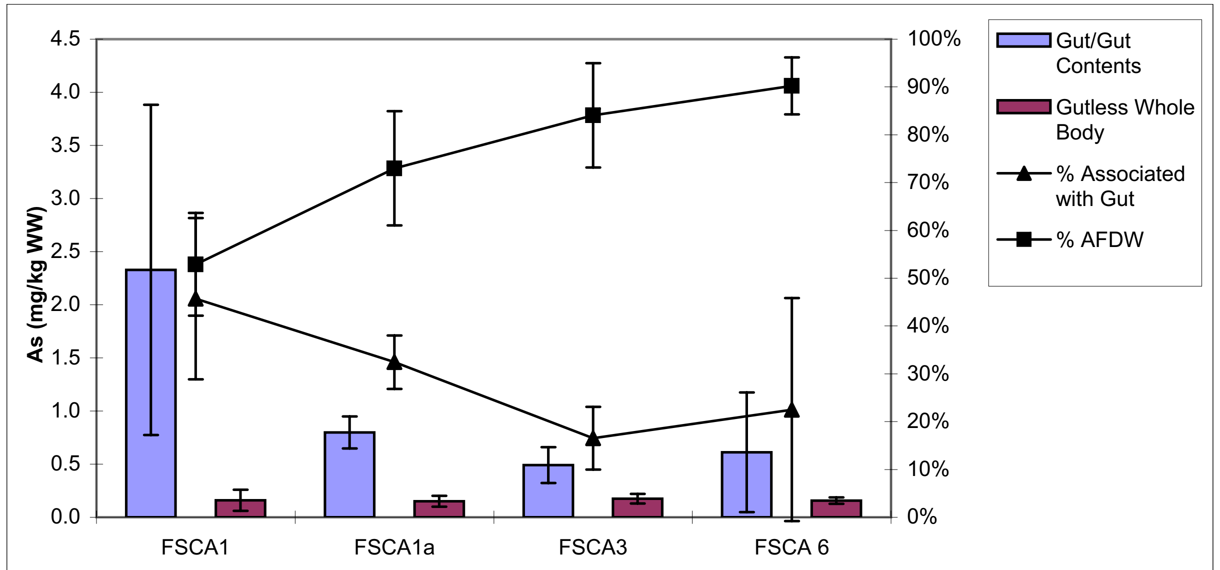
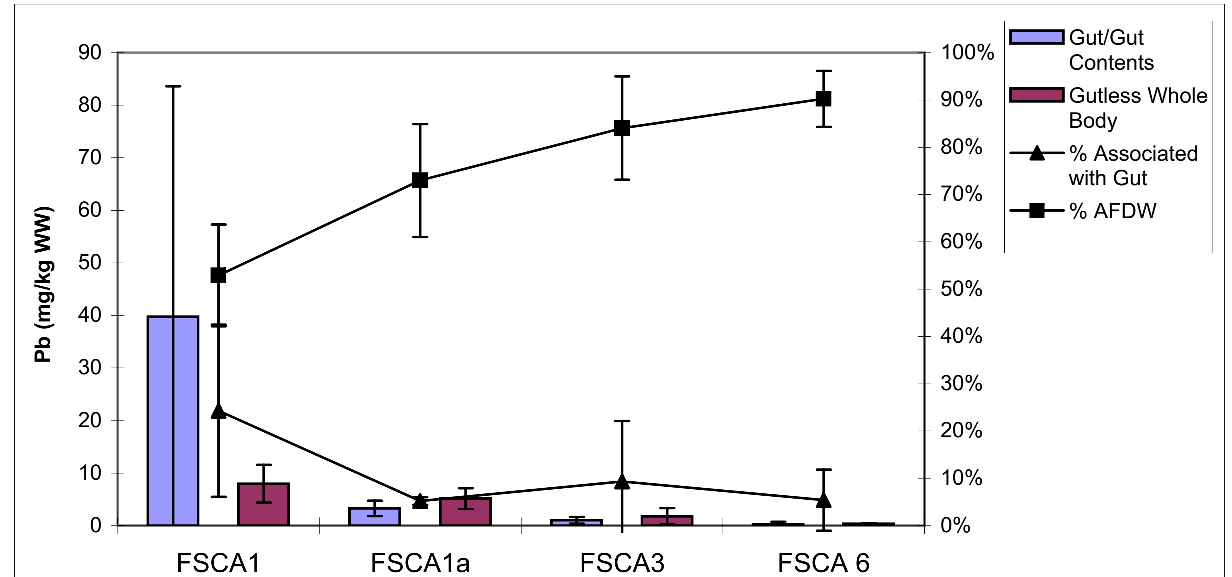


Figure 3-24 Comparison of Inorganic and Organic Arsenic Species in Fillets of Walleye and Rainbow Trout
Upper Columbia River RI/FS



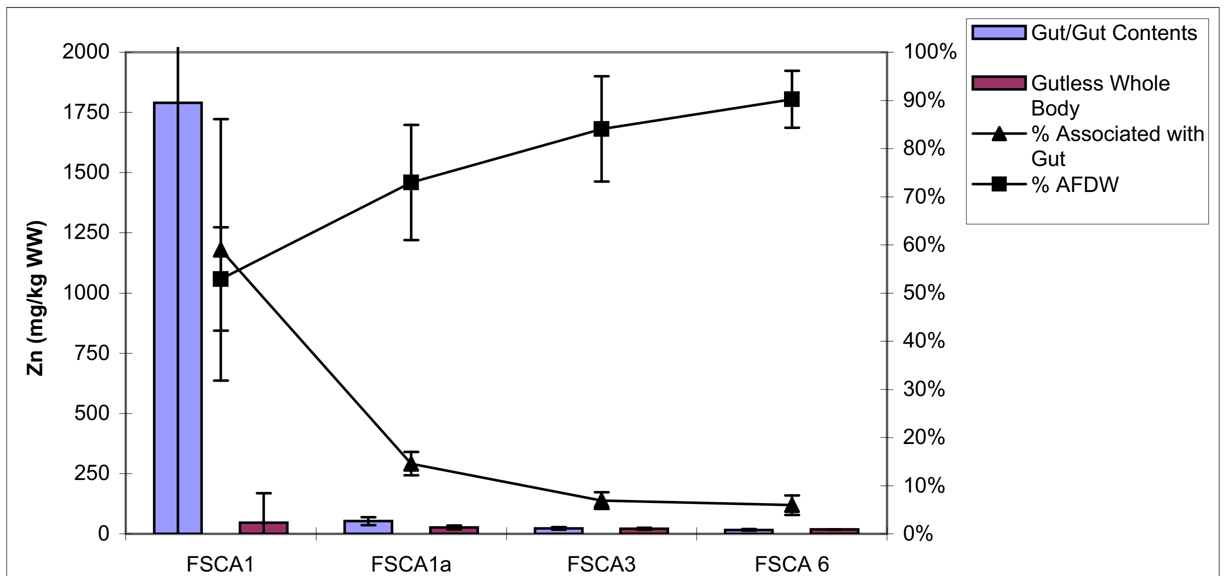
Error bars equal ± 1 SD

Figure 3-25 Comparison of As in Gut/Gut Contents to Gutless Whole Body Concentration in Largescale Suckers
Upper Columbia River RI/FS



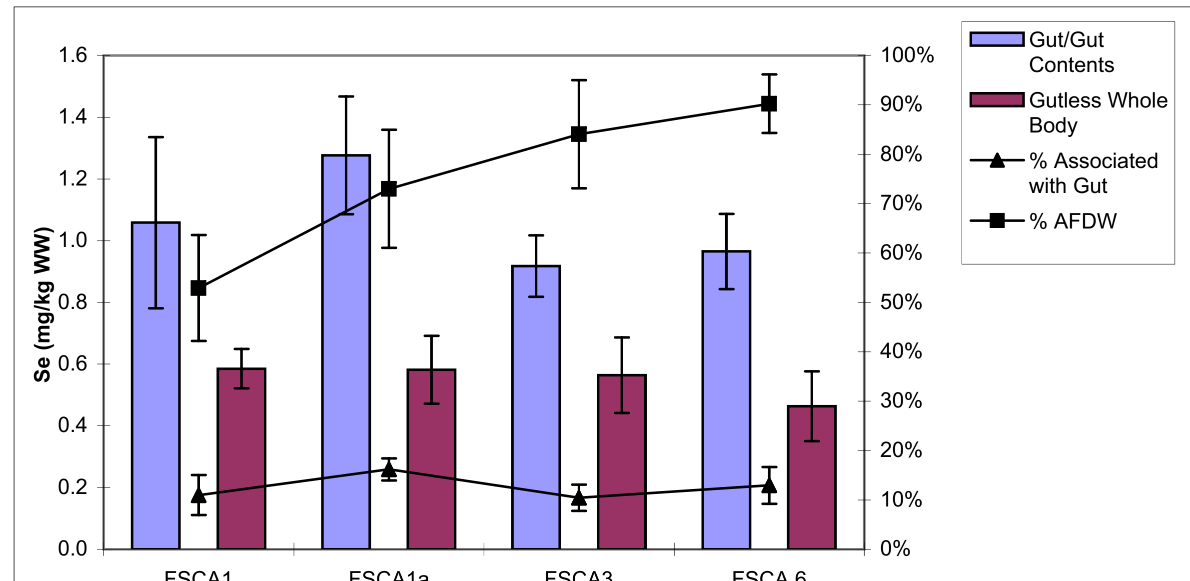
Error bars equal ± 1 SD

Figure 3-27 Comparison of Pb in Gut/Gut Contents to Gutless Whole Body Concentration in Largescale Suckers
Upper Columbia River RI/FS



Error bars equal ± 1 SD

Figure 3-26 Comparison of Zn in Gut/Gut Contents to Gutless Whole Body Concentration in Largescale Suckers
Upper Columbia River RI/FS



Error bars equal ± 1 SD

Figure 3-28 Comparison of Se in Gut/Gut Contents to Gutless Whole Body Concentration in Largescale Suckers
Upper Columbia River RI/FS

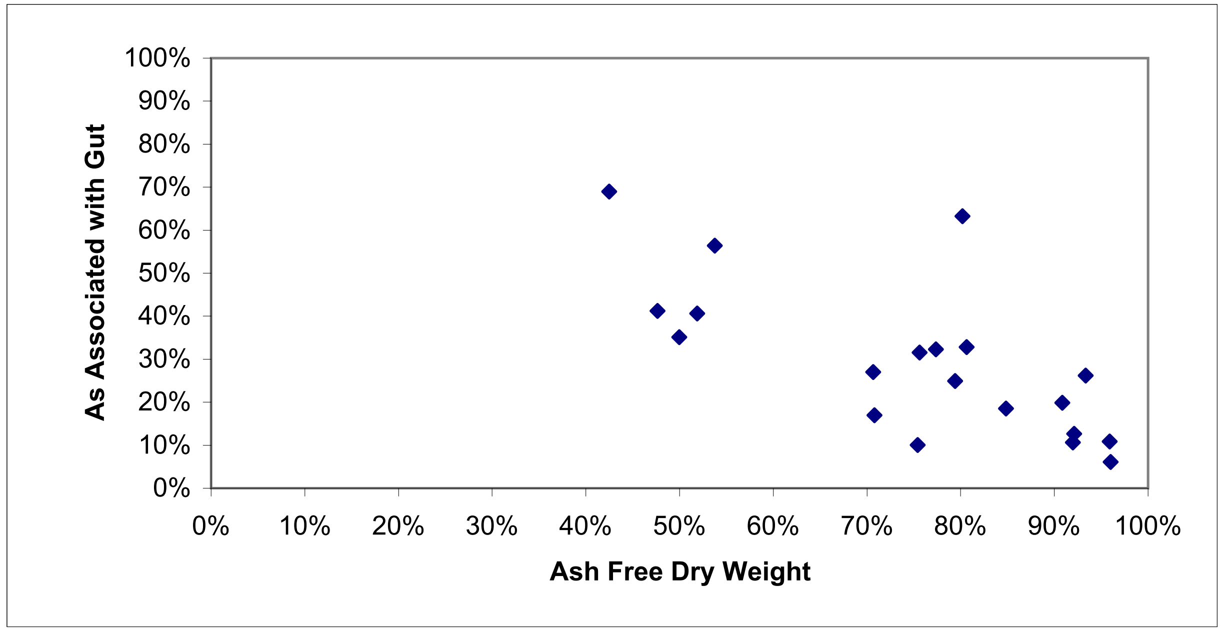


Figure 3-29 Comparison of Percent As Associated with Gut/Contents and % Inorganic Matter as Ash Free Dry Weight for Largescale Sucker
Upper Columbia River RI/FS

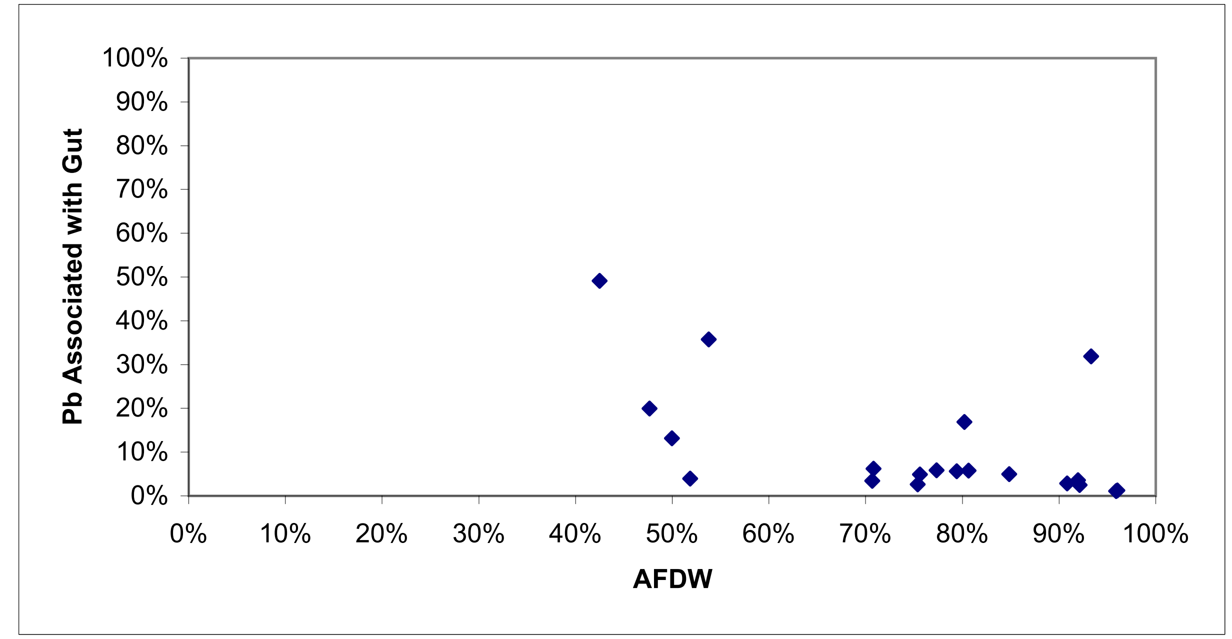


Figure 3-31 Comparison of Percent Pb Associated with Gut/Contents and % Inorganic Matter as Ash Free Dry Weight for Largescale Sucker
Upper Columbia River RI/FS

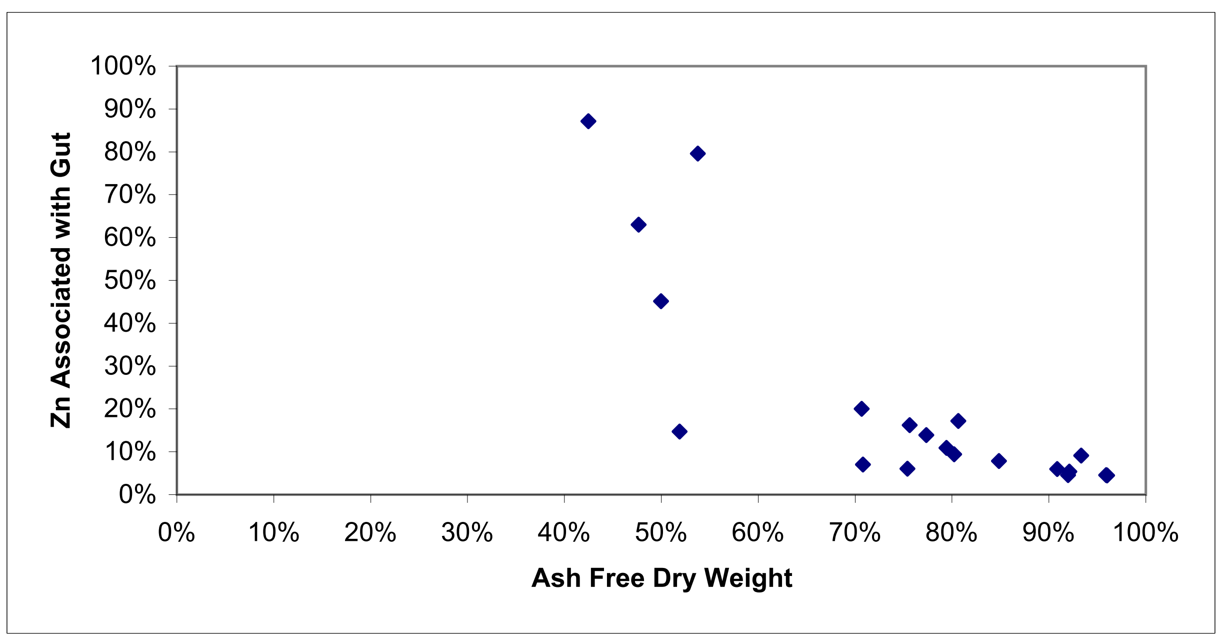


Figure 3-30 Comparison of Percent Zn Associated with Gut/Contents and % Inorganic Matter as Ash Free Dry Weight for Largescale Sucker
Upper Columbia River RI/FS

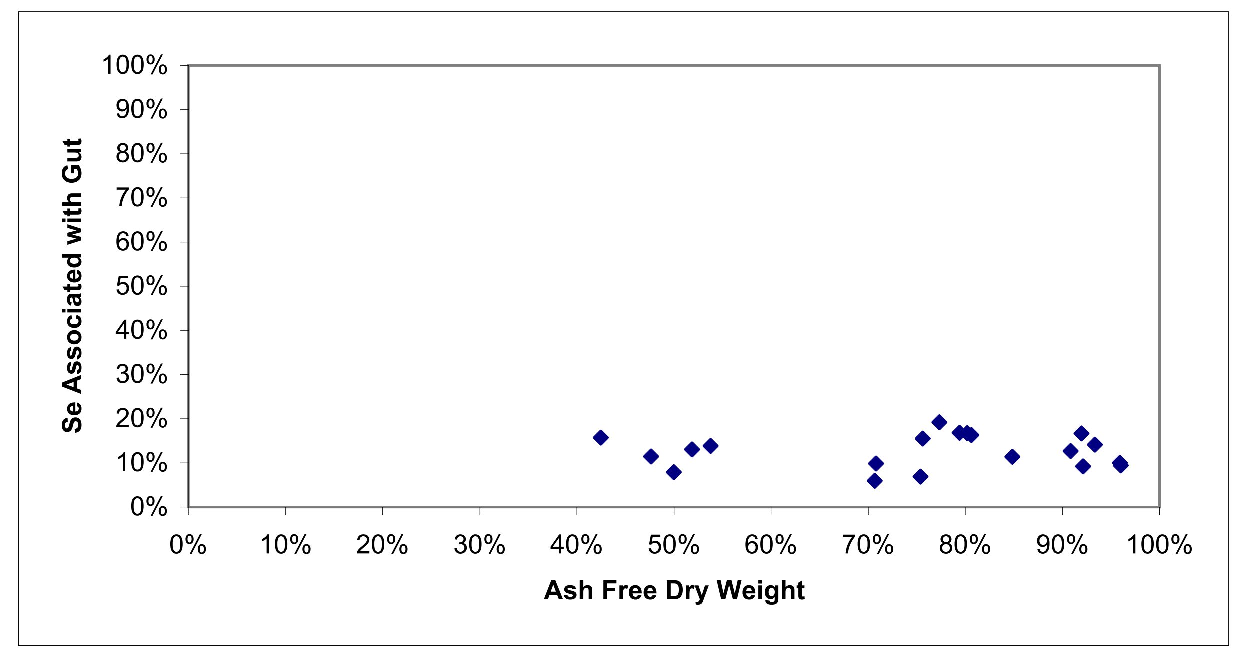


Figure 3-32 Comparison of Percent Se Associated with Gut/Contents and % Inorganic Matter as Ash Free Dry Weight for Largescale Sucker
Upper Columbia River RI/FS

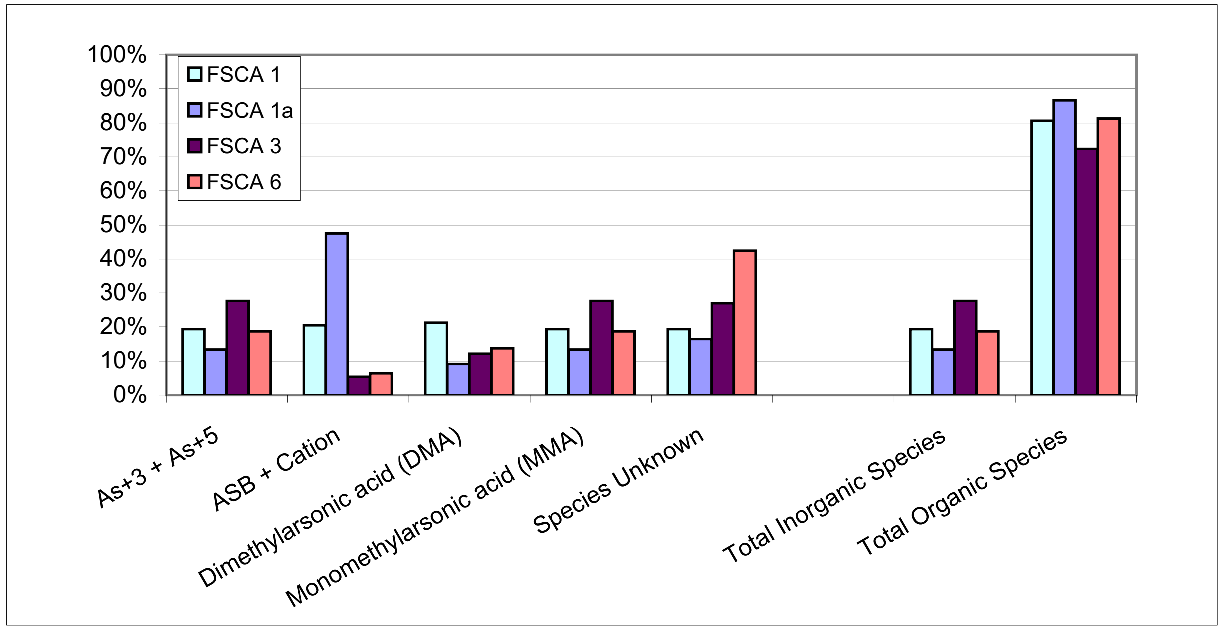


Figure 3-33 Comparison of Inorganic and Organic Arsenic Species in Gutless Whole Body Largescale Sucker Samples by FSCA
Upper Columbia River RI/FS

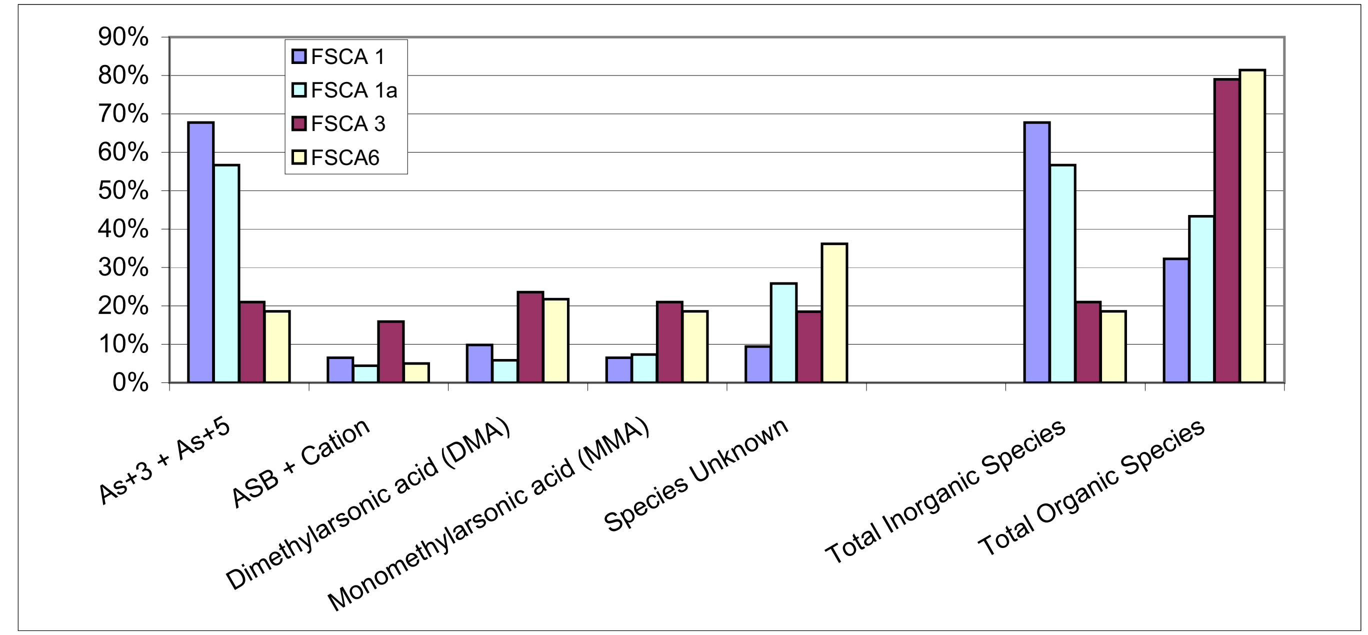


Figure 3-34 Comparison of Inorganic and Organic Arsenic Species in Largescale Sucker Gut/Contents Samples by FSCA
Upper Columbia River RI/FS

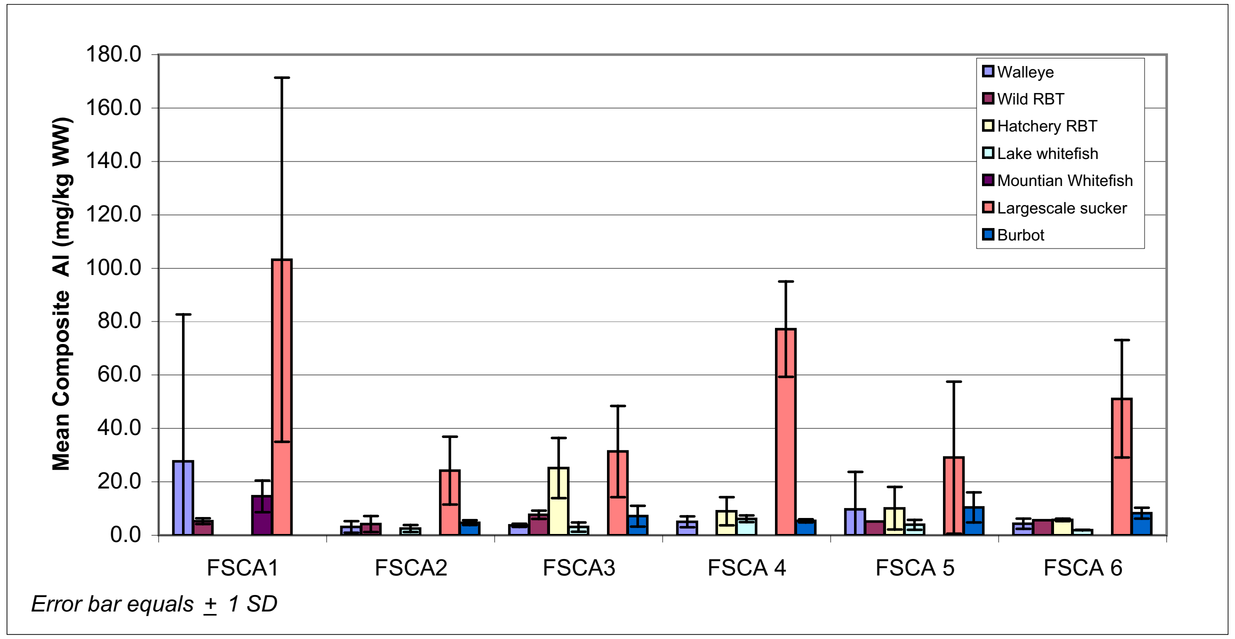


Figure 3-35 Comparison of Aluminum Concentrations in Whole Body Samples from Target Species by FSCA
Upper Columbia River RI/FS

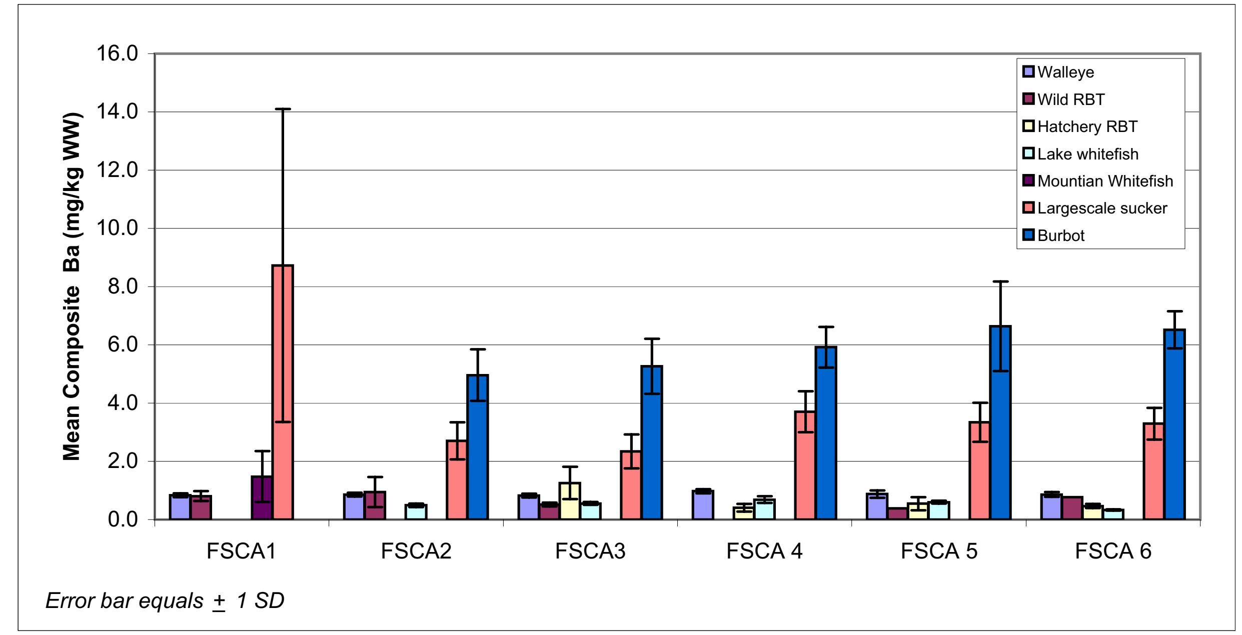


Figure 3-37 Comparison of Barium Concentrations in Whole Body Samples from Target Species by FSCA
Upper Columbia River RI/FS

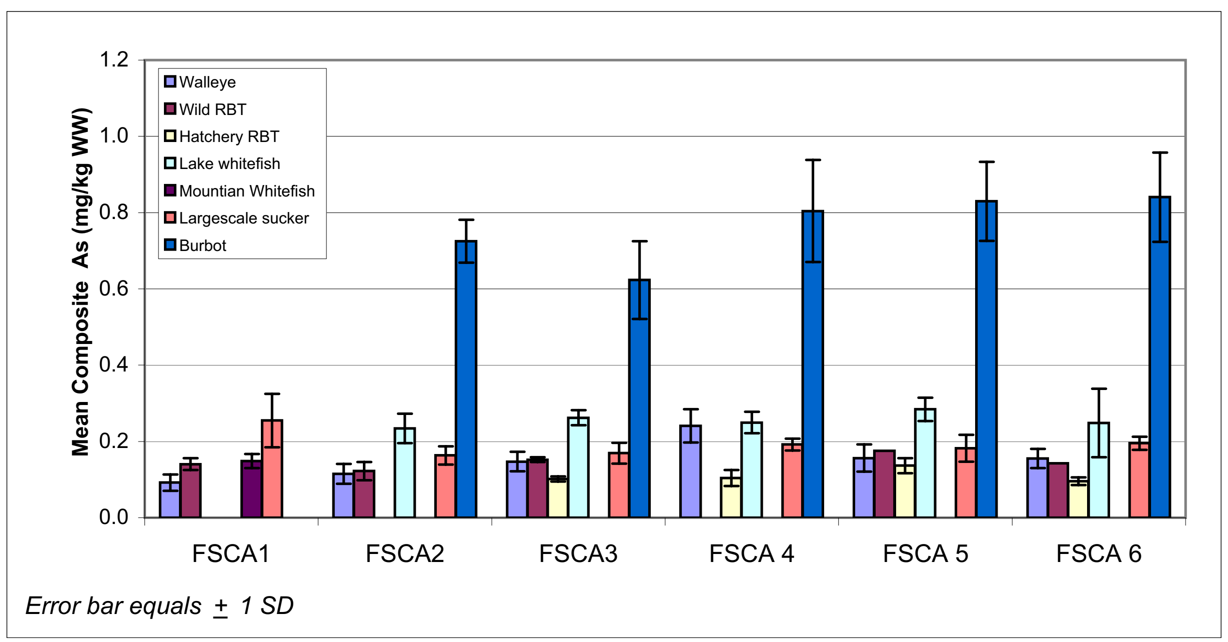


Figure 3-36 Comparison of Arsenic Concentrations in Whole Body Samples from Target Species by FSCA
Upper Columbia River RI/FS

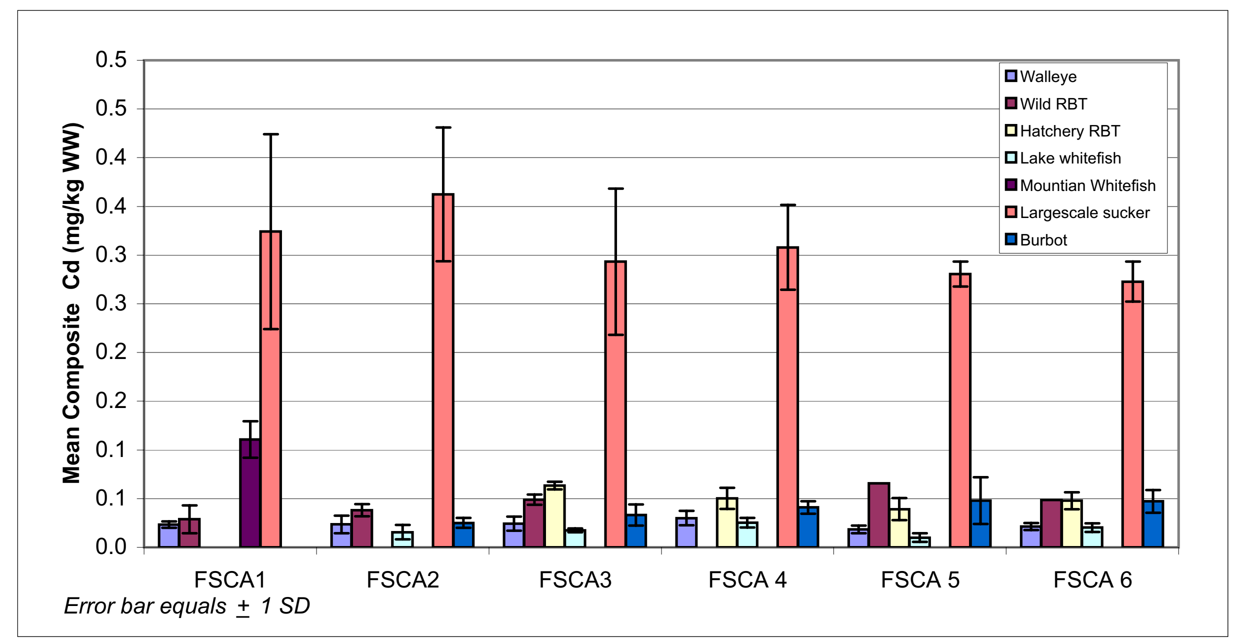


Figure 3-38 Comparison of Cadmium Concentrations in Whole Body Samples from Target Species by FSCA
Upper Columbia River RI/FS

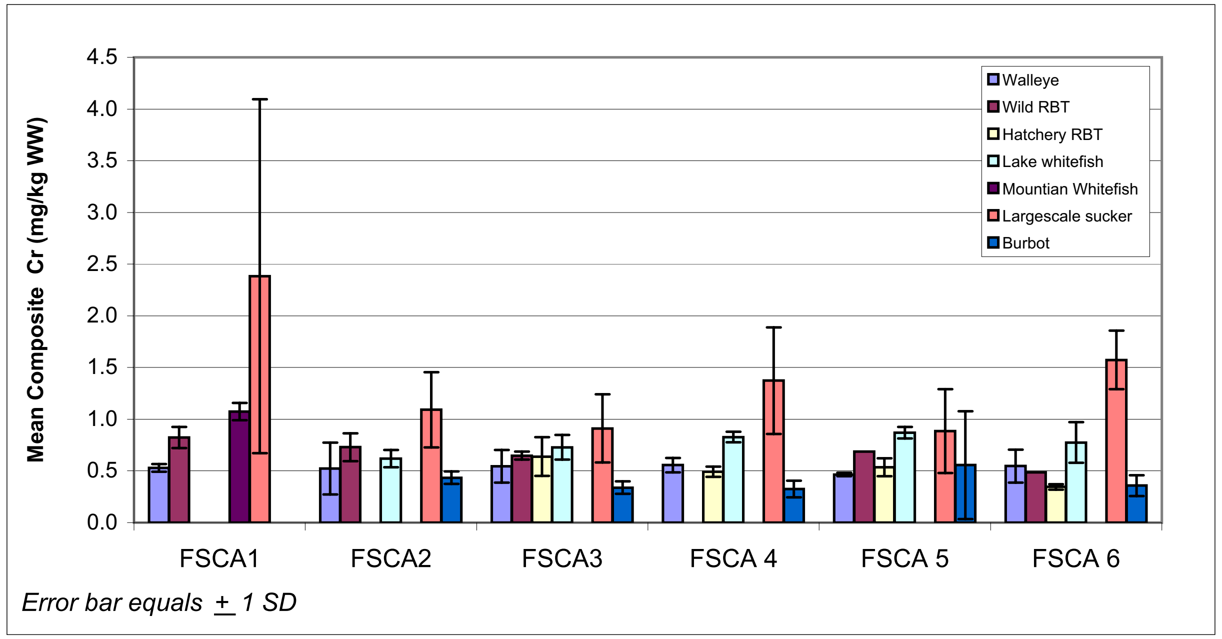


Figure 3-39 Comparison of Chromium Concentrations in Whole Body Samples from Target Species by FSCA
Upper Columbia River RI/FS

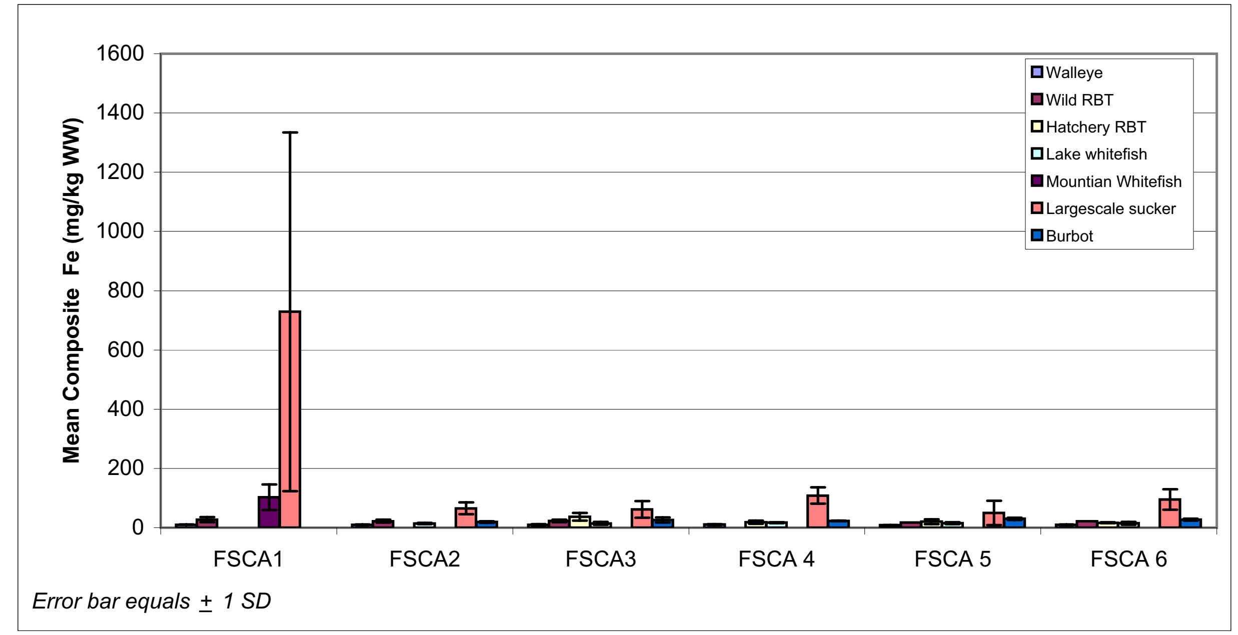


Figure 3-41 Comparison of Iron Concentrations in Whole Body Samples from Target Species by FSCA
Upper Columbia River RI/FS

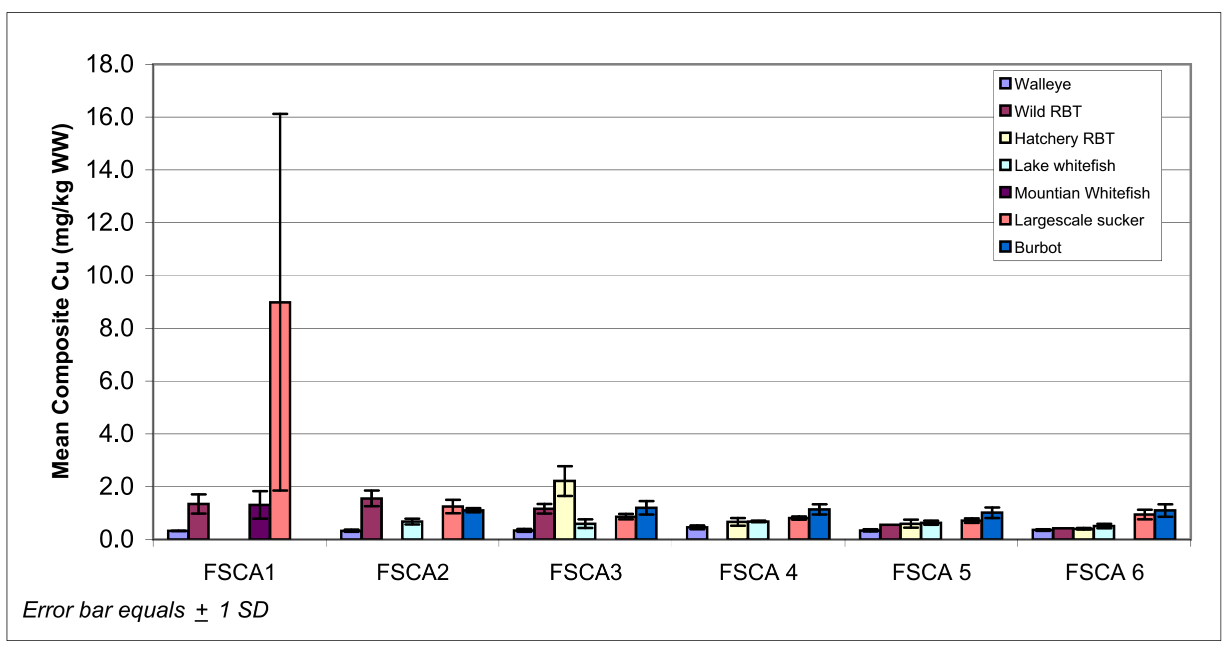


Figure 3-40 Comparison of Copper Concentrations in Whole Body Samples from Target Species by FSCA
Upper Columbia River RI/FS

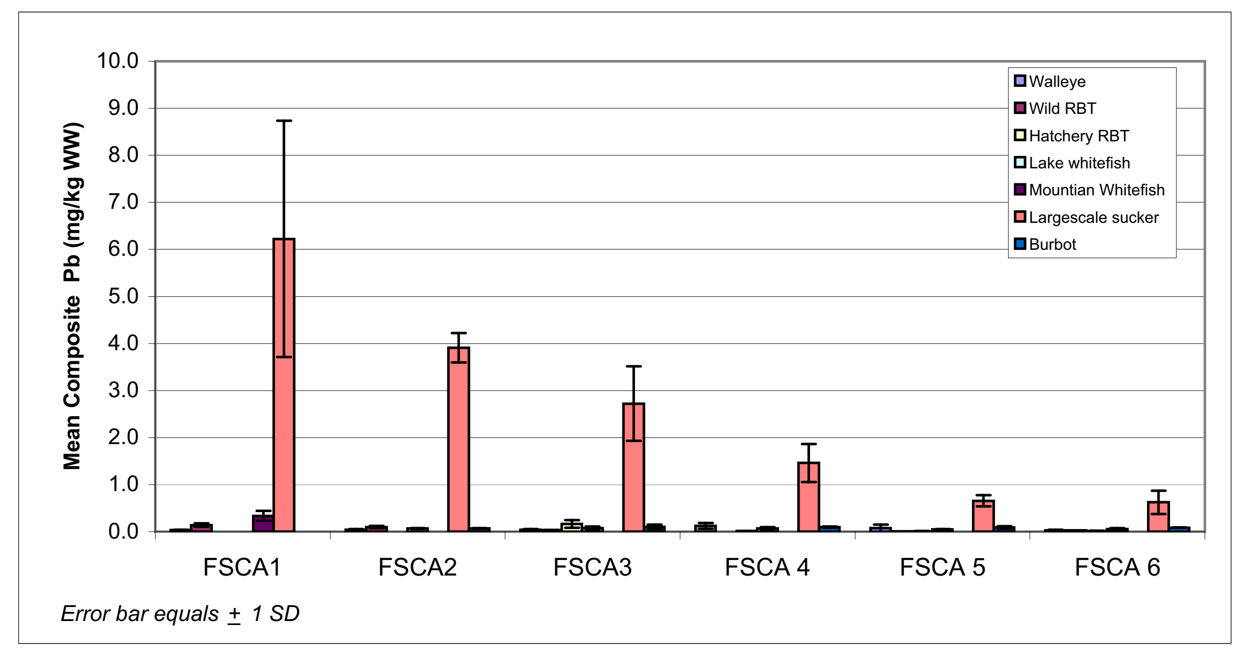


Figure 3-42 Comparison of Lead Concentrations in Whole Body Samples from Target Species by FSCA
Upper Columbia River RI/FS

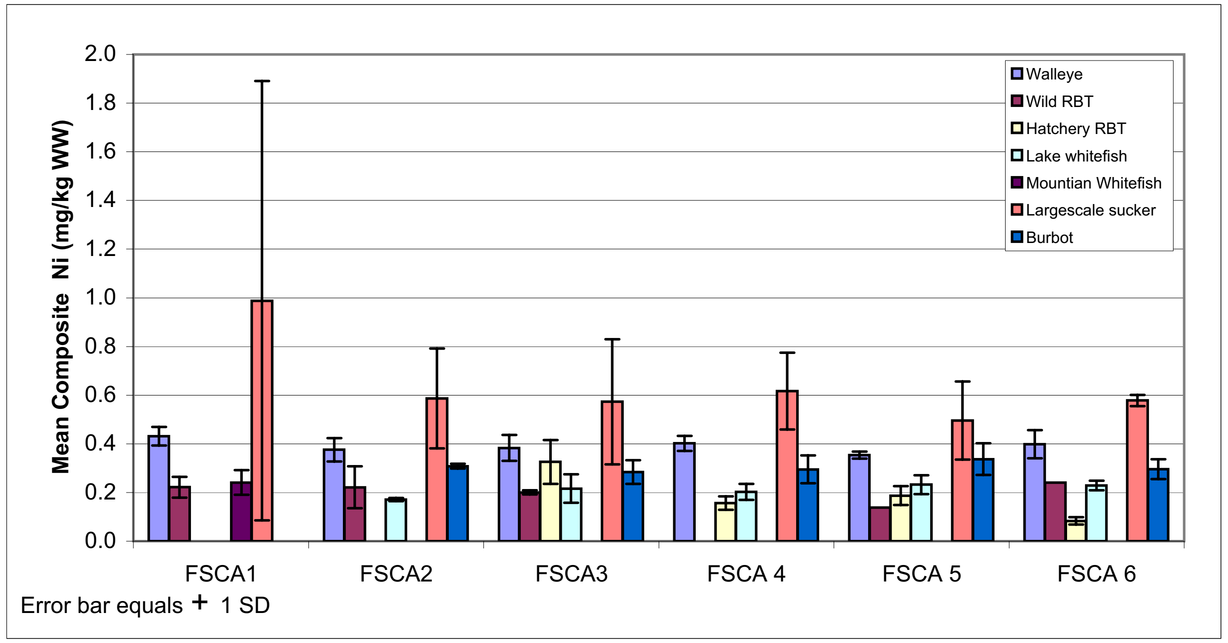


Figure 3-43 Comparison of Nickel Concentrations in Whole Body Samples from Target Species by FSCA
Upper Columbia River RI/FS

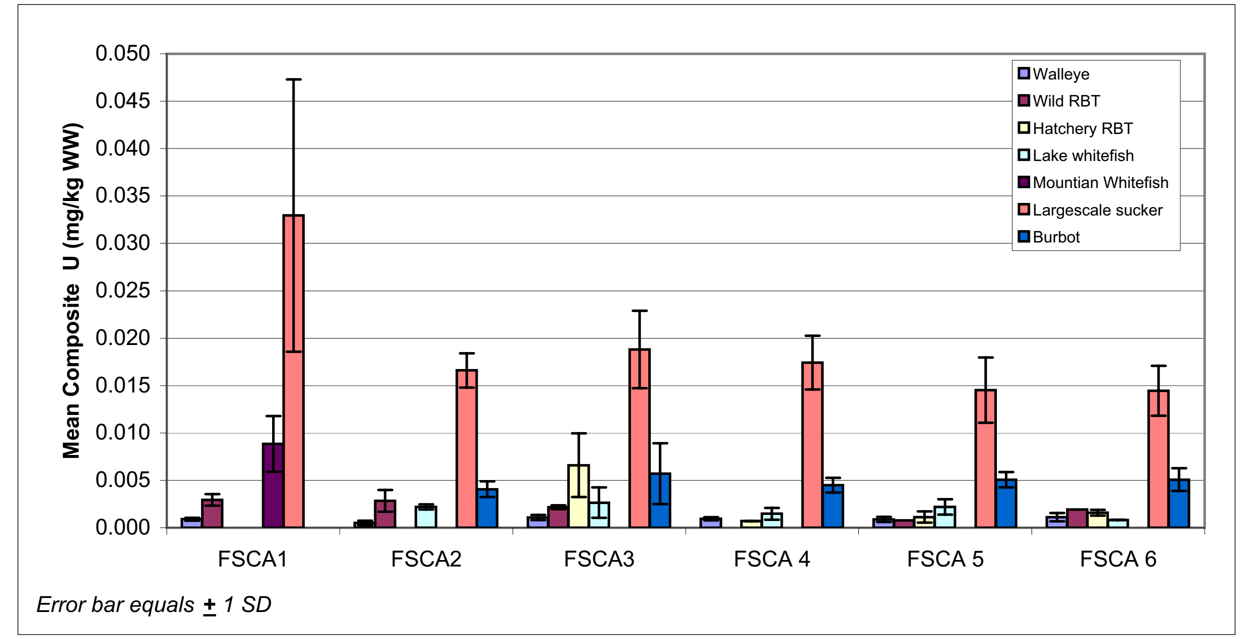


Figure 3-45 Comparison of Uranium Concentrations in Whole Body Samples from Target Species by FSCA
Upper Columbia River RI/FS

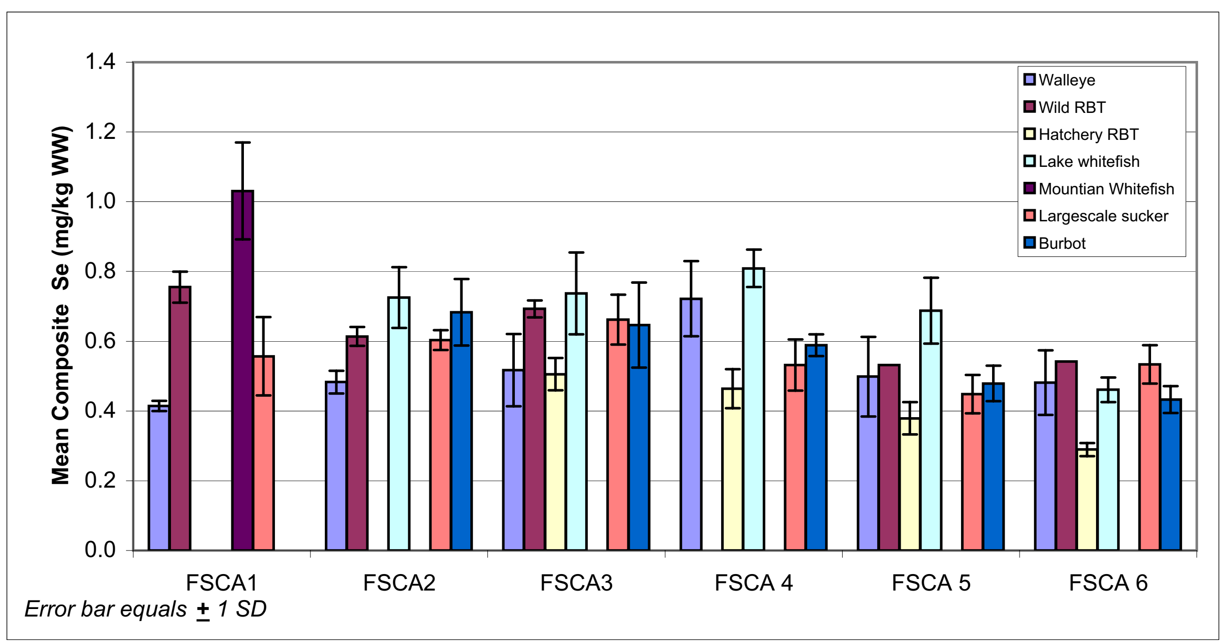


Figure 3-44 Comparison of Selenium Concentrations in Whole Body Samples from Target Species by FSCA
Upper Columbia River RI/FS

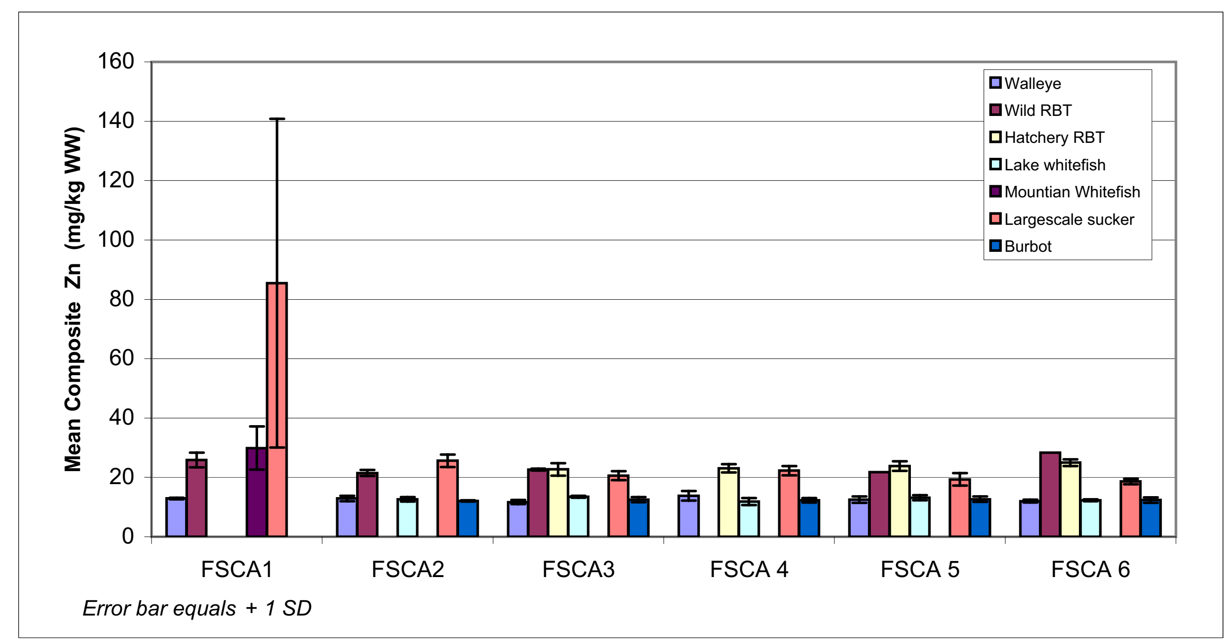


Figure 3-46 Comparison of Zinc Concentrations in Whole Body Samples from Target Species by FSCA
Upper Columbia River RI/FS

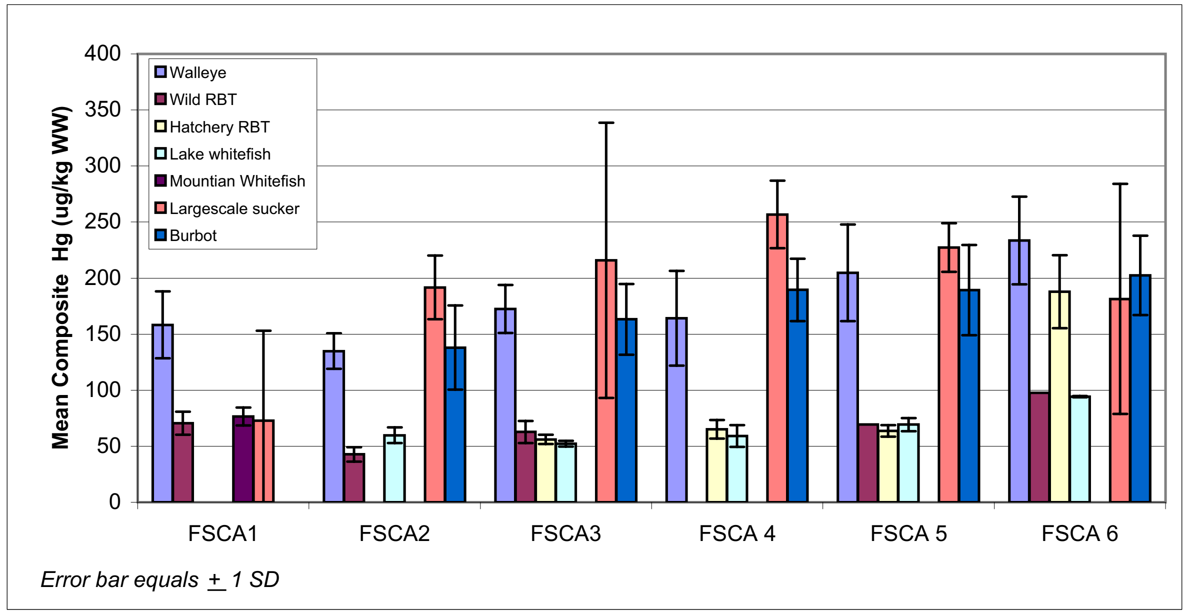


Figure 3-47 Comparison of Mercury Concentrations in Whole Body Samples from Target Species by FSCA
Upper Columbia River RI/FS

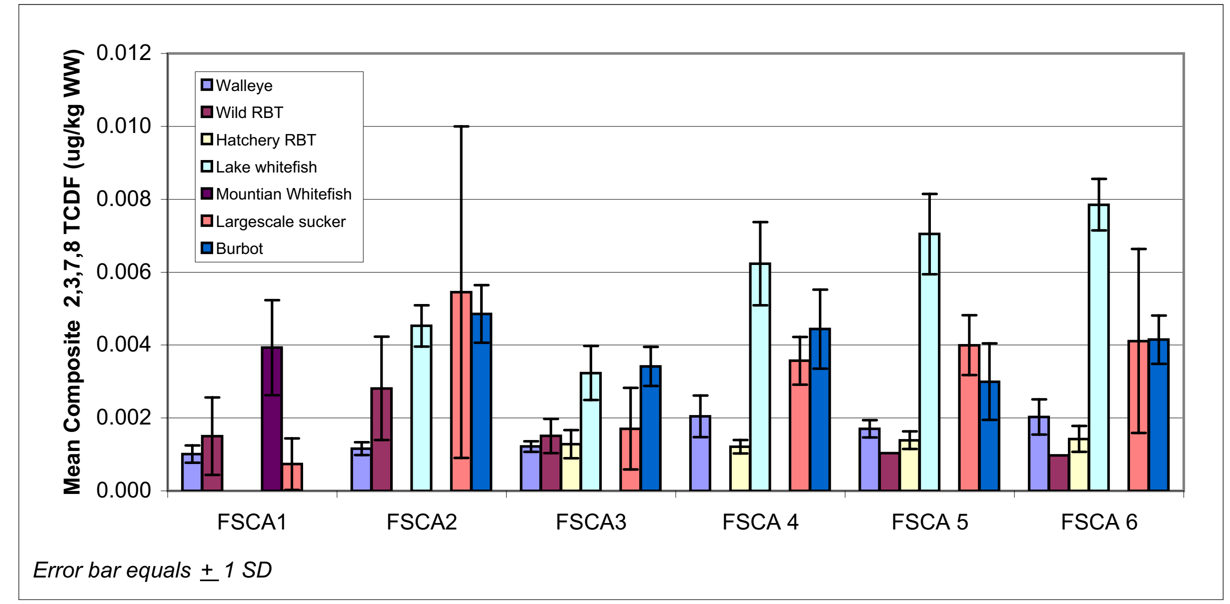


Figure 3-49 Comparison of 2,3,7,8 TCDF Concentrations in Whole Body Samples from Target Species by FSCA
Upper Columbia River RI/FS

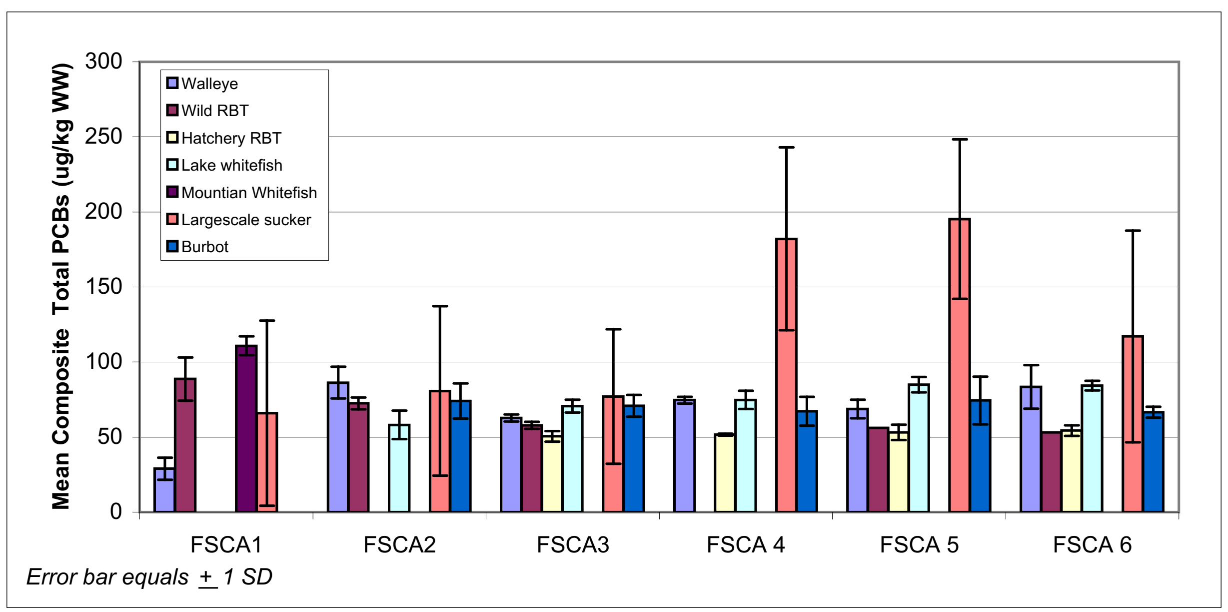


Figure 3-48 Comparison of Total PCB as Aroclor Concentrations in Whole Body Samples from Target Species by FSCA
Upper Columbia River RI/FS

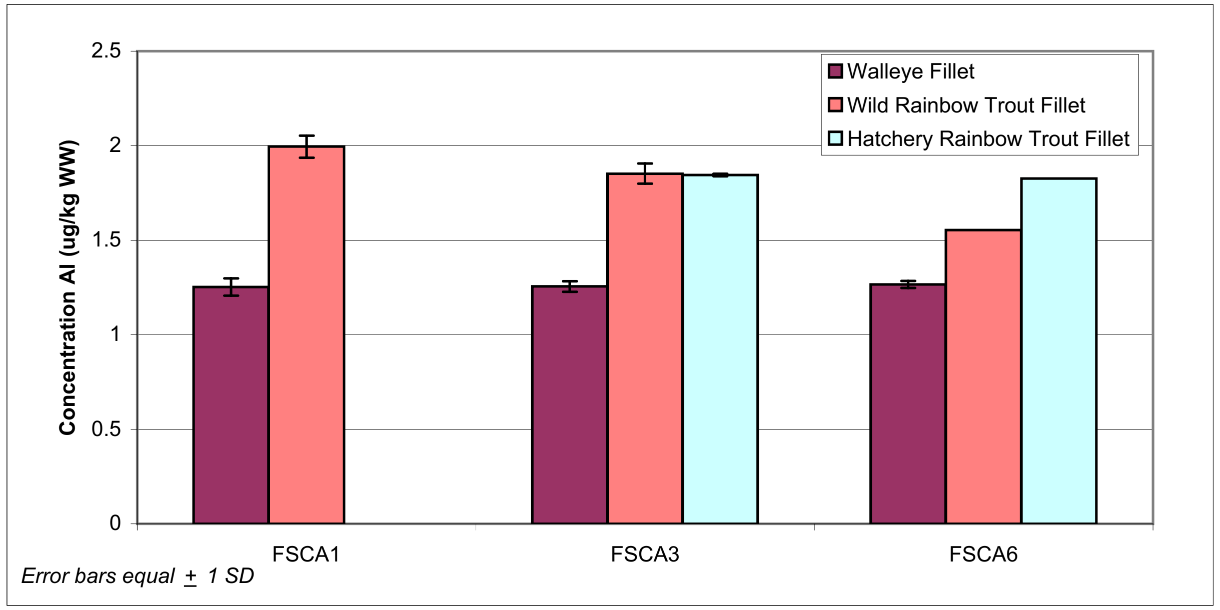


Figure 3-50 Comparison of Aluminum Concentrations in Fillet Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

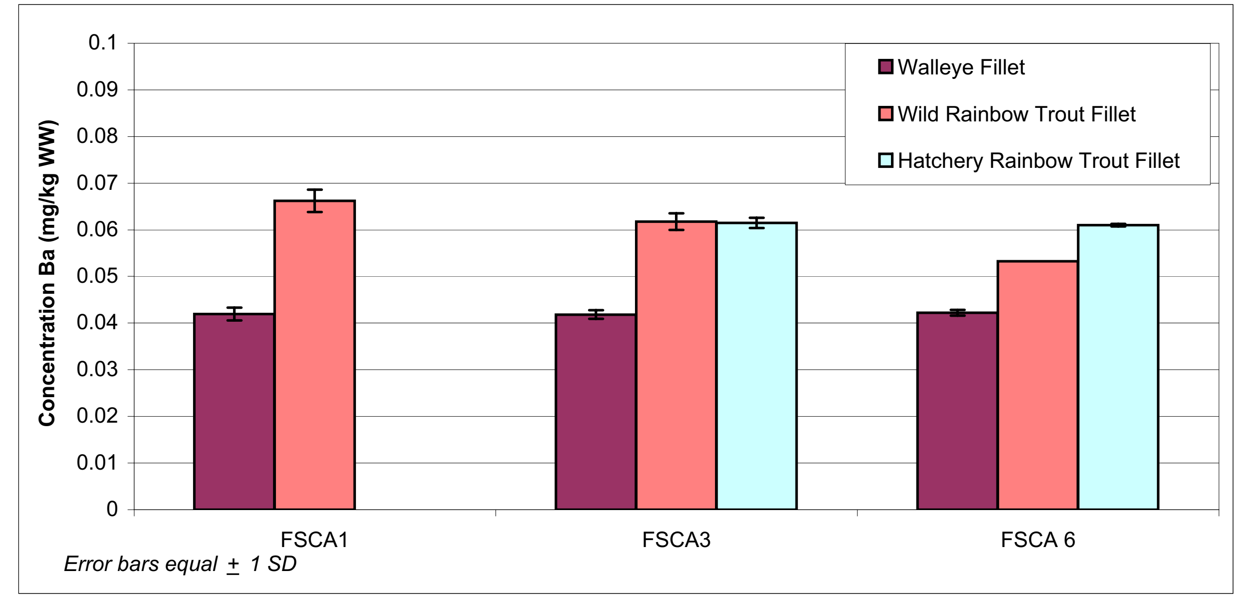


Figure 3-52 Comparison of Barium Concentrations in Fillet Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

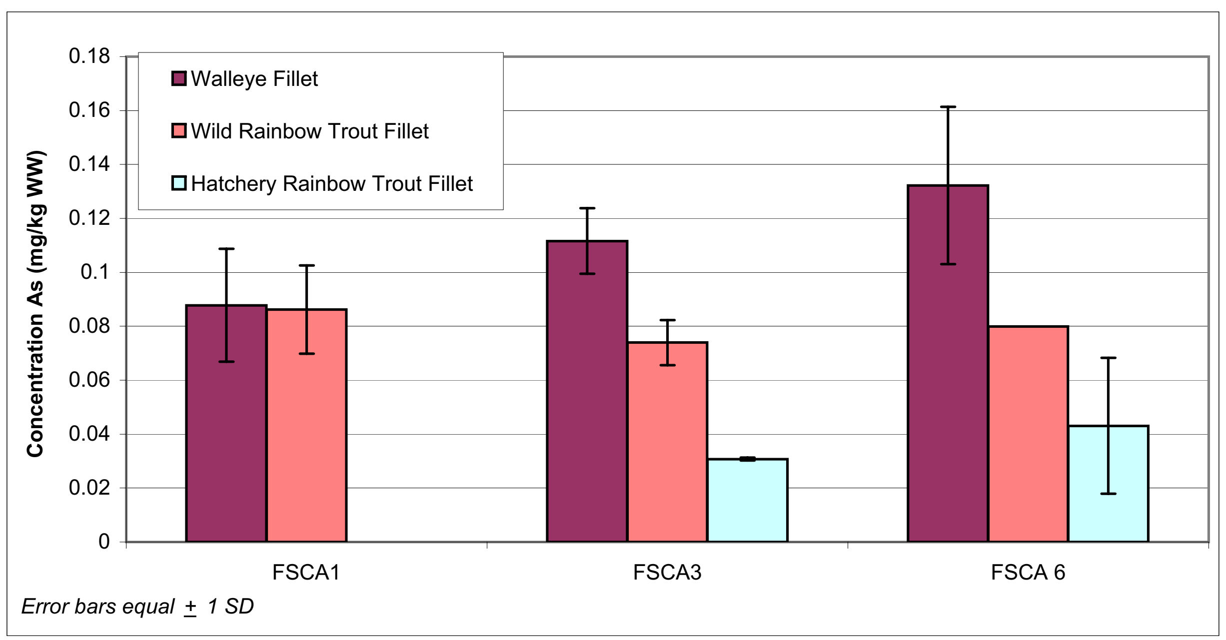


Figure 3-51 Comparison of Arsenic Concentrations in Fillet Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

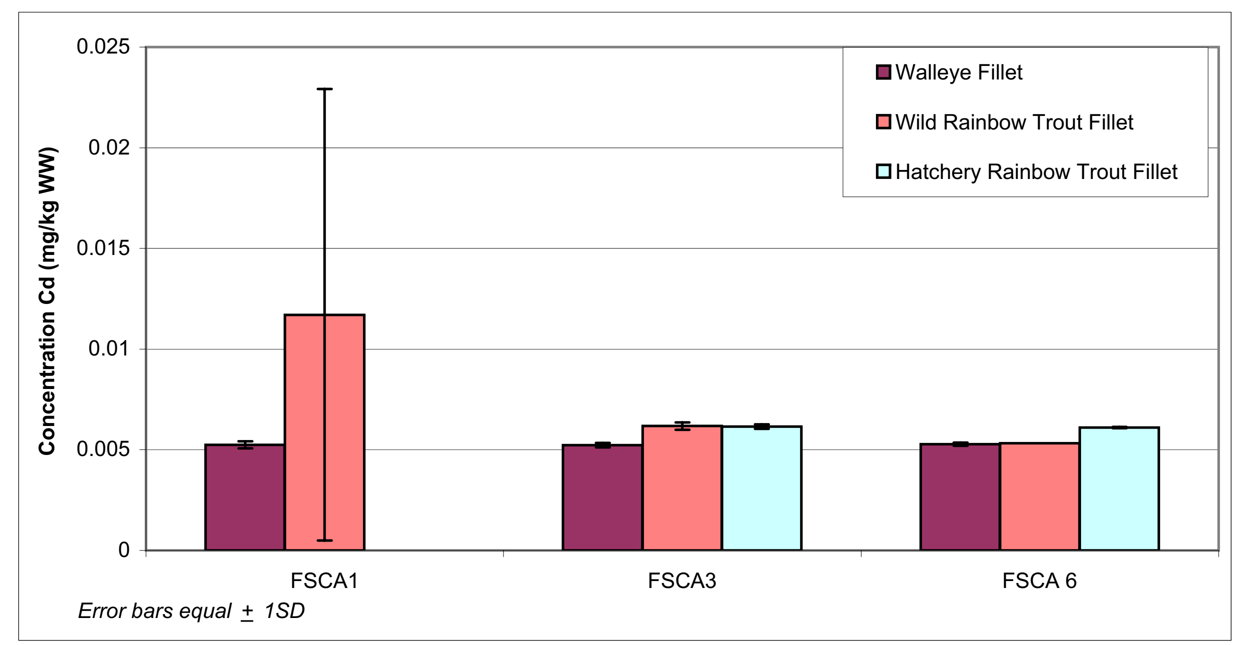


Figure 3-53 Comparison of Cadmium Concentrations in Fillet Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

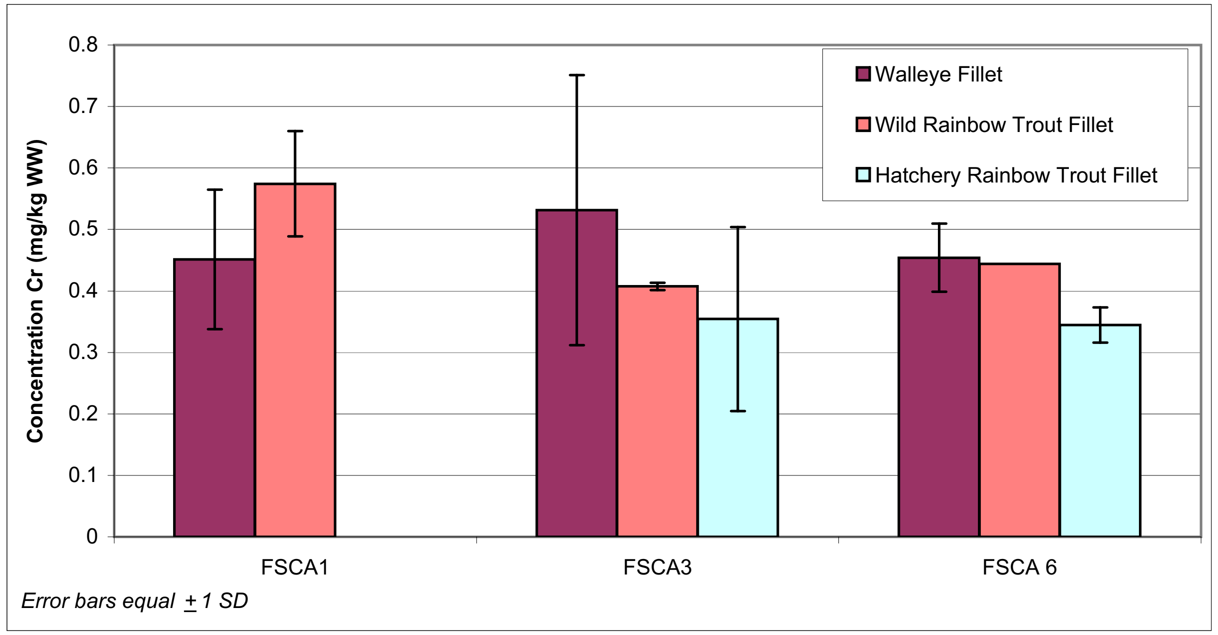


Figure 3-54 Comparison of Chromium Concentrations in Fillet Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

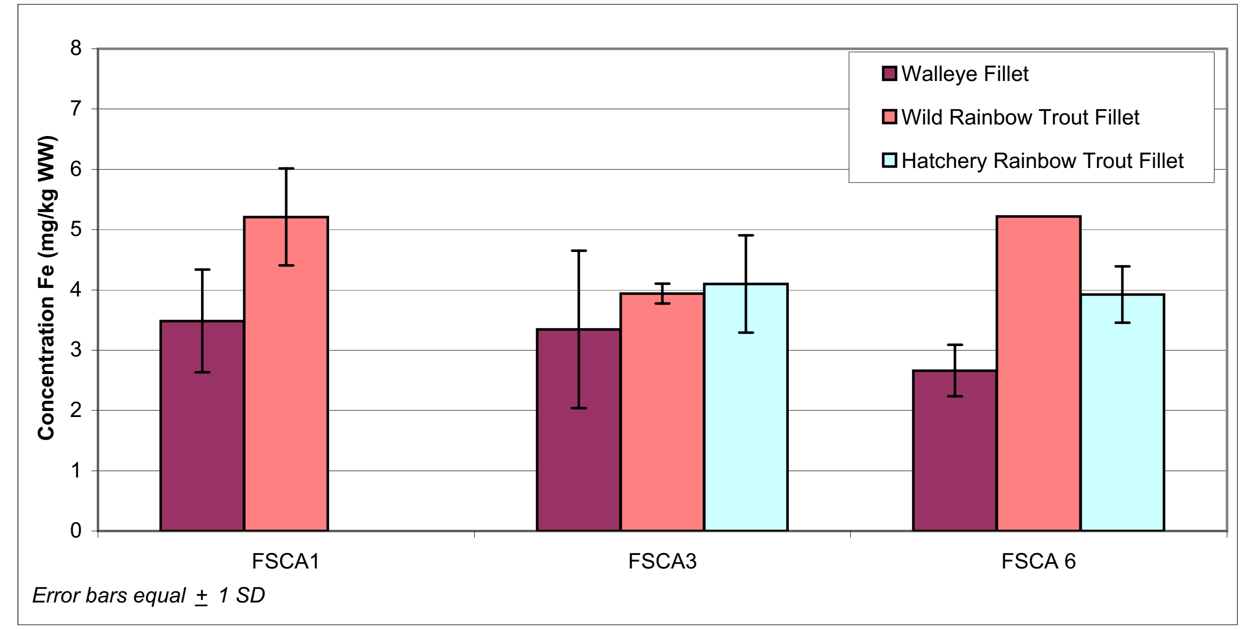


Figure 3-56 Comparison of Iron Concentrations in Fillet Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

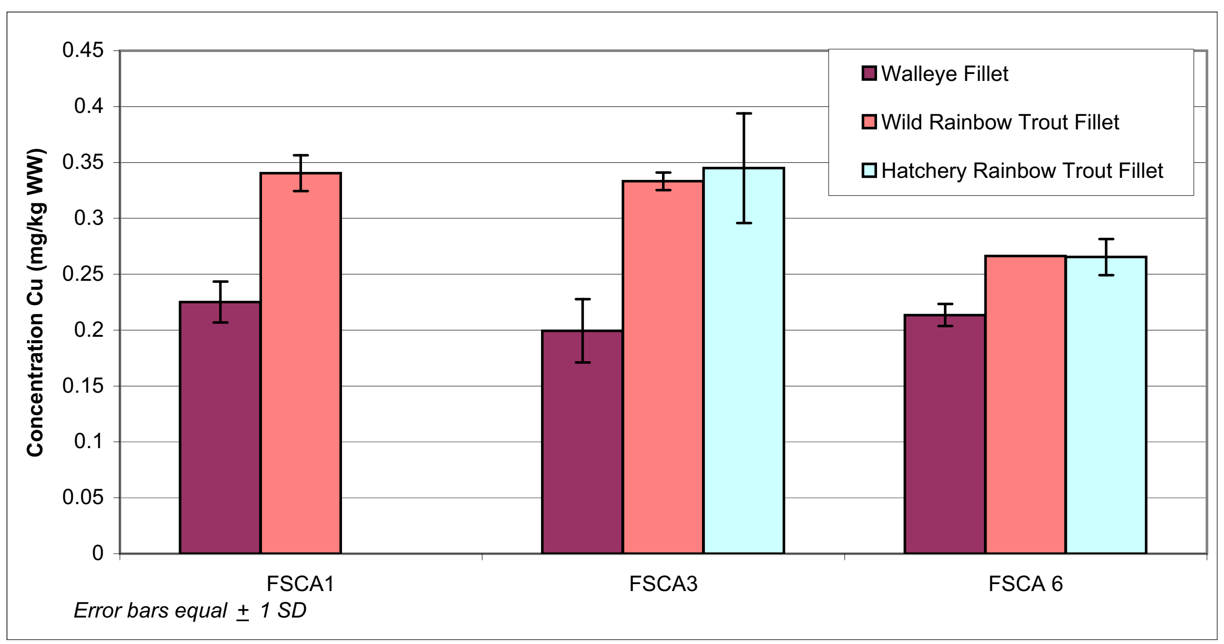


Figure 3-55 Comparison of Copper Concentrations in Fillet Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

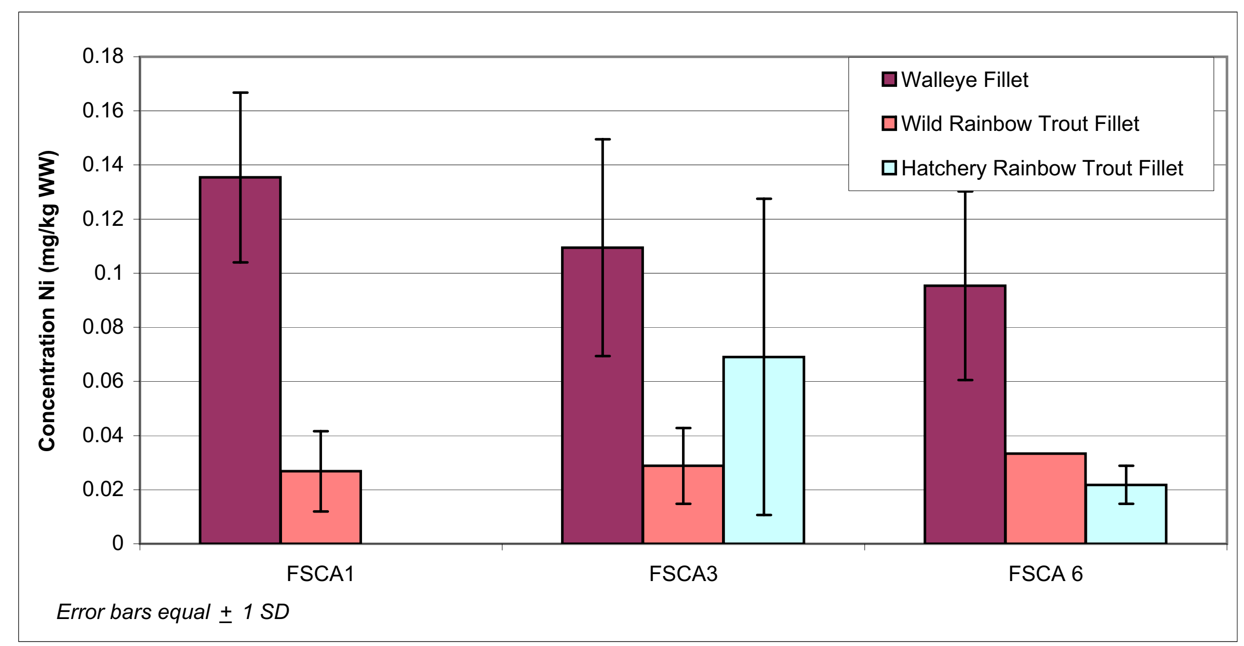


Figure 3-57 Comparison of Nickel Concentrations in Fillet Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

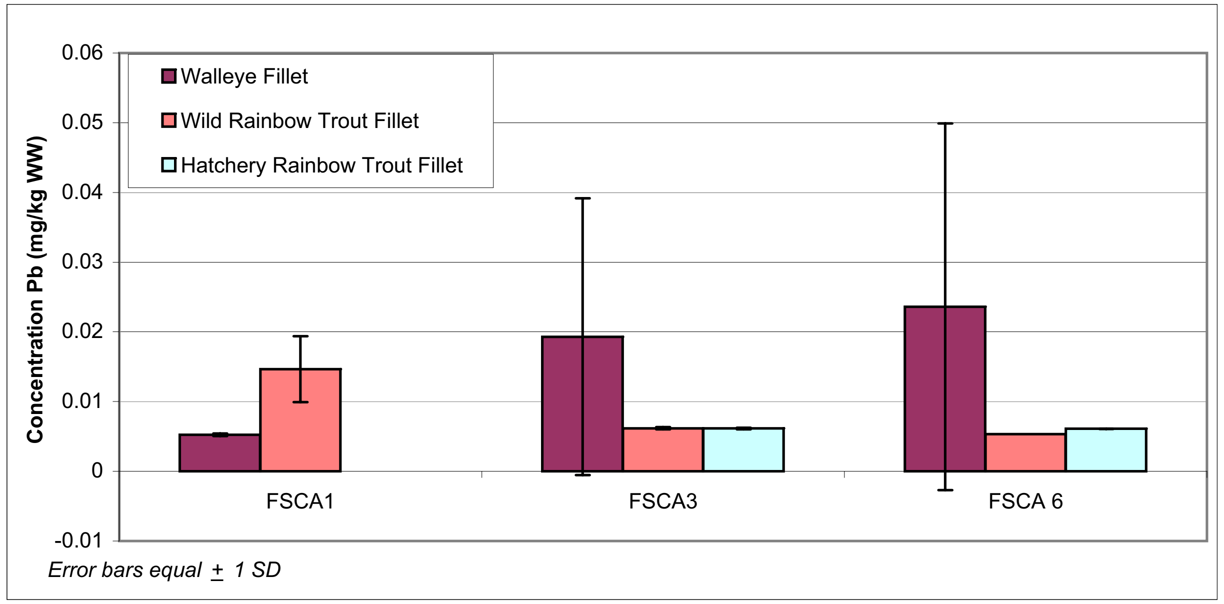


Figure 3-58 Comparison of Lead Concentrations in Fillet Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

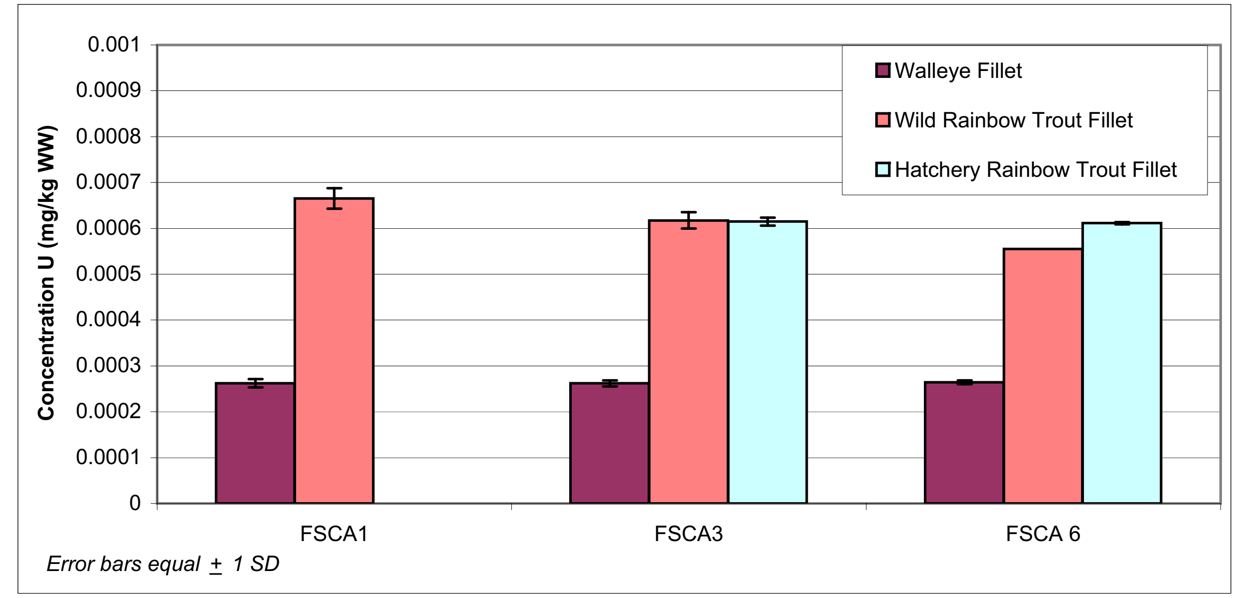


Figure 3-60 Comparison of Uranium Concentrations in Fillet Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

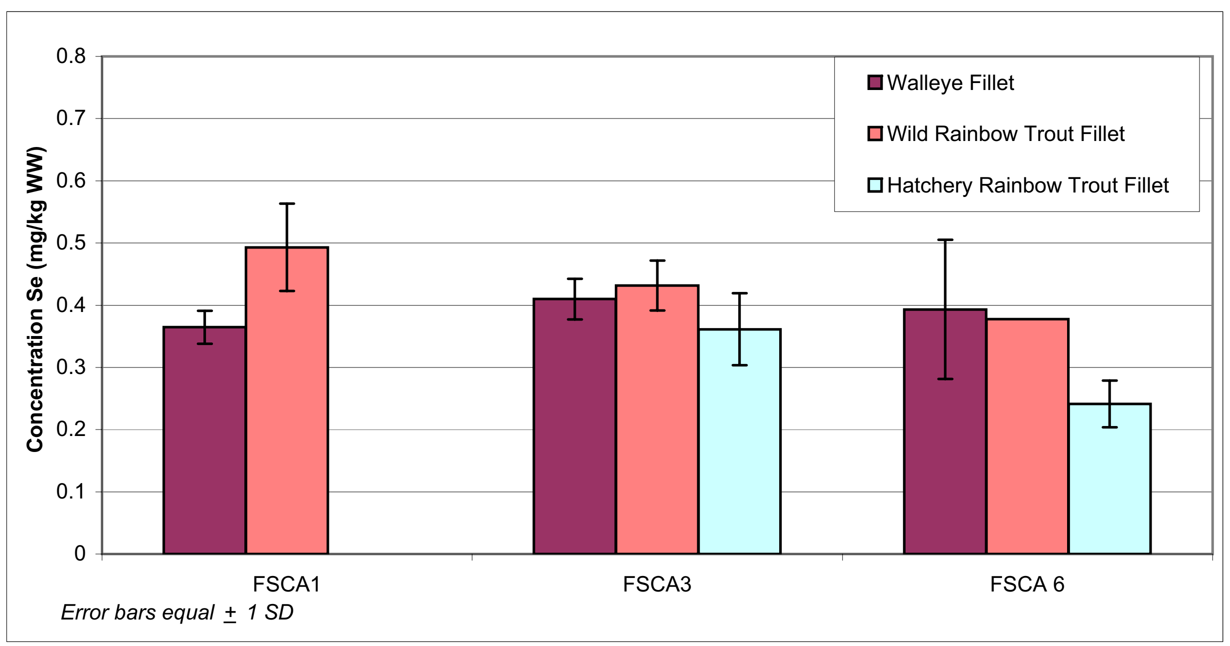


Figure 3-59 Comparison of Selenium Concentrations in Fillet Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

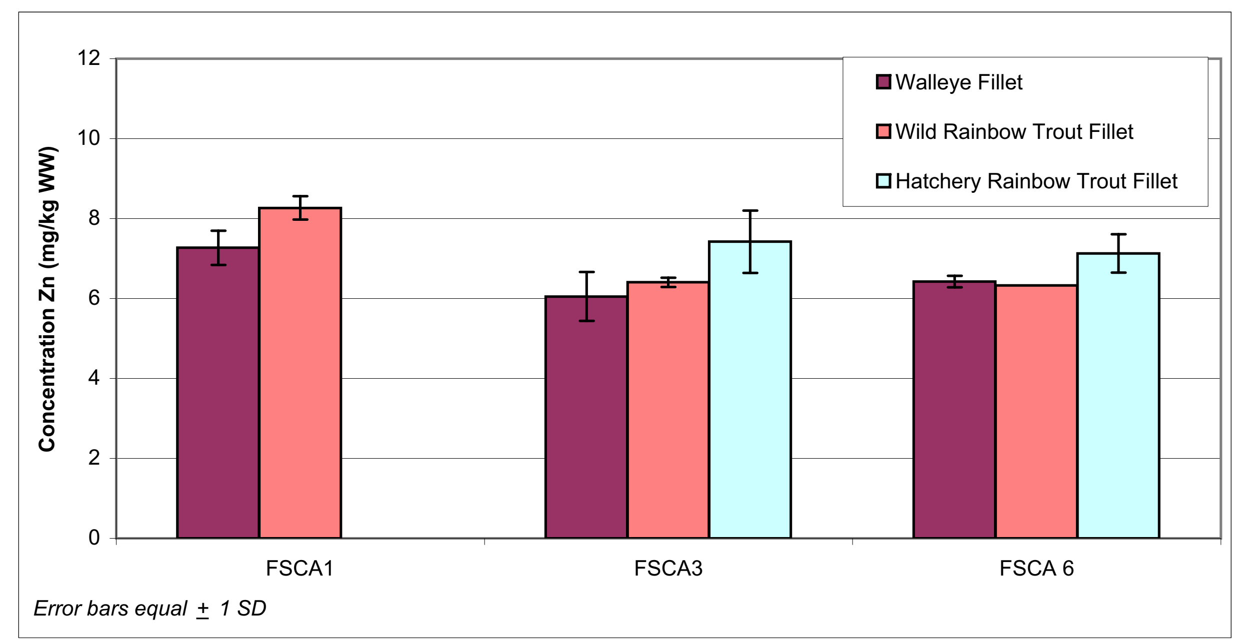


Figure 3-61 Comparison of Zinc Concentrations in Fillet Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

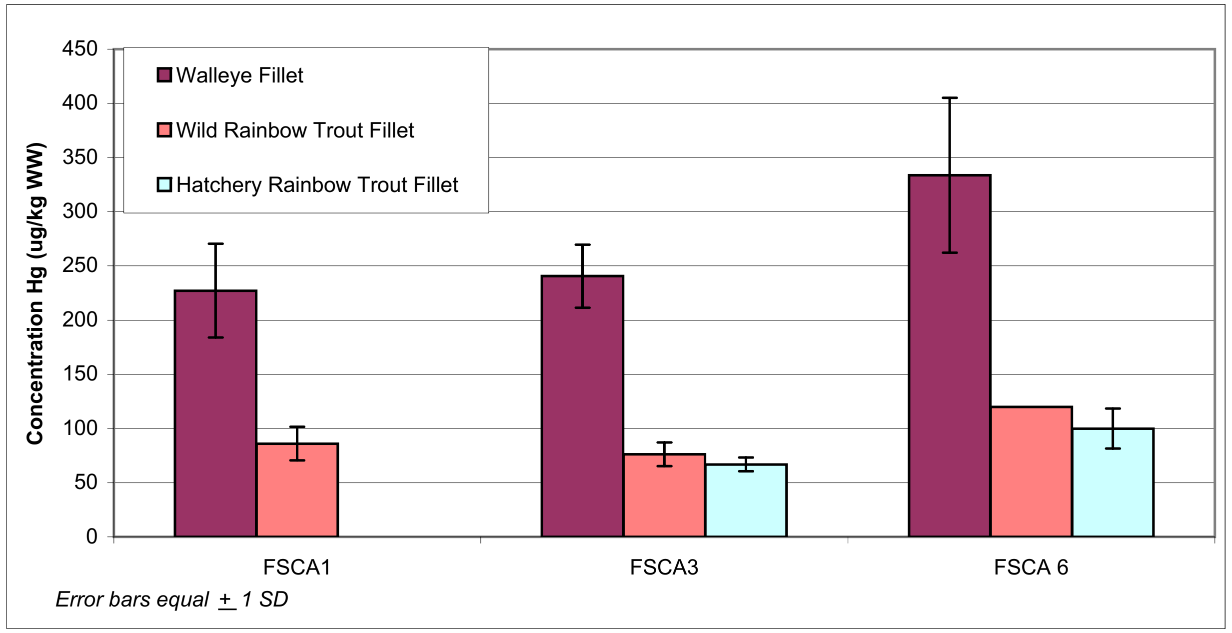


Figure 3-62 Comparison of Mercury Concentrations in Fillet Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

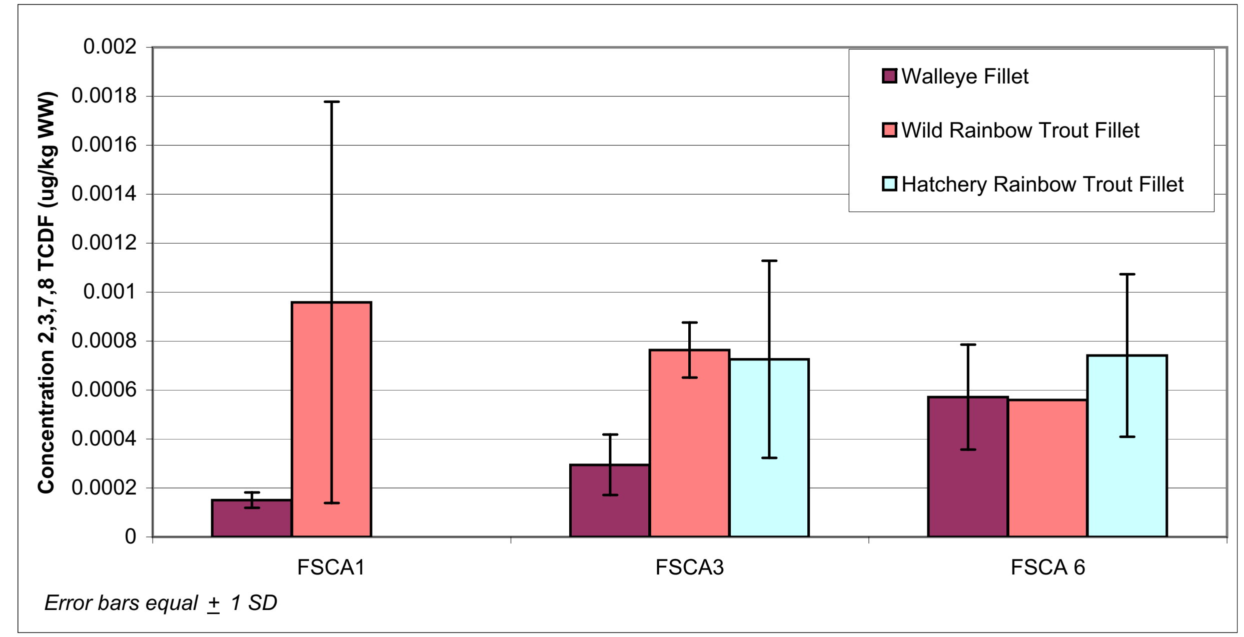


Figure 3-64 Comparison of 2,3,7,8 TCDF Concentrations in Fillet Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

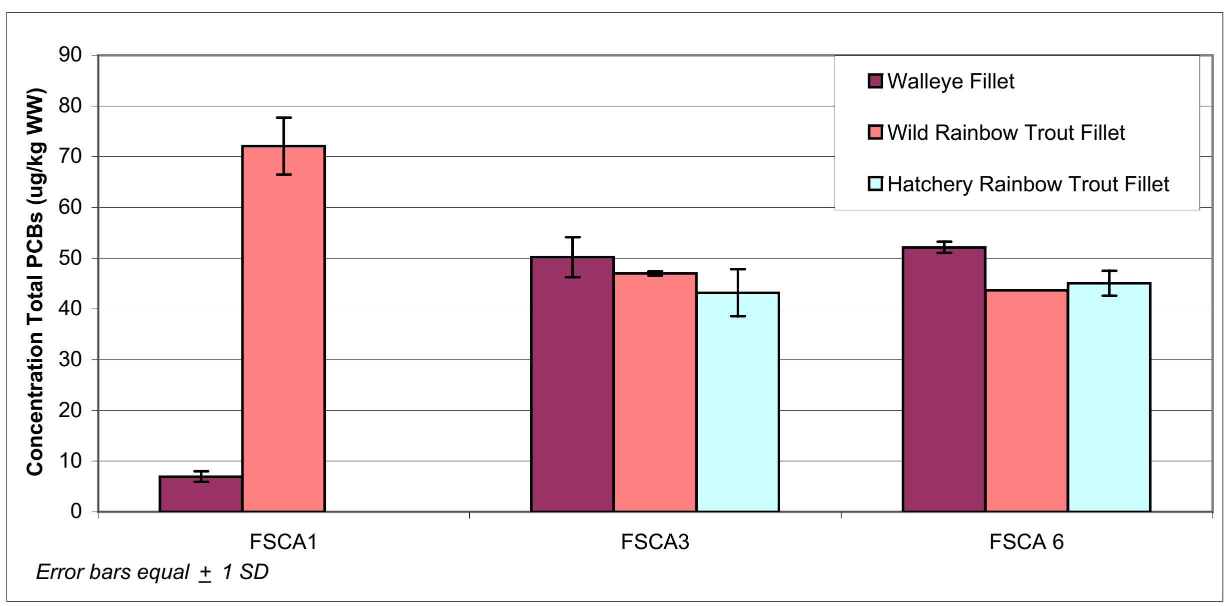
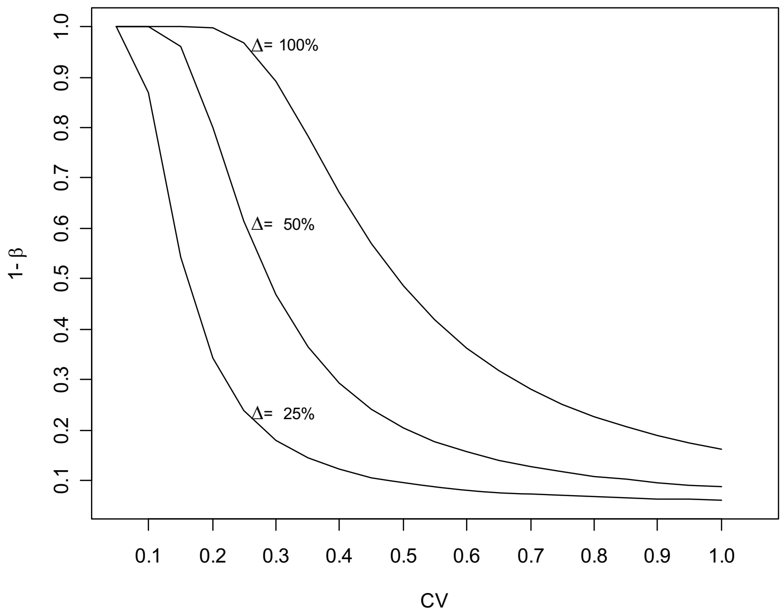


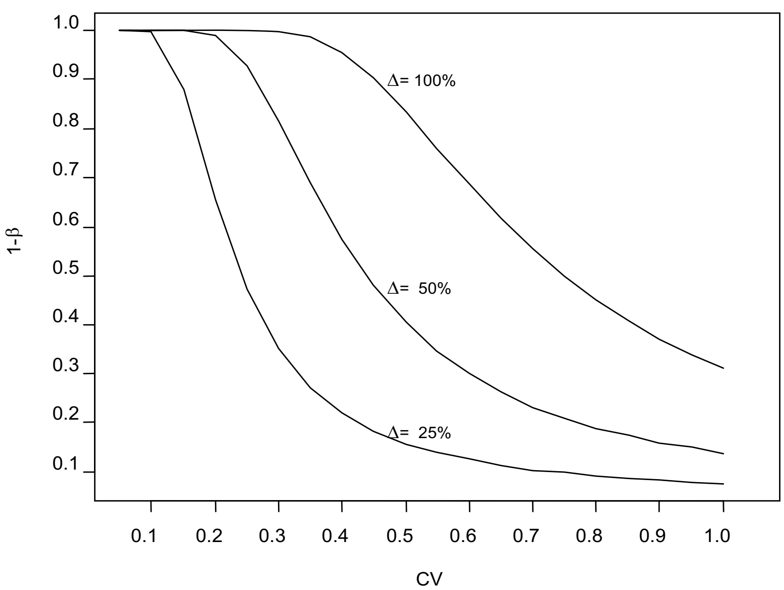
Figure 3-63 Comparison of Total PCBs Concentrations as Aroclors in Fillet Samples from Walleye and Rainbow Trout by FSCA
Upper Columbia River RI/FS

FIGURE 3-65
Statistical Power to Detect Increase or Decrease in Mean Concentration Between Composite Samples
Upper Columbia River RI/FS

a. n = 5



b. n = 10



Note: Graphs show statistical power $(1-\beta)$ to detect a relative increase of 25%, 50%, or 100% (or, equivalently a decrease of 20%, 33%, or 50%) in mean concentration at α = 0.05, two-tailed, as a function of the coefficient of variation (CV) between composite samples when sample sizes are (a) n = 5, (b) n = 10.

FIGURE 3-66A
Mean Aluminum Concentration Comparison by Sediment Focus Area (1, 3, 5, 7, 11) — Largescale Sucker in µg/kg Wet Weight vs. Sediment in mg/kg Dry Weight
Upper Columbia River RI/FS

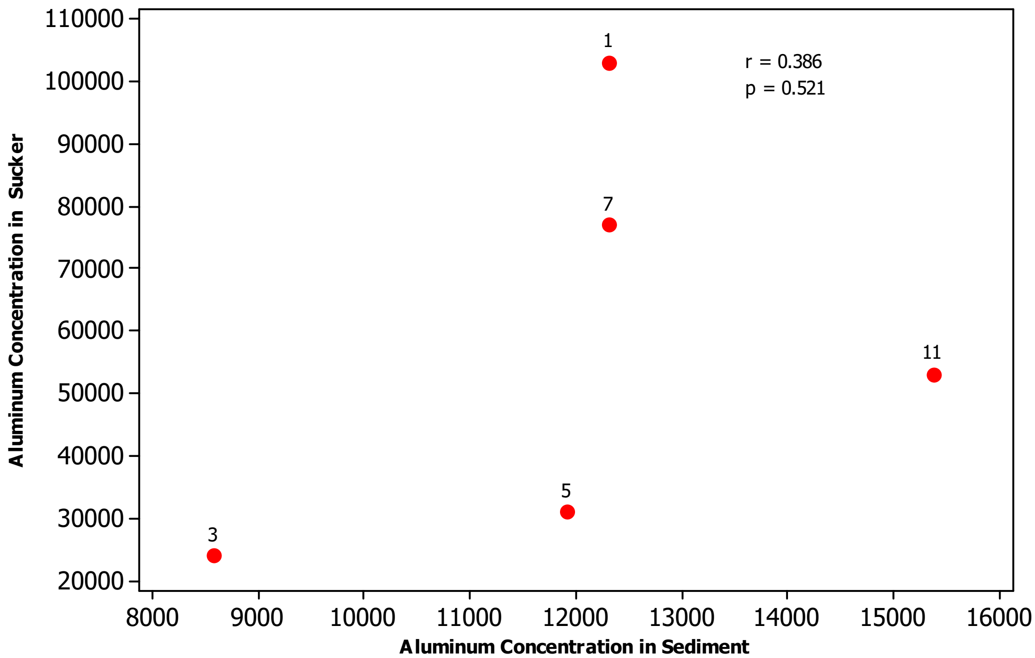


FIGURE 3-66B
Mean Aluminum Concentration with Associated Asymptotic 95% Confidence Intervals — Largescale Sucker and Sediment
Upper Columbia River RI/FS

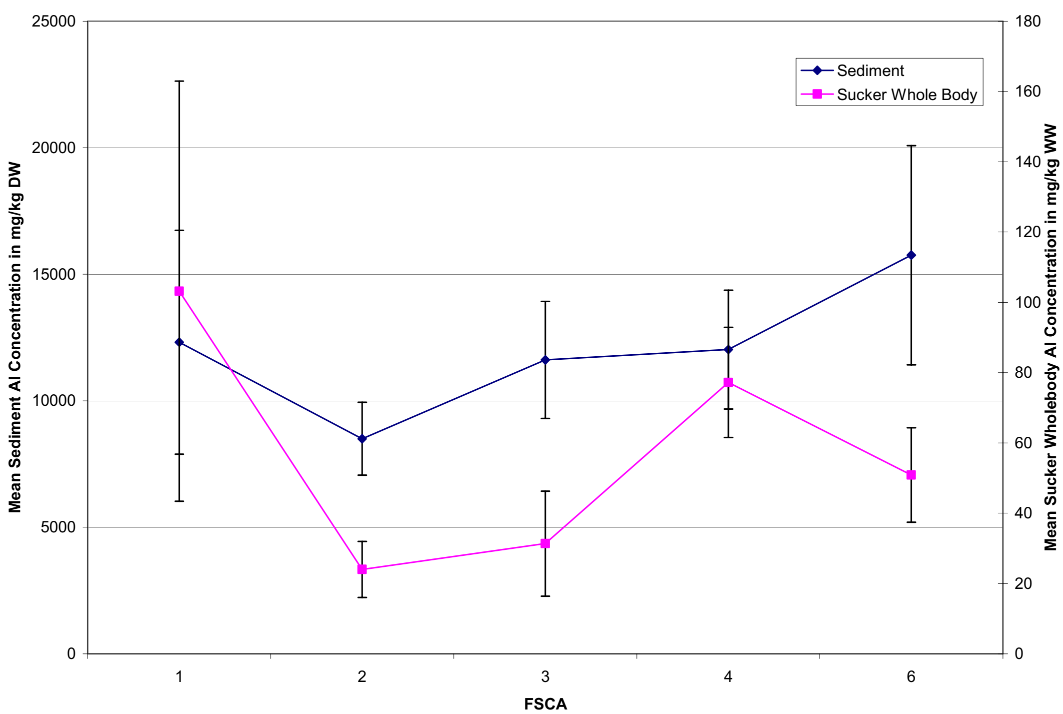


FIGURE 3-67A
Mean Arsenic Concentration Comparison by Sediment Focus Area (1, 3, 5, 7, 11) — Largescale Sucker in µg/kg Wet Weight vs. Sediment in mg/kg Dry Weight
Upper Columbia River RI/FS

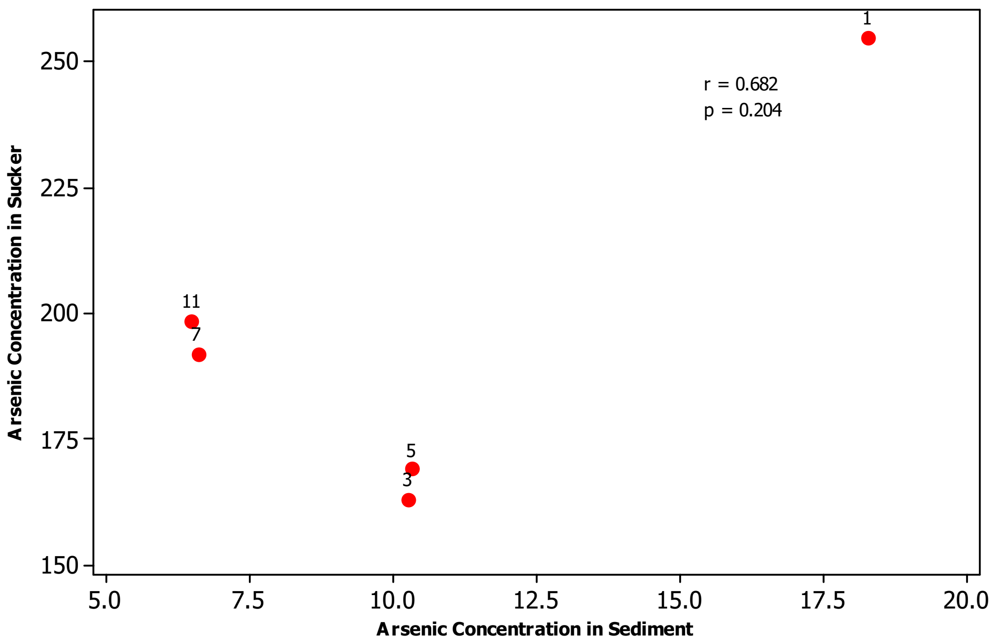


FIGURE 3-67B
Mean Arsenic Concentration with Associated Asymptotic 95% Confidence Intervals — Largescale Sucker and Sediment
Upper Columbia River RI/FS

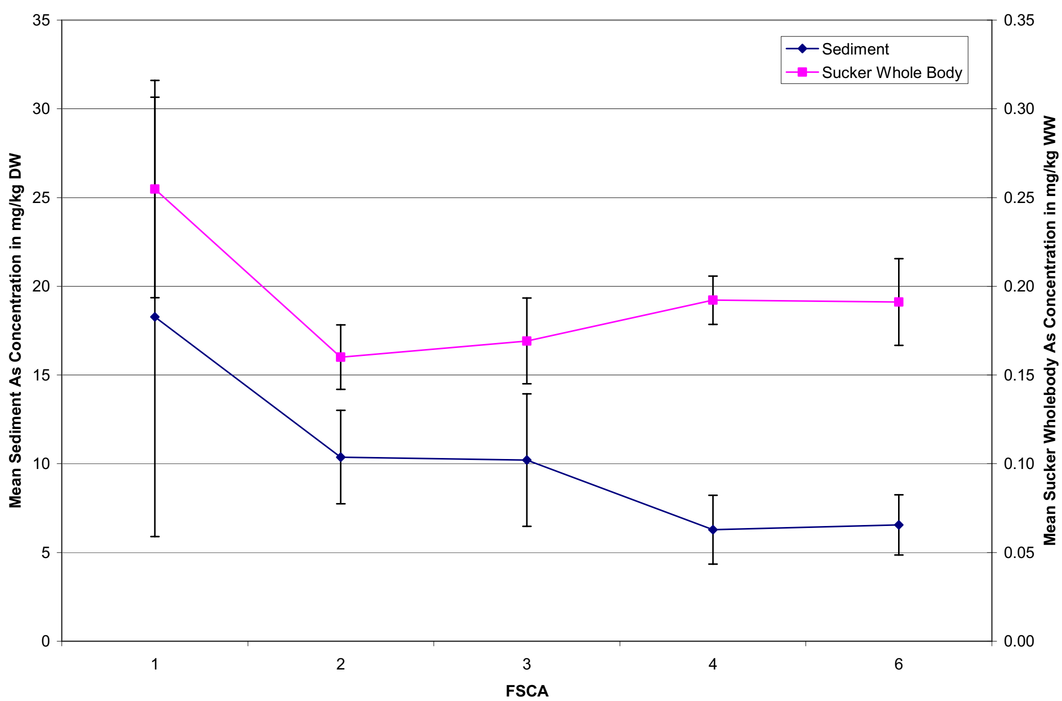


FIGURE 3-68A
Mean Barium Concentration Comparison by Sediment Focus Area (1, 3, 5, 7, 11) — Largescale Sucker in µg/kg Wet Weight vs. Sediment in mg/kg Dry Weight
Upper Columbia River RI/FS

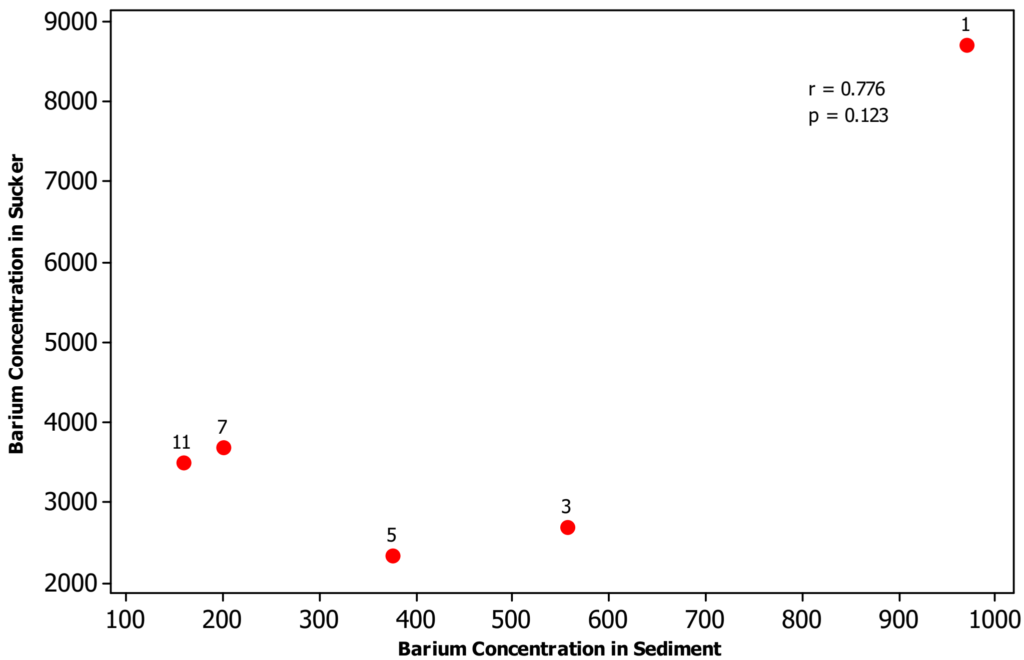


FIGURE 3-68B
Mean Barium Concentration with Associated Asymptotic 95% Confidence Intervals — Largescale Sucker and Sediment
Upper Columbia River RI/FS

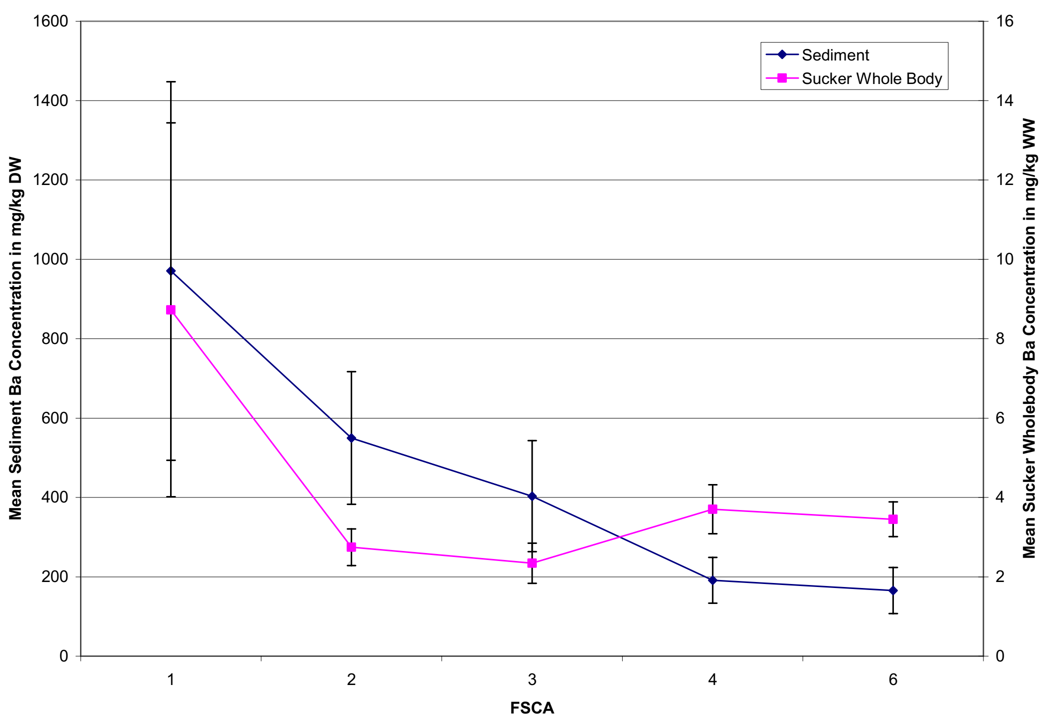


FIGURE 3-69A
Mean Cadmium Concentration Comparison by Sediment Focus Area (1, 3, 5, 7, 11) — Largescale Sucker in µg/kg Wet Weight vs. Sediment in mg/kg Dry Weight
Upper Columbia River RI/FS

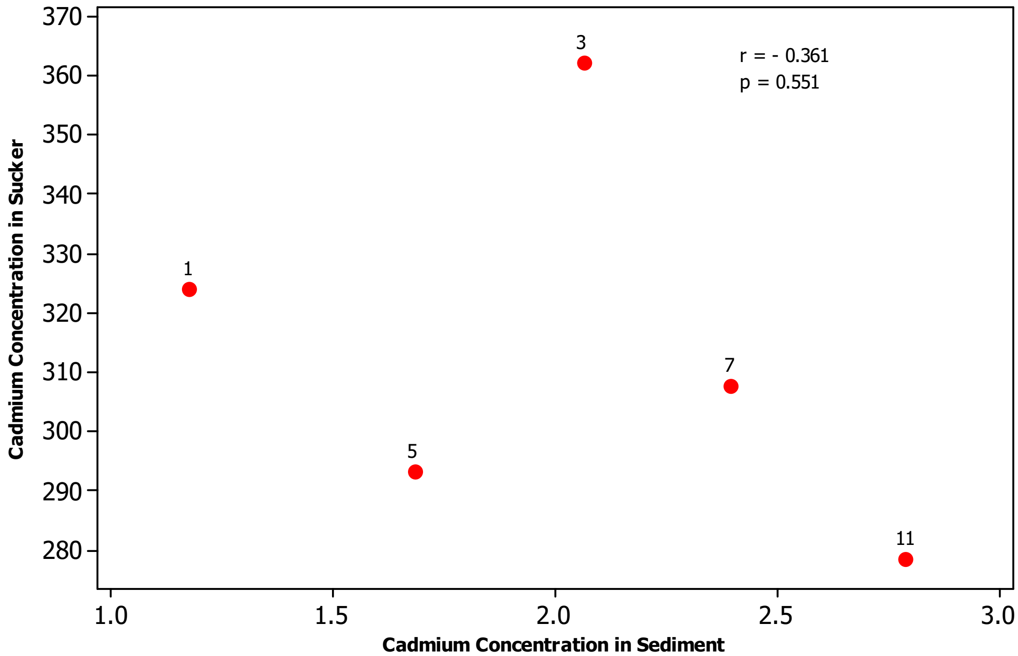


FIGURE 3-69B
Mean Cadmium Concentration with Associated Asymptotic 95% Confidence Intervals — Largescale Sucker and Sediment
Upper Columbia River RI/FS

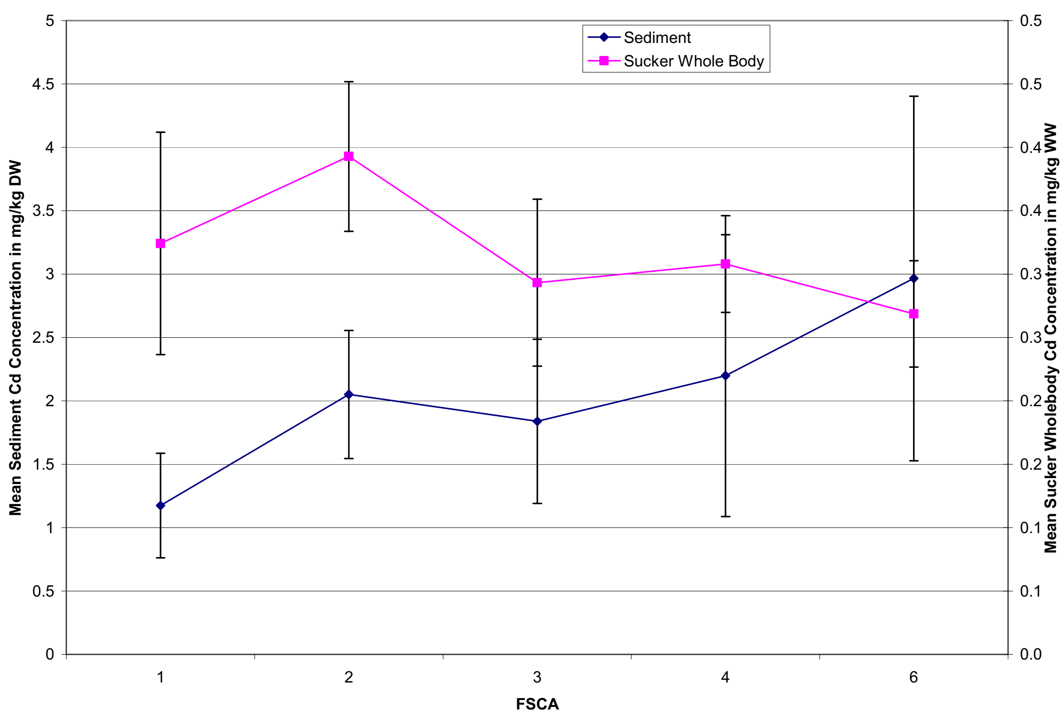


FIGURE 3-70A
Mean Chromium Concentration Comparison by Sediment Focus Area (1, 3, 5, 7, 11) — Largescale Sucker in μg/kg Wet Weight vs. Sediment in mg/kg Dry Weight
Upper Columbia River RI/FS

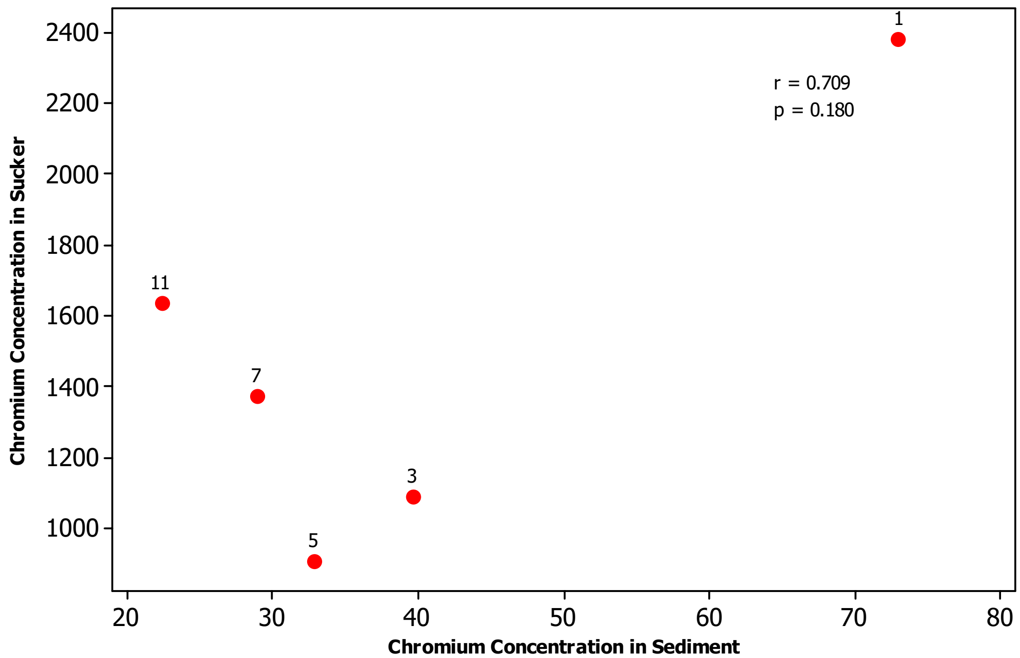


FIGURE 70B
Mean Chromium Concentration with Associated Asymptotic 95% Confidence Intervals — Largescale Sucker and Sediment
Upper Columbia River RI/FS

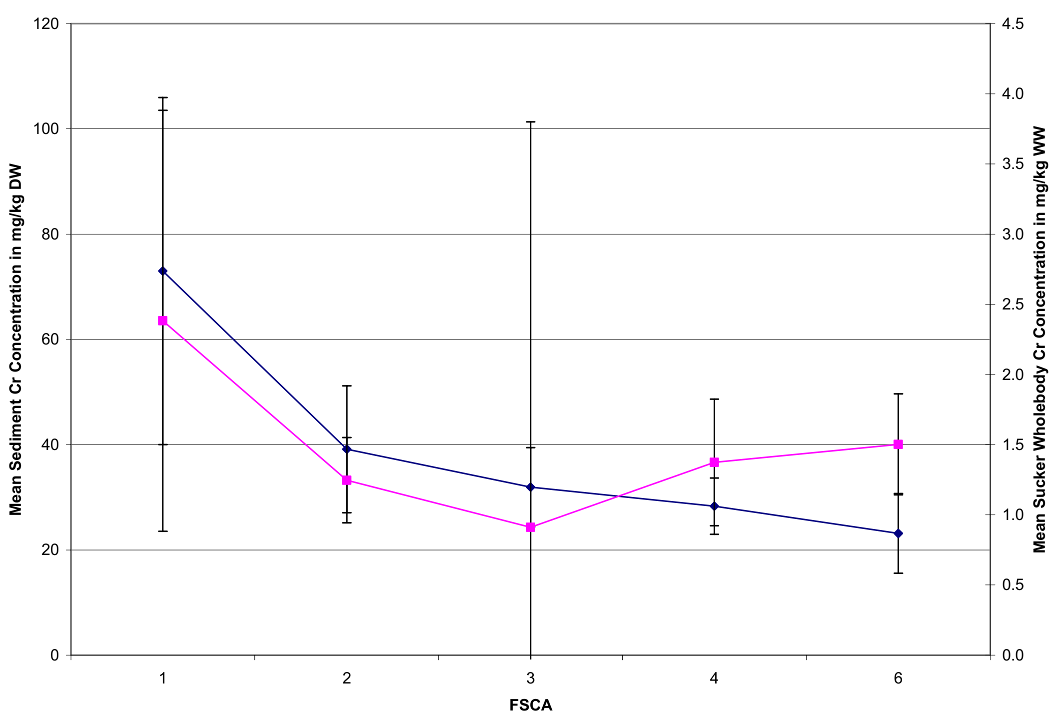


FIGURE 3-71A
Mean Copper Concentration Comparison by Sediment Focus Area (1, 3, 5, 7, 11) — Largescale Sucker in μg/kg Wet Weight vs. Sediment in mg/kg Dry Weight
Upper Columbia River RI/FS

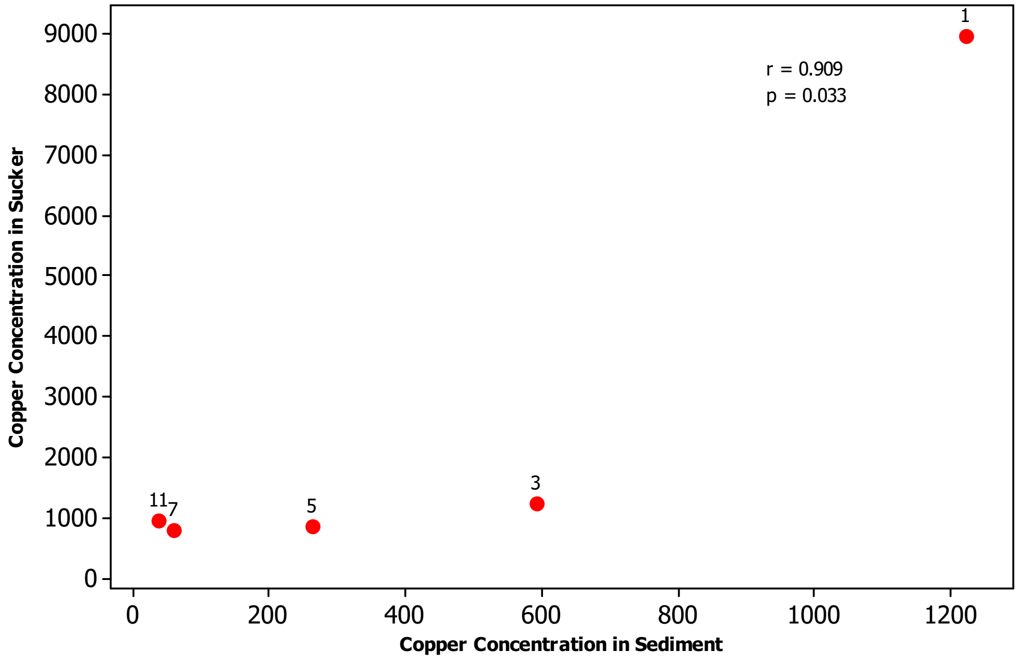


FIGURE 3-71B
Mean Copper Concentration with Associated Asymptotic 95% Confidence Intervals — Largescale Sucker and Sediment
Upper Columbia River RI/FS

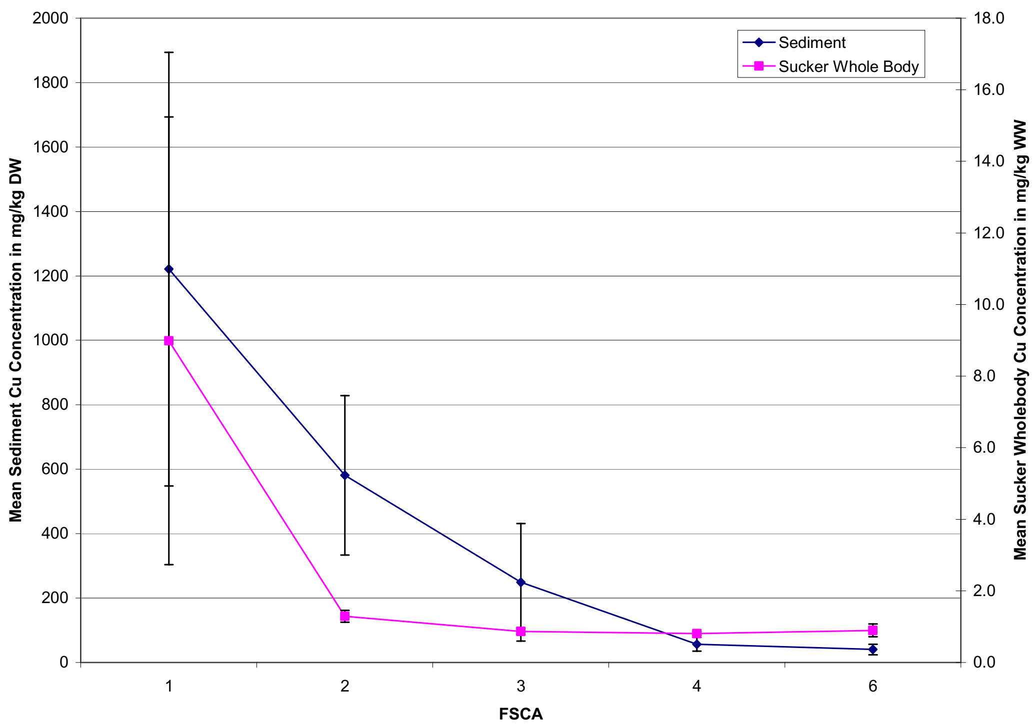


FIGURE 3-72A
Mean Iron Concentration Comparison by Sediment Focus Area (1, 3, 5, 7, 11) — Largescale Sucker in µg/kg Wet Weight vs. Sediment in mg/kg Dry Weight
Upper Columbia River RI/FS

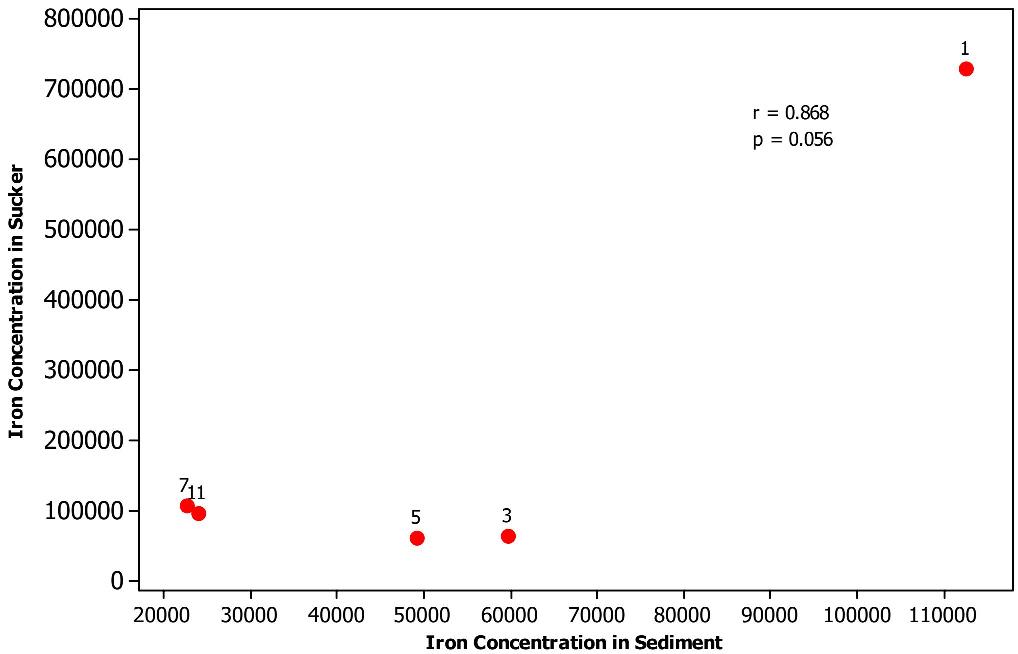


FIGURE 3-72B
Mean Iron Concentration with Associated Asymptotic 95% Confidence Intervals — Largescale Sucker and Sediment
Upper Columbia River RI/FS

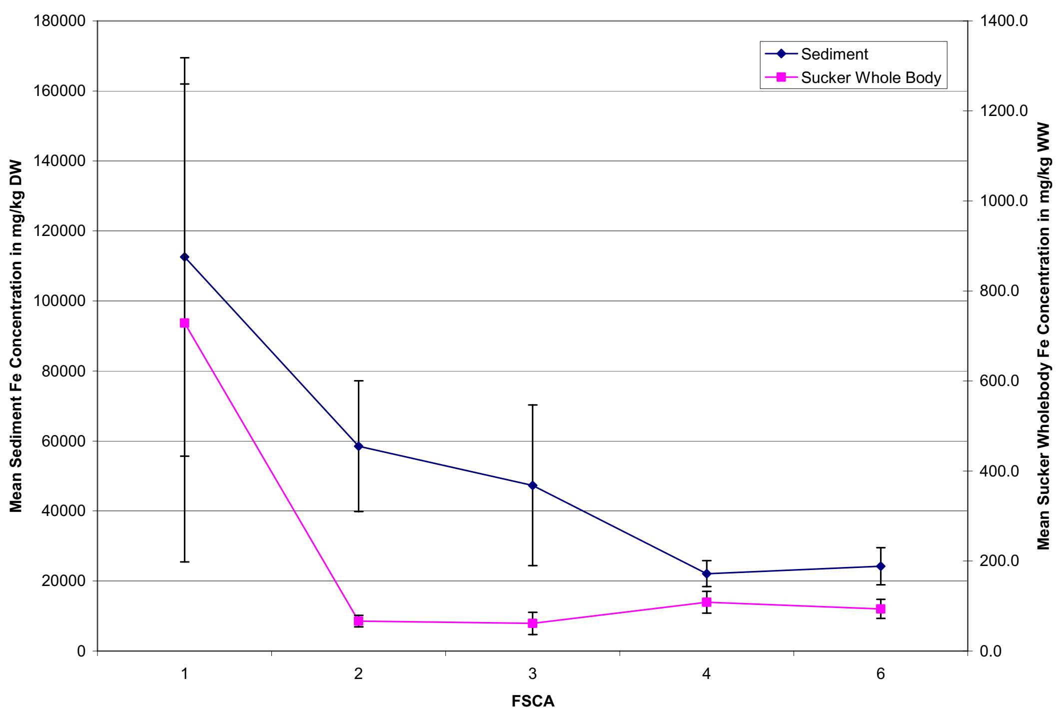


FIGURE 3-73A
Mean Mercury Concentration Comparison by Sediment Focus Area (1, 3, 5, 7, 11) — Largescale Sucker in µg/kg Wet Weight vs. Sediment in mg/kg Dry Weight
Upper Columbia River RI/FS

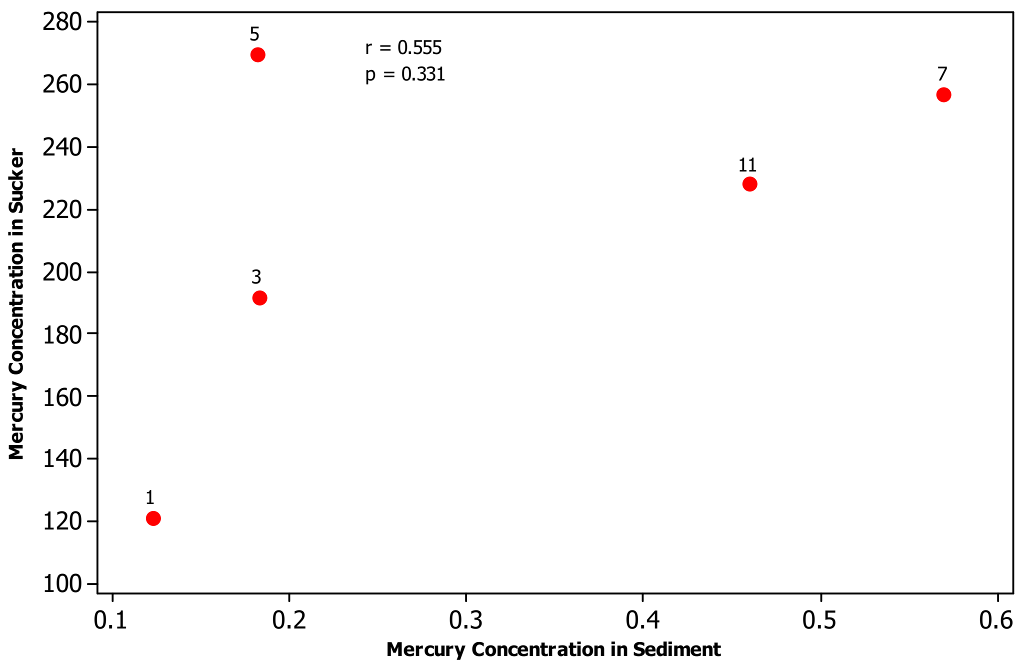


FIGURE 3-73B
Mean Mercury Concentration with Associated Asymptotic 95% Confidence Intervals — Largescale Sucker and Sediment
Upper Columbia River RI/FS

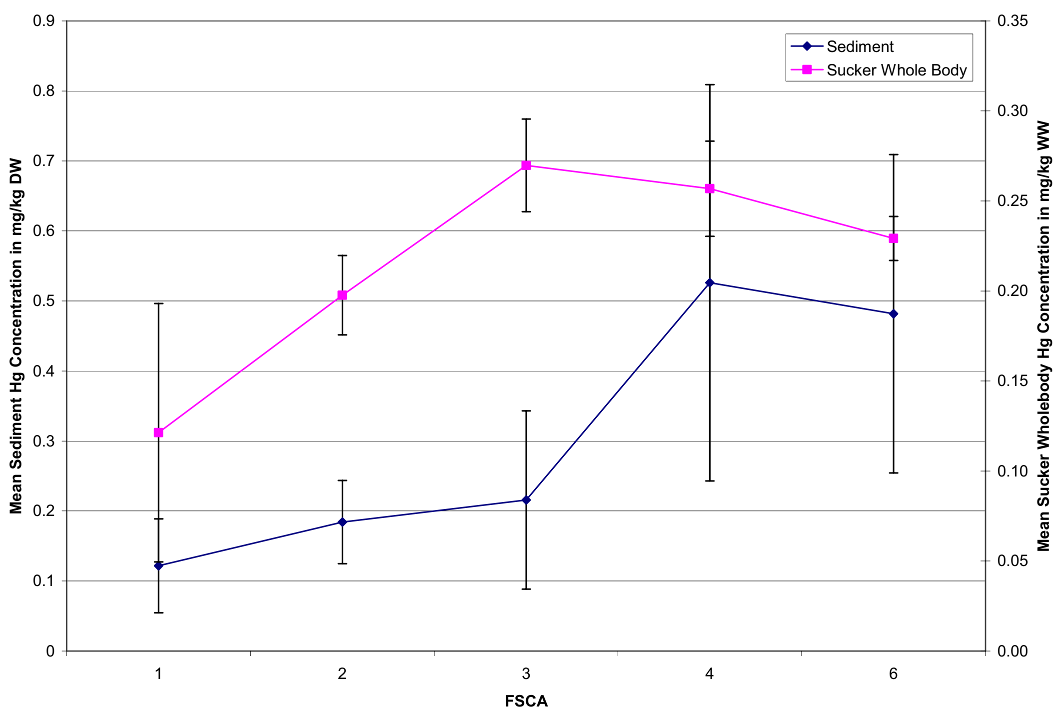


FIGURE 3-74A
Mean Nickel Concentration Comparison by Sediment Focus Area (1, 3, 5, 7, 11) — Largescale Sucker in µg/kg Wet Weight vs. Sediment in mg/kg Dry Weight
Upper Columbia River RI/FS

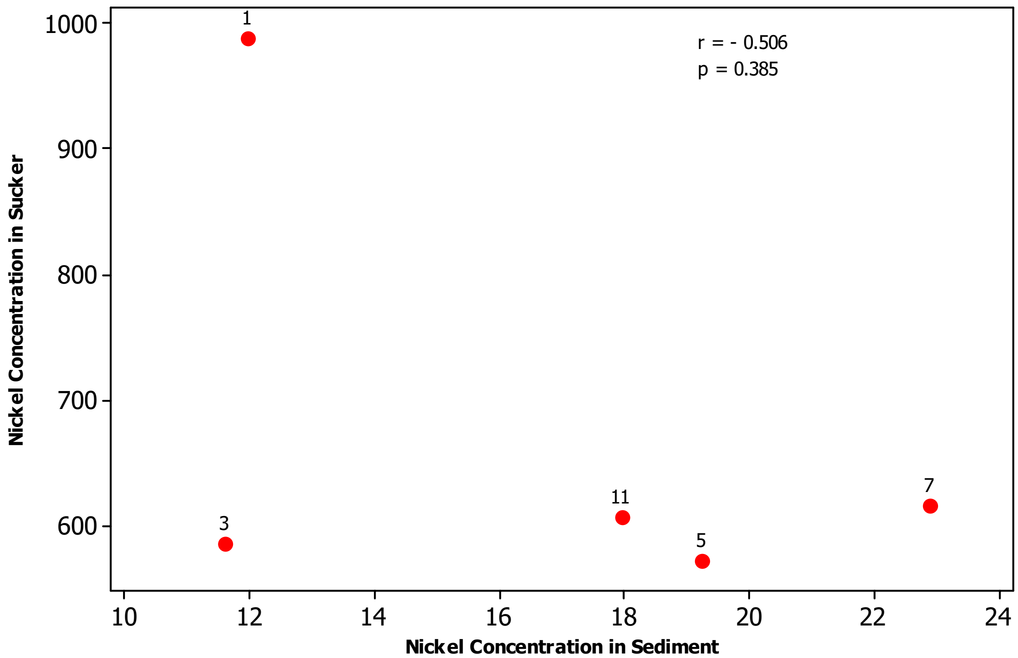


FIGURE 3-74B
Mean Nickel Concentration with Associated Asymptotic 95% Confidence Intervals — Largescale Sucker and Sediment
Upper Columbia River RI/FS

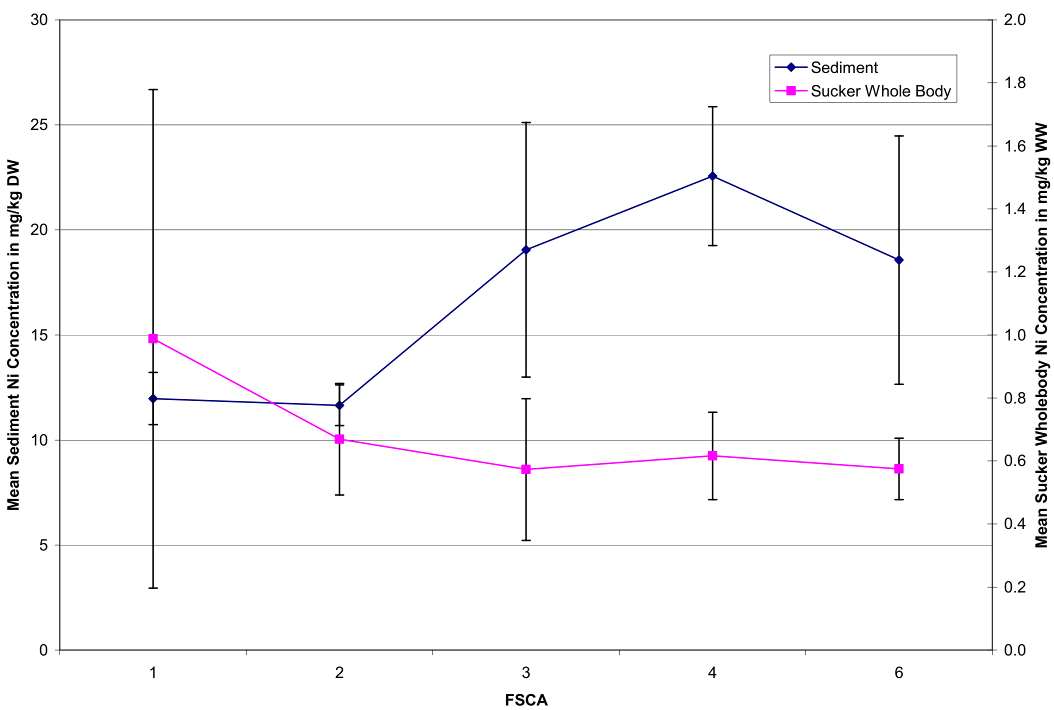


FIGURE 3-75A
Mean Lead Concentration Comparison by Sediment Focus Area (1, 3, 5, 7, 11) — Largescale Sucker in µg/kg Wet Weight vs. Sediment in mg/kg Dry Weight
Upper Columbia River RI/FS

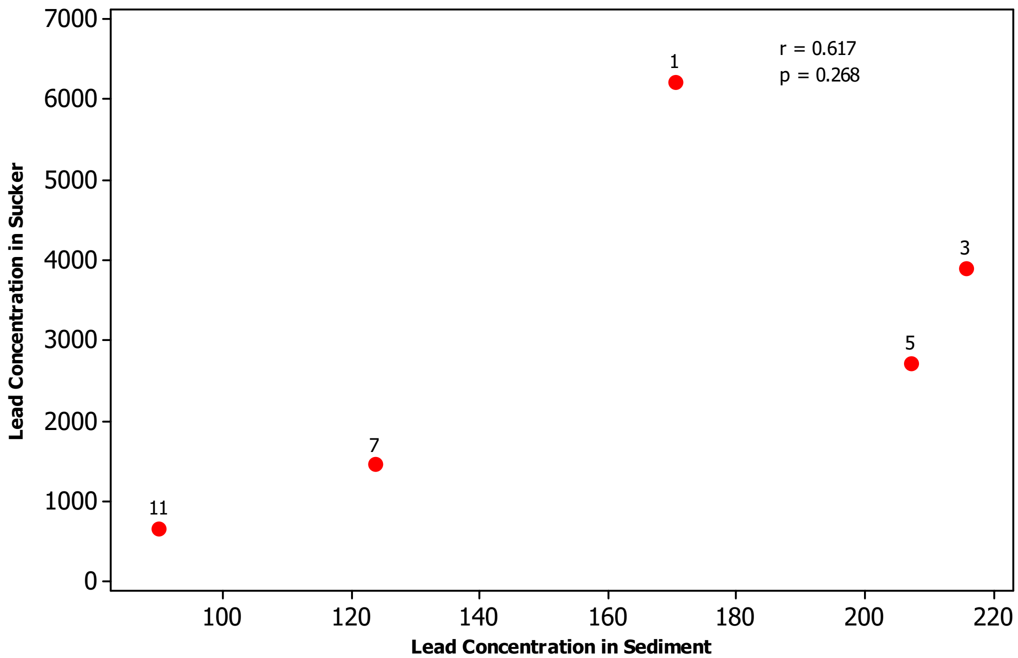


FIGURE 3-75B
Mean Lead Concentration with Associated Asymptotic 95% Confidence Intervals — Largescale Sucker and Sediment
Upper Columbia River RI/FS

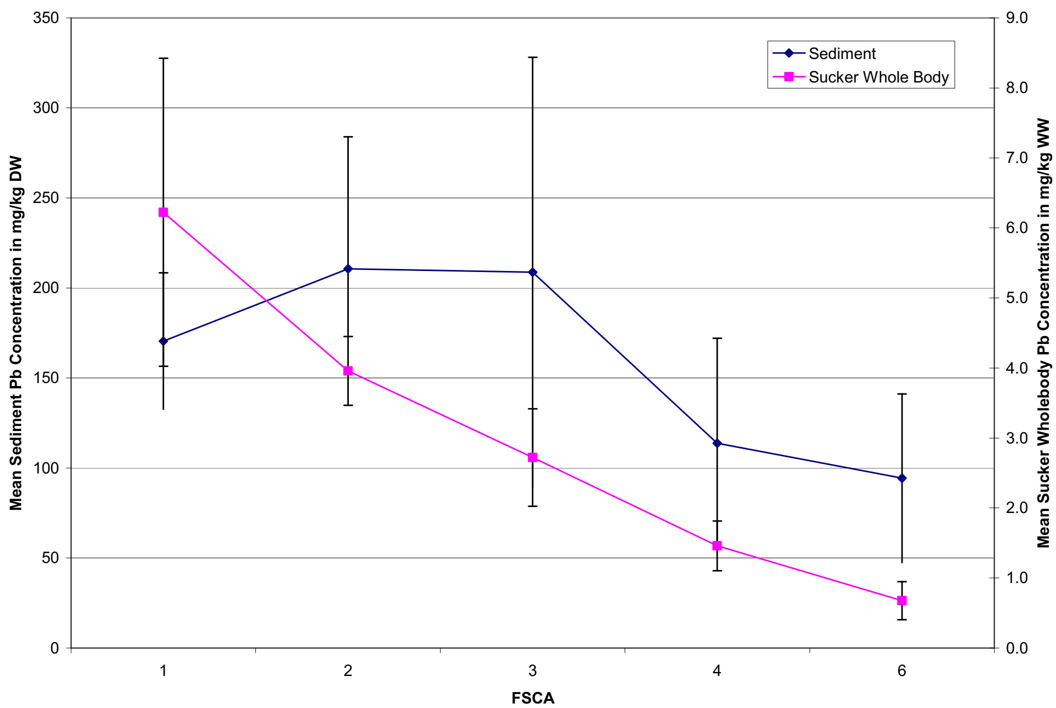


FIGURE 3-76A
Mean Selenium Concentration Comparison by Sediment Focus Area (1, 3, 5, 7, 11) — Largescale Sucker in µg/kg Wet Weight vs. Sediment in mg/kg Dry Weight
Upper Columbia River RI/FS

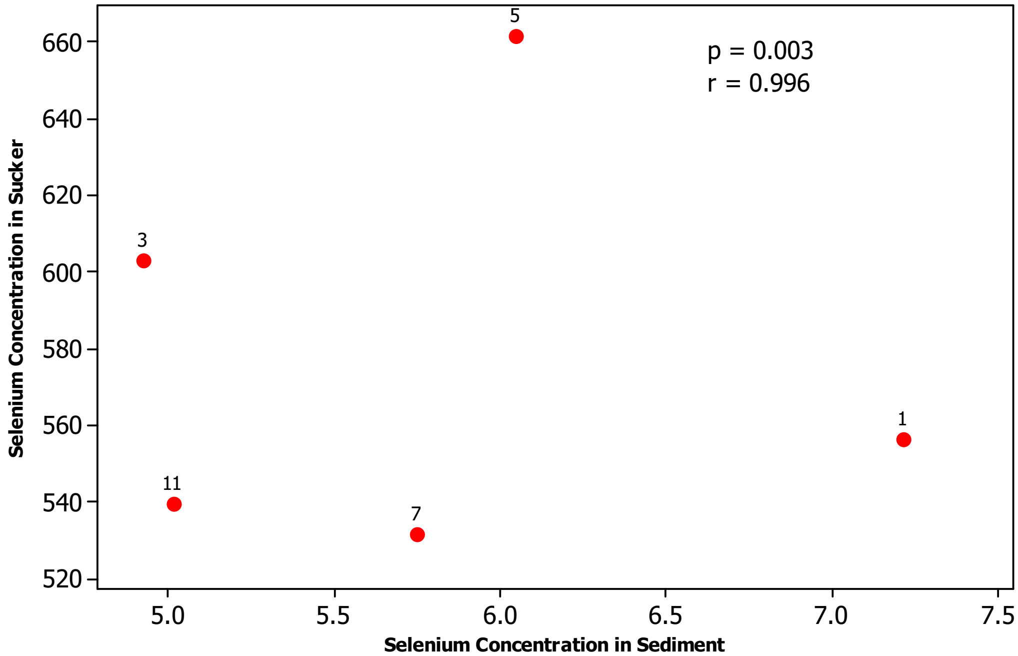


FIGURE 3-76B
Mean Selenium Concentration with Associated Asymptotic 95% Confidence Intervals — Largescale Sucker and Sediment
Upper Columbia River RI/FS

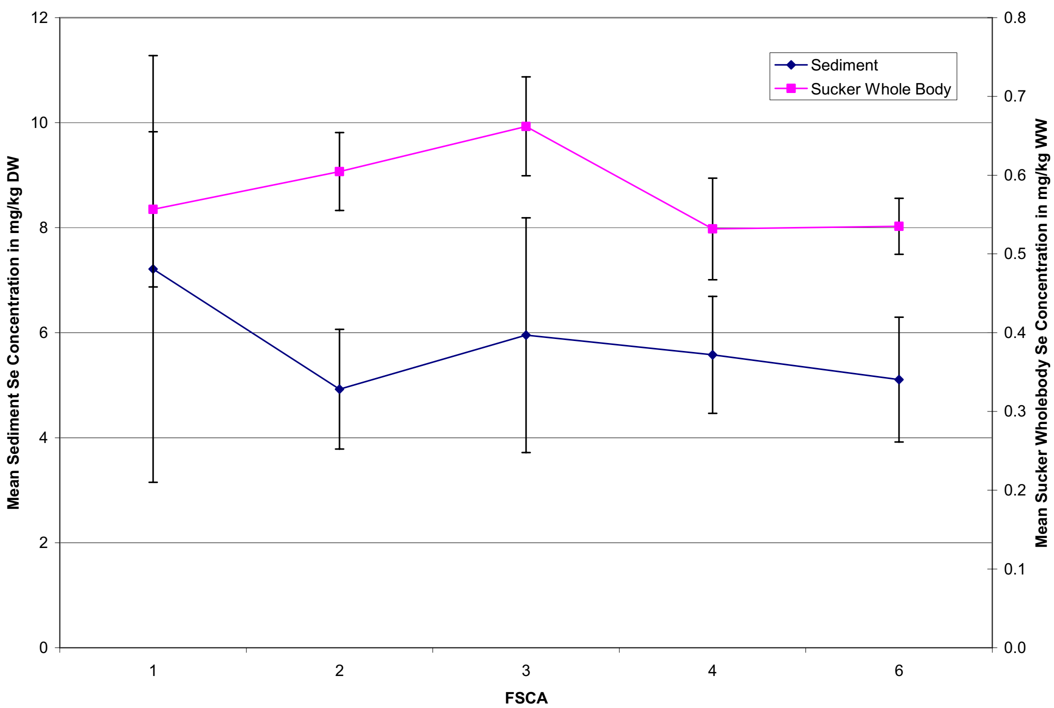


FIGURE 3-77A
Mean Uranium Concentration Comparison by Sediment Focus Area (1, 3, 5, 7, 11) — Largescale Sucker in µg/kg Wet Weight vs. Sediment in mg/kg Dry Weight
Upper Columbia River RI/FS

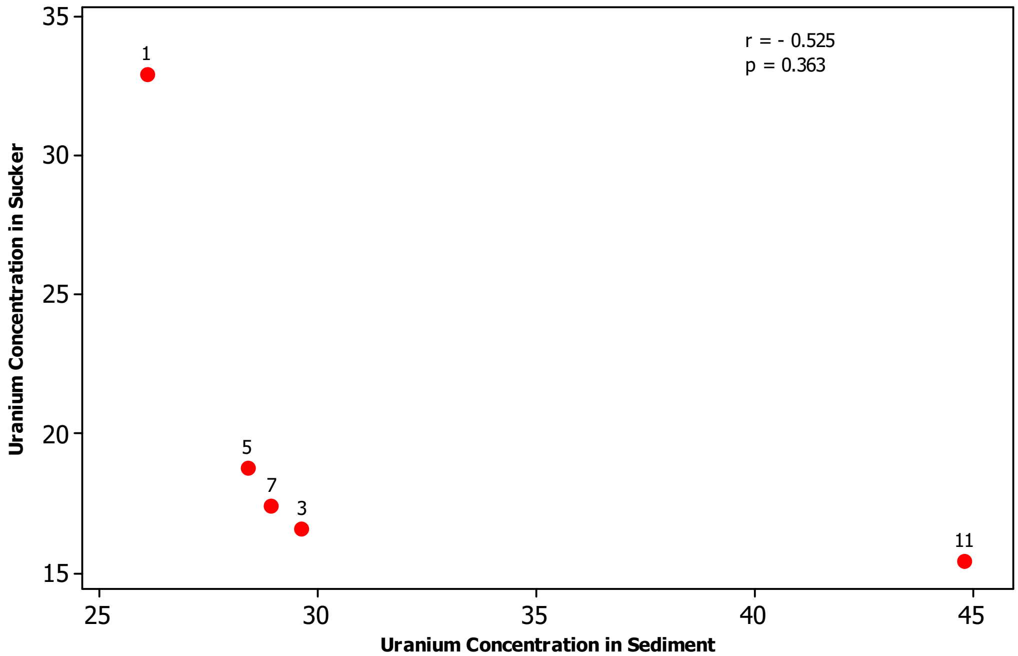


FIGURE 3-77B
Mean Uranium Concentration with Associated Asymptotic 95% Confidence Intervals — Largescale Sucker and Sediment
Upper Columbia River RI/FS

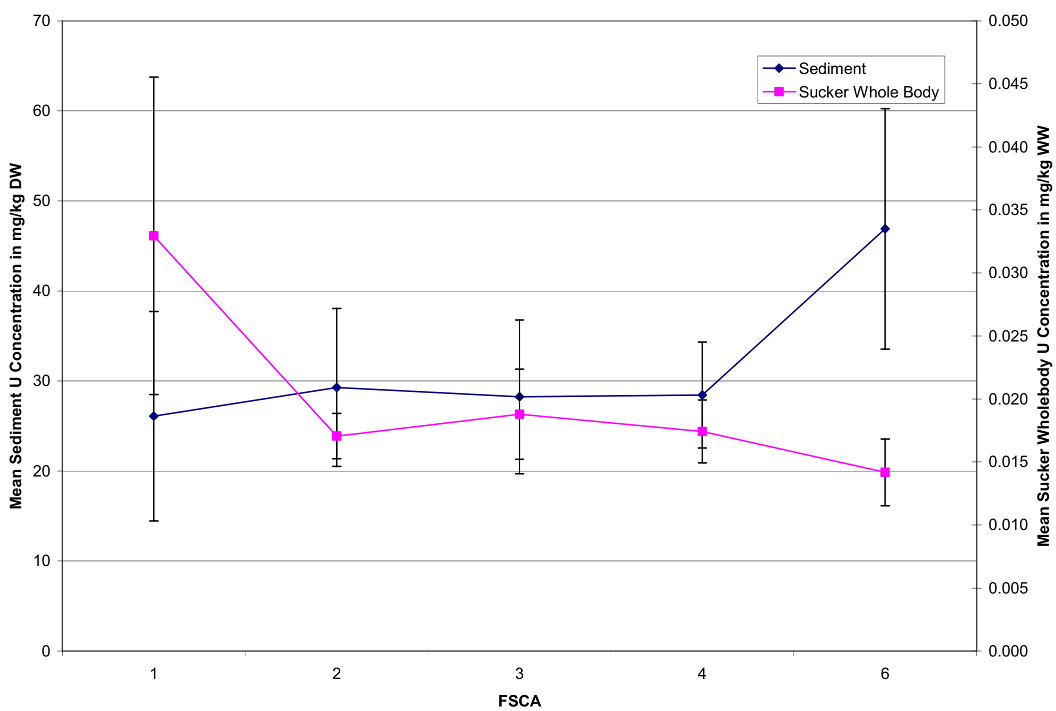


FIGURE 3-78A
Mean Zinc Concentration Comparison by Sediment Focus Area (1, 3, 5, 7, 11) — Largescale Sucker in µg/kg Wet Weight vs. Sediment in mg/kg Dry Weight
Upper Columbia River RI/FS

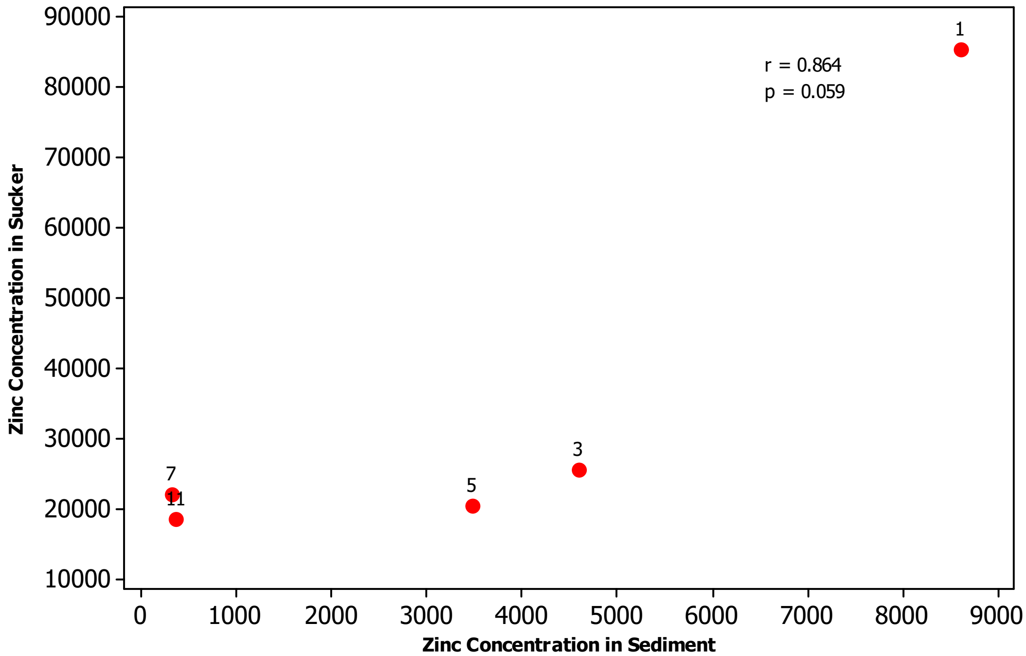
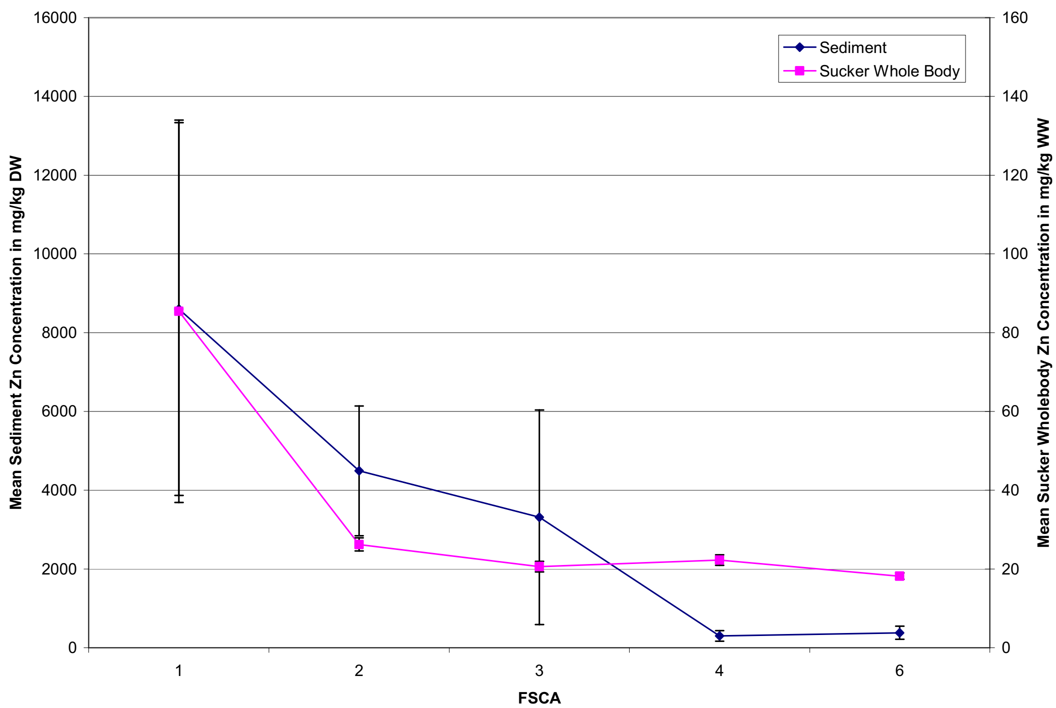


FIGURE 3-78B
Mean Zinc Concentration with Associated Asymptotic 95% Confidence Intervals — Largescale Sucker and Sediment
Upper Columbia River RI/FS



SECTION 4

Data Gaps and Recommendations

This section identifies data gaps that were identified based on the results of the Phase I Fish Tissue Sampling and makes recommendations for obtaining additional information to fill the data gaps. The evaluation approach described in this report was intended to facilitate information sharing, communicate preliminary Phase I findings, and provide context for subsequent RI/FS scoping documents and work plans to be prepared by Teck Cominco. Given this, the evaluation was not intended to be a comprehensive analysis of the Phase I data. The following subsections discuss gaps in the data evaluation methods and the data obtained.

4.1 Gaps in Data Analysis

Several areas of analysis are considered data gaps that need to be or should be filled during the subsequent RI/FS analysis. They include the treatment of PCB congener results, arsenic speciation, spatial aggregation of data, statistical comparison of data, and normalization of the data.

4.1.1 PCB Congeners

Because of funding limitations and the high cost of analysis the study design limited PCB congener analysis to a subset (i.e., approximately 20 percent) of the samples. The objective was to quantify concentrations of PCB congeners within our constraints and to determine if it was feasible to focus future analysis on a subset of the most frequently detected congeners and the co-planar congeners known to be most toxic. Because of the limited number of PCB congener results available at the time this Data Evaluation Report was prepared, a detailed presentation of the results was not undertaken. Additional collection of fish tissue for PCB and/or alternative analyses are at this time considered data gaps that must be filled as part of the human health and ecological risk assessments.

4.1.2 Arsenic Speciation

Because of funding limitations and the high cost of analysis, the study design limited arsenic speciation analysis to a subset (i.e., approximately 20 percent) of the samples and many of those analyses failed to meet our Analytical Concentration Goals causing the majority of samples to be non-detect or otherwise qualified as estimated values. Consequently, additional collection of fish tissue for arsenic speciation analyses using a more sensitive analytical method are at this time considered data gaps that should be filled as part of the human health and ecological risk assessments.

4.1.3 Spatial Aggregation of Data

The study design focused on six locations spaced throughout the 150-mile length of the study area for sampling and analysis. The study was designed to allow for the six locations to be aggregated into three reaches for statistical analysis. The analysis presented is based on that study design, and is not as comprehensive an analysis as the fish tissue data might undergo. The need for additional and/or alternative sampling locations and the application of additional data evaluation approaches are at this time considered potential data gaps that will be filled as part of the human health and ecological risk assessments if identified as a data need during future planning efforts.

4.1.3 Statistical Comparisons

The statistical comparisons presented in this report were intended to present the picture of the nature and extent of PCOIs in the target fish species in the UCR. In addition, the comparisons were intended to analyze the data relative to the secondary objectives described in Section 1. As stated above, the analysis presented in this report is based on the study design. A more comprehensive analysis of the fish tissue data is considered a data gap that will be filled as necessary to evaluate human health and ecological risk.

4.1.4 Normalization of Data

The Phase I Fish Tissue data were presented and evaluated on a wet weight basis. The use of alternative methods, such as presentation on a lipid basis, may aid in the interpretation of the data for lipophilic contaminants (e.g., PCBs). Additional and/or alternative analyses of the data (e.g., adjusting comparisons by normalizing to size, age, or sex) are at this time considered data gaps that will be filled as part of the UCR human health and ecological risk assessment.

4.2 Gaps in Data Obtained

The Phase I fish tissue study was intended as the first phase of an investigation of contaminants in biota within the UCR site. Collection of additional and/or alternative data was beyond the scope of the Phase I fish tissue study and is a data gap requiring further analysis. These data gaps should be filled as part of the UCR human health and ecological risk assessments if a need is identified during future planning efforts. Additional data that will support the evaluation of human health and ecological risk include additional sample locations, additional target species, expanded fish sizes, sampling individual fish, an expanded analyte list, further investigation of the potential effects of gut contents on largescale sucker whole body measurements, and measurements of temporal trends in fish tissue concentrations.

4.2.1 Sample Locations

The number and placement of FSCAs were selected to try to maximize the utility of the data relative to the stated objectives of the Phase I study. It was anticipated that, based on the Phase I results, additional and/or alternative sampling and analysis programs would be required. At this time, the spatial distribution and number of fish tissue sample locations are considered data gaps requiring further evaluation.

In addition, the results of the current study suggest that exposure to mercury and 2,3,7,8 TCDF is greatest in the more lake-like portion of the UCR. The source of exposure is undefined, but is some combination of the water column, sediment, and the food web. If the risk and public health analysis indicates the need for risk reduction due to these contaminants, a better understanding of the portioning of these contaminants in the potential exposure media will be required to assess the effectiveness of risk reduction options.

4.2.2 Target Species

By necessity, the Phase I fish tissue study focused on target species that were chosen to represent key species in the UCR fish community, and various potential exposure pathways. The issue of whether the results from the current study could or should be applied to other species needs further evaluation. The results seen in the largescale sucker suggest that the potential for exposure to all contaminants appears to be particularly high for bottom-feeding species. Piscivorous species, such as walleye and burbot, also have higher potential for exposure to certain bioaccumulative contaminants. This suggests that the white sturgeon may have a uniquely great exposure potential because they feed from both the water column and bottom organisms. Given the status of the white sturgeon population in the UCR, tissue studies should also be designed and implemented to determine the concentration of contaminants in various size classes of white sturgeon.

The white sturgeon was considered as a candidate target species during the development of the Phase I study design, but because of the sensitive nature of the white sturgeon population in Lake Roosevelt, nontraditional methods for collection of tissue samples were considered necessary. Given the timing of the field effort, it was not possible to develop appropriate sampling methods and include the white sturgeon as a target species during the Phase I sampling. Tissue contaminant analysis and toxicological studies involving the white sturgeon are at this time considered data gaps that will be filled as part of the human health and ecological risk assessments.

4.2.3 Fish Size

As with the selection of sample locations, the target size range was selected to try to maximize the utility of the data relative to the stated objectives of the Phase I study. It was anticipated that, based on the results, additional or alternative sampling and analyses would be required. At this time, the lack of data on smaller size classes of the target species and, to a lesser extent, the lack of data on smaller forage species (e.g., dace and sculpin) are considered data gaps that will be filled as part of the ecological risk assessment.

4.2.4 Use of Composite Samples

A compositing approach to sampling precludes measurement of contaminant concentrations in individual fish and the calculation of certain measures of central tendency. However, the variance of the individuals around the mean concentration for the population could be estimated based on the composite scheme used. Compositing was selected to maximize the number of fish submitted to the laboratory for analysis. It was anticipated that, based on the results, additional and/or alternative sampling and analyses would be required. Use of measures of individual fish to improve estimates of the spread in the data is considered a potential data gap that may be filled as part of the human health and ecological risk assessments.

4.2.5 Target Analytes

The preliminary target analytes were selected based on historical data and were intended to maximize the utility of the data, within project constraints, relative to the stated objectives of the Phase I study. Other potential contaminants of concern, such as pesticides, polycyclic aromatic hydrocarbons (PAHs), Teck Cominco discharged wastes (including specialty metals such as indium, germanium, etc.), and fire retardants in fish tissue are considered potential data gaps at this time that will be filled as part of the UCR ecological risk assessment.

4.2.6 Largescale Sucker Gut Analysis

The decision to conduct the largescale sucker gut analysis was made in response to unforeseen field observations of significant amounts of slag in the gut of this species, and in recognition of the potential role of the slag in the uncertainties of the tissue measurements and the future use of the data. This unplanned and opportunistic effort attempted to optimize the use of the samples in hand. Although this analysis is not ideal or comprehensive, it is a reasonable response to the potentially significant and unanticipated field observations.

The results of the gut/gut contents analysis demonstrates that in some areas, largescale sucker may be exposed by ingesting large quantities of sediment and slag. However, the gutless whole body results show for certain contaminants there may be correlations between slag and whole body concentrations an that contaminants found in the ingested sediment/slag may not be taken up equally. These results, in conjunction with the limited sediment/tissue relationships observed, suggest that the bioavailability of contaminants in sediment/slag may be variable. The bioavailability of contaminants needs to be better understood to assess risk from exposure, as well as the effectiveness in any risk reduction option. Additional and/or alternative analyses are at this time considered data gaps that will be filled as part of the UCR ecological risk assessment.

4.2.7 Temporal Sampling

Because of limited and non-comparable historical data, statistical analysis of temporal trends was not possible, as noted in Section 3.3.3. The Phase I fish tissue study was designed to provide baseline data for future studies investigating temporal trends of contaminants in UCR fish. In addition to the data gaps discussed, periodic fish tissue study should be repeated at approximately 5-year intervals to assess temporal trends in fish tissue contaminant concentrations. The details of the trend analysis will depend on the results of the human health risk and ecological risk assessments, as well as any remedial actions.

SECTION 5

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APPENDIX A

Preliminary Contaminant of Interest Comparison Value Results

APPENDIX A

Preliminary Contaminant of Interest Comparison Value Results

This appendix contains the following tables:

TABLE A-1
Analytical Results Summary and Comparison Value Evaluation, Walleye Fillet
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
		Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
TAL Metals																	
Aluminum	mg/kg WW	1	15	7%	2.4	2.6	280.3	280.3	25		1	11.3	11.3	4.4	1	63.71	63.71
Antimony	mg/kg WW	--	15	0%	0.08	0.09	--	--						0.03			
Arsenic	mg/kg WW	15	15	100%	--	--	0.06	0.18		0.0039	15	16.0	45.9	1.6			
Barium	mg/kg WW	--	15	0%	0.08	0.09	--	--	5.2								
Beryllium	mg/kg WW	--	15	0%	0.004	0.004	--	--	0.050					0.1			
Cadmium	mg/kg WW	--	15	0%	0.010	0.011	--	--	0.025					0.04			
Calcium	mg/kg WW	15	15	100%	--	--	264	874									
Chromium	mg/kg WW	15	15	100%	--	--	0.3	0.9	38					0.18	15	1.42	5.00
Cobalt	mg/kg WW	15	15	100%	--	--	0.004	0.007	0.50								
Copper	mg/kg WW	15	15	100%	--	--	0.18	0.25	1.0					3.0			
Iron	mg/kg WW	15	15	100%	--	--	2.1	5.6	15								
Lead	mg/kg WW	5	15	33%	0.010	0.011	0.012	0.062	0.05		2		1.3	0.06	1		1.04
Magnesium	mg/kg WW	15	15	100%	--	--	260	282									
Manganese	mg/kg WW	15	15	100%	--	--	0.12	0.47	3.5								
Nickel	mg/kg WW	15	15	100%	--	--	0.06	0.17	0.50					0.39			
Potassium	mg/kg WW	15	15	100%	--	--	4162	4470									
Selenium	mg/kg WW	15	15	100%	--	--	0.30	0.57	0.13		15	2.3	4.5	0.56	1		1.02
Silver	mg/kg WW	--	15	0%	0.03	0.03	--	--	0.13					0.37			
Sodium	mg/kg WW	15	15	100%	--	--	375	529									
Thallium	mg/kg WW	5	15	33%	0.05	0.05	0.06	0.07	0.002		15	32.5	40.6	4.6			
Uranium	mg/kg WW	--	15	0%	0.0005	0.0005	--	--	0.005								
Vanadium	mg/kg WW	--	15	0%	0.08	0.09	--	--	0.025								
Zinc	mg/kg WW	15	15	100%	--	--	5.2	7.7	7.5		1.0		1.0	20			
Mercury	µg/kg WW	15	15	100%	--	--	181	417	3		15	72.4	166.8	60	15	3.02	6.95
PCB Aroclors																	
PCB-1016	µg/kg WW	--	15	0%	1.3	14	--	--	0.85					440			
PCB-1221	µg/kg WW	--	15	0%	1.3	14	--	--		0.30				440			
PCB-1232	µg/kg WW	--	15	0%	2.6	28	--	--		0.30				440			
PCB-1242	µg/kg WW	--	15	0%	1.3	14	--	--		0.30				440			
PCB-1248	µg/kg WW	--	15	0%	1.3	14	--	--		0.30				440			
PCB-1254	µg/kg WW	--	5	0%	1.3	1.4	--	--		0.30				440			
PCB-1260	µg/kg WW	5	5	100%	--	--	1.9	4.3		0.30				440			
PCB-1254/1260	µg/kg WW	15	15	100%	--	--	1.7	14		0.30				440			
PCB-1262	µg/kg WW	--	10	0%	13	14	--	--		0.30				440			
PCB-1268	µg/kg WW	--	10	0%	13	14	--	--		0.30				440			
PCB Congeners																	
PCB 1	pg/g	1	4	25%	0.43	0.54	0.47	0.47	522					60			
PCB 2	pg/g	--	4	0%	0.73	1.1	--	--	522					60			
PCB 3	pg/g	--	4	0%	0.75	0.91	--	--	522					60			
PCB 4	pg/g	--	4	0%	1.2	1.6	--	--	522					60			
PCB 5	pg/g	--	4	0%	0.39	0.64	--	--	522					60			
PCB 6	pg/g	1	4	25%	0.64	1.1	0.85	0.85	522					60			
PCB 7	pg/g	--	4	0%	0.25	0.58	--	--	522					60			
PCB 8	pg/g	1	4	25%	2.5	5.3	4.1	4.1	522					60			
PCB 9	pg/g	1	4	25%	0.46	0.64	0.32	0.32	522					60			
PCB 10	pg/g	--	4	0%	0.33	1.0	--	--	522					60			
PCB 11	pg/g	--	4	0%	20	61	--	--	522					60			
PCB 12	pg/g	--	4	0%	0.40	0.67	--	--	522					60			
PCB 14	pg/g	--	4	0%	0.27	0.64	--	--	522					60			
PCB 15	pg/g	--	4	0%	3.9	4.9	--	--	522					60			
PCB 16	pg/g	--	4	0%	2.3	3.3	--	--	522					60			
PCB 17	pg/g	--	4	0%	2.6	4.2	--	--	522					60			
PCB 18	pg/g	--	4	0%	4.8	7.2	--	--	522					60			
PCB 19	pg/g	1	4	25%	0.55	0.63	0.54	0.54	522					60			
PCB 20	pg/g	1	4	25%	29	38	19	19	522					60			
PCB 21	pg/g	1	4	25%	11	12	6.4	6.4	522					60			
PCB 22	pg/g	1	4	25%	5.0	9.0	7.7	7.7	522					60			

TABLE A-1
Analytical Results Summary and Comparison Value Evaluation, Walleye Fillet
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics: Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	Human Health Comparison Value Evaluation: USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Comparison Value Evaluation: Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 23	pg/g	--	4	0%	0.15	0.25	--	--	522					60			
PCB 24	pg/g	--	4	0%	0.18	0.25	--	--	522					60			
PCB 25	pg/g	--	4	0%	0.78	1.5	--	--	522					60			
PCB 26	pg/g	--	4	0%	2.2	4.7	--	--	522					60			
PCB 27	pg/g	1	4	25%	0.57	0.73	0.59	0.59	522					60			
PCB 31	pg/g	--	4	0%	14	28	--	--	522					60			
PCB 32	pg/g	--	4	0%	1.1	2.7	--	--	522					60			
PCB 34	pg/g	--	4	0%	0.17	0.27	--	--	522					60			
PCB 35	pg/g	1	4	25%	0.40	0.70	0.40	0.40	522					60			
PCB 36	pg/g	--	4	0%	0.11	0.65	--	--	522					60			
PCB 37	pg/g	1	4	25%	3.6	5.2	4.2	4.2	522					60			
PCB 38	pg/g	--	4	0%	0.11	0.68	--	--	522					60			
PCB 39	pg/g	2	4	50%	0.19	0.61	0.16	0.16	522					60			
PCB 40	pg/g	1	4	25%	6.4	9.1	10	10	522					60			
PCB 41	pg/g	2	4	50%	2.0	2.9	2.0	3.0	522					60			
PCB 42	pg/g	4	4	100%	--	--	6.2	11	522					60			
PCB 43	pg/g	2	4	50%	1.2	1.5	1.3	1.4	522					60			
PCB 44	pg/g	4	4	100%	--	--	36	60	522					60	1		1.00
PCB 45	pg/g	--	4	0%	1.7	2.7	--	--	522					60			
PCB 46	pg/g	1	4	25%	0.34	0.57	0.68	0.68	522					60			
PCB 48	pg/g	1	4	25%	2.4	3.8	5.3	5.3	522					60			
PCB 49	pg/g	4	4	100%	--	--	27	45	522					60			
PCB 50	pg/g	1	4	25%	1.4	2.2	1.2	1.2	522					60			
PCB 52	pg/g	4	4	100%	--	--	63	97	522					60	4	1.05	1.61
PCB 54	pg/g	--	4	0%	0.15	0.39	--	--	522					60			
PCB 55	pg/g	3	4	75%	1.1	1.1	2.6	4.8	522					60			
PCB 56	pg/g	3	4	75%	4.9	4.9	5.9	9.2	522					60			
PCB 57	pg/g	1	4	25%	0.88	1.8	0.47	0.47	522					60			
PCB 58	pg/g	--	4	0%	0.61	1.8	--	--	522					60			
PCB 59	pg/g	3	4	75%	5.0	5.0	3.1	4.3	522					60			
PCB 60	pg/g	4	4	100%	--	--	13	19	522					60			
PCB 61	pg/g	4	4	100%	--	--	110	143	522					60	4	1.83	2.38
PCB 63	pg/g	4	4	100%	--	--	3.5	5.2	522					60			
PCB 64	pg/g	4	4	100%	--	--	18	30	522					60			
PCB 66	pg/g	4	4	100%	--	--	60	102	522					60	4	1.00	1.70
PCB 67	pg/g	1	4	25%	0.72	1.5	0.56	0.56	522					60			
PCB 68	pg/g	2	4	50%	1.6	1.6	1.1	1.4	522					60			
PCB 72	pg/g	4	4	100%	--	--	1.6	2.2	522					60			
PCB 73	pg/g	3	4	75%	0.51	0.51	1.4	1.6	522					60			
PCB 77	pg/g	--	4	0%	0.29	2.7	--	--		40				60			
PCB 78	pg/g	--	4	0%	0.31	1.8	--	--	522					60			
PCB 79	pg/g	4	4	100%	--	--	4.9	6.4	522					60			
PCB 80	pg/g	--	4	0%	0.27	1.6	--	--	522					60			
PCB 81	pg/g	--	4	0%	0.29	2.0	--	--		13.3				60			
PCB 82	pg/g	4	4	100%	--	--	14	21	522					60			
PCB 83	pg/g	4	4	100%	--	--	17	27	522					60			
PCB 84	pg/g	4	4	100%	--	--	15	19	522					60			
PCB 85	pg/g	4	4	100%	--	--	62	78	522					60	4	1.03	1.30
PCB 86	pg/g	4	4	100%	--	--	149	188	522					60	4	2.48	3.13
PCB 88	pg/g	4	4	100%	--	--	19	26	522					60			
PCB 89	pg/g	--	4	0%	0.39	1.3	--	--	522					60			
PCB 90	pg/g	4	4	100%	--	--	267	366	522					60	4	4.45	6.10
PCB 92	pg/g	4	4	100%	--	--	62	83	522					60	4	1.03	1.38
PCB 93	pg/g	4	4	100%	--	--	88	106	522					60	4	1.47	1.77
PCB 94	pg/g	4	4	100%	--	--	2.5	3.4	522					60			
PCB 95	pg/g	--	4	0%	0.37	1.2	--	--	522					60			
PCB 96	pg/g	1	4	25%	0.25	0.99	0.41	0.41	522					60			

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Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 98	pg/g	1	4	25%	1.3	1.8	0.85	0.85	522					60			
PCB 99	pg/g	4	4	100%	--	--	139	252	522					60	4	2.32	4.20
PCB 103	pg/g	4	4	100%	--	--	1.9	2.3	522					60			
PCB 104	pg/g	--	4	0%	0.14	0.60	--	--	522					60			
PCB 105	pg/g	4	4	100%	--	--	97	167		113.3	3		1.47	60	4	1.61	2.78
PCB 106	pg/g	1	4	25%	0.38	0.67	5.2	5.2	522					60			
PCB 107	pg/g	4	4	100%	--	--	7.0	11	522					60			
PCB 109	pg/g	4	4	100%	--	--	31	54	522					60			
PCB 110	pg/g	4	4	100%	--	--	255	311	522					60	4	4.25	5.18
PCB 111	pg/g	2	4	50%	0.70	0.86	0.58	0.65	522					60			
PCB 112	pg/g	4	4	100%	--	--	13	37	522					60			
PCB 114	pg/g	4	4	100%	--	--	6.3	11		113.3				60			
PCB 118	pg/g	4	4	100%	--	--	273	485		113.3	4	2.41	4.28	60	4	4.55	8.08
PCB 120	pg/g	4	4	100%	--	--	2.6	5.2	522					60			
PCB 121	pg/g	1	4	25%	0.45	0.89	0.43	0.43	522					60			
PCB 122	pg/g	--	4	0%	0.42	1.3	--	--	522					60			
PCB 123	pg/g	3	4	75%	5.3	5.3	4.0	6.7		113.3				60			
PCB 126	pg/g	2	4	50%	0.48	1.3	2.1	2.8		0.41	4	5.05	6.93	60			
PCB 127	pg/g	--	4	0%	0.40	1.1	--	--	522					60			
PCB 128	pg/g	4	4	100%	--	--	89	142	522					60	4	1.49	2.37
PCB 129	pg/g	4	4	100%	--	--	666	1,250	522		4	1.28	2.39	60	4	11.10	20.83
PCB 130	pg/g	4	4	100%	--	--	36	59	522					60			
PCB 131	pg/g	3	4	75%	3.2	3.2	1.8	4.7	522					60			
PCB 132	pg/g	4	4	100%	--	--	60	111	522					60	4	1.00	1.85
PCB 133	pg/g	4	4	100%	--	--	12	22	522					60			
PCB 134	pg/g	4	4	100%	--	--	7.8	13	522					60			
PCB 135	pg/g	4	4	100%	--	--	126	187	522					60	4	2.10	3.12
PCB 136	pg/g	4	4	100%	--	--	22	34	522					60			
PCB 137	pg/g	4	4	100%	--	--	33	71	522					60			
PCB 139	pg/g	4	4	100%	--	--	9.3	19	522					60			
PCB 141	pg/g	4	4	100%	--	--	59	138	522					60			
PCB 142	pg/g	1	4	25%	1.1	1.8	1.3	1.3	522					60			
PCB 143	pg/g	4	4	100%	--	--	14	25	522					60			
PCB 144	pg/g	4	4	100%	--	--	149	297	522					60	4	2.48	4.95
PCB 145	pg/g	--	4	0%	0.31	0.78	--	--	522					60			
PCB 146	pg/g	4	4	100%	--	--	94	189	522					60	4	1.57	3.15
PCB 147	pg/g	--	4	0%	1.3	2.0	--	--	522					60			
PCB 148	pg/g	2	4	50%	1.0	1.1	0.84	1.2	522					60			
PCB 150	pg/g	1	4	25%	0.39	0.72	0.42	0.42	522					60			
PCB 152	pg/g	1	4	25%	0.42	0.77	0.34	0.34	522					60			
PCB 153	pg/g	4	4	100%	--	--	595	1,290	522		4	1.14	2.47	60	4	9.92	21.50
PCB 154	pg/g	4	4	100%	--	--	7.3	13	522					60			
PCB 155	pg/g	2	4	50%	0.54	0.74	0.69	0.95	522					60			
PCB 156	pg/g	4	4	100%	--	--	40	109		113.3				60	2		1.82
PCB 158	pg/g	4	4	100%	--	--	46	74	522					60	2		1.23
PCB 159	pg/g	2	4	50%	1.1	3.6	2.2	4.7	522					60			
PCB 160	pg/g	--	4	0%	0.89	1.4	--	--	522					60			
PCB 161	pg/g	--	4	0%	0.89	1.4	--	--	522					60			
PCB 162	pg/g	3	4	75%	4.6	4.6	2.0	11	522					60			
PCB 164	pg/g	3	4	75%	19	19	16	37	522					60			
PCB 165	pg/g	--	4	0%	0.92	1.5	--	--	522					60			
PCB 167	pg/g	4	4	100%	--	--	14	27	522					60			
PCB 169	pg/g	--	4	0%	1.1	2.5	--	--		0.13				60			
PCB 170	pg/g	4	4	100%	--	--	107	281	522					60	4	1.78	4.68
PCB 171	pg/g	4	4	100%	--	--	42	90	522					60	2		1.50
PCB 172	pg/g	4	4	100%	--	--	27	61	522					60	1		1.02
PCB 174	pg/g	4	4	100%	--	--	42	96	522					60	3		1.61

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Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 175	pg/g	3	4	75%	6.1	6.1	4.9	8.8	522					60			
PCB 176	pg/g	4	4	100%	--	--	6.0	12	522					60			
PCB 177	pg/g	4	4	100%	--	--	59	118	522					60	3		1.97
PCB 178	pg/g	4	4	100%	--	--	43	59	522					60			
PCB 179	pg/g	4	4	100%	--	--	42	49	522					60			
PCB 180	pg/g	4	4	100%	--	--	288	792	522		2		1.52	60	4	4.80	13.20
PCB 181	pg/g	1	4	25%	1.1	1.8	2.7	2.7	522					60			
PCB 182	pg/g	4	4	100%	--	--	118	267	522					60	4	1.97	4.45
PCB 183	pg/g	1	4	25%	1.4	2.4	2.2	2.2	522					60			
PCB 184	pg/g	2	4	50%	0.73	1.2	0.92	1.2	522					60			
PCB 186	pg/g	--	4	0%	0.45	0.75	--	--	522					60			
PCB 187	pg/g	4	4	100%	--	--	208	356	522					60	4	3.47	5.93
PCB 188	pg/g	1	4	25%	0.50	0.53	0.81	0.81	522					60			
PCB 189	pg/g	3	4	75%	2.5	2.5	3.3	7.6		113.3				60			
PCB 190	pg/g	4	4	100%	--	--	24	59	522					60			
PCB 191	pg/g	4	4	100%	--	--	4.5	10	522					60			
PCB 192	pg/g	--	4	0%	0.84	2.0	--	--	522					60			
PCB 194	pg/g	4	4	100%	--	--	24	92	522					60	2		1.53
PCB 195	pg/g	4	4	100%	--	--	18	50	522					60			
PCB 196	pg/g	4	4	100%	--	--	42	98	522					60	2		1.64
PCB 197	pg/g	3	4	75%	8.0	8.0	7.9	14	522					60			
PCB 198	pg/g	4	4	100%	--	--	85	182	522					60	4	1.42	3.03
PCB 201	pg/g	4	4	100%	--	--	12	19	522					60			
PCB 202	pg/g	4	4	100%	--	--	21	40	522					60			
PCB 203	pg/g	4	4	100%	--	--	52	164	522					60	3		2.73
PCB 204	pg/g	--	4	0%	0.47	0.70	--	--	522					60			
PCB 205	pg/g	2	4	50%	2.0	5.9	2.4	5.3	522					60			
PCB 206	pg/g	4	4	100%	--	--	24	81	522					60	1		1.35
PCB 207	pg/g	3	4	75%	3.7	3.7	5.2	10	522					60			
PCB 208	pg/g	3	4	75%	8.3	8.3	10	18	522					60			
PCB 209	pg/g	4	4	100%	--	--	4.8	8.6	522					60			
Dioxin/Furans																	
2,3,7,8-TCDD	pg/g	--	15	0%	0.085	0.13	--	--		0.004				6			
1,2,3,7,8-PeCDD	pg/g	--	15	0%	0.073	0.14	--	--		0.004				6			
1,2,3,6,7,8-HxCDD	pg/g	--	15	0%	0.15	0.30	--	--		0.040				6			
1,2,3,4,7,8-HxCDD	pg/g	--	15	0%	0.14	0.30	--	--		0.040				6			
1,2,3,7,8,9-HxCDD	pg/g	--	15	0%	0.15	0.30	--	--		0.040				6			
1,2,3,4,6,7,8-HpCDD	pg/g	7	15	47%	0.16	0.32	0.11	1.3		0.40	1		3.35	6			
OCDD	pg/g	9	15	60%	1.3	2.7	0.71	8.8		13.3				6	2		1.47
2,3,7,8-TCDF	pg/g	7	15	47%	0.20	0.47	0.36	0.80		0.040	7	9.10	19.90	6			
1,2,3,7,8-PeCDF	pg/g	--	15	0%	0.056	0.14	--	--		0.13				6			
2,3,4,7,8-PeCDF	pg/g	--	15	0%	0.081	0.15	--	--		0.013				6			
1,2,3,6,7,8-HxCDF	pg/g	1	15	7%	0.077	0.16	0.10	0.10		0.04	1	2.45	2.45	6			
1,2,3,4,7,8-HxCDF	pg/g	2	15	13%	0.085	0.18	0.072	0.089		0.04	2	1.69	2.10	6			
2,3,4,6,7,8-HxCDF	pg/g	--	15	0%	0.046	0.17	--	--		0.04				6			
1,2,3,4,6,7,8-HpCDF	pg/g	1	15	7%	0.070	0.15	0.21	0.21		0.40				6			
1,2,3,4,7,8,9-HpCDF	pg/g	--	15	0%	0.089	0.24	--	--		0.40				6			
OCDF	pg/g	2	15	13%	0.13	0.54	0.37	1.4		13.3				6			

mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
pg/g = picograms
PRG = Preliminary Remediation Goal
TAL = Target Analyte List
WW = wet weight

CV = comparison value

TABLE A-2
Analytical Results Summary and Comparison Value Evaluation, Walleye Offal
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics: Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	Human Health Comparison Value Evaluation: USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Comparison Value Evaluation: Ecological Comparison Value Evaluation	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
TAL Metals																	
Aluminum	mg/kg WW	8	15	53%	3.2760	3.6600	3.5	8.3	25					4.4	7		1.88
Antimony	mg/kg WW	--	15	0%	0.11	0.13	--	--						0.03			
Arsenic	mg/kg WW	14	15	93%	0.0683	0.0683	0.08	0.25		0.0039	15	19.6	65.1	1.6			
Barium	mg/kg WW	15	15	100%	--	--	1.26	1.75	5.2								
Beryllium	mg/kg WW	--	15	0%	0.006	0.007	--	--	0.050					0.1			
Cadmium	mg/kg WW	15	15	100%	--	--	0.024	0.054	0.025		15	1.0	2.2	0.04			
Calcium	mg/kg WW	15	15	100%	--	--	16613	22565									
Chromium	mg/kg WW	15	15	100%	--	--	0.4	1.2	38					0.18	15	2.07	6.51
Cobalt	mg/kg WW	15	15	100%	--	--	0.030	0.045	0.50								
Copper	mg/kg WW	15	15	100%	--	--	0.3	0.54	1.0					3.0			
Iron	mg/kg WW	15	15	100%	--	--	11.5	19.7	15		11		1.3				
Lead	mg/kg WW	15	15	100%	--	--	0.021	0.089	0.05		6		1.8	0.06	6		1.48
Magnesium	mg/kg WW	15	15	100%	--	--	398	478									
Manganese	mg/kg WW	15	15	100%	--	--	1.57	2.83	3.5								
Nickel	mg/kg WW	15	15	100%	--	--	0.53	0.78	0.50		15	1.1	1.6	0.39	15	1.35	2.01
Potassium	mg/kg WW	15	15	100%	--	--	2336	2713									
Selenium	mg/kg WW	15	15	100%	--	--	0.36	0.82	0.13		15	2.8	6.4	0.56	13		1.47
Silver	mg/kg WW	--	15	0%	0.04	0.05	--	--	0.13					0.37			
Sodium	mg/kg WW	15	15	100%	--	--	1227	1417									
Thallium	mg/kg WW	--	15	0%	0.07	0.08	--	--	0.002					4.6			
Uranium	mg/kg WW	15	15	100%	--	--	0.001	0.0023	0.005								
Vanadium	mg/kg WW	--	15	0%	0.11	0.13	--	--	0.025								
Zinc	mg/kg WW	15	15	100%	--	--	14.5	18.2	7.5		15	1.9	2.4	20			
Mercury	µg/kg WW	15	15	100%	--	--	78	191	3		15	31.2	76.4	60	15	1.30	3.18
PCB Aroclors																	
PCB-1016	µg/kg WW	--	15	0%	1	14	--	--	0.85					440			
PCB-1221	µg/kg WW	--	15	0%	1	14	--	--		0.30				440			
PCB-1232	µg/kg WW	--	15	0%	3	28	--	--		0.30				440			
PCB-1242	µg/kg WW	--	15	0%	1	14	--	--		0.30				440			
PCB-1248	µg/kg WW	--	15	0%	1	14	--	--		0.30				440			
PCB-1254	µg/kg WW	6	11	55%	1	3	8	21		0.30	6	32.0	32.0	440			
PCB-1260	µg/kg WW	11	11	100%	--	--	9	57		0.30	11	34.0	34.0	440			
PCB-1254/1260	µg/kg WW	4	4	100%	--	--	8	101		0.30	4	22.0	116.0	440			
PCB-1262	µg/kg WW	--	10	0%	13	14	--	--		0.30				440			
PCB-1268	µg/kg WW	--	10	0%	13	14	--	--		0.30				440			
PCB Congeners																	
PCB 1	pg/g	3	3	100%	--	--	1.76	3.45	522					60			
PCB 2	pg/g	--	3	0%	3.01	10.1	--	--	522					60			
PCB 3	pg/g	--	3	0%	2.03	4.7	--	--	522					60			
PCB 4	pg/g	2	3	67%	22.90	22.9	5.9	6.5	522					60			
PCB 5	pg/g	--	3	0%	0.53	16.50	--	--	522					60			
PCB 6	pg/g	2	3	67%	14.20	14.20	3.88	4.22	522					60			
PCB 7	pg/g	1	3	33%	1.07	14.20	0.789	0.789	522					60			
PCB 8	pg/g	2	3	67%	13.2	13.2	20.4	20.7	522					60			
PCB 9	pg/g	--	3	0%	3.11	16.70	--	--	522					60			
PCB 10	pg/g	--	3	0%	0.48	17.30	--	--	522					60			
PCB 11	pg/g	3	3	100%	--	--	57.2	217	522					60	1		3.62
PCB 12	pg/g	2	3	67%	13.90	13.90	1.39	1.42	522					60			
PCB 14	pg/g	--	3	0%	0.53	14.90	--	--	522					60			
PCB 15	pg/g	2	3	67%	355.0	355.0	11.2	11.6	522					60			
PCB 16	pg/g	2	3	67%	66.2	66.2	14.9	17.8	522					60			
PCB 17	pg/g	3	3	100%	--	--	18.2	109.0	522					60	1		1.82
PCB 18	pg/g	3	3	100%	--	--	35.6	192	522					60	1		3.20
PCB 19	pg/g	2	3	67%	16.40	16.4	3.44	3.96	522					60			
PCB 20	pg/g	3	3	100%	--	--	141	1130	522		1		2.16	60	3	2.35	18.83
PCB 21	pg/g	3	3	100%	--	--	28.2	190.0	522					60	1		3.17
PCB 22	pg/g	3	3	100%	--	--	24.3	160.0	522					60	1		2.67

TABLE A-2
Analytical Results Summary and Comparison Value Evaluation, Walleye Offal
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
		Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Comparison Value Evaluation	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 23	pg/g	--	3	0%	0.30	14.50	--	--	522					60			
PCB 24	pg/g	--	3	0%	0.94	14.40	--	--	522					60			
PCB 25	pg/g	3	3	100%	--	--	5	30	522					60			
PCB 26	pg/g	3	3	100%	--	--	16.0	127	522					60	1		2.12
PCB 27	pg/g	2	3	67%	4.59	4.6	3.34	18.70	522					60			
PCB 31	pg/g	3	3	100%	--	--	93	699	522					60	3	1.54	11.65
PCB 32	pg/g	3	3	100%	--	--	6.5	64.6	522					60	1		1.08
PCB 34	pg/g	1	3	33%	1.09	16.70	1.32	1.32	522					60			
PCB 35	pg/g	--	3	0%	0.59	9.61	--	--	522					60			
PCB 36	pg/g	--	3	0%	0.51	8.98	--	--	522					60			
PCB 37	pg/g	3	3	100%	--	--	13.3	16.9	522					60			
PCB 38	pg/g	--	3	0%	0.56	8.96	--	--	522					60			
PCB 39	pg/g	1	3	33%	1.79	8.44	0.84	0.84	522					60			
PCB 40	pg/g	3	3	100%	--	--	5.1	122	522					60	1		2.03
PCB 41	pg/g	3	3	100%	--	--	8.5	30.2	522					60			
PCB 42	pg/g	3	3	100%	--	--	5.7	178	522					60	1		2.97
PCB 43	pg/g	1	3	33%	6.4	8.0	10.5	11	522					60			
PCB 44	pg/g	3	3	100%	--	--	5	738	522					60	3		12.30
PCB 45	pg/g	3	3	100%	--	--	18.0	89.9	522					60	1		1.50
PCB 46	pg/g	2	3	67%	3.61	3.61	2.70	14.0	522					60			
PCB 48	pg/g	3	3	100%	--	--	23.7	198	522					60	1		3.30
PCB 49	pg/g	3	3	100%	--	--	310	1550	522		2		2.97	60	3	5.17	25.83
PCB 50	pg/g	3	3	100%	--	--	13.8	67	522					60			1.12
PCB 52	pg/g	3	3	100%	--	--	637	3230	522		3	1.22	6.19	60	3	10.62	53.83
PCB 54	pg/g	--	3	0%	0.43	2.83	--	--	522					60			
PCB 55	pg/g	3	3	100%	--	--	9.9	260	522					60	1		4.33
PCB 56	pg/g	3	3	100%	--	--	56.8	194	522					60	2		3.23
PCB 57	pg/g	--	3	0%	2.45	40.20	--	--	522					60			
PCB 58	pg/g	1	3	33%	6.80	41.0	3.32	3.32	522					60			
PCB 59	pg/g	3	3	100%	--	--	38.2	135	522					60	2		2.25
PCB 60	pg/g	3	3	100%	--	--	132	609	522		1		1.17	60	3	2.20	10.15
PCB 61	pg/g	3	3	100%	--	--	1020	4960	522		3	1.95	9.50	60	3	17.00	82.67
PCB 63	pg/g	3	3	100%	--	--	46.0	179	522					60	2		2.98
PCB 64	pg/g	3	3	100%	--	--	201	829	522		1		1.59	60	3	3.35	13.82
PCB 66	pg/g	3	3	100%	--	--	765	2740	522		3	1.47	5.25	60	3	12.75	45.67
PCB 67	pg/g	2	3	67%	33.20	33.20	5.50	8.0	522					60			
PCB 68	pg/g	3	3	100%	--	--	13.7	50.0	522					60			
PCB 72	pg/g	3	3	100%	--	--	19.4	82	522					60	1		1.37
PCB 73	pg/g	1	3	33%	2.9	4.0	74.2	74.2	522					60	1	1.24	1.24
PCB 77	pg/g	3	3	100%	--	--	19.3	79		40	1		1.97	60	1		1.31
PCB 78	pg/g	--	3	0%	1.40	42.30	--	--	522					60			
PCB 79	pg/g	3	3	100%	--	--	58.0	283	522					60	2		4.72
PCB 80	pg/g	--	3	0%	1.13	36.70	--	--	522					60			
PCB 81	pg/g	1	3	33%	1.18	51.00	3.65	3.65		13				60			
PCB 82	pg/g	3	3	100%	--	--	138	772	522		1		1.48	60	3	2.30	12.87
PCB 83	pg/g	3	3	100%	--	--	210	1170	522		1		2.24	60	3	3.50	19.50
PCB 84	pg/g	3	3	100%	--	--	139.0	775	522		1		1.48	60	3	2.32	12.92
PCB 85	pg/g	3	3	100%	--	--	694	4020	522		3	1.33	7.70	60	3	11.57	67.00
PCB 86	pg/g	3	3	100%	--	--	1420	8820	522		3	2.72	16.90	60	3	23.67	147.00
PCB 88	pg/g	3	3	100%	--	--	383.0	896	522		2		1.72	60	3	6.38	14.93
PCB 89	pg/g	2	3	67%	5.15	5.2	8.34	15	522					60			
PCB 90	pg/g	3	3	100%	--	--	2710	16,200	522		3	5.19	31.03	60	3	45.17	270.00
PCB 92	pg/g	3	3	100%	--	--	679	3510	522		3	1.30	6.72	60	3	11.32	58.50
PCB 93	pg/g	3	3	100%	--	--	899	4910	522		3	1.72	9.41	60	3	14.98	81.83
PCB 94	pg/g	3	3	100%	--	--	25.0	191	522					60	2		3.18
PCB 95	pg/g	1	3	33%	1.99	12.4	3.3	3.3	522					60			

TABLE A-2
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		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Comparison Value Evaluation	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 96	pg/g	2	3	67%	12.10	12.10	3.47	5.45	522					60			
PCB 98	pg/g	2	3	67%	68.00	68.0	8.6	24.5	522					60			
PCB 99	pg/g	3	3	100%	--	--	1720	11,300	522		3	3.29	21.65	60	3	28.67	188.33
PCB 103	pg/g	3	3	100%	--	--	22.5	89	522					60			1.48
PCB 104	pg/g	--	3	0%	0.68	5.51	--	--	522					60			
PCB 105	pg/g	3	3	100%	--	--	1000	7560		113	3	8.83	66.73	60	3	16.67	126.00
PCB 106	pg/g	--	3	0%	2.96	30.9	--	--	522					60			
PCB 107	pg/g	3	3	100%	--	--	64.5	500	522					60	3	1.08	8.33
PCB 109	pg/g	3	3	100%	--	--	339	2030	522		1		3.89	60	3	5.65	33.83
PCB 110	pg/g	3	3	100%	--	--	4730	14500	522		3	9.06	27.78	60	3	78.83	241.67
PCB 111	pg/g	2	3	67%	8.8	8.8	6.6	6.6	522					60			
PCB 112	pg/g	3	3	100%	--	--	174	1150	522		1		2.20	60	3	2.90	19.17
PCB 114	pg/g	3	3	100%	--	--	74	475		113	3	0.65	4.19	60	3	1.24	7.92
PCB 118	pg/g	3	3	100%	--	--	2,920	21,900		113	3	25.77	193.29	60	3	48.67	365.00
PCB 120	pg/g	3	3	100%	--	--	32.3	205	522					60	1		3.42
PCB 121	pg/g	1	3	33%	1.7	13.3	2.49	2.5	522					60			
PCB 122	pg/g	--	3	0%	3.25	37.5	--	--	522					60			
PCB 123	pg/g	3	3	100%	--	--	36	448		113	2		3.95	60	1		7.47
PCB 126	pg/g	3	3	100%	--	--	42.5	117		0.41	3	103.66	285.37	60	1		1.95
PCB 127	pg/g	3	3	100%	--	--	12.3	46.2	522					60			
PCB 128	pg/g	3	3	100%	--	--	940	6620	522		3	1.80	12.68	60	3	15.67	110.33
PCB 129	pg/g	3	3	100%	--	--	6,420	63,200	522		3	12.30	121.07	60	3	107.00	1053.33
PCB 130	pg/g	3	3	100%	--	--	382	2800	522		1		5.36	60	3	6.37	46.67
PCB 131	pg/g	2	3	67%	17.5	17.5	27.6	182.0	522					60	1		3.03
PCB 132	pg/g	3	3	100%	--	--	593.0	4860	522		3	1.14	9.31	60	3	9.88	81.00
PCB 133	pg/g	3	3	100%	--	--	129	1140	522		1		2.18	60	3	2.15	19.00
PCB 134	pg/g	3	3	100%	--	--	90.7	673	522		1		1.29	60	3	1.51	11.22
PCB 135	pg/g	3	3	100%	--	--	1390	8780	522		3	2.66	16.82	60	3	23.17	146.33
PCB 136	pg/g	3	3	100%	--	--	266.0	1570	522		1		3.01	60	3	4.43	26.17
PCB 137	pg/g	3	3	100%	--	--	349	3160	522		1		6.05	60	3	5.82	52.67
PCB 139	pg/g	3	3	100%	--	--	103	924	522		1		1.77	60	3	1.72	15.40
PCB 141	pg/g	3	3	100%	--	--	632	5280	522		3	1.21	10.11	60	3	10.53	88.00
PCB 142	pg/g	--	3	0%	7.5	80.2	--	--	522					60			
PCB 143	pg/g	3	3	100%	--	--	147.0	1160.0	522		1		2.22	60	3	2.45	19.33
PCB 144	pg/g	3	3	100%	--	--	1520	14200	522		3	2.91	27.20	60	3	25.33	236.67
PCB 145	pg/g	--	3	0%	1.77	12.6	--	--	522					60			
PCB 146	pg/g	3	3	100%	--	--	1030	9660	522		3	1.97	18.51	60	3	17.17	161.00
PCB 147	pg/g	--	3	0%	7.69	93.4	--	--	522					60			
PCB 148	pg/g	3	3	100%	--	--	9.4	62.4	522					60	1		1.04
PCB 150	pg/g	2	3	67%	3.20	3.2	4.23	22.5	522					60			
PCB 152	pg/g	--	3	0%	1.94	13.2	--	--	522					60			
PCB 153	pg/g	3	3	100%	--	--	6,480	66,600	522		3	12.41	127.58	60	3	108.00	1110.00
PCB 154	pg/g	2	3	67%	620	620	85	111	522					60	2	1.41	1.85
PCB 155	pg/g	2	3	67%	8.5	8.5	5.6	43.9	522					60			
PCB 156	pg/g	3	3	100%	--	--	405	5210		113	3	3.57	45.98	60	3	6.75	86.83
PCB 158	pg/g	3	3	100%	--	--	481	3830	522		2		7.34	60	3	8.02	63.83
PCB 159	pg/g	2	3	67%	5.5	5.5	19.4	179	522					60	1		2.98
PCB 160	pg/g	--	3	0%	5.92	64.8	--	--	522					60			
PCB 161	pg/g	--	3	0%	5.77	66.0	--	--	522					60			
PCB 162	pg/g	3	3	100%	--	--	50	407	522					60	1		6.78
PCB 164	pg/g	2	3	67%	1880	1880	198	215	522					60	2	3.30	3.58
PCB 165	pg/g	--	3	0%	5.50	68.6	--	--	522					60			
PCB 167	pg/g	3	3	100%	--	--	159	1360	522		1		2.61	60	3	2.65	22.67
PCB 169	pg/g	--	3	0%	4.3	65.6	--	--		0.13				60			
PCB 170	pg/g	3	3	100%	--	--	1180	12600	522		3	2.26	24.14	60	3	19.67	210.00
PCB 171	pg/g	3	3	100%	--	--	404	4000	522		2		7.66	60	3	6.73	66.67

TABLE A-2
Analytical Results Summary and Comparison Value Evaluation, Walleye Offal
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Comparison Value Evaluation	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 172	pg/g	3	3	100%	--	--	280	2680	522		1		5.13	60	3	4.67	44.67
PCB 174	pg/g	3	3	100%	--	--	444	4160	522		2		7.97	60	3	7.40	69.33
PCB 175	pg/g	3	3	100%	--	--	61.2	331	522					60	3	1.02	5.52
PCB 176	pg/g	3	3	100%	--	--	67.70	369.0	522					60	3	1.13	6.15
PCB 177	pg/g	3	3	100%	--	--	622.0	5140	522		3	1.19	9.85	60	3	10.37	85.67
PCB 178	pg/g	3	3	100%	--	--	414	2400	522		2		4.60	60	3	6.90	40.00
PCB 179	pg/g	3	3	100%	--	--	423.0	2210	522		1		4.23	60	3	7.05	36.83
PCB 180	pg/g	3	3	100%	--	--	3,060	36,200	522		3	5.86	69.35	60	3	51.00	603.33
PCB 181	pg/g	1	3	33%	16.5	94.7	13.8	13.8	522					60			
PCB 182	pg/g	3	3	100%	--	--	1220.0	12000	522		3	2.34	22.99	60	3	20.33	200.00
PCB 183	pg/g	1	3	33%	7.37	7.51	133	133	522					60	1	2.22	2.22
PCB 184	pg/g	3	3	100%	--	--	8.2	68.1	522					60			1.14
PCB 186	pg/g	--	3	0%	1.22	16.1	--	--	522					60			
PCB 187	pg/g	3	3	100%	--	--	2110	13100	522		3	4.04	25.09	60	3	35.17	218.33
PCB 188	pg/g	3	3	100%	--	--	5.5	23.4	522					60			
PCB 189	pg/g	3	3	100%	--	--	24.2	345		113	1		3.05	60	1		5.75
PCB 190	pg/g	3	3	100%	--	--	256	2700	522		1		5.17	60	3	4.27	45.00
PCB 191	pg/g	3	3	100%	--	--	42	597	522		1		1.14	60	1		9.95
PCB 192	pg/g	--	3	0%	6.3	53.3	--	--	522					60			
PCB 194	pg/g	3	3	100%	--	--	333	5050	522		1		9.67	60	3	5.55	84.17
PCB 195	pg/g	3	3	100%	--	--	212	2130	522		1		4.08	60	3	3.53	35.50
PCB 196	pg/g	3	3	100%	--	--	418	3740	522		1		7.16	60	3	6.97	62.33
PCB 197	pg/g	3	3	100%	--	--	66	518	522					60	3	1.10	8.63
PCB 198	pg/g	3	3	100%	--	--	697	6680	522		3	1.34	12.80	60	3	11.62	111.33
PCB 201	pg/g	3	3	100%	--	--	97.4	798	522		1		1.53	60	3	1.62	13.30
PCB 202	pg/g	3	3	100%	--	--	196	1690	522		1		3.24	60	3	3.27	28.17
PCB 203	pg/g	3	3	100%	--	--	484	6240	522		2		11.95	60	3	8.07	104.00
PCB 204	pg/g	--	3	0%	1.81	8.8	--	--	522					60			
PCB 205	pg/g	3	3	100%	--	--	18	286	522					60	1		4.77
PCB 206	pg/g	3	3	100%	--	--	202	3030	522		1		5.80	60	3	3.37	50.50
PCB 207	pg/g	3	3	100%	--	--	38	364	522					60	1		6.07
PCB 208	pg/g	3	3	100%	--	--	72	778	522		1		1.49	60	3	1.19	12.97
PCB 209	pg/g	2	3	67%	281	281	35	53	522					60			
Dioxin/Furans																	
2,3,7,8-TCDD	pg/g	--	15	0%	0.09	0.24	--	--		0.004				6			
1,2,3,7,8-PeCDD	pg/g	1	15	7%	0.14	1.18	0.381	0.381		0.004	1	95.25	95.25	6			
1,2,3,6,7,8-HxCDD	pg/g	5	15	33%	0.13	0.37	0.17	0.28		0.040	5	4.35	7.05	6			
1,2,3,4,7,8-HxCDD	pg/g	1	15	7%	0.121	0.33	0.305	0.305		0.040	1	7.63	7.63	6			
1,2,3,7,8,9-HxCDD	pg/g	--	15	0%	0.128	0.33	--	--		0.040				6			
1,2,3,4,6,7,8-HpCDD	pg/g	14	15	93%	0.20	0.20	0.22	0.45		0.40	1		1.11	6			
OCDD	pg/g	8	15	53%	1.05	2.1	0.825	3.86		13.3				6			
2,3,7,8-TCDF	pg/g	15	15	100%	--	--	1.1	4.6		0.040	15	26.25	115.00	6			
1,2,3,7,8-PeCDF	pg/g	--	15	0%	0.12	0.21	--	--		0.13				6			
2,3,4,7,8-PeCDF	pg/g	--	15	0%	0.16	0.31	--	--		0.013				6			
1,2,3,6,7,8-HxCDF	pg/g	1	15	7%	0.074	0.13	0.0671	0.0671		0.04	1	1.58	1.58	6			
1,2,3,4,7,8-HxCDF	pg/g	1	15	7%	0.080	0.14	0.0575	0.0575		0.04	1	1.35	1.35	6			
2,3,4,6,7,8-HxCDF	pg/g	1	15	7%	0.074	0.14	0.0594	0.0594		0.04	1	1.40	1.40	6			
1,2,3,4,6,7,8-HpCDF	pg/g	2	15	13%	0.071	0.13	0.138	0.195		0.40				6			
1,2,3,4,7,8,9-HpCDF	pg/g	--	15	0%	0.078	0.20	--	--		0.40				6			
OCDF	pg/g	1	15	7%	0.138	0.38	0.36	0.36		13.3				6			

mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
pg/g = picograms
PRG = Preliminary Remediation Goal
TAL = Target Analyte List
WW = wet weight
µg/kg = micrograms per kilogram

TABLE A-3
Analytical Results Summary and Comparison Value Evaluation, Walleye Whole Body
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics: Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	Human Health Comparison Value Evaluation: USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Comparison Value Evaluation: Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
TAL Metals																	
Aluminum	mg/kg WW	8	17	47%	3.0240	3.3240	5.0	25.9	25					4.4	8	1.14	5.89
Antimony	mg/kg WW	--	17	0%	0.10	0.11	--	--						0.03			
Arsenic	mg/kg WW	17	17	100%	--	--	0.08	0.31		0.0039	17	21.2	80.0	1.6			
Barium	mg/kg WW	17	17	100%	--	--	0.76	1.06	5.2								
Beryllium	mg/kg WW	--	17	0%	0.005	0.006	--	--	0.050					0.1			
Cadmium	mg/kg WW	17	17	100%	--	--	0.014	0.042	0.025		6		1.7	0.04			
Calcium	mg/kg WW	17	17	100%	--	--	10464	13628									
Chromium	mg/kg WW	17	17	100%	--	--	0.3	1.0	38					0.18	17	1.58	5.38
Cobalt	mg/kg WW	17	17	100%	--	--	0.020	0.039	0.50								
Copper	mg/kg WW	17	17	100%	--	--	0.3	0.57	1.0					3.0			
Iron	mg/kg WW	17	17	100%	--	--	7.1	13.1	15								
Lead	mg/kg WW	16	17	94%	0.0132	0.0132	0.015	0.223	0.05		6		4.6	0.06	8		3.71
Magnesium	mg/kg WW	17	17	100%	--	--	344	394									
Manganese	mg/kg WW	17	17	100%	--	--	1.00	2.25	3.5								
Nickel	mg/kg WW	17	17	100%	--	--	0.31	0.44	0.50					0.39	5		1.13
Potassium	mg/kg WW	17	17	100%	--	--	3173	3686									
Selenium	mg/kg WW	17	17	100%	--	--	0.37	0.80	0.13		17	2.9	6.3	0.56	6		1.43
Silver	mg/kg WW	--	17	0%	0.04	0.04	--	--	0.13					0.37			
Sodium	mg/kg WW	17	17	100%	--	--	913	1103									
Thallium	mg/kg WW	--	17	0%	0.06	0.07	--	--	0.002					4.6			
Uranium	mg/kg WW	12	17	71%	0.0006	0.0007	0.001	0.0020	0.005								
Vanadium	mg/kg WW	--	17	0%	0.10	0.11	--	--	0.025								
Zinc	mg/kg WW	17	17	100%	--	--	11.4	15.9	7.5		17	1.5	2.1	20			
Mercury	µg/kg WW	17	17	100%	--	--	114	213	3		17	45.6	85.2	60	15	1.90	3.55
PCB Aroclors																	
PCB-1016	µg/kg WW	--	17	0%	10	14	--	--	0.85					440			
PCB-1221	µg/kg WW	--	17	0%	10	14	--	--		0.30				440			
PCB-1232	µg/kg WW	--	17	0%	20	28	--	--		0.30				440			
PCB-1242	µg/kg WW	--	17	0%	10	14	--	--		0.30				440			
PCB-1248	µg/kg WW	--	17	0%	10	14	--	--		0.30				440			
PCB-1254	µg/kg WW	9	9	100%	--	--	5	15		0.30	9	16.7	50.0	440			
PCB-1260	µg/kg WW	9	9	100%	--	--	8	22		0.30	9	26.0	73.3	440			
PCB-1254/1260	µg/kg WW	8	8	100%	--	--	22	51		0.30	8	73.3	170.0	440			
PCB-1262	µg/kg WW	--	17	0%	10	14	--	--		0.30				440			
PCB-1268	µg/kg WW	--	17	0%	10	14	--	--		0.30				440			
PCB Congeners																	
PCB 1	pg/g	1	3	33%	0.60	0.73	0.57	0.57	522					60			
PCB 2	pg/g	--	3	0%	1.01	1.3	--	--	522					60			
PCB 3	pg/g	--	3	0%	0.76	1.0	--	--	522					60			
PCB 4	pg/g	1	3	33%	2.02	2.8	1.7	1.7	522					60			
PCB 5	pg/g	--	3	0%	0.28	0.83	--	--	522					60			
PCB 6	pg/g	--	3	0%	1.16	1.86	--	--	522					60			
PCB 7	pg/g	--	3	0%	0.27	1.53	--	--	522					60			
PCB 8	pg/g	1	3	33%	4.5	7.7	5.54	5.54	522					60			
PCB 9	pg/g	--	3	0%	0.60	1.81	--	--	522					60			
PCB 10	pg/g	--	3	0%	0.47	1.56	--	--	522					60			
PCB 11	pg/g	1	3	33%	23	27	40.7	40.7	522					60			
PCB 12	pg/g	--	3	0%	0.52	0.77	--	--	522					60			
PCB 14	pg/g	--	3	0%	0.28	0.84	--	--	522					60			
PCB 15	pg/g	--	3	0%	4.3	4.8	--	--	522					60			
PCB 16	pg/g	3	3	100%	--	--	6.02	10.5	522					60			
PCB 17	pg/g	3	3	100%	--	--	8.5	14.8	522					60			
PCB 18	pg/g	3	3	100%	--	--	15.5	27	522					60			
PCB 19	pg/g	3	3	100%	--	--	1.08	2.37	522					60			
PCB 20	pg/g	3	3	100%	--	--	92	129	522					60	3	1.54	2.15
PCB 21	pg/g	3	3	100%	--	--	16.5	22.8	522					60			
PCB 22	pg/g	3	3	100%	--	--	16.5	21.7	522					60			
PCB 23	pg/g	--	3	0%	0.15	0.25	--	--	522					60			
PCB 24	pg/g	2	3	67%	0.54	0.54	0.33	0.60	522					60			
PCB 25	pg/g	3	3	100%	--	--	3	4	522					60			
PCB 26	pg/g	3	3	100%	--	--	9.4	14	522					60			

TABLE A-3
Analytical Results Summary and Comparison Value Evaluation, Walleye Whole Body
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 27	pg/g	3	3	100%	--	--	1.40	2.90	522					60			
PCB 31	pg/g	3	3	100%	--	--	58	86	522					60	2		1.44
PCB 32	pg/g	3	3	100%	--	--	2.7	4.9	522					60			
PCB 34	pg/g	2	3	67%	0.70	0.70	0.37	0.70	522					60			
PCB 35	pg/g	--	3	0%	0.23	0.57	--	--	522					60			
PCB 36	pg/g	--	3	0%	0.21	0.36	--	--	522					60			
PCB 37	pg/g	3	3	100%	--	--	7.46	8.32	522					60			
PCB 38	pg/g	1	3	33%	0.22	0.30	0.434	0.434	522					60			
PCB 39	pg/g	1	3	33%	0.40	0.68	1.21	1.21	522					60			
PCB 40	pg/g	3	3	100%	--	--	24.1	46	522					60			
PCB 41	pg/g	2	3	67%	11.10	11.10	5.4	11.3	522					60			
PCB 42	pg/g	3	3	100%	--	--	28.1	65	522					60	1		1.08
PCB 43	pg/g	2	3	67%	4.3	4.3	5.9	9	522					60			
PCB 44	pg/g	3	3	100%	--	--	163	331	522					60	3	2.72	5.52
PCB 45	pg/g	3	3	100%	--	--	7.1	15.3	522					60			
PCB 46	pg/g	2	3	67%	2.53	2.53	1.04	2.0	522					60			
PCB 48	pg/g	3	3	100%	--	--	13.5	20	522					60			
PCB 49	pg/g	3	3	100%	--	--	133	261	522					60	3	2.22	4.35
PCB 50	pg/g	3	3	100%	--	--	5.7	14	522					60			
PCB 52	pg/g	3	3	100%	--	--	275	491	522					60	3	4.58	8.18
PCB 54	pg/g	1	3	33%	0.10	0.35	0.208	0.208	522					60			
PCB 55	pg/g	3	3	100%	--	--	2.7	8	522					60			
PCB 56	pg/g	3	3	100%	--	--	22.9	54	522					60			
PCB 57	pg/g	2	3	67%	1.31	1.31	2.23	2.8	522					60			
PCB 58	pg/g	3	3	100%	--	--	1.65	2.90	522					60			
PCB 59	pg/g	3	3	100%	--	--	14.2	32	522					60			
PCB 60	pg/g	3	3	100%	--	--	62	99	522					60	3	1.03	1.66
PCB 61	pg/g	3	3	100%	--	--	462	784	522		2		1.50	60	3	7.70	13.07
PCB 63	pg/g	3	3	100%	--	--	17.7	34	522					60			
PCB 64	pg/g	3	3	100%	--	--	78	157	522					60	3	1.31	2.62
PCB 66	pg/g	3	3	100%	--	--	256	561	522		1		1.07	60	3	4.27	9.35
PCB 67	pg/g	2	3	67%	2.04	2.04	4.09	4.4	522					60			
PCB 68	pg/g	3	3	100%	--	--	4.8	8.3	522					60			
PCB 72	pg/g	3	3	100%	--	--	6.8	14	522					60			
PCB 73	pg/g	2	3	67%	0.6	0.6	1.9	3.5	522					60			
PCB 77	pg/g	3	3	100%	--	--	8.5	16		40				60			
PCB 78	pg/g	--	3	0%	0.54	1.12	--	--	522					60			
PCB 79	pg/g	3	3	100%	--	--	24.3	45	522					60			
PCB 80	pg/g	--	3	0%	0.47	0.97	--	--	522					60			
PCB 81	pg/g	1	3	33%	0.63	1.02	1.55	1.55		13				60			
PCB 82	pg/g	3	3	100%	--	--	65	97	522					60	3	1.08	1.62
PCB 83	pg/g	2	3	67%	1.7	1.7	23	182	522					60			
PCB 84	pg/g	3	3	100%	--	--	54.9	110	522					60	2		1.83
PCB 85	pg/g	3	3	100%	--	--	270	459	522					60	3	4.50	7.65
PCB 86	pg/g	3	3	100%	--	--	718	890	522		3	1.38	1.70	60	3	11.97	14.83
PCB 88	pg/g	3	3	100%	--	--	77.4	137	522					60	3	1.29	2.28
PCB 89	pg/g	1	3	33%	1.62	3.8	3.06	3.06	522					60			
PCB 90	pg/g	3	3	100%	--	--	1390	1,650	522		3	2.66	3.16	60	3	23.17	27.50
PCB 92	pg/g	3	3	100%	--	--	272	385	522					60	3	4.53	6.42
PCB 93	pg/g	3	3	100%	--	--	393	596	522		1		1.14	60	3	6.55	9.93
PCB 94	pg/g	3	3	100%	--	--	11.2	16	522					60			
PCB 95	pg/g	1	3	33%	1.01	1.5	1.4	1.4	522					60			
PCB 96	pg/g	3	3	100%	--	--	1.25	2.37	522					60			
PCB 98	pg/g	2	3	67%	5.52	5.5	7.4	8.5	522					60			
PCB 99	pg/g	3	3	100%	--	--	865	1,060	522		3	1.66	2.03	60	3	14.42	17.67
PCB 103	pg/g	3	3	100%	--	--	6.9	14	522					60			
PCB 104	pg/g	1	3	33%	0.39	0.58	0.368	0.368	522					60			
PCB 105	pg/g	3	3	100%	--	--	567	605		113	3	5.00	5.34	60	3	9.45	10.08
PCB 106	pg/g	2	3	67%	1.14	1.1	22.3	28.1	522					60			
PCB 107	pg/g	3	3	100%	--	--	38.7	45	522					60			
PCB 109	pg/g	3	3	100%	--	--	155	211	522					60	3	2.58	3.52

TABLE A-3
Analytical Results Summary and Comparison Value Evaluation, Walleye Whole Body
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics: Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	Human Health Comparison Value Evaluation: USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Comparison Value Evaluation: Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 110	pg/g	3	3	100%	--	--	1180	1520	522		3	2.26	2.91	60	3	19.67	25.33
PCB 111	pg/g	2	3	67%	1.1	1.1	2.5	4.5	522					60			
PCB 112	pg/g	2	3	67%	1.22	1.22	18	70	522					60	1		1.16
PCB 114	pg/g	3	3	100%	--	--	41	46		113	3	0.37	0.40	60			
PCB 118	pg/g	3	3	100%	--	--	1,610	1,720		113	3	14.21	15.18	60	3	26.83	28.67
PCB 120	pg/g	3	3	100%	--	--	12.7	18	522					60			
PCB 121	pg/g	2	3	67%	1.2	1.2	1.31	1.8	522					60			
PCB 122	pg/g	--	3	0%	1.21	2.3	--	--	522					60			
PCB 123	pg/g	3	3	100%	--	--	18	22		113				60			
PCB 126	pg/g	2	3	67%	2.2	2.2	8.1	29		0.41	3	19.68	70.00	60			
PCB 127	pg/g	--	3	0%	1.12	2.1	--	--	522					60			
PCB 128	pg/g	3	3	100%	--	--	576	648	522		3	1.10	1.24	60	3	9.60	10.80
PCB 129	pg/g	3	3	100%	--	--	4,300	5,320	522		3	8.24	10.19	60	3	71.67	88.67
PCB 130	pg/g	3	3	100%	--	--	230	253	522					60	3	3.83	4.22
PCB 131	pg/g	2	3	67%	10.7	10.7	11.7	12.9	522					60			
PCB 132	pg/g	3	3	100%	--	--	394.0	495	522					60	3	6.57	8.25
PCB 133	pg/g	3	3	100%	--	--	91	101	522					60	3	1.51	1.68
PCB 134	pg/g	3	3	100%	--	--	47.3	59	522					60			
PCB 135	pg/g	3	3	100%	--	--	779	988	522		3	1.49	1.89	60	3	12.98	16.47
PCB 136	pg/g	3	3	100%	--	--	143.0	165	522					60	3	2.38	2.75
PCB 137	pg/g	3	3	100%	--	--	224	246	522					60	3	3.73	4.10
PCB 139	pg/g	3	3	100%	--	--	69	73	522					60	3	1.16	1.21
PCB 141	pg/g	3	3	100%	--	--	336	496	522					60	3	5.60	8.27
PCB 142	pg/g	1	3	33%	4.3	10.7	7.79	7.79	522					60			
PCB 143	pg/g	3	3	100%	--	--	87.6	125.0	522					60	3	1.46	2.08
PCB 144	pg/g	3	3	100%	--	--	986	1470	522		3	1.89	2.82	60	3	16.43	24.50
PCB 145	pg/g	--	3	0%	0.50	1.3	--	--	522					60			
PCB 146	pg/g	3	3	100%	--	--	682	764	522		3	1.31	1.46	60	3	11.37	12.73
PCB 147	pg/g	--	3	0%	2.65	11.1	--	--	522					60			
PCB 148	pg/g	2	3	67%	1.7	1.7	4.9	5.8	522					60			
PCB 150	pg/g	1	3	33%	1.22	1.4	2.22	2.22	522					60			
PCB 152	pg/g	1	3	33%	1.06	1.3	0.937	0.937	522					60			
PCB 153	pg/g	3	3	100%	--	--	3,890	5,140	522		3	7.45	9.85	60	3	64.83	85.67
PCB 154	pg/g	3	3	100%	--	--	48	55	522					60			
PCB 155	pg/g	3	3	100%	--	--	2.9	4.6	522					60			
PCB 156	pg/g	3	3	100%	--	--	270	362		113	3	2.38	3.20	60	3	4.50	6.03
PCB 158	pg/g	3	3	100%	--	--	298	372	522					60	3	4.97	6.20
PCB 159	pg/g	2	3	67%	17.3	17.3	14.9	15.7	522					60			
PCB 160	pg/g	--	3	0%	1.83	7.7	--	--	522					60			
PCB 161	pg/g	--	3	0%	1.91	8.0	--	--	522					60			
PCB 162	pg/g	3	3	100%	--	--	8	39	522					60			
PCB 164	pg/g	3	3	100%	--	--	105	174	522					60	3	1.75	2.90
PCB 165	pg/g	--	3	0%	1.87	8.0	--	--	522					60			
PCB 167	pg/g	3	3	100%	--	--	87	115	522					60	3	1.45	1.92
PCB 169	pg/g	1	3	33%	2.8	5.8	9.6	9.6		0.13	1	73.69	73.69	60			
PCB 170	pg/g	3	3	100%	--	--	710	969	522		3	1.36	1.86	60	3	11.83	16.15
PCB 171	pg/g	3	3	100%	--	--	282	310	522					60	3	4.70	5.17
PCB 172	pg/g	3	3	100%	--	--	164	200	522					60	3	2.73	3.33
PCB 174	pg/g	3	3	100%	--	--	239	343	522					60	3	3.98	5.72
PCB 175	pg/g	3	3	100%	--	--	25.6	38	522					60			
PCB 176	pg/g	3	3	100%	--	--	42.50	50.4	522					60			
PCB 177	pg/g	3	3	100%	--	--	370.0	476	522					60	3	6.17	7.93
PCB 178	pg/g	3	3	100%	--	--	261	304	522					60	3	4.35	5.07
PCB 179	pg/g	3	3	100%	--	--	250.0	321	522					60	3	4.17	5.35
PCB 180	pg/g	3	3	100%	--	--	1,720	2,550	522		3	3.29	4.88	60	3	28.67	42.50
PCB 181	pg/g	3	3	100%	--	--	6.74	8.53	522					60			
PCB 182	pg/g	3	3	100%	--	--	831.0	984	522		3	1.59	1.88	60	3	13.85	16.40
PCB 183	pg/g	--	3	0%	1.64	7.28	--	--	522					60			
PCB 184	pg/g	2	3	67%	5.0	5.0	4.0	5.8	522					60			
PCB 186	pg/g	--	3	0%	0.42	1.1	--	--	522					60			
PCB 187	pg/g	3	3	100%	--	--	1260	1660	522		3	2.41	3.18	60	3	21.00	27.67

TABLE A-3
Analytical Results Summary and Comparison Value Evaluation, Walleye Whole Body
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics: Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	Human Health Comparison Value Evaluation: USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Comparison Value Evaluation: Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 188	pg/g	3	3	100%	--	--	2.1	3.8	522					60			
PCB 189	pg/g	3	3	100%	--	--	15.1	29		113				60			
PCB 190	pg/g	3	3	100%	--	--	179	214	522					60	3	2.98	3.57
PCB 191	pg/g	2	3	67%	6	6	27	32	522					60			
PCB 192	pg/g	--	3	0%	1.4	6.1	--	--	522					60			
PCB 194	pg/g	3	3	100%	--	--	156	361	522					60	3	2.60	6.02
PCB 195	pg/g	3	3	100%	--	--	157	212	522					60	3	2.62	3.53
PCB 196	pg/g	3	3	100%	--	--	300	387	522					60	3	5.00	6.45
PCB 197	pg/g	3	3	100%	--	--	36	57	522					60			
PCB 198	pg/g	3	3	100%	--	--	608	721	522		3	1.16	1.38	60	3	10.13	12.02
PCB 201	pg/g	3	3	100%	--	--	74.0	78	522					60	3	1.23	1.29
PCB 202	pg/g	3	3	100%	--	--	138	168	522					60	3	2.30	2.80
PCB 203	pg/g	3	3	100%	--	--	317	472	522					60	3	5.28	7.87
PCB 204	pg/g	--	3	0%	0.62	0.8	--	--	522					60			
PCB 205	pg/g	3	3	100%	--	--	12	24	522					60			
PCB 206	pg/g	3	3	100%	--	--	128	257	522					60	3	2.13	4.28
PCB 207	pg/g	3	3	100%	--	--	27	36	522					60			
PCB 208	pg/g	3	3	100%	--	--	50	72	522					60	2		1.20
PCB 209	pg/g	3	3	100%	--	--	27	28	522					60			
Dioxin/Furans																	
2,3,7,8-TCDD	pg/g	--	17	0%	0.09	0.43	--	--		0.004				6			
1,2,3,7,8-PeCDD	pg/g	3	17	18%	0.10	0.46	0.127	0.169		0.004	3	31.75	42.25	6			
1,2,3,6,7,8-HxCDD	pg/g	2	17	12%	0.12	0.97	0.20	0.27		0.040	2	5.03	6.63	6			
1,2,3,4,7,8-HxCDD	pg/g	--	17	0%	0.129	0.89	--	--		0.040				6			
1,2,3,7,8,9-HxCDD	pg/g	--	17	0%	0.131	0.96	--	--		0.040				6			
1,2,3,4,6,7,8-HpCDD	pg/g	7	17	41%	0.25	0.94	0.19	0.53		0.40	6		1.32	6			
OCDD	pg/g	2	17	12%	0.65	5.3	1.2	1.83		13.3				6			
2,3,7,8-TCDF	pg/g	17	17	100%	--	--	0.9	2.6		0.040	17	22.25	65.50	6			
1,2,3,7,8-PeCDF	pg/g	1	17	6%	0.10	0.28	0.20	0.20		0.13	1	1.54	1.54	6			
2,3,4,7,8-PeCDF	pg/g	1	17	6%	0.11	0.29	0.17	0.17		0.013	1	13.08	13.08	6			
1,2,3,6,7,8-HxCDF	pg/g	2	17	12%	0.086	0.42	0.0758	0.0878		0.04	2	1.78	2.07	6			
1,2,3,4,7,8-HxCDF	pg/g	1	17	6%	0.083	0.39	0.0956	0.0956		0.04	1	2.25	2.25	6			
2,3,4,6,7,8-HxCDF	pg/g	1	17	6%	0.084	0.41	0.0663	0.0663		0.04	1	1.56	1.56	6			
1,2,3,4,6,7,8-HpCDF	pg/g	--	17	0%	0.067	0.52	--	--		0.40				6			
1,2,3,4,7,8,9-HpCDF	pg/g	--	17	0%	0.076	0.73	--	--		0.40				6			
OCDF	pg/g	--	17	0%	0.150	1.32	--	--		13.3				6			

mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
pg/g = picograms
PRG = Preliminary Remediation Goal
TAL = Target Analyte List
WW = wet weight
µg/kg = micrograms per kilogram

TABLE A-4
Analytical Results Summary and Comparison Value Evaluation, Wild Rainbow Trout Fillet
Upper Columbia River RI/FS

		Summary Statistics					Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
TAL Metals															
Aluminum	mg/kg WW	--	9	0%	--	--	25					4.4			
Antimony	mg/kg WW	--	9	0%	--	--						0.03			
Arsenic	mg/kg WW	9	9	100%	0.07	0.10		0.0039	9	16.9	25.8	1.6			
Barium	mg/kg WW	--	9	0%	--	--	5.2								
Beryllium	mg/kg WW	--	9	0%	--	--	0.050					0.1			
Cadmium	mg/kg WW	--	9	0%	--	--	0.025					0.04			
Calcium	mg/kg WW	9	9	100%	196	407									
Chromium	mg/kg WW	9	9	100%	0.4	0.7	38					0.18	9	2.24	4.02
Cobalt	mg/kg WW	1	9	11%	0.005	0.005	0.50								
Copper	mg/kg WW	9	9	100%	0.3	0.36	1.0					3.0			
Iron	mg/kg WW	9	9	100%	3.8	6.3	15								
Lead	mg/kg WW	5	9	56%	0.015	0.018	0.05					0.06			
Magnesium	mg/kg WW	9	9	100%	251	283									
Manganese	mg/kg WW	9	9	100%	0.12	0.17	3.5								
Nickel	mg/kg WW	3	9	33%	0.03	0.05	0.50					0.39			
Potassium	mg/kg WW	9	9	100%	4100	4574									
Selenium	mg/kg WW	9	9	100%	0.38	0.61	0.13		9	3.0	4.8	0.56	1		1.09
Silver	mg/kg WW	--	9	0%	--	--	0.13					0.37			
Sodium	mg/kg WW	9	9	100%	382	497									
Thallium	mg/kg WW	--	9	0%	--	--	0.002					4.6			
Uranium	mg/kg WW	--	9	0%	--	--	0.005								
Vanadium	mg/kg WW	--	9	0%	--	--	0.025								
Zinc	mg/kg WW	9	9	100%	6.3	9.0	7.5		5		1.2	20			
Mercury	µg/kg WW	9	9	100%	65	120	3		17	26.2	48.0	60	15	1.09	2.00
PCB Aroclors															
PCB-1016	µg/kg WW	--	9	0%	--	--	0.85					440			
PCB-1221	µg/kg WW	--	9	0%	--	--		0.3				440			
PCB-1232	µg/kg WW	--	9	0%	--	--		0.3				440			
PCB-1242	µg/kg WW	--	9	0%	--	--		0.3				440			
PCB-1248	µg/kg WW	--	9	0%	--	--		0.3				440			
PCB-1254/1260	µg/kg WW	9	9	100%	6	37		0.3	9	19.0	122.0	440			
PCB-1262	µg/kg WW	--	9	0%	--	--		0.3				440			
PCB-1268	µg/kg WW	--	9	0%	--	--		0.3				440			
PCB Congeners															
PCB 1	pg/g	--	2	0%	--	--	522					60			
PCB 2	pg/g	--	2	0%	--	--	522					60			
PCB 3	pg/g	1	2	50%	1.67	1.67	522					60			
PCB 4	pg/g	--	2	0%	--	--	522					60			
PCB 5	pg/g	--	2	0%	--	--	522					60			
PCB 6	pg/g	--	2	0%	--	--	522					60			
PCB 7	pg/g	--	2	0%	--	--	522					60			
PCB 8	pg/g	--	2	0%	--	--	522					60			
PCB 9	pg/g	--	2	0%	--	--	522					60			
PCB 10	pg/g	--	2	0%	--	--	522					60			
PCB 11	pg/g	1	2	50%	47.2	47.2	522					60			
PCB 12	pg/g	--	2	0%	--	--	522					60			
PCB 14	pg/g	--	2	0%	--	--	522					60			
PCB 15	pg/g	--	2	0%	--	--	522					60			
PCB 16	pg/g	--	2	0%	--	--	522					60			
PCB 17	pg/g	1	2	50%	11.2	11.2	522					60			
PCB 18	pg/g	2	2	100%	9.4	26	522					60			
PCB 19	pg/g	--	2	0%	--	--	522					60			
PCB 20	pg/g	2	2	100%	42	107	522					60	1		1.78
PCB 21	pg/g	2	2	100%	8.7	15.2	522					60			
PCB 22	pg/g	--	2	0%	--	--	522					60			
PCB 23	pg/g	--	2	0%	--	--	522					60			
PCB 24	pg/g	1	2	50%	0.20	0.20	522					60			
PCB 25	pg/g	2	2	100%	2	4	522					60			
PCB 26	pg/g	2	2	100%	4.2	15	522					60			
PCB 27	pg/g	2	2	100%	0.72	1.20	522					60			
PCB 31	pg/g	2	2	100%	30	90	522					60	1		1.50

TABLE A-4
Analytical Results Summary and Comparison Value Evaluation, Wild Rainbow Trout Fillet
Upper Columbia River RI/FS

		Summary Statistics					Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 32	pg/g	1	2	50%	8.1	8.1	522					60			
PCB 34	pg/g	--	2	0%	--	--	522					60			
PCB 35	pg/g	--	2	0%	--	--	522					60			
PCB 36	pg/g	--	2	0%	--	--	522					60			
PCB 37	pg/g	1	2	50%	15.9	15.9	522					60			
PCB 38	pg/g	--	2	0%	--	--	522					60			
PCB 39	pg/g	1	2	50%	1.06	1.06	522					60			
PCB 40	pg/g	2	2	100%	7.7	31	522					60			
PCB 41	pg/g	1	2	50%	5.0	5.0	522					60			
PCB 42	pg/g	2	2	100%	5.9	24	522					60			
PCB 43	pg/g	2	2	100%	1.2	5	522					60			
PCB 44	pg/g	2	2	100%	43	153	522					60	1		2.55
PCB 45	pg/g	1	2	50%	11.2	11.2	522					60			
PCB 46	pg/g	1	2	50%	2.49	2.5	522					60			
PCB 48	pg/g	2	2	100%	6.8	29	522					60			
PCB 49	pg/g	2	2	100%	31	126	522					60	1		2.10
PCB 50	pg/g	2	2	100%	2.8	13	522					60			
PCB 52	pg/g	2	2	100%	73	304	522					60	2	1.22	5.07
PCB 54	pg/g	--	2	0%	--	--	522					60			
PCB 55	pg/g	1	2	50%	9.4	9	522					60			
PCB 56	pg/g	2	2	100%	6.0	15	522					60			
PCB 57	pg/g	1	2	50%	0.62	0.6	522					60			
PCB 58	pg/g	1	2	50%	2.84	2.84	522					60			
PCB 59	pg/g	2	2	100%	4.1	14	522					60			
PCB 60	pg/g	2	2	100%	13	47	522					60			
PCB 61	pg/g	2	2	100%	117	532	522		1		1.02	60	2	1.95	8.87
PCB 63	pg/g	2	2	100%	3.9	18	522					60			
PCB 64	pg/g	2	2	100%	20	90	522					60	1		1.49
PCB 66	pg/g	2	2	100%	58	236	522					60	1		3.93
PCB 67	pg/g	1	2	50%	6.47	6.5	522					60			
PCB 68	pg/g	1	2	50%	1.2	1.2	522					60			
PCB 72	pg/g	2	2	100%	1.6	8	522					60			
PCB 73	pg/g	2	2	100%	0.8	3.3	522					60			
PCB 77	pg/g	2	2	100%	5.1	15		40				60			
PCB 78	pg/g	--	2	0%	--	--	522					60			
PCB 79	pg/g	2	2	100%	4.2	18	522					60			
PCB 80	pg/g	--	2	0%	--	--	522					60			
PCB 81	pg/g	--	2	0%	--	--		13				60			
PCB 82	pg/g	2	2	100%	5	17	522					60			
PCB 83	pg/g	1	2	50%	38	38	522					60			
PCB 84	pg/g	2	2	100%	12.9	52	522					60			
PCB 85	pg/g	2	2	100%	41	168	522					60	1		2.80
PCB 86	pg/g	2	2	100%	105	551	522		1		1.06	60	2	1.75	9.18
PCB 88	pg/g	2	2	100%	16.6	81	522					60	1		1.36
PCB 89	pg/g	1	2	50%	0.914	0.914	522					60			
PCB 90	pg/g	2	2	100%	234	1,140	522					60	2	3.90	19.00
PCB 92	pg/g	2	2	100%	43	257	522					60	1		4.28
PCB 93	pg/g	2	2	100%	92	435	522					60	2	1.53	7.25
PCB 94	pg/g	2	2	100%	2.3	9	522					60			
PCB 95	pg/g	--	2	0%	--	--	522					60			
PCB 96	pg/g	--	2	0%	--	--	522					60			
PCB 98	pg/g	2	2	100%	3.7	15.3	522					60			
PCB 99	pg/g	2	2	100%	121	748	522		1		1.43	60	2	2.02	12.47
PCB 103	pg/g	2	2	100%	1.4	8	522					60			
PCB 104	pg/g	--	2	0%	--	--	522					60			
PCB 105	pg/g	2	2	100%	89	436		113	1		3.85	60	2	1.48	7.27
PCB 106	pg/g	--	2	0%	--	--	522					60			
PCB 107	pg/g	2	2	100%	9.3	50	522					60			
PCB 109	pg/g	2	2	100%	22	153	522					60	1		2.55
PCB 110	pg/g	2	2	100%	200	1210	522		1		2.32	60	2	3.33	20.17

TABLE A-4
Analytical Results Summary and Comparison Value Evaluation, Wild Rainbow Trout Fillet
Upper Columbia River RI/FS

		Summary Statistics					Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 111	pg/g	--	2	0%	--	--	522					60			
PCB 112	pg/g	1	2	50%	23	23	522					60			
PCB 114	pg/g	1	2	50%	26	26		113				60			
PCB 118	pg/g	2	2	100%	245	1230		113	2	2.16	10.86	60	2	4.08	20.50
PCB 120	pg/g	2	2	100%	2.4	18	522					60			
PCB 121	pg/g	--	2	0%	--	--	522					60			
PCB 122	pg/g	--	2	0%	--	--	522					60			
PCB 123	pg/g	1	2	50%	17	17		113				60			
PCB 126	pg/g	1	2	50%	9.6	10		0.41	1	23.29	23.29	60			
PCB 127	pg/g	--	2	0%	--	--	522					60			
PCB 128	pg/g	2	2	100%	74	349	522					60	2	1.24	5.82
PCB 129	pg/g	2	2	100%	556	2580	522		2	1.07	4.94	60	2	9.27	43.00
PCB 130	pg/g	2	2	100%	29	144	522					60	1		2.40
PCB 131	pg/g	1	2	50%	5.1	5.1	522					60			
PCB 132	pg/g	2	2	100%	50.5	223	522					60	1		3.72
PCB 133	pg/g	2	2	100%	11	52	522					60			
PCB 134	pg/g	2	2	100%	9.1	34	522					60			
PCB 135	pg/g	2	2	100%	118	455	522					60	2	1.97	7.58
PCB 136	pg/g	2	2	100%	15.8	56	522					60			
PCB 137	pg/g	2	2	100%	28	181	522					60	2		3.02
PCB 139	pg/g	2	2	100%	7	44	522					60			
PCB 141	pg/g	2	2	100%	54	237	522					60	2		3.95
PCB 142	pg/g	1	2	50%	4.99	4.99	522					60			
PCB 143	pg/g	2	2	100%	13.8	58.0	522					60			
PCB 144	pg/g	2	2	100%	219	986	522		1		1.89	60	2	3.65	16.43
PCB 145	pg/g	--	2	0%	--	--	522					60			
PCB 146	pg/g	2	2	100%	87	442	522					60	2	1.45	7.37
PCB 147	pg/g	--	2	0%	--	--	522					60			
PCB 148	pg/g	1	2	50%	3.9	3.9	522					60			
PCB 150	pg/g	--	2	0%	--	--	522					60			
PCB 152	pg/g	--	2	0%	--	--	522					60			
PCB 153	pg/g	2	2	100%	571	2790	522		2	1.09	5.34	60	2	9.52	46.50
PCB 154	pg/g	1	2	50%	31	31	522					60			
PCB 155	pg/g	2	2	100%	0.6	3.3	522					60			
PCB 156	pg/g	2	2	100%	41	235		113	1		2.07	60	1		3.92
PCB 158	pg/g	2	2	100%	40	170	522					60	1		2.83
PCB 159	pg/g	2	2	100%	2.72	9.2	522					60			
PCB 160	pg/g	--	2	0%	--	--	522					60			
PCB 161	pg/g	--	2	0%	--	--	522					60			
PCB 162	pg/g	2	2	100%	5	22	522					60			
PCB 164	pg/g	2	2	100%	20	95	522					60	2		1.58
PCB 165	pg/g	--	2	0%	--	--	522					60			
PCB 167	pg/g	2	2	100%	19	90	522					60	1		1.50
PCB 169	pg/g	1	2	50%	4.6	4.6		0.13	1	35.69	35.69	60			
PCB 170	pg/g	2	2	100%	129	446	522					60	2	2.15	7.43
PCB 171	pg/g	2	2	100%	36	128	522					60	1		2.13
PCB 172	pg/g	2	2	100%	30	105	522					60	1		1.75
PCB 174	pg/g	2	2	100%	76	231	522					60	2	1.27	3.85
PCB 175	pg/g	1	2	50%	21.3	21	522					60			
PCB 176	pg/g	2	2	100%	6.47	11.2	522					60			
PCB 177	pg/g	2	2	100%	83.6	234	522					60	2	1.39	3.90
PCB 178	pg/g	2	2	100%	40	98	522					60	1		1.64
PCB 179	pg/g	2	2	100%	29.8	63	522					60	1		1.05
PCB 180	pg/g	2	2	100%	342	1270	522		1		2.43	60	1	5.70	21.17
PCB 181	pg/g	2	2	100%	0.99	3.51	522					60			
PCB 182	pg/g	2	2	100%	114.0	422	522					60	1	1.90	7.03
PCB 183	pg/g	1	2	50%	4	4	522					60			
PCB 184	pg/g	--	2	0%	--	--	522					60			
PCB 186	pg/g	--	2	0%	--	--	522					60			
PCB 187	pg/g	2	2	100%	252	700	522		1		1.34	60	2	4.20	11.67

TABLE A-4
Analytical Results Summary and Comparison Value Evaluation, Wild Rainbow Trout Fillet
Upper Columbia River RI/FS

		Summary Statistics					Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 188	pg/g	--	2	0%	--	--	522					60			
PCB 189	pg/g	2	2	100%	4.0	16		113				60			
PCB 190	pg/g	2	2	100%	27	105	522					60	1		1.75
PCB 191	pg/g	2	2	100%	5	21	522					60			
PCB 192	pg/g	--	2	0%	--	--	522					60			
PCB 194	pg/g	2	2	100%	52	220	522					60	1		3.67
PCB 195	pg/g	2	2	100%	22	81	522					60	1		1.35
PCB 196	pg/g	2	2	100%	45	143	522					60	1		2.38
PCB 197	pg/g	2	2	100%	6	15	522					60			
PCB 198	pg/g	2	2	100%	108	306	522					60	1	1.80	5.10
PCB 201	pg/g	2	2	100%	11.1	31	522					60			
PCB 202	pg/g	2	2	100%	22	57	522					60			
PCB 203	pg/g	2	2	100%	51	228	522					60	1		3.80
PCB 204	pg/g	--	2	0%	--	--	522					60			
PCB 205	pg/g	2	2	100%	3	9	522					60			
PCB 206	pg/g	2	2	100%	35	115	522					60	1		1.92
PCB 207	pg/g	2	2	100%	5	14	522					60			
PCB 208	pg/g	2	2	100%	13	27	522					60			
PCB 209	pg/g	2	2	100%	9	10	522					60			
Dioxin/Furans															
2,3,7,8-TCDD	pg/g	--	9	0%	--	--		0.004				6			
1,2,3,7,8-PeCDD	pg/g	3	9	33%	0.17	0.27		0.004	3	43.50	67.50	6			
1,2,3,6,7,8-HxCDD	pg/g	--	9	0%	--	--		0.040				6			
1,2,3,4,7,8-HxCDD	pg/g	--	9	0%	--	--		0.040				6			
1,2,3,7,8,9-HxCDD	pg/g	1	9	11%	0.076	0.076		0.040	1	1.90	1.90	6			
1,2,3,4,6,7,8-HpCDD	pg/g	6	9	67%	0.15	0.32		0.40				6			
OCDD	pg/g	5	9	56%	0.61	1.4		13.3				6			
2,3,7,8-TCDF	pg/g	9	9	100%	0.53	2.4		0.040	9	13.35	60.50	6			
1,2,3,7,8-PeCDF	pg/g	5	9	56%	0.095	0.12		0.13				6			
2,3,4,7,8-PeCDF	pg/g	3	9	33%	0.13	0.15		0.013	3	9.92	11.69	6			
1,2,3,6,7,8-HxCDF	pg/g	--	9	0%	--	--		0.04				6			
1,2,3,4,7,8-HxCDF	pg/g	--	9	0%	--	--		0.04				6			
2,3,4,6,7,8-HxCDF	pg/g	--	9	0%	--	--		0.04				6			
1,2,3,4,6,7,8-HpCDF	pg/g	2	9	22%	0.077	0.20		0.40				6			
1,2,3,4,7,8,9-HpCDF	pg/g	--	9	0%	--	--		0.40				6			
OCDF	pg/g	--	9	0%	--	--		13.3				6			

mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
pg/g = picograms
PRG = Preliminary Remediation Goal
TAL = Target Analyte List
WW = wet weight
µg/kg = micrograms per kilogram

TABLE A-5
Analytical Results Summary and Comparison Value Evaluation, Wild Rainbow Trout Offal
Upper Columbia River RI/FS

		Summary Statistics					Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
TAL Metals															
Aluminum	mg/kg WW	6	9	67%	7.2	13.6	25					4.4	9	1.63	3.09
Antimony	mg/kg WW	--	9	0%	--	--						0.03			
Arsenic	mg/kg WW	9	9	100%	0.16	0.23		0.0039	9	40.1	58.8	1.6			
Barium	mg/kg WW	9	9	100%	0.76	2.49	5.2								
Beryllium	mg/kg WW	--	9	0%	--	--	0.050					0.1			
Cadmium	mg/kg WW	9	9	100%	0.028	0.091	0.025		9	1.1	3.6	0.04			
Calcium	mg/kg WW	9	9	100%	8632	13634									
Chromium	mg/kg WW	9	9	100%	0.5	1.3	38					0.18	9	2.91	7.44
Cobalt	mg/kg WW	9	9	100%	0.029	0.065	0.50								
Copper	mg/kg WW	9	9	100%	0.6	3.48	1.0		8		3.6	3.0	2		1.16
Iron	mg/kg WW	9	9	100%	32.5	100.0	15		9	2.1	6.6				
Lead	mg/kg WW	9	9	100%	0.039	0.510	0.05		8		10.5	0.06	6		8.50
Magnesium	mg/kg WW	9	9	100%	283	397									
Manganese	mg/kg WW	9	9	100%	1.83	4.53	3.5		2		1.3				
Nickel	mg/kg WW	9	9	100%	0.31	0.49	0.50					0.39	3		1.25
Potassium	mg/kg WW	9	9	100%	2358	2943									
Selenium	mg/kg WW	9	9	100%	0.70	1.09	0.13		9	5.5	8.5	0.56	9	1.25	1.94
Silver	mg/kg WW	--	9	0%	--	--	0.13					0.37			
Sodium	mg/kg WW	9	9	100%	1209	1570									
Thallium	mg/kg WW	--	9	0%	--	--	0.002					4.6			
Uranium	mg/kg WW	9	9	100%	0.003	0.0064	0.005		2		1.3				
Vanadium	mg/kg WW	4	9	44%	0.12	0.15	0.025		4	4.7	6.0				
Zinc	mg/kg WW	9	9	100%	36.8	51.0	7.5		9	4.9	6.8	20	9	1.84	2.55
Mercury	µg/kg WW	9	9	100%	44	76	3		17	17.6	30.3	60	9	0.73	1.26
PCB Aroclors															
PCB-1016	µg/kg WW	--	9	0%	--	--	0.85					440			
PCB-1221	µg/kg WW	--	9	0%	--	--		0.3				440			
PCB-1232	µg/kg WW	--	9	0%	--	--		0.3				440			
PCB-1242	µg/kg WW	--	9	0%	--	--		0.3				440			
PCB-1248	µg/kg WW	--	9	0%	--	--		0.3				440			
PCB-1254/1260	µg/kg WW	9	9	100%	15	83		0.3	9	50.0	278.0	440			
PCB-1262	µg/kg WW	--	9	0%	--	--		0.3				440			
PCB-1268	µg/kg WW	--	9	0%	--	--		0.3				440			
PCB Congeners															
PCB 1	pg/g	1	2	50%	2.82	2.82	522					60			
PCB 2	pg/g	--	2	0%	--	--	522					60			
PCB 3	pg/g	--	2	0%	--	--	522					60			
PCB 4	pg/g	--	2	0%	--	--	522					60			
PCB 5	pg/g	--	2	0%	--	--	522					60			
PCB 6	pg/g	--	2	0%	--	--	522					60			
PCB 7	pg/g	--	2	0%	--	--	522					60			
PCB 8	pg/g	--	2	0%	--	--	522					60			
PCB 9	pg/g	--	2	0%	--	--	522					60			
PCB 10	pg/g	--	2	0%	--	--	522					60			
PCB 11	pg/g	--	2	0%	--	--	522					60			
PCB 12	pg/g	--	2	0%	--	--	522					60			
PCB 14	pg/g	--	2	0%	--	--	522					60			
PCB 15	pg/g	--	2	0%	--	--	522					60			
PCB 16	pg/g	2	2	100%	6.3	17.8	522					60			
PCB 17	pg/g	2	2	100%	10.5	37.2	522					60			
PCB 18	pg/g	2	2	100%	21.1	81	522					60			
PCB 19	pg/g	2	2	100%	1.59	5.76	522					60			
PCB 20	pg/g	2	2	100%	72	225	522					60	2	1.21	3.75
PCB 21	pg/g	2	2	100%	16.1	27.9	522					60			
PCB 22	pg/g	2	2	100%	14.9	15.2	522					60			
PCB 23	pg/g	--	2	0%	--	--	522					60			
PCB 24	pg/g	2	2	100%	0.52	1.20	522					60			
PCB 25	pg/g	2	2	100%	4	11	522					60			
PCB 26	pg/g	2	2	100%	9.9	39	522					60			
PCB 27	pg/g	2	2	100%	1.67	4.32	522					60			
PCB 31	pg/g	2	2	100%	54	196	522					60	1		3.27

TABLE A-5
Analytical Results Summary and Comparison Value Evaluation, Wild Rainbow Trout Offal
Upper Columbia River RI/FS

		Summary Statistics					Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 32	pg/g	2	2	100%	4.8	21.2	522					60			
PCB 34	pg/g	--	2	0%	--	--	522					60			
PCB 35	pg/g	--	2	0%	--	--	522					60			
PCB 36	pg/g	--	2	0%	--	--	522					60			
PCB 37	pg/g	2	2	100%	11.8	27.6	522					60			
PCB 38	pg/g	--	2	0%	--	--	522					60			
PCB 39	pg/g	--	2	0%	--	--	522					60			
PCB 40	pg/g	2	2	100%	18.3	80	522					60			
PCB 41	pg/g	2	2	100%	2.3	12.7	522					60			
PCB 42	pg/g	2	2	100%	14.1	58	522					60			
PCB 43	pg/g	1	2	50%	10.6	11	522					60			
PCB 44	pg/g	2	2	100%	107	370	522					60	2	1.78	6.17
PCB 45	pg/g	2	2	100%	6.9	29.5	522					60			
PCB 46	pg/g	1	2	50%	6.72	6.7	522					60			
PCB 48	pg/g	2	2	100%	16.7	79	522					60	1		1.32
PCB 49	pg/g	2	2	100%	83	367	522					60	2	1.38	6.12
PCB 50	pg/g	2	2	100%	6.4	36	522					60			
PCB 52	pg/g	2	2	100%	183	956	522		1		1.83	60	2	3.05	15.93
PCB 54	pg/g	--	2	0%	--	--	522					60			
PCB 55	pg/g	1	2	50%	6.1	6	522					60			
PCB 56	pg/g	2	2	100%	13.0	39	522					60			
PCB 57	pg/g	--	2	0%	--	--	522					60			
PCB 58	pg/g	2	2	100%	1.73	4.86	522					60			
PCB 59	pg/g	2	2	100%	10.2	40	522					60			
PCB 60	pg/g	2	2	100%	32	134	522					60	1		2.23
PCB 61	pg/g	2	2	100%	285	1470	522		1		2.82	60	2	4.75	24.50
PCB 63	pg/g	1	2	50%	40.5	41	522					60			
PCB 64	pg/g	2	2	100%	53	242	522					60			
PCB 66	pg/g	2	2	100%	153	636	522		1		1.22	60	2	2.55	10.60
PCB 67	pg/g	2	2	100%	2.90	14.8	522					60			
PCB 68	pg/g	2	2	100%	3.0	19.0	522					60			
PCB 72	pg/g	2	2	100%	3.5	26	522					60			
PCB 73	pg/g	2	2	100%	3.8	5.5	522					60			
PCB 77	pg/g	2	2	100%	11.1	41		40	1		1.02	60			
PCB 78	pg/g	--	2	0%	--	--	522					60			
PCB 79	pg/g	2	2	100%	9.1	47	522					60			
PCB 80	pg/g	--	2	0%	--	--	522					60			
PCB 81	pg/g	1	2	50%	3.4	3.4		13				60			
PCB 82	pg/g	2	2	100%	10	31	522					60			
PCB 83	pg/g	2	2	100%	20	160	522					60	1		2.67
PCB 84	pg/g	2	2	100%	32.0	158	522					60	1		2.63
PCB 85	pg/g	2	2	100%	128	928	522		1		1.78	60	2	2.13	15.47
PCB 86	pg/g	2	2	100%	258	1480	522		1		2.84	60	2	4.30	24.67
PCB 88	pg/g	2	2	100%	38.4	260	522					60	1		4.33
PCB 89	pg/g	1	2	50%	4.72	4.72	522					60			
PCB 90	pg/g	2	2	100%	594	3,460	522		2	1.14	6.63	60	2	9.90	57.67
PCB 92	pg/g	2	2	100%	109	824	522		1		1.58	60	2	1.82	13.73
PCB 93	pg/g	2	2	100%	190	1310	522		1		2.51	60	2	3.17	21.83
PCB 94	pg/g	2	2	100%	6.4	26	522					60			
PCB 95	pg/g	--	2	0%	--	--	522					60			
PCB 96	pg/g	1	2	50%	3.47	3.47	522					60			
PCB 98	pg/g	2	2	100%	7.4	36.9	522					60			
PCB 99	pg/g	2	2	100%	298	2,100	522		1		4.02	60	2	4.97	35.00
PCB 103	pg/g	2	2	100%	4.0	29	522					60			
PCB 104	pg/g	--	2	0%	--	--	522					60			
PCB 105	pg/g	2	2	100%	207	1260		113	2	1.83	11.12	60	2	3.45	21.00
PCB 106	pg/g	1	2	50%	67.2	67.2	522					60	2	1.12	1.12
PCB 107	pg/g	2	2	100%	22.8	147	522					60	1		2.45
PCB 109	pg/g	2	2	100%	54	391	522					60	1		6.52
PCB 110	pg/g	2	2	100%	479	2520	522		1		4.83	60	2	7.98	42.00
PCB 111	pg/g	--	2	0%	--	--	522					60			

TABLE A-5
Analytical Results Summary and Comparison Value Evaluation, Wild Rainbow Trout Offal
Upper Columbia River RI/FS

		Summary Statistics					Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 112	pg/g	2	2	100%	23	147	522					60	1		2.45
PCB 114	pg/g	2	2	100%	13	77		113				60	1		1.29
PCB 118	pg/g	2	2	100%	596	3540		113	2	5.26	31.24	60	2	9.93	59.00
PCB 120	pg/g	1	2	50%	5.8	6	522					60			
PCB 121	pg/g	--	2	0%	--	--	522					60			
PCB 122	pg/g	--	2	0%	--	--	522					60			
PCB 123	pg/g	2	2	100%	10	56		113				60			
PCB 126	pg/g	2	2	100%	3.4	34		0.41	2	8.37	83.66	60			
PCB 127	pg/g	--	2	0%	--	--	522					60			
PCB 128	pg/g	1	2	50%	165	165	522					60	2	2.75	2.75
PCB 129	pg/g	2	2	100%	1,360	4,500	522		2	2.61	8.62	60	2	22.67	75.00
PCB 130	pg/g	2	2	100%	74	462	522					60	2	1.24	7.70
PCB 131	pg/g	--	2	0%	--	--	522					60			
PCB 132	pg/g	2	2	100%	129.0	632	522		1		1.21	60	2	2.15	10.53
PCB 133	pg/g	2	2	100%	23	129	522					60	1		2.15
PCB 134	pg/g	2	2	100%	22.2	85	522					60	1		1.42
PCB 135	pg/g	2	2	100%	273	1410	522		1		2.70	60	2	4.55	23.50
PCB 136	pg/g	2	2	100%	41.1	182	522					60	1		3.03
PCB 137	pg/g	2	2	100%	55	436	522					60	1		7.27
PCB 139	pg/g	2	2	100%	17	115	522					60	1		1.92
PCB 141	pg/g	2	2	100%	164	669	522		1		1.28	60	2	2.73	11.15
PCB 142	pg/g	1	2	50%	2.4	2.4	522					60			
PCB 143	pg/g	2	2	100%	34.3	95.8	522					60	1		1.60
PCB 144	pg/g	2	2	100%	550	2610	522		1		5.00	60	2	9.17	43.50
PCB 145	pg/g	--	2	0%	--	--	522					60			
PCB 146	pg/g	2	2	100%	202	1110	522		1		2.13	60	2	3.37	18.50
PCB 147	pg/g	--	2	0%	--	--	522					60			
PCB 148	pg/g	2	2	100%	1.6	8.3	522					60			
PCB 150	pg/g	--	2	0%	--	--	522					60			
PCB 152	pg/g	--	2	0%	--	--	522					60			
PCB 153	pg/g	2	2	100%	1,390	3,900	522		2	2.66	7.47	60	2	23.17	65.00
PCB 154	pg/g	2	2	100%	13	87	522					60	1		1.46
PCB 155	pg/g	1	2	50%	8.7	8.7	522					60			
PCB 156	pg/g	2	2	100%	97	646		113	1		5.70	60	2	1.62	10.77
PCB 158	pg/g	2	2	100%	94	107	522					60	2	1.57	1.78
PCB 159	pg/g	--	2	0%	--	--	522					60			
PCB 160	pg/g	--	2	0%	--	--	522					60			
PCB 161	pg/g	--	2	0%	--	--	522					60			
PCB 162	pg/g	2	2	100%	12	68	522					60	1		1.14
PCB 164	pg/g	2	2	100%	59	212	522					60	1		3.53
PCB 165	pg/g	--	2	0%	--	--	522					60			
PCB 167	pg/g	2	2	100%	42	233	522					60	1		3.88
PCB 169	pg/g	--	2	0%	--	--		0.13				60			
PCB 170	pg/g	2	2	100%	257	1270	522		1		2.43	60	2	4.28	21.17
PCB 171	pg/g	2	2	100%	80	411	522					60	2	1.34	6.85
PCB 172	pg/g	2	2	100%	53	230	522					60	1		3.83
PCB 174	pg/g	2	2	100%	162	562	522		1		1.08	60	2	2.70	9.37
PCB 175	pg/g	1	2	50%	17.4	17	522					60			
PCB 176	pg/g	2	2	100%	9.08	12.9	522					60			
PCB 177	pg/g	2	2	100%	194.0	839	522		1		1.61	60	2	3.23	13.98
PCB 178	pg/g	2	2	100%	86	96	522					60	2	1.43	1.60
PCB 179	pg/g	2	2	100%	65.7	123	522					60	2	1.10	2.05
PCB 180	pg/g	2	2	100%	705	3460	522		2	1.35	6.63	60	2	11.75	57.67
PCB 181	pg/g	2	2	100%	10.6	231	522					60	1		3.85
PCB 182	pg/g	2	2	100%	255.0	1290	522		1		2.47	60	2	4.25	21.50
PCB 183	pg/g	--	2	0%	--	--	522					60			
PCB 184	pg/g	1	2	50%	1.1	1.1	522					60			
PCB 186	pg/g	--	2	0%	--	--	522					60			
PCB 187	pg/g	2	2	100%	142	520	522					60	2	2.37	8.67
PCB 188	pg/g	1	2	50%	1.0	1.0	522					60			
PCB 189	pg/g	2	2	100%	6.9	44		113				60	1		0.74

TABLE A-5
Analytical Results Summary and Comparison Value Evaluation, Wild Rainbow Trout Offal
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics: Number of Detects	Number of Samples	Frequency of Detection	Minimum Detected Value	Maximum Detected Value	Human Health Comparison Value Evaluation: USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Comparison Value Evaluation: Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 190	pg/g	2	2	100%	46	233	522					60	2	0.77	3.88
PCB 191	pg/g	1	2	50%	20	20	522					60			
PCB 192	pg/g	--	2	0%	--	--	522					60			
PCB 194	pg/g	2	2	100%	86	523	522					60	2	1.43	8.72
PCB 195	pg/g	2	2	100%	45	241	522					60	1		4.02
PCB 196	pg/g	2	2	100%	75	531	522		1		1.02	60	2	1.25	8.85
PCB 197	pg/g	2	2	100%	12	46	522					60			
PCB 198	pg/g	2	2	100%	181	695	522		1		1.33	60	2	3.02	11.58
PCB 201	pg/g	2	2	100%	20.9	109	522					60	1		1.82
PCB 202	pg/g	2	2	100%	43	143	522					60	1		2.38
PCB 203	pg/g	2	2	100%	98	650	522		1		1.25	60	2	1.63	10.83
PCB 204	pg/g	--	2	0%	--	--	522					60			
PCB 205	pg/g	2	2	100%	5	24	522					60			
PCB 206	pg/g	2	2	100%	64	256	522					60	2	1.06	4.27
PCB 207	pg/g	2	2	100%	9	25	522					60			
PCB 208	pg/g	2	2	100%	22	61	522					60	1		1.02
PCB 209	pg/g	1	2	50%	15	15	522					60			
Dioxin/Furans															
2,3,7,8-TCDD	pg/g	1	9	11%	0.233	0.233		0.004	1	58.25	58.25	6			
1,2,3,7,8-PeCDD	pg/g	1	9	11%	0.42	0.42		0.004	1	106.00	106.00	6			
1,2,3,6,7,8-HxCDD	pg/g	7	9	78%	0.225	0.418		0.040	7	5.63	10.45	6			
1,2,3,4,7,8-HxCDD	pg/g	--	9	0%	--	--		0.040				6			
1,2,3,7,8,9-HxCDD	pg/g	1	9	11%	0.230	0.230		0.040	1	5.75	5.75	6			
1,2,3,4,6,7,8-HpCDD	pg/g	9	9	100%	0.26	0.51		0.40	2		1.27	6			
OCDD	pg/g	4	9	44%	0.69	1.0		13.3				6			
2,3,7,8-TCDF	pg/g	9	9	100%	1.35	4.4		0.040	9	33.75	110.50	6			
1,2,3,7,8-PeCDF	pg/g	4	9	44%	0.160	0.21		0.13	4	1.23	1.63	6			
2,3,4,7,8-PeCDF	pg/g	--	9	0%	--	--		0.013				6			
1,2,3,6,7,8-HxCDF	pg/g	--	9	0%	--	--		0.04				6			
1,2,3,4,7,8-HxCDF	pg/g	--	9	0%	--	--		0.04				6			
2,3,4,6,7,8-HxCDF	pg/g	--	9	0%	--	--		0.04				6			
1,2,3,4,6,7,8-HpCDF	pg/g	--	9	0%	--	--		0.40				6			
1,2,3,4,7,8,9-HpCDF	pg/g	--	9	0%	--	--		0.40				6			
OCDF	pg/g	--	9	0%	--	--		13.3				6			

mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
pg/g = picograms
PRG = Preliminary Remediation Goa
TAL = Target Analyte List
WW = wet weight
µg/kg = micrograms per kilogram

TABLE A-6
Analytical Results Summary and Comparison Value Evaluation, Wild Rainbow Trout Whole Body
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	\	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
TAL Metals																	
Aluminum	mg/kg WW	3	8	38%	4.4250	4.8150	4.8	9.3	25					4.4	3	1.09	2.10
Antimony	mg/kg WW	--	8	0%	0.11	0.13	--	--						0.03			
Arsenic	mg/kg WW	8	8	100%	--	--	0.10	0.18		0.0039	8	25.7	44.9	1.6			
Barium	mg/kg WW	8	8	100%	--	--	0.38	1.74	5.2								
Beryllium	mg/kg WW	--	8	0%	0.006	0.006	--	--	0.050					0.1			
Cadmium	mg/kg WW	8	8	100%	--	--	0.033	0.066	0.025		8	1.3	2.6	0.04			
Calcium	mg/kg WW	8	8	100%	--	--	3339	8605									
Chromium	mg/kg WW	8	8	100%	--	--	0.6	0.9	38					0.18	8	3.20	5.03
Cobalt	mg/kg WW	2	8	25%	0.0106	0.0165	0.018	0.022	0.50								
Copper	mg/kg WW	8	8	100%	--	--	0.6	1.93	1.0		7		2.0	3.0			
Iron	mg/kg WW	8	8	100%	--	--	17.0	30.4	15		8	1.1	2.0				
Lead	mg/kg WW	7	8	88%	0.0153	0.0153	0.065	0.115	0.05		7	1.3	2.4	0.06	7	1.08	1.92
Magnesium	mg/kg WW	8	8	100%	--	--	276	317									
Manganese	mg/kg WW	8	8	100%	--	--	1.04	2.19	3.5								
Nickel	mg/kg WW	8	8	100%	--	--	0.12	0.37	0.50					0.39			
Potassium	mg/kg WW	8	8	100%	--	--	3338	3540									
Selenium	mg/kg WW	8	8	100%	--	--	0.53	0.67	0.13		8	4.2	5.3	0.56	5		1.20
Silver	mg/kg WW	--	8	0%	0.07	0.08	--	--	0.13					0.37			
Sodium	mg/kg WW	8	8	100%	--	--	761	858									
Thallium	mg/kg WW	--	8	0%	0.07	0.08	--	--	0.002					4.6			
Uranium	mg/kg WW	7	8	88%	0.0016	0.0016	0.002	0.0042	0.005								
Vanadium	mg/kg WW	--	8	0%	0.11	0.13	--	--	0.025								
Zinc	mg/kg WW	8	8	100%	--	--	19.4	22.7	7.5		8	2.6	3.0	20	8	8.00	1.14
Mercury	µg/kg WW	8	8	100%	--	--	36	70	3		8	14.4	27.8	60	8	0.60	1.16
PCB Aroclors																	
PCB-1016	µg/kg WW	--	8	0%	11	11	--	--	0.85					440			
PCB-1221	µg/kg WW	--	8	0%	11	11	--	--		0.3				440			
PCB-1232	µg/kg WW	--	8	0%	21	22	--	--		0.3				440			
PCB-1242	µg/kg WW	--	8	0%	11	11	--	--		0.3				440			
PCB-1248	µg/kg WW	--	8	0%	11	11	--	--		0.3				440			
PCB-1254	µg/kg WW	7	7	100%	--	--	7.5	11		0.3	7	25.0	36.7	440			
PCB-1260	µg/kg WW	7	7	100%	--	--	15	23.3		0.3	7	50.0	77.7	440			
PCB-1254/1260	µg/kg WW	1	1	100%	--	--	16	16		0.3	1	53.3	53.3	440			
PCB-1262	µg/kg WW	--	8	0%	10.8	11	--	--		0.3				440			
PCB-1268	µg/kg WW	--	8	0%	10.8	11	--	--		0.3				440			
PCB Congeners																	
PCB 1	pg/g	1	2	50%	1.91	1.91	2.13	2.13	522					60			
PCB 2	pg/g	--	2	0%	5.01	6.9	--	--	522					60			
PCB 3	pg/g	--	2	0%	1.77	2.2	--	--	522					60			
PCB 4	pg/g	1	2	50%	12.60	12.6	12.6	12.6	522					60			
PCB 5	pg/g	--	2	0%	1.08	6.05	--	--	522					60			
PCB 6	pg/g	--	2	0%	4.83	5.91	--	--	522					60			
PCB 7	pg/g	--	2	0%	1.88	1.97	--	--	522					60			
PCB 8	pg/g	--	2	0%	9.0	9.7	--	--	522					60			
PCB 9	pg/g	--	2	0%	2.80	4.97	--	--	522					60			
PCB 10	pg/g	--	2	0%	1.54	2.22	--	--	522					60			
PCB 11	pg/g	--	2	0%	55	66	--	--	522					60			
PCB 12	pg/g	--	2	0%	1.02	1.10	--	--	522					60			
PCB 14	pg/g	--	2	0%	1.10	1.18	--	--	522					60			
PCB 15	pg/g	1	2	50%	10.1	10.1	12.2	12.2	522					60			
PCB 16	pg/g	2	2	100%	--	--	15.2	18.2	522					60			
PCB 17	pg/g	2	2	100%	--	--	22.2	22.7	522					60			
PCB 18	pg/g	2	2	100%	--	--	47.7	53	522					60			
PCB 19	pg/g	1	2	50%	4.18	4.2	4.41	4.41	522					60			
PCB 20	pg/g	2	2	100%	--	--	123	213	522					60	2	2.05	3.55
PCB 21	pg/g	2	2	100%	--	--	20.1	21.1	522					60			
PCB 22	pg/g	2	2	100%	--	--	12.4	22.2	522					60			
PCB 23	pg/g	--	2	0%	0.45	0.52	--	--	522					60			
PCB 24	pg/g	--	2	0%	0.49	0.64	--	--	522					60			
PCB 25	pg/g	2	2	100%	--	--	5	8	522					60			
PCB 26	pg/g	2	2	100%	--	--	17.3	24	522					60			

TABLE A-6
Analytical Results Summary and Comparison Value Evaluation, Wild Rainbow Trout Whole Body
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	\	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 27	pg/g	2	2	100%	--	--	2.95	3.54	522					60			
PCB 31	pg/g	2	2	100%	--	--	84	137	522					60	2	1.41	2.28
PCB 32	pg/g	2	2	100%	--	--	8.5	14.2	522					60			
PCB 34	pg/g	1	2	50%	0.58	0.58	0.54	0.54	522					60			
PCB 35	pg/g	--	2	0%	0.50	1.14	--	--	522					60			
PCB 36	pg/g	--	2	0%	0.46	1.04	--	--	522					60			
PCB 37	pg/g	2	2	100%	--	--	17.5	19.6	522					60			
PCB 38	pg/g	--	2	0%	0.46	1.03	--	--	522					60			
PCB 39	pg/g	2	2	100%	--	--	2.09	2.12	522					60			
PCB 40	pg/g	2	2	100%	--	--	43.3	56	522					60			
PCB 41	pg/g	--	2	0%	6.03	7.72	--	--	522					60			
PCB 42	pg/g	2	2	100%	--	--	26.9	41	522					60			
PCB 43	pg/g	--	2	0%	7.1	10.7	--	--	522					60			
PCB 44	pg/g	2	2	100%	--	--	218	392	522					60	2	3.63	6.53
PCB 45	pg/g	2	2	100%	--	--	19.6	22.6	522					60			
PCB 46	pg/g	--	2	0%	3.58	4.35	--	--	522					60			
PCB 48	pg/g	2	2	100%	--	--	34.8	48	522					60			
PCB 49	pg/g	2	2	100%	--	--	161	330	522					60	2	2.68	5.50
PCB 50	pg/g	2	2	100%	--	--	16.4	28	522					60			
PCB 52	pg/g	2	2	100%	--	--	401	828	522		1		1.59	60	2	6.68	13.80
PCB 54	pg/g	--	2	0%	0.45	0.51	--	--	522					60			
PCB 55	pg/g	--	2	0%	2.22	2.84	--	--	522					60			
PCB 56	pg/g	2	2	100%	--	--	29.8	32	522					60			
PCB 57	pg/g	--	2	0%	1.41	2.82	--	--	522					60			
PCB 58	pg/g	--	2	0%	1.29	2.6	--	--	522					60			
PCB 59	pg/g	2	2	100%	--	--	21.8	32	522					60			
PCB 60	pg/g	2	2	100%	--	--	53	146	522					60	1		2.43
PCB 61	pg/g	2	2	100%	--	--	442	1120	522		1		2.15	60	2	7.37	18.67
PCB 63	pg/g	1	2	50%	13.9	13.9	39.8	40	522					60			
PCB 64	pg/g	2	2	100%	--	--	121	223	522					60	2	2.02	3.72
PCB 66	pg/g	2	2	100%	--	--	293	623	522		1		1.19	60	2	4.88	10.38
PCB 67	pg/g	1	2	50%	5.51	5.51	9.25	9.3	522					60			
PCB 68	pg/g	1	2	50%	4.12	4.12	12.3	12.3	522					60			
PCB 72	pg/g	2	2	100%	--	--	5.9	15	522					60			
PCB 73	pg/g	--	2	0%	1.1	4.1	--	--	522					60			
PCB 77	pg/g	2	2	100%	--	--	18.8	24		40				60			
PCB 78	pg/g	--	2	0%	1.38	2.76	--	--	522					60			
PCB 79	pg/g	2	2	100%	--	--	19.4	40	522					60			
PCB 80	pg/g	--	2	0%	1.21	2.42	--	--	522					60			
PCB 81	pg/g	--	2	0%	1.31	2.86	--	--		13				60			
PCB 82	pg/g	1	2	50%	2.2	2	23	23	522					60			
PCB 83	pg/g	--	2	0%	2.29	2.38	--	--	522					60			
PCB 84	pg/g	2	2	100%	--	--	53.2	97	522					60	1		1.61
PCB 85	pg/g	2	2	100%	--	--	147	575	522		1		1.10	60	2	2.45	9.58
PCB 86	pg/g	2	2	100%	--	--	386	1010	522		1		1.93	60	2	6.43	16.83
PCB 88	pg/g	2	2	100%	--	--	69.4	188	522					60	2	1.16	3.13
PCB 89	pg/g	--	2	0%	4.92	5.1	--	--	522					60			
PCB 90	pg/g	2	2	100%	--	--	808	2,590	522		2	1.55	4.96	60	2	13.47	43.17
PCB 92	pg/g	2	2	100%	--	--	173	576	522		1		1.10	60	2	2.88	9.60
PCB 93	pg/g	2	2	100%	--	--	435	1080	522		1		2.07	60	2	7.25	18.00
PCB 94	pg/g	2	2	100%	--	--	6.1	15	522					60			
PCB 95	pg/g	--	2	0%	2.08	2.6	--	--	522					60			
PCB 96	pg/g	--	2	0%	1.98	2.92	--	--	522					60			
PCB 98	pg/g	2	2	100%	--	--	16.1	36.6	522					60			
PCB 99	pg/g	2	2	100%	--	--	451	1,900	522		1		3.64	60	2	7.52	31.67
PCB 103	pg/g	2	2	100%	--	--	6.3	19	522					60			
PCB 104	pg/g	--	2	0%	1.09	1.57	--	--	522					60			
PCB 105	pg/g	2	2	100%	--	--	203	1010		113	2	1.79	8.91	60	2	3.38	16.83
PCB 106	pg/g	1	2	50%	1.81	1.8	26	26	522					60			
PCB 107	pg/g	2	2	100%	--	--	23.6	71	522					60	1		1.18

TABLE A-6
Analytical Results Summary and Comparison Value Evaluation, Wild Rainbow Trout Whole Body
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	\	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 109	pg/g	2	2	100%	--	--	60	290	522					60	2	1.01	4.83
PCB 110	pg/g	2	2	100%	--	--	786	2200	522		1		4.21	60	2	13.10	36.67
PCB 111	pg/g	--	2	0%	1.3	1.4	--	--	522					60			
PCB 112	pg/g	--	2	0%	1.33	1.38	--	--	522					60	1		
PCB 114	pg/g	2	2	100%	--	--	13	66		113				60	1		1.09
PCB 118	pg/g	2	2	100%	--	--	552	2090		113	2	4.87	18.45	60	2	9.20	34.83
PCB 120	pg/g	2	2	100%	--	--	6.1	18	522					60			
PCB 121	pg/g	--	2	0%	1.5	2.3	--	--	522					60			
PCB 122	pg/g	--	2	0%	2.01	5.6	--	--	522					60			
PCB 123	pg/g	1	2	50%	12.3	12.3	22	22		113				60			
PCB 126	pg/g	--	2	0%	1.8	8.2	--	--		0.41				60			
PCB 127	pg/g	--	2	0%	1.83	5.1	--	--	522					60			
PCB 128	pg/g	2	2	100%	--	--	174	491	522					60	2	2.90	8.18
PCB 129	pg/g	2	2	100%	--	--	1,100	5,970	522		2	2.11	11.44	60	2	18.33	99.50
PCB 130	pg/g	2	2	100%	--	--	63	354	522					60	2	1.05	5.90
PCB 131	pg/g	--	2	0%	4.4	7.0	--	--	522					60			
PCB 132	pg/g	2	2	100%	--	--	172.0	498	522					60	2	2.87	8.30
PCB 133	pg/g	2	2	100%	--	--	22	124	522					60	1		2.07
PCB 134	pg/g	2	2	100%	--	--	27.3	67	522					60	1		1.12
PCB 135	pg/g	2	2	100%	--	--	334	1490	522		1		2.85	60	2	5.57	24.83
PCB 136	pg/g	2	2	100%	--	--	55.4	117	522					60	1		1.95
PCB 137	pg/g	1	2	50%	3.76	3.76	354	354	522					60	2	5.90	5.90
PCB 139	pg/g	1	2	50%	18.5	18.5	94	94	522					60	2	1.57	1.57
PCB 141	pg/g	2	2	100%	--	--	144	800	522		1		1.53	60	2	2.40	13.33
PCB 142	pg/g	--	2	0%	4.6	7.3	--	--	522					60			
PCB 143	pg/g	2	2	100%	--	--	33.9	162.0	522					60	1		2.70
PCB 144	pg/g	2	2	100%	--	--	612	2510	522		2	1.17	4.81	60	2	10.20	41.83
PCB 145	pg/g	--	2	0%	3.39	3.7	--	--	522					60			
PCB 146	pg/g	2	2	100%	--	--	185	1130	522		1		2.16	60	2	3.08	18.83
PCB 147	pg/g	--	2	0%	4.46	7.08	--	--	522					60			
PCB 148	pg/g	1	2	50%	4.9	4.9	5.8	5.8	522					60			
PCB 150	pg/g	--	2	0%	3.33	3.6	--	--	522					60			
PCB 152	pg/g	--	2	0%	3.48	3.8	--	--	522					60			
PCB 153	pg/g	2	2	100%	--	--	1,150	8,210	522		2	2.20	15.73	60	2	19.17	136.83
PCB 154	pg/g	2	2	100%	--	--	16	61	522					60	1		1.01
PCB 155	pg/g	--	2	0%	2.4	3.9	--	--	522					60			
PCB 156	pg/g	2	2	100%	--	--	55	614		113	1		5.42	60	1		10.23
PCB 158	pg/g	2	2	100%	--	--	77	373	522					60	2	1.29	6.22
PCB 159	pg/g	1	2	50%	2.8	2.8	45.9	45.9	522					60			
PCB 160	pg/g	--	2	0%	3.44	5.5	--	--	522					60			
PCB 161	pg/g	--	2	0%	3.25	5.2	--	--	522					60			
PCB 162	pg/g	1	2	50%	10.6	11	86	86	522					60	2	1.43	1.43
PCB 164	pg/g	2	2	100%	--	--	54	269	522					60	1		4.48
PCB 165	pg/g	--	2	0%	3.24	5.1	--	--	522					60			
PCB 167	pg/g	2	2	100%	--	--	27	112	522					60	1		1.87
PCB 169	pg/g	--	2	0%	2.4	4.1	--	--		0.13				60			
PCB 170	pg/g	2	2	100%	--	--	173	2140	522		1		4.10	60	2	2.88	35.67
PCB 171	pg/g	2	2	100%	--	--	65	625	522		1		1.20	60	2	1.08	10.42
PCB 172	pg/g	2	2	100%	--	--	48	428	522					60	1		7.13
PCB 174	pg/g	2	2	100%	--	--	174	837	522		1		1.60	60	2	2.90	13.95
PCB 175	pg/g	2	2	100%	--	--	12.9	56	522					60			
PCB 176	pg/g	1	2	50%	2.22	2.22	15.10	15.1	522					60			
PCB 177	pg/g	2	2	100%	--	--	142.0	1110	522		1		2.13	60	2	2.37	18.50
PCB 178	pg/g	2	2	100%	--	--	74	272	522					60	2	1.23	4.53
PCB 179	pg/g	2	2	100%	--	--	79.6	247	522					60	2	1.33	4.12
PCB 180	pg/g	2	2	100%	--	--	444	6100	522		1		11.69	60	2	7.40	101.67
PCB 181	pg/g	--	2	0%	2.6	5.8	--	--	522					60			
PCB 182	pg/g	2	2	100%	--	--	206.0	2050	522		1		3.93	60	2	3.43	34.17
PCB 183	pg/g	--	2	0%	2.66	5.33	--	--	522					60			
PCB 184	pg/g	--	2	0%	3.1	4.3	--	--	522					60			

TABLE A-6
Analytical Results Summary and Comparison Value Evaluation, Wild Rainbow Trout Whole Body
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	\	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 186	pg/g	--	2	0%	2.11	4.7	--	--	522					60			
PCB 187	pg/g	2	2	100%	--	--	401	1810	522		1		3.47	60	2	6.68	30.17
PCB 188	pg/g	--	2	0%	1.95	3.91	--	--	522					60			
PCB 189	pg/g	1	2	50%	2.96	2.96	61	61		113				60	2	1.01	1.01
PCB 190	pg/g	2	2	100%	--	--	31	418	522					60	1		6.97
PCB 191	pg/g	1	2	50%	2	2	102	102	522					60	2	1.70	1.70
PCB 192	pg/g	--	2	0%	2.3	4.6	--	--	522					60			
PCB 194	pg/g	2	2	100%	--	--	43	950	522		1		1.82	60	1		15.83
PCB 195	pg/g	2	2	100%	--	--	27	389	522					60	1		6.48
PCB 196	pg/g	2	2	100%	--	--	59	710	522		1		1.36	60	1		11.83
PCB 197	pg/g	2	2	100%	--	--	9	70	522					60	1		1.17
PCB 198	pg/g	2	2	100%	--	--	133	1280	522		1		2.45	60	2	2.22	21.33
PCB 201	pg/g	2	2	100%	--	--	16.5	139	522					60	1		2.32
PCB 202	pg/g	2	2	100%	--	--	33	208	522					60	1		3.47
PCB 203	pg/g	2	2	100%	--	--	66	859	522		1		1.65	60	2	1.11	14.32
PCB 204	pg/g	--	2	0%	1.39	2.2	--	--	522					60			
PCB 205	pg/g	1	2	50%	1.98	1.98	43	43	522					60			
PCB 206	pg/g	2	2	100%	--	--	26	297	522					60	1		4.95
PCB 207	pg/g	1	2	50%	5.22	5.22	41	41	522					60			
PCB 208	pg/g	2	2	100%	--	--	13	83	522					60	1		1.38
PCB 209	pg/g	2	2	100%	--	--	7	28	522					60			
Dioxin/Furans																	
2,3,7,8-TCDD	pg/g	--	8	0%	0.204	0.38	--	--		0.004				6			
1,2,3,7,8-PeCDD	pg/g	--	8	0%	0.317	0.77	--	--		0.004				6			
1,2,3,6,7,8-HxCDD	pg/g	3	8	38%	0.354	0.56	0.393	0.521		0.040	3	9.83	13.03	6			
1,2,3,4,7,8-HxCDD	pg/g	--	8	0%	0.387	0.56	--	--		0.040				6			
1,2,3,7,8,9-HxCDD	pg/g	--	8	0%	0.39	0.59	--	--		0.040				6			
1,2,3,4,6,7,8-HpCDD	pg/g	5	8	63%	0.38	0.61	0.27	0.77		0.40	4		1.93	6			
OCDD	pg/g	6	8	75%	1.20	2.2	0.78	1.9		13.3				6			
2,3,7,8-TCDF	pg/g	8	8	100%	--	--	1.54	4.7		0.040	8	38.50	116.75	6			
1,2,3,7,8-PeCDF	pg/g	1	8	13%	0.18	0.23	0.207	0.21		0.13	1	1.59	1.59	6			
2,3,4,7,8-PeCDF	pg/g	1	8	13%	0.20	0.25	0.26	0.26		0.013	1	19.69	19.69	6			
1,2,3,6,7,8-HxCDF	pg/g	--	8	0%	0.090	0.31	--	--		0.04				6			
1,2,3,4,7,8-HxCDF	pg/g	--	8	0%	0.105	0.32	--	--		0.04				6			
2,3,4,6,7,8-HxCDF	pg/g	--	8	0%	0.170	0.30	--	--		0.04				6			
1,2,3,4,6,7,8-HpCDF	pg/g	1	8	13%	0.145	0.33	0.258	0.26		0.40				6			
1,2,3,4,7,8,9-HpCDF	pg/g	--	8	0%	0.215	0.46	--	--		0.40				6			
OCDF	pg/g	--	8	0%	0.45	0.77	--	--		13.3				6			

mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
pg/g = picograms
PRG = Preliminary Remediation Goal
TAL = Target Analyte List
WW = wet weight
µg/kg = micrograms per kilogram

TABLE A-7

Analytical Results Summary and Comparison Value Evaluation, Hatchery Rainbow Trout Fillet

Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
TAL Metals																	
Aluminum	mg/kg WW	--	8	0%	3.6450	3.7650	--	--	25					4.4			
Antimony	mg/kg WW	--	8	0%	0.10	0.10	--	--						0.03			
Arsenic	mg/kg WW	1	8	13%	0.0608	0.0628	0.08	0.08		0.0039	1	20.7	20.7	1.6			
Barium	mg/kg WW	--	8	0%	0.1215	0.1255	--	--	5.2								
Beryllium	mg/kg WW	--	8	0%	0.005	0.005	--	--	0.050					0.1			
Cadmium	mg/kg WW	--	8	0%	0.0122	0.0126	--	--	0.025					0.04			
Calcium	mg/kg WW	8	8	100%	--	--	217	442									
Chromium	mg/kg WW	8	8	100%	--	--	0.3	0.5	38					0.18	8	1.49	2.93
Cobalt	mg/kg WW	8	8	100%	--	--	0.006	0.009	0.50								
Copper	mg/kg WW	8	8	100%	--	--	0.2	0.40	1.0					3.0			
Iron	mg/kg WW	8	8	100%	--	--	3.3	5.0	15								
Lead	mg/kg WW	--	8	0%	0.0122	0.0126	--	--	0.05					0.06			
Magnesium	mg/kg WW	8	8	100%	--	--	250	306									
Manganese	mg/kg WW	8	8	100%	--	--	0.11	0.19	3.5								
Nickel	mg/kg WW	3	8	38%	0.0365	0.0371	0.05	0.13	0.50					0.39			
Potassium	mg/kg WW	8	8	100%	--	--	4263	4869									
Selenium	mg/kg WW	8	8	100%	--	--	0.21	0.43	0.13		8	1.7	3.3	0.56			
Silver	mg/kg WW	--	8	0%	0.06	0.06	--	--	0.13					0.37			
Sodium	mg/kg WW	8	8	100%	--	--	350	493									
Thallium	mg/kg WW	--	8	0%	0.06	0.06	--	--	0.002					4.6			
Uranium	mg/kg WW	--	8	0%	0.0012	0.0013	--	--	0.005								
Vanadium	mg/kg WW	--	8	0%	0.10	0.10	--	--	0.025								
Zinc	mg/kg WW	8	8	100%	--	--	6.4	8.2	7.5		4		1.1	20			
Mercury	µg/kg WW	8	8	100%	--	--	63	122	3		8	25.2	48.8	60	8	1.05	2.03
PCB Aroclors																	
PCB-1016	µg/kg WW	--	8	0%	10	11	--	--	0.85					440			
PCB-1221	µg/kg WW	--	8	0%	10	11	--	--		0.3				440			
PCB-1232	µg/kg WW	--	8	0%	20	22	--	--		0.3				440			
PCB-1242	µg/kg WW	--	8	0%	10	11	--	--		0.3				440			
PCB-1248	µg/kg WW	--	8	0%	10	11	--	--		0.3				440			
PCB-1254	µg/kg WW	5	5	100%	--	--	2.4	5.0		0.3	3	8.0	16.7	440			
PCB-1260	µg/kg WW	5	5	100%	--	--	3.3	5.8		0.3	5	11.0	19.3	440			
PCB-1254/1260	µg/kg WW	3	3	100%	--	--	5.0	10		0.3	3	16.7	33.3	440			
PCB-1262	µg/kg WW	--	8	0%	10	11	--	--		0.3				440			
PCB-1268	µg/kg WW	--	8	0%	10	11	--	--		0.3				440			
PCB Congeners																	
PCB 1	pg/g	1	2	50%	0.82	0.82	0.68	0.68	522					60			
PCB 2	pg/g	--	2	0%	1.35	3.8	--	--	522					60			
PCB 3	pg/g	--	2	0%	0.84	1.2	--	--	522					60			
PCB 4	pg/g	--	2	0%	1.35	1.8	--	--	522					60			
PCB 5	pg/g	--	2	0%	0.88	1.09	--	--	522					60			
PCB 6	pg/g	--	2	0%	0.85	1.06	--	--	522					60			
PCB 7	pg/g	--	2	0%	0.77	0.98	--	--	522					60			
PCB 8	pg/g	--	2	0%	1.0	5.2	--	--	522					60			
PCB 9	pg/g	--	2	0%	1.07	1.20	--	--	522					60			
PCB 10	pg/g	--	2	0%	1.04	1.36	--	--	522					60			
PCB 11	pg/g	--	2	0%	24	52	--	--	522					60			
PCB 12	pg/g	--	2	0%	0.80	0.97	--	--	522					60			
PCB 14	pg/g	--	2	0%	0.85	1.11	--	--	522					60			
PCB 15	pg/g	1	2	50%	5.2	5.2	6.92	6.92	522					60			
PCB 16	pg/g	--	2	0%	3.3	4.2	--	--	522					60			
PCB 17	pg/g	1	2	50%	5.2	5.2	6.7	6.7	522					60			
PCB 18	pg/g	1	2	50%	10.4	10.4	13.3	13	522					60			
PCB 19	pg/g	2	2	100%	--	--	0.75	1.06	522					60			
PCB 20	pg/g	2	2	100%	--	--	60	83	522					60	2	1.00	1.39
PCB 21	pg/g	1	2	50%	3.2	3.2	2.6	2.6	522					60			
PCB 22	pg/g	1	2	50%	10.0	10.0	10.1	10.1	522					60			
PCB 23	pg/g	--	2	0%	0.33	0.50	--	--	522					60			
PCB 24	pg/g	1	2	50%	0.48	0.48	0.36	0.36	522					60			
PCB 25	pg/g	1	2	50%	9.6	10	10	10	522					60			
PCB 26	pg/g	2	2	100%	--	--	6.7	7	522					60			

TABLE A-7
Analytical Results Summary and Comparison Value Evaluation, Hatchery Rainbow Trout Fillet
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 27	pg/g	1	2	50%	0.79	0.8	1.13	1.13	522					60			
PCB 31	pg/g	2	2	100%	--	--	44	44	522					60			
PCB 32	pg/g	--	2	0%	2.93	3.1	--	--	522					60			
PCB 34	pg/g	--	2	0%	0.35	0.52	--	--	522					60			
PCB 35	pg/g	--	2	0%	0.44	0.45	--	--	522					60			
PCB 36	pg/g	--	2	0%	0.40	0.41	--	--	522					60			
PCB 37	pg/g	--	2	0%	6.5	6.8	--	--	522					60			
PCB 38	pg/g	--	2	0%	0.42	0.44	--	--	522					60			
PCB 39	pg/g	1	2	50%	0.53	0.53	0.81	0.81	522					60			
PCB 40	pg/g	2	2	100%	--	--	8.2	27	522					60			
PCB 41	pg/g	--	2	0%	1.37	3.35	--	--	522					60			
PCB 42	pg/g	2	2	100%	--	--	6.9	16	522					60			
PCB 43	pg/g	1	2	50%	4.5	4.5	2.0	2	522					60			
PCB 44	pg/g	2	2	100%	--	--	59	129	522					60	1		2.15
PCB 45	pg/g	1	2	50%	3.9	4	8.3	8.3	522					60			
PCB 46	pg/g	1	2	50%	0.75	0.75	0.97	1.0	522					60			
PCB 48	pg/g	1	2	50%	20.9	20.9	9.2	9	522					60			
PCB 49	pg/g	2	2	100%	--	--	48	98	522					60	1		1.63
PCB 50	pg/g	1	2	50%	3.45	3.45	7.6	8	522					60			
PCB 52	pg/g	2	2	100%	--	--	102	202	522					60	2	1.70	3.37
PCB 54	pg/g	--	2	0%	0.28	0.34	--	--	522					60			
PCB 55	pg/g	1	2	50%	3.01	3.01	5.0	5	522					60			
PCB 56	pg/g	2	2	100%	--	--	7.5	11	522					60			
PCB 57	pg/g	--	2	0%	0.78	1.30	--	--	522					60			
PCB 58	pg/g	1	2	50%	1.12	1.1	1.43	1.43	522					60			
PCB 59	pg/g	2	2	100%	--	--	6.2	13	522					60			
PCB 60	pg/g	2	2	100%	--	--	18	32	522					60			
PCB 61	pg/g	2	2	100%	--	--	188	274	522					60	2	3.13	4.57
PCB 63	pg/g	2	2	100%	--	--	6.1	10	522					60			
PCB 64	pg/g	2	2	100%	--	--	26	67	522					60			
PCB 66	pg/g	2	2	100%	--	--	98	181	522					60	2	1.64	3.02
PCB 67	pg/g	1	2	50%	2.10	2.10	3.50	3.5	522					60			
PCB 68	pg/g	1	2	50%	2.34	2.34	2.8	2.8	522					60			
PCB 72	pg/g	2	2	100%	--	--	2.9	3	522					60			
PCB 73	pg/g	2	2	100%	--	--	1.8	2.8	522					60			
PCB 77	pg/g	2	2	100%	--	--	5.1	10		40				60			
PCB 78	pg/g	1	2	50%	0.71	0.71	4.41	4.41	522					60			
PCB 79	pg/g	2	2	100%	--	--	7.7	11	522					60			
PCB 80	pg/g	--	2	0%	0.64	1.04	--	--	522					60			
PCB 81	pg/g	1	2	50%	1.18	1.18	1.96	1.96		13				60			
PCB 82	pg/g	2	2	100%	--	--	3	9	522					60			
PCB 83	pg/g	2	2	100%	--	--	15	19	522					60			
PCB 84	pg/g	1	2	50%	10.8	10.8	28.4	28	522					60			
PCB 85	pg/g	2	2	100%	--	--	60	99	522					60	2	0.99	1.65
PCB 86	pg/g	2	2	100%	--	--	148	266	522					60	2	2.47	4.43
PCB 88	pg/g	2	2	100%	--	--	18.9	45	522					60			
PCB 89	pg/g	--	2	0%	1.89	2.9	--	--	522					60			
PCB 90	pg/g	2	2	100%	--	--	358	537	522		1		1.03	60	2	5.97	8.95
PCB 92	pg/g	2	2	100%	--	--	66	107	522					60	2	1.10	1.78
PCB 93	pg/g	1	2	50%	3.07	3.07	5	5	522					60			
PCB 94	pg/g	--	2	0%	1.39	1.73	--	--	522					60			
PCB 95	pg/g	2	2	100%	--	--	119.0	251.0	522					60	2	1.98	4.18
PCB 96	pg/g	--	2	0%	1.11	1.41	--	--	522					60			
PCB 98	pg/g	2	2	100%	--	--	3.7	12.7	522					60			
PCB 99	pg/g	2	2	100%	--	--	178	244	522					60	2	2.97	4.07
PCB 103	pg/g	2	2	100%	--	--	2.7	4	522					60			
PCB 104	pg/g	--	2	0%	0.63	0.84	--	--	522					60			
PCB 105	pg/g	2	2	100%	--	--	141	148		113	2	1.24	1.31	60	2	2.35	2.47
PCB 106	pg/g	--	2	0%	1.38	1.6	--	--	522					60			
PCB 107	pg/g	2	2	100%	--	--	12.8	14	522					60			

TABLE A-7
Analytical Results Summary and Comparison Value Evaluation, Hatchery Rainbow Trout Fillet
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
		Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 109	pg/g	2	2	100%	--	--	37	40	522					60			
PCB 110	pg/g	2	2	100%	--	--	289	550	522		1		1.05	60	2	4.82	9.17
PCB 111	pg/g	--	2	0%	1.0	1.2	--	--	522					60			
PCB 112	pg/g	2	2	100%	--	--	8	10	522					60			
PCB 114	pg/g	1	2	50%	8.1	8.1	8	8		113				60			
PCB 118	pg/g	2	2	100%	--	--	395	436		113	2	3.49	3.85	60	2	6.58	7.27
PCB 120	pg/g	1	2	50%	4	4	4.2	4	522					60			
PCB 121	pg/g	--	2	0%	1.0	1.2	--	--	522					60			
PCB 122	pg/g	--	2	0%	1.40	1.7	--	--	522					60			
PCB 123	pg/g	1	2	50%	7.6	7.6	8	8		113				60			
PCB 126	pg/g	2	2	100%	--	--	2.3	5		0.41	2	5.68	11.27	60			
PCB 127	pg/g	--	2	0%	1.31	1.6	--	--	522					60			
PCB 128	pg/g	2	2	100%	--	--	107	118	522					60	2	1.78	1.97
PCB 129	pg/g	2	2	100%	--	--	768	922	522		1		1.77	60	2	12.80	15.37
PCB 130	pg/g	2	2	100%	--	--	40	40	522					60			
PCB 131	pg/g	--	2	0%	2.2	2.3	--	--	522					60			
PCB 132	pg/g	2	2	100%	--	--	66.9	101	522					60	2	1.12	1.68
PCB 133	pg/g	2	2	100%	--	--	13	16	522					60			
PCB 134	pg/g	2	2	100%	--	--	14.0	19	522					60			
PCB 135	pg/g	2	2	100%	--	--	159	179	522					60	2	2.65	2.98
PCB 136	pg/g	2	2	100%	--	--	20.0	27	522					60			
PCB 137	pg/g	2	2	100%	--	--	37	43	522					60			
PCB 139	pg/g	2	2	100%	--	--	11	12	522					60			
PCB 141	pg/g	2	2	100%	--	--	74	85	522					60	2	1.24	1.41
PCB 142	pg/g	--	2	0%	2.2	2.4	--	--	522					60			
PCB 143	pg/g	--	2	0%	2.1	2.5	--	--	522					60			
PCB 144	pg/g	2	2	100%	--	--	19	22	522					60			
PCB 145	pg/g	--	2	0%	0.58	1.4	--	--	522					60			
PCB 146	pg/g	2	2	100%	--	--	118	141	522					60	2	1.97	2.35
PCB 147	pg/g	2	2	100%	--	--	299	390	522					60	2	4.98	6.50
PCB 148	pg/g	1	2	50%	1.9	1.9	1.1	1.1	522					60			
PCB 150	pg/g	--	2	0%	0.66	1.4	--	--	522					60			
PCB 152	pg/g	--	2	0%	0.61	1.4	--	--	522					60			
PCB 153	pg/g	2	2	100%	--	--	812	987	522		2	1.56	1.89	60	2	13.53	16.45
PCB 154	pg/g	2	2	100%	--	--	8	11	522					60			
PCB 155	pg/g	--	2	0%	1.1	1.4	--	--	522					60			
PCB 156	pg/g	2	2	100%	--	--	37	75		113				60	1		1.25
PCB 158	pg/g	2	2	100%	--	--	51	64	522					60	1		1.07
PCB 159	pg/g	--	2	0%	3.5	4.9	--	--	522					60			
PCB 160	pg/g	--	2	0%	1.48	1.8	--	--	522					60			
PCB 161	pg/g	--	2	0%	1.61	1.9	--	--	522					60			
PCB 162	pg/g	2	2	100%	--	--	7	9	522					60			
PCB 164	pg/g	--	2	0%	27	34	--	--	522					60			
PCB 165	pg/g	--	2	0%	1.56	1.7	--	--	522					60			
PCB 167	pg/g	2	2	100%	--	--	19	31	522					60			
PCB 169	pg/g	--	2	0%	1.2	5.9	--	--		0.13				60			
PCB 170	pg/g	2	2	100%	--	--	135	216	522					60	2	2.25	3.60
PCB 171	pg/g	2	2	100%	--	--	45	69	522					60	1		1.15
PCB 172	pg/g	2	2	100%	--	--	33	41	522					60			
PCB 174	pg/g	2	2	100%	--	--	96	103	522					60	2	1.60	1.72
PCB 175	pg/g	--	2	0%	7.09	8.09	--	--	522					60			
PCB 176	pg/g	2	2	100%	--	--	8.99	9.5	522					60			
PCB 177	pg/g	2	2	100%	--	--	97.8	125	522					60	2	1.63	2.08
PCB 178	pg/g	2	2	100%	--	--	49	51	522					60			
PCB 179	pg/g	2	2	100%	--	--	44.4	47	522					60			
PCB 180	pg/g	2	2	100%	--	--	350	560	522		1		1.07	60	2	5.83	9.33
PCB 181	pg/g	--	2	0%	2.1	2.3	--	--	522					60			
PCB 182	pg/g	1	2	50%	3.43	3.43	1.9	2	522					60			
PCB 183	pg/g	2	2	100%	--	--	149	192	522					60	2	2.48	3.20
PCB 184	pg/g	1	2	50%	1.3	1.3	1.2	1.2	522					60			

TABLE A-7
Analytical Results Summary and Comparison Value Evaluation, Hatchery Rainbow Trout Fillet
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
		Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 186	pg/g	--	2	0%	1.27	1.3	--	--	522					60			
PCB 187	pg/g	2	2	100%	--	--	281	355	522					60	2	4.68	5.92
PCB 188	pg/g	--	2	0%	1.16	1.28	--	--	522					60			
PCB 189	pg/g	2	2	100%	--	--	2.1	7		113				60			
PCB 190	pg/g	2	2	100%	--	--	22	47	522					60			
PCB 191	pg/g	1	2	50%	4	4	8	8	522					60			
PCB 192	pg/g	--	2	0%	1.8	1.9	--	--	522					60			
PCB 194	pg/g	2	2	100%	--	--	47	81	522					60	1		1.36
PCB 195	pg/g	2	2	100%	--	--	18	51	522					60			
PCB 196	pg/g	2	2	100%	--	--	42	69	522					60	1		1.15
PCB 197	pg/g	1	2	50%	6.55	6.55	9	9	522					60			
PCB 198	pg/g	2	2	100%	--	--	100	164	522					60	2	1.66	2.73
PCB 201	pg/g	2	2	100%	--	--	11.5	19	522					60			
PCB 202	pg/g	2	2	100%	--	--	25	37	522					60			
PCB 203	pg/g	2	2	100%	--	--	45	106	522					60	1		1.77
PCB 204	pg/g	--	2	0%	0.79	1.4	--	--	522					60			
PCB 205	pg/g	--	2	0%	1.19	4.09	--	--	522					60			
PCB 206	pg/g	2	2	100%	--	--	23	61	522					60	1		1.02
PCB 207	pg/g	1	2	50%	3.92	3.92	10	10	522					60			
PCB 208	pg/g	2	2	100%	--	--	9	23	522					60			
PCB 209	pg/g	1	2	50%	7.53	7.53	14	14	522					60			
Dioxin/Furans																	
2,3,7,8-TCDD	pg/g	--	8	0%	0.235	1.05	--	--		0.004				6			
1,2,3,7,8-PeCDD	pg/g	--	8	0%	0.336	1.10	--	--		0.004				6			
1,2,3,6,7,8-HxCDD	pg/g	--	8	0%	0.509	0.94	--	--		0.040				6			
1,2,3,4,7,8-HxCDD	pg/g	--	8	0%	0.521	0.94	--	--		0.040				6			
1,2,3,7,8,9-HxCDD	pg/g	--	8	0%	0.53	0.97	--	--		0.040				6			
1,2,3,4,6,7,8-HpCDD	pg/g	--	8	0%	0.66	1.42	--	--		0.40				6			
OCDD	pg/g	2	8	25%	0.65	2.3	1.70	4.0		13.3				6			
2,3,7,8-TCDF	pg/g	5	8	63%	0.372	1.18	0.65	1.2		0.040	5	16.33	29.75	6			
1,2,3,7,8-PeCDF	pg/g	--	8	0%	0.17	0.51	--	--		0.13				6			
2,3,4,7,8-PeCDF	pg/g	--	8	0%	0.17	0.53	--	--		0.013				6			
1,2,3,6,7,8-HxCDF	pg/g	--	8	0%	0.273	0.48	--	--		0.04				6			
1,2,3,4,7,8-HxCDF	pg/g	--	8	0%	0.280	0.53	--	--		0.04				6			
2,3,4,6,7,8-HxCDF	pg/g	--	8	0%	0.295	0.53	--	--		0.04				6			
1,2,3,4,6,7,8-HpCDF	pg/g	--	8	0%	0.354	0.82	--	--		0.40				6			
1,2,3,4,7,8,9-HpCDF	pg/g	--	8	0%	0.520	1.15	--	--		0.40				6			
OCDF	pg/g	--	8	0%	0.43	1.72	--	--		13.3				6			

mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
pg/g = picograms
PRG = Preliminary Remediation Goal
TAL = Target Analyte List
WW = wet weight
µg/kg = micrograms per kilogram

TABLE A-8
Analytical Results Summary and Comparison Value Evaluation, Hatchery Rainbow Offal
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics: Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	Human Health Comparison Value Evaluation: USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Comparison Value Evaluation: Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
TAL Metals																	
Aluminum	mg/kg WW	8	8	0%	--	--	7.5	60.6	25					4.4	8	1.70	13.76
Antimony	mg/kg WW	--	8	0%	0.11	0.12	--	--						0.03			
Arsenic	mg/kg WW	8	8	0%	--	--	0.11	0.16		0.0039	8	27.1	41.4	1.6			
Barium	mg/kg WW	8	8	0%	--	--	0.70	3.03	5.2								
Beryllium	mg/kg WW	--	8	0%	0.006	0.006	--	--	0.050					0.1			
Cadmium	mg/kg WW	8	8	0%	--	--	0.066	0.123	0.025		8	2.6	4.9	0.04			
Calcium	mg/kg WW	8	8	0%	--	--	8607	14687									
Chromium	mg/kg WW	8	8	0%	--	--	0.3	1.1	38					0.18	8	1.80	6.18
Cobalt	mg/kg WW	8	8	0%	--	--	0.031	0.060	0.50								
Copper	mg/kg WW	8	8	0%	--	--	0.5	4.61	1.0		3		4.8	3.0	2		1.54
Iron	mg/kg WW	8	8	0%	--	--	27.3	81.4	15		8	1.8	5.4				
Lead	mg/kg WW	8	8	0%	--	--	0.015	0.410	0.05		3		8.4	0.06	3		6.83
Magnesium	mg/kg WW	8	8	0%	--	--	316	404									
Manganese	mg/kg WW	8	8	0%	--	--	2.08	5.32	3.5		2		1.5				
Nickel	mg/kg WW	8	8	0%	--	--	0.29	0.70	0.50		2		1.4	0.39	4		1.78
Potassium	mg/kg WW	8	8	0%	--	--	2465	2904									
Selenium	mg/kg WW	8	8	0%	--	--	0.32	0.68	0.13		8	2.5	5.4	0.56	3		1.22
Silver	mg/kg WW	--	8	0%	0.07	0.07	--	--	0.13					0.37			
Sodium	mg/kg WW	8	8	0%	--	--	1233	1648									
Thallium	mg/kg WW	--	8	0%	0.07	0.07	--	--	0.002					4.6			
Uranium	mg/kg WW	6	8	0%	0.0014	0.0015	0.002	0.0155	0.005		2		3.2				
Vanadium	mg/kg WW	2	8	0%	0.11	0.12	0.16	0.16	0.025		2	6.5	6.6				
Zinc	mg/kg WW	8	8	0%	--	--	36.2	45.7	7.5		8	4.8	6.1	20	8	1.81	2.29
Mercury	µg/kg WW	8	8	0%	--	--	45	83	3		8	17.8	33.0	60	8	0.74	1.38
PCB Aroclors																	
PCB-1016	µg/kg WW	--	8	0	10	11	--	--	0.85					440			
PCB-1221	µg/kg WW	--	8	0	10	11	--	--		0.3				440			
PCB-1232	µg/kg WW	--	8	0	21	22	--	--		0.3				440			
PCB-1242	µg/kg WW	--	8	0	10	11	--	--		0.3				440			
PCB-1248	µg/kg WW	--	8	0	10	11	--	--		0.3				440			
PCB-1254	µg/kg WW	5	5	0	--	--	6.0	10		0.3	5	20.0	33.3	440			
PCB-1260	µg/kg WW	5	5	0	--	--	5.5	11		0.3	5	18.3	36.7	440			
PCB-1254/1260	µg/kg WW	3	3	0	--	--	9.1	11		0.3	3	30.3	36.7	440			
PCB-1262	µg/kg WW	--	8	0	10	11	--	--		0.3				440			
PCB-1268	µg/kg WW	--	8	0	10	11	--	--		0.3				440			
PCB Congeners																	
PCB 1	pg/g	1	2	0%	1.22	1.22	2.16	2.16	522					60			
PCB 2	pg/g	--	2	0%	2.75	2.9	--	--	522					60			
PCB 3	pg/g	--	2	0%	1.49	1.8	--	--	522					60			
PCB 4	pg/g	1	2	0%	1.39	1.4	6.0	6.0	522					60			
PCB 5	pg/g	--	2	0%	0.35	1.07	--	--	522					60			
PCB 6	pg/g	1	2	0%	1.06	1.06	3.44	3.44	522					60			
PCB 7	pg/g	--	2	0%	0.96	1.01	--	--	522					60			
PCB 8	pg/g	--	2	0%	5.9	6.3	--	--	522					60			
PCB 9	pg/g	--	2	0%	1.34	1.67	--	--	522					60			
PCB 10	pg/g	--	2	0%	0.29	1.14	--	--	522					60			
PCB 11	pg/g	1	2	0%	61	61	41.9	41.9	522					60			
PCB 12	pg/g	--	2	0%	1.02	1.41	--	--	522					60			
PCB 14	pg/g	--	2	0%	0.36	1.08	--	--	522					60			
PCB 15	pg/g	1	2	0%	6.8	6.8	13.9	13.9	522					60			
PCB 16	pg/g	2	2	0%	--	--	9.92	10.2	522					60			
PCB 17	pg/g	2	2	0%	--	--	13.4	18.3	522					60			
PCB 18	pg/g	2	2	0%	--	--	27.9	38	522					60			
PCB 19	pg/g	1	2	0%	2.11	2.1	1.85	1.85	522					60			
PCB 20	pg/g	2	2	0%	--	--	149	157	522					60	2	2.48	2.62
PCB 21	pg/g	1	2	0%	15.0	15.0	16.8	16.8	522					60			
PCB 22	pg/g	2	2	0%	--	--	16.7	22.7	522					60			

TABLE A-8
Analytical Results Summary and Comparison Value Evaluation, Hatchery Rainbow Offal
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 23	pg/g	--	2	0%	0.59	0.62	--	--	522					60			
PCB 24	pg/g	2	2	0%	--	--	0.63	0.82	522					60			
PCB 25	pg/g	2	2	0%	--	--	6	6	522					60			
PCB 26	pg/g	2	2	0%	--	--	13.5	19	522					60			
PCB 27	pg/g	1	2	0%	2.98	3.0	2.08	2.08	522					60			
PCB 31	pg/g	2	2	0%	--	--	104	114	522					60	2	1.73	1.90
PCB 32	pg/g	2	2	0%	--	--	6.7	6.8	522					60			
PCB 34	pg/g	--	2	0%	0.59	0.69	--	--	522					60			
PCB 35	pg/g	--	2	0%	0.49	0.87	--	--	522					60			
PCB 36	pg/g	--	2	0%	0.44	0.75	--	--	522					60			
PCB 37	pg/g	2	2	0%	--	--	12.4	13.4	522					60			
PCB 38	pg/g	--	2	0%	0.45	0.83	--	--	522					60			
PCB 39	pg/g	2	2	0%	--	--	0.97	2.90	522					60			
PCB 40	pg/g	2	2	0%	--	--	26.1	85	522					60	1		1.41
PCB 41	pg/g	1	2	0%	4.15	4.15	10.5	10.5	522					60			
PCB 42	pg/g	2	2	0%	--	--	17.4	50	522					60			
PCB 43	pg/g	--	2	0%	2.9	13.7	--	--	522					60			
PCB 44	pg/g	2	2	0%	--	--	135	406	522					60	2	2.25	6.77
PCB 45	pg/g	2	2	0%	--	--	7.8	24.6	522					60			
PCB 46	pg/g	1	2	0%	1.52	1.52	2.45	2.5	522					60			
PCB 48	pg/g	2	2	0%	--	--	20.1	64	522					60	1		1.07
PCB 49	pg/g	2	2	0%	--	--	111	299	522					60	2	1.85	4.98
PCB 50	pg/g	1	2	0%	8.19	8.19	21.6	22	522					60			
PCB 52	pg/g	2	2	0%	--	--	247	598	522		1		1.15	60	2	4.12	9.97
PCB 54	pg/g	--	2	0%	0.37	0.47	--	--	522					60			
PCB 55	pg/g	2	2	0%	--	--	3.9	14	522					60			
PCB 56	pg/g	2	2	0%	--	--	15.6	33	522					60			
PCB 57	pg/g	1	2	0%	2.72	2.72	3.56	3.6	522					60			
PCB 58	pg/g	1	2	0%	1.28	1.3	4.49	4.49	522					60			
PCB 59	pg/g	1	2	0%	13.6	13.6	40.0	40	522					60			
PCB 60	pg/g	2	2	0%	--	--	43	95	522					60	1		1.58
PCB 61	pg/g	2	2	0%	--	--	286	842	522		1		1.61	60	2	4.77	14.03
PCB 63	pg/g	2	2	0%	--	--	12.3	28	522					60			
PCB 64	pg/g	2	2	0%	--	--	72	224	522					60	2	1.20	3.73
PCB 66	pg/g	2	2	0%	--	--	204	554	522		1		1.06	60	2	3.40	9.23
PCB 67	pg/g	1	2	0%	3.98	3.98	9.75	9.8	522					60			
PCB 68	pg/g	2	2	0%	--	--	4.8	8.0	522					60			
PCB 72	pg/g	1	2	0%	5.8	5.8	10.4	10	522					60			
PCB 73	pg/g	2	2	0%	--	--	1.6	6.8	522					60			
PCB 77	pg/g	2	2	0%	--	--	11.0	31		40				60			
PCB 78	pg/g	--	2	0%	1.05	1.46	--	--	522					60			
PCB 79	pg/g	2	2	0%	--	--	16.5	28	522					60			
PCB 80	pg/g	--	2	0%	0.86	1.18	--	--	522					60			
PCB 81	pg/g	--	2	0%	0.98	1.25	--	--		13.3				60			
PCB 82	pg/g	2	2	0%	--	--	13	28	522					60			
PCB 83	pg/g	2	2	0%	--	--	115	129	522					60	2	1.92	2.15
PCB 84	pg/g	2	2	0%	--	--	20.3	89	522					60	1		1.48
PCB 85	pg/g	2	2	0%	--	--	215	435	522					60	2	3.58	7.25
PCB 86	pg/g	2	2	0%	--	--	413	816	522		1		1.56	60	2	6.88	13.60
PCB 88	pg/g	2	2	0%	--	--	75.0	139	522					60	2	1.25	2.32
PCB 89	pg/g	--	2	0%	2.53	9.4	--	--	522					60			
PCB 90	pg/g	2	2	0%	--	--	983	1590	522		2	1.88	3.05	60	2	16.38	26.50
PCB 92	pg/g	2	2	0%	--	--	186	323	522					60	2	3.10	5.38
PCB 93	pg/g	2	2	0%	--	--	347	764	522		1		1.46	60	2	5.78	12.73
PCB 94	pg/g	1	2	0%	15.7	15.7	6.0	6	522					60			
PCB 95	pg/g	--	2	0%	1.86	2.0	--	--	522					60			

TABLE A-8
Analytical Results Summary and Comparison Value Evaluation, Hatchery Rainbow Offal
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 96	pg/g	--	2	0%	1.22	1.74	--	--	522					60			
PCB 98	pg/g	2	2	0%	--	--	10.7	37.1	522					60			
PCB 99	pg/g	2	2	0%	--	--	404	719	522		1		1.38	60	2	6.73	11.98
PCB 103	pg/g	1	2	0%	1.75	1.75	7.2	7	522					60			
PCB 104	pg/g	--	2	0%	0.65	1.03	--	--	522					60			
PCB 105	pg/g	2	2	0%	--	--	341	398		113	2	3.01	3.51	60	2	5.68	6.63
PCB 106	pg/g	1	2	0%	1.49	1.5	22.4	22.4	522					60			
PCB 107	pg/g	2	2	0%	--	--	37.0	38	522					60			
PCB 109	pg/g	2	2	0%	--	--	95	121	522					60	2	1.58	2.02
PCB 110	pg/g	2	2	0%	--	--	1530	1600	522		2	2.93	3.07	60	2	25.50	26.67
PCB 111	pg/g	2	2	0%	--	--	2.5	3.1	522					60			
PCB 112	pg/g	2	2	0%	--	--	93	103	522					60	2	1.55	1.72
PCB 114	pg/g	2	2	0%	--	--	22	25		113				60			
PCB 118	pg/g	2	2	0%	--	--	1010	1080		113	2	8.91	9.53	60	2	16.83	18.00
PCB 120	pg/g	2	2	0%	--	--	11.1	11	522					60			
PCB 121	pg/g	--	2	0%	1.3	1.4	--	--	522					60			
PCB 122	pg/g	--	2	0%	1.64	2.6	--	--	522					60			
PCB 123	pg/g	2	2	0%	--	--	13	19		113				60			
PCB 126	pg/g	2	2	0%	--	--	7.7	13		0.41	2	18.88	31.95	60			
PCB 127	pg/g	--	2	0%	1.44	2.4	--	--	522					60			
PCB 128	pg/g	2	2	0%	--	--	310	329	522					60	2	5.17	5.48
PCB 129	pg/g	2	2	0%	--	--	2440	2560	522		2	4.67	4.90	60	2	40.67	42.67
PCB 130	pg/g	2	2	0%	--	--	117	132	522					60	2	1.95	2.20
PCB 131	pg/g	1	2	0%	3.5	3.5	7.1	7.1	522					60			
PCB 132	pg/g	2	2	0%	--	--	163.0	354	522					60	2	2.72	5.90
PCB 133	pg/g	2	2	0%	--	--	39	46	522					60			
PCB 134	pg/g	2	2	0%	--	--	31.4	60	522					60	1		1.00
PCB 135	pg/g	2	2	0%	--	--	493	643	522		1		1.23	60	2	8.22	10.72
PCB 136	pg/g	2	2	0%	--	--	53.4	105	522					60	1		1.75
PCB 137	pg/g	2	2	0%	--	--	106	127	522					60	2	1.77	2.12
PCB 139	pg/g	2	2	0%	--	--	29	43	522					60			
PCB 141	pg/g	2	2	0%	--	--	232	277	522					60	2	3.87	4.62
PCB 142	pg/g	1	2	0%	3.6	3.6	6.74	6.74	522					60			
PCB 143	pg/g	2	2	0%	--	--	55.8	79.0	522					60	1		1.32
PCB 144	pg/g	2	2	0%	--	--	805	1450	522		2	1.54	2.78	60	2	13.42	24.17
PCB 145	pg/g	--	2	0%	1.74	2.2	--	--	522					60			
PCB 146	pg/g	2	2	0%	--	--	352	400	522					60	2	5.87	6.67
PCB 147	pg/g	--	2	0%	3.73	6.54	--	--	522					60			
PCB 148	pg/g	1	2	0%	3.1	3.1	4.4	4.4	522					60			
PCB 150	pg/g	1	2	0%	2.14	2.1	2.74	2.74	522					60			
PCB 152	pg/g	--	2	0%	1.66	2.3	--	--	522					60			
PCB 153	pg/g	2	2	0%	--	--	2590	2630	522		2	4.96	5.04	60	2	43.17	43.83
PCB 154	pg/g	2	2	0%	--	--	26	33	522					60			
PCB 155	pg/g	--	2	0%	2.7	3.6	--	--	522					60			
PCB 156	pg/g	2	2	0%	--	--	107	176		113	1		1.55	60	2	1.78	2.93
PCB 158	pg/g	2	2	0%	--	--	165	182	522					60	2	2.75	3.03
PCB 159	pg/g	--	2	0%	2.3	2.8	--	--	522					60			
PCB 160	pg/g	--	2	0%	2.87	4.5	--	--	522					60			
PCB 161	pg/g	--	2	0%	2.80	4.5	--	--	522					60			
PCB 162	pg/g	2	2	0%	--	--	18	21	522					60			
PCB 164	pg/g	2	2	0%	--	--	84	102	522					60	2	1.41	1.70
PCB 165	pg/g	--	2	0%	2.67	4.4	--	--	522					60			
PCB 167	pg/g	2	2	0%	--	--	51	72	522					60	1		1.21
PCB 169	pg/g	--	2	0%	1.8	2.0	--	--		0.13				60			
PCB 170	pg/g	2	2	0%	--	--	301	560	522					60	2	5.02	9.33
PCB 171	pg/g	2	2	0%	--	--	124	154	522					60	2	2.07	2.57

TABLE A-8
Analytical Results Summary and Comparison Value Evaluation, Hatchery Rainbow Offal
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 172	pg/g	2	2	0%	--	--	71	83	522					60	2	1.18	1.38
PCB 174	pg/g	2	2	0%	--	--	241	300	522					60	2	4.02	5.00
PCB 175	pg/g	2	2	0%	--	--	20.1	22	522					60			
PCB 176	pg/g	2	2	0%	--	--	21.90	27.7	522					60			
PCB 177	pg/g	2	2	0%	--	--	254.0	280	522					60	2	4.23	4.67
PCB 178	pg/g	2	2	0%	--	--	142	144	522					60	2	2.37	2.40
PCB 179	pg/g	2	2	0%	--	--	116.0	148	522					60	2	1.93	2.47
PCB 180	pg/g	2	2	0%	--	--	840	1350	522		2	1.61	2.59	60	2	14.00	22.50
PCB 181	pg/g	1	2	0%	4.0	4.0	6.02	6.02	522					60			
PCB 182	pg/g	2	2	0%	--	--	411.0	457	522					60	2	6.85	7.62
PCB 183	pg/g	--	2	0%	2.7	4.48	--	--	522					60			
PCB 184	pg/g	1	2	0%	2.4	2.4	4.2	4.2	522					60			
PCB 186	pg/g	--	2	0%	2.51	2.9	--	--	522					60			
PCB 187	pg/g	2	2	0%	--	--	779	862	522		2	1.49	1.65	60	2	12.98	14.37
PCB 188	pg/g	--	2	0%	2.4	2.44	--	--	522					60			
PCB 189	pg/g	2	2	0%	--	--	6.2	13		113				60			
PCB 190	pg/g	2	2	0%	--	--	47	124	522					60	1		2.07
PCB 191	pg/g	1	2	0%	11	11	23	23	522					60			
PCB 192	pg/g	--	2	0%	2.3	3.9	--	--	522					60			
PCB 194	pg/g	2	2	0%	--	--	85	152	522					60	2	1.42	2.53
PCB 195	pg/g	2	2	0%	--	--	47	116	522					60	1		1.93
PCB 196	pg/g	2	2	0%	--	--	103	166	522					60	2	1.72	2.77
PCB 197	pg/g	2	2	0%	--	--	17	21	522					60			
PCB 198	pg/g	2	2	0%	--	--	221	375	522					60	2	3.68	6.25
PCB 201	pg/g	2	2	0%	--	--	32.8	40	522					60			
PCB 202	pg/g	2	2	0%	--	--	56	75	522					60	1		1.25
PCB 203	pg/g	2	2	0%	--	--	123	235	522					60	2	2.05	3.92
PCB 204	pg/g	--	2	0%	1.06	1.4	--	--	522					60			
PCB 205	pg/g	2	2	0%	--	--	4	10	522					60			
PCB 206	pg/g	2	2	0%	--	--	51	116	522					60	1		1.93
PCB 207	pg/g	2	2	0%	--	--	9	18	522					60			
PCB 208	pg/g	2	2	0%	--	--	22	42	522					60			
PCB 209	pg/g	2	2	0%	--	--	16	26	522					60			
Dioxin/Furans																	
2,3,7,8-TCDD	pg/g	--	8	0%	0.275	0.63	--	--		0.004				6			
1,2,3,7,8-PeCDD	pg/g	--	8	0%	0.412	1.06	--	--		0.004				6			
1,2,3,6,7,8-HxCDD	pg/g	--	8	0%	0.564	1.06	--	--		0.040				6			
1,2,3,4,7,8-HxCDD	pg/g	--	8	0%	0.569	1.00	--	--		0.040				6			
1,2,3,7,8,9-HxCDD	pg/g	--	8	0%	0.58	1.06	--	--		0.040				6			
1,2,3,4,6,7,8-HpCDD	pg/g	--	8	0%	0.65	1.29	--	--		0.40				6			
OCDD	pg/g	--	8	0%	0.97	2.7	--	--		13.3				6			
2,3,7,8-TCDF	pg/g	6	8	0%	1.59	2.2	1.34	2.5		0.040	6	33.50	61.50	6			
1,2,3,7,8-PeCDF	pg/g	--	8	0%	0.28	0.64	--	--		0.13				6			
2,3,4,7,8-PeCDF	pg/g	--	8	0%	0.30	0.73	--	--		0.013				6			
1,2,3,6,7,8-HxCDF	pg/g	--	8	0%	0.252	0.65	--	--		0.04				6			
1,2,3,4,7,8-HxCDF	pg/g	--	8	0%	0.240	0.63	--	--		0.04				6			
2,3,4,6,7,8-HxCDF	pg/g	--	8	0%	0.337	0.67	--	--		0.04				6			
1,2,3,4,6,7,8-HpCDF	pg/g	--	8	0%	0.395	0.68	--	--		0.40				6			
1,2,3,4,7,8,9-HpCDF	pg/g	--	8	0%	0.557	0.97	--	--		0.40				6			
OCDF	pg/g	--	8	0%	0.65	1.70	--	--		13.3				6			

mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
pg/g = picograms
PRG = Preliminary Remediation Goal
TAL = Target Analyte List
WW = wet weight
µg/kg = micrograms per kilogram

TABLE A-9
Analytical Results Summary and Comparison Value Evaluation, Hatchery Rainbow Trout Whole Body
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
		Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
TAL Metals																	
Aluminum	mg/kg WW	12	12	100%	--	--	4.5	23.5	25					4.4	12	1.03	5.35
Antimony	mg/kg WW	--	12	0%	0.11	0.12	--	--						0.03			
Arsenic	mg/kg WW	12	12	100%	--	--	0.09	0.17		0.0039	12	21.9	42.9	1.6			
Barium	mg/kg WW	12	12	100%	--	--	0.28	0.88	5.2								
Beryllium	mg/kg WW	--	12	0%	0.005	0.006	--	--	0.050					0.1			
Cadmium	mg/kg WW	12	12	100%	--	--	0.022	0.061	0.025		11		2.4	0.04			
Calcium	mg/kg WW	12	12	100%	--	--	3427	5852									
Chromium	mg/kg WW	12	12	100%	--	--	0.4	0.6	38					0.18	12	2.19	3.51
Cobalt	mg/kg WW	12	12	100%	--	--	0.014	0.033	0.50								
Copper	mg/kg WW	12	12	100%	--	--	0.4	0.90	1.0					3.0			
Iron	mg/kg WW	12	12	100%	--	--	14.9	33.8	15		12	1.0	2.2				
Lead	mg/kg WW	4	12	33%	0.0137	0.0155	0.014	0.022	0.05					0.06			
Magnesium	mg/kg WW	12	12	100%	--	--	281	324									
Manganese	mg/kg WW	12	12	100%	--	--	0.87	1.84	3.5								
Nickel	mg/kg WW	12	12	100%	--	--	0.12	0.24	0.50					0.39			
Potassium	mg/kg WW	12	12	100%	--	--	3461	3817									
Selenium	mg/kg WW	12	12	100%	--	--	0.31	0.54	0.13		12	2.4	4.2	0.56			
Silver	mg/kg WW	--	12	0%	0.07	0.08	--	--	0.13					0.37			
Sodium	mg/kg WW	12	12	100%	--	--	811	976									
Thallium	mg/kg WW	--	12	0%	0.07	0.08	--	--	0.002					4.6			
Uranium	mg/kg WW	2	12	17%	0.0014	0.0016	0.001	0.0020	0.005								
Vanadium	mg/kg WW	--	12	0%	0.11	0.12	--	--	0.025								
Zinc	mg/kg WW	12	12	100%	--	--	19.8	26.2	7.5		12	2.6	3.5	20	9		1.31
Mercury	µg/kg WW	12	12	100%	--	--	57	75	3		12	22.6	30.1	60	7		1.25
PCB Aroclors																	
PCB-1016	µg/kg WW	--	12	0	10	11	--	--	0.85					440			
PCB-1221	µg/kg WW	--	12	0	10	11	--	--		0.3				440			
PCB-1232	µg/kg WW	--	12	0	21	22	--	--		0.3				440			
PCB-1242	µg/kg WW	--	12	0	10	11	--	--		0.3				440			
PCB-1248	µg/kg WW	--	12	0	10	11	--	--		0.3				440			
PCB-1254	µg/kg WW	4	4	1	--	--	4.3	8		0.3	4	14.3	26.3	440			
PCB-1260	µg/kg WW	4	4	1	--	--	4.2	9		0.3	4	14.0	30.7	440			
PCB-1254/1260	µg/kg WW	8	8	1	--	--	6.3	12		0.3	8	21.0	40.0	440			
PCB-1262	µg/kg WW	--	12	0	10	11	--	--		0.3				440			
PCB-1268	µg/kg WW	--	12	0	10	11	--	--		0.3				440			
PCB Congeners																	
PCB 1	pg/g	1	2	50%	0.94	0.94	0.79	0.79	522					60			
PCB 2	pg/g	--	2	0%	1.30	2.1	--	--	522					60			
PCB 3	pg/g	--	2	0%	0.91	1.7	--	--	522					60			
PCB 4	pg/g	2	2	100%	--	--	1.1	2.3	522					60			
PCB 5	pg/g	--	2	0%	0.53	0.86	--	--	522					60			
PCB 6	pg/g	--	2	0%	0.83	1.37	--	--	522					60			
PCB 7	pg/g	--	2	0%	0.47	0.77	--	--	522					60			
PCB 8	pg/g	--	2	0%	2.6	7.3	--	--	522					60			
PCB 9	pg/g	--	2	0%	0.84	0.90	--	--	522					60			
PCB 10	pg/g	--	2	0%	0.59	0.86	--	--	522					60			
PCB 11	pg/g	--	2	0%	23	66	--	--	522					60			
PCB 12	pg/g	--	2	0%	0.48	0.76	--	--	522					60			
PCB 14	pg/g	--	2	0%	0.51	0.87	--	--	522					60			
PCB 15	pg/g	--	2	0%	5.1	8.5	--	--	522					60			
PCB 16	pg/g	2	2	100%	--	--	6	8.68	522					60			
PCB 17	pg/g	2	2	100%	--	--	8.8	14.6	522					60			
PCB 18	pg/g	2	2	100%	--	--	18.2	27	522					60			
PCB 19	pg/g	--	2	0%	1.06	1.9	--	--	522					60			
PCB 20	pg/g	2	2	100%	--	--	52	104	522					60	2	0.87	1.73
PCB 21	pg/g	1	2	50%	15.3	15.3	11.4	11.4	522					60			
PCB 22	pg/g	2	2	100%	--	--	10.1	17.5	522					60			
PCB 23	pg/g	--	2	0%	0.27	0.37	--	--	522					60			
PCB 24	pg/g	2	2	100%	--	--	0.70	0.71	522					60			
PCB 25	pg/g	2	2	100%	--	--	3	4	522					60			
PCB 26	pg/g	2	2	100%	--	--	7.6	13	522					60			

TABLE A-9
Analytical Results Summary and Comparison Value Evaluation, Hatchery Rainbow Trout Whole Body
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 27	pg/g	2	2	100%	--	--	1.24	2.10	522					60			
PCB 31	pg/g	2	2	100%	--	--	34	64	522					60	1		1.06
PCB 32	pg/g	2	2	100%	--	--	2.7	4.1	522					60			
PCB 34	pg/g	--	2	0%	0.28	0.38	--	--	522					60			
PCB 35	pg/g	--	2	0%	0.34	0.67	--	--	522					60			
PCB 36	pg/g	--	2	0%	0.31	0.32	--	--	522					60			
PCB 37	pg/g	2	2	100%	--	--	8.1	16.1	522					60			
PCB 38	pg/g	--	2	0%	0.34	0.34	--	--	522					60			
PCB 39	pg/g	1	2	50%	0.68	0.68	1.17	1.17	522					60			
PCB 40	pg/g	2	2	100%	--	--	20.3	31	522					60			
PCB 41	pg/g	2	2	100%	--	--	4.1	5.4	522					60			
PCB 42	pg/g	2	2	100%	--	--	13.9	23	522					60			
PCB 43	pg/g	2	2	100%	--	--	4.7	8	522					60			
PCB 44	pg/g	2	2	100%	--	--	105	177	522					60	2	1.75	2.95
PCB 45	pg/g	2	2	100%	--	--	7.2	12.6	522					60			
PCB 46	pg/g	1	2	50%	2.26	2.26	1.69	1.7	522					60			
PCB 48	pg/g	2	2	100%	--	--	16.6	26	522					60			
PCB 49	pg/g	2	2	100%	--	--	76	121	522					60	2	1.26	2.02
PCB 50	pg/g	2	2	100%	--	--	6.9	12	522					60			
PCB 52	pg/g	2	2	100%	--	--	195	272	522					60	2	3.25	4.53
PCB 54	pg/g	--	2	0%	0.20	0.25	--	--	522					60			
PCB 55	pg/g	2	2	100%	--	--	4.9	7	522					60			
PCB 56	pg/g	2	2	100%	--	--	12.6	25	522					60			
PCB 57	pg/g	2	2	100%	--	--	0.78	1.8	522					60			
PCB 58	pg/g	2	2	100%	--	--	1.56	1.90	522					60			
PCB 59	pg/g	2	2	100%	--	--	9.7	16	522					60			
PCB 60	pg/g	2	2	100%	--	--	22	41	522					60			
PCB 61	pg/g	2	2	100%	--	--	250	334	522					60	2	4.17	5.57
PCB 63	pg/g	2	2	100%	--	--	7.5	11	522					60			
PCB 64	pg/g	2	2	100%	--	--	47	88	522					60	1		1.46
PCB 66	pg/g	2	2	100%	--	--	111	196	522					60	2	1.85	3.27
PCB 67	pg/g	1	2	50%	3.58	3.58	2.59	2.6	522					60			
PCB 68	pg/g	1	2	50%	2.9	2.9	3.1	3.1	522					60			
PCB 72	pg/g	2	2	100%	--	--	3.8	4	522					60			
PCB 73	pg/g	2	2	100%	--	--	2.9	3.8	522					60			
PCB 77	pg/g	2	2	100%	--	--	10.4	13		40				60			
PCB 78	pg/g	--	2	0%	0.59	1.19	--	--	522					60			
PCB 79	pg/g	2	2	100%	--	--	12.4	14	522					60			
PCB 80	pg/g	--	2	0%	0.48	1.06	--	--	522					60			
PCB 81	pg/g	--	2	0%	0.61	1.46	--	--		13				60			
PCB 82	pg/g	2	2	100%	--	--	12	15	522					60			
PCB 83	pg/g	2	2	100%	--	--	30	39	522					60			
PCB 84	pg/g	2	2	100%	--	--	31.1	42	522					60			
PCB 85	pg/g	2	2	100%	--	--	89	104	522					60	2	1.48	1.73
PCB 86	pg/g	2	2	100%	--	--	259	279	522					60	2	4.32	4.65
PCB 88	pg/g	2	2	100%	--	--	41.0	48	522					60			
PCB 89	pg/g	--	2	0%	2.25	3.0	--	--	522					60			
PCB 90	pg/g	2	2	100%	--	--	540	551	522					60	2	9.00	9.18
PCB 92	pg/g	2	2	100%	--	--	95	113	522					60	2	1.58	1.88
PCB 93	pg/g	1	2	50%	283	283	223	223	522					60	2	3.72	3.72
PCB 94	pg/g	2	2	100%	--	--	5.6	8	522					60			
PCB 95	pg/g	--	2	0%	1.43	2.1	--	--	522					60			
PCB 96	pg/g	1	2	50%	0.53	0.53	0.896	0.896	522					60			
PCB 98	pg/g	2	2	100%	--	--	7.9	11.0	522					60			
PCB 99	pg/g	2	2	100%	--	--	184	224	522					60	2	3.07	3.73
PCB 103	pg/g	--	2	0%	3.82	4.03	--	--	522					60			
PCB 104	pg/g	--	2	0%	0.31	0.45	--	--	522					60			
PCB 105	pg/g	2	2	100%	--	--	149	188		113	2	1.32	1.66	60	2	2.48	3.13
PCB 106	pg/g	--	2	0%	0.67	1.8	--	--	522					60			
PCB 107	pg/g	2	2	100%	--	--	15.3	21	522					60			
PCB 109	pg/g	2	2	100%	--	--	40	50	522					60			

TABLE A-9

Analytical Results Summary and Comparison Value Evaluation, Hatchery Rainbow Trout Whole Body

Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 110	pg/g	2	2	100%	--	--	471	540	522		1		1.03	60	2	7.85	9.00
PCB 111	pg/g	--	2	0%	1.0	1.7	--	--	522					60			
PCB 112	pg/g	2	2	100%	--	--	18	47	522					60			
PCB 114	pg/g	1	2	50%	7.1	7.1	10	10		113				60			
PCB 118	pg/g	2	2	100%	--	--	400	514		113	2	3.53	4.54	60	2	6.67	8.57
PCB 120	pg/g	2	2	100%	--	--	3.6	5	522					60			
PCB 121	pg/g	--	2	0%	1.0	1.4	--	--	522					60			
PCB 122	pg/g	--	2	0%	0.74	1.8	--	--	522					60			
PCB 123	pg/g	2	2	100%	--	--	9	10		113				60			
PCB 126	pg/g	2	2	100%	--	--	2.6	11		0.41	2	6.44	25.85	60			
PCB 127	pg/g	--	2	0%	0.68	1.7	--	--	522					60			
PCB 128	pg/g	2	2	100%	--	--	117	166	522					60	2	1.95	2.77
PCB 129	pg/g	2	2	100%	--	--	880	1080	522		2	1.69	2.07	60	2	14.67	18.00
PCB 130	pg/g	2	2	100%	--	--	49	66	522					60	1		1.10
PCB 131	pg/g	2	2	100%	--	--	3.5	4.3	522					60			
PCB 132	pg/g	2	2	100%	--	--	135.0	185	522					60	2	2.25	3.08
PCB 133	pg/g	2	2	100%	--	--	16	24	522					60			
PCB 134	pg/g	2	2	100%	--	--	20.0	29	522					60			
PCB 135	pg/g	2	2	100%	--	--	222	271	522					60	2	3.70	4.52
PCB 136	pg/g	2	2	100%	--	--	41.5	48	522					60			
PCB 137	pg/g	2	2	100%	--	--	43	55	522					60			
PCB 139	pg/g	2	2	100%	--	--	14	18	522					60			
PCB 141	pg/g	2	2	100%	--	--	104	119	522					60	2	1.73	1.98
PCB 142	pg/g	1	2	50%	2.2	2.2	3.18	3.18	522					60			
PCB 143	pg/g	2	2	100%	--	--	24.9	27.1	522					60			
PCB 144	pg/g	2	2	100%	--	--	479	639	522		1		1.22	60	2	7.98	10.65
PCB 145	pg/g	--	2	0%	0.70	1.4	--	--	522					60			
PCB 146	pg/g	2	2	100%	--	--	127	200	522					60	2	2.12	3.33
PCB 147	pg/g	--	2	0%	2.11	2.48	--	--	522					60			
PCB 148	pg/g	1	2	50%	1.9	1.9	2.1	2.1	522					60			
PCB 150	pg/g	1	2	50%	1.40	1.4	1.27	1.27	522					60			
PCB 152	pg/g	--	2	0%	0.73	1.4	--	--	522					60			
PCB 153	pg/g	2	2	100%	--	--	865	1260	522		2	1.66	2.41	60	2	14.42	21.00
PCB 154	pg/g	2	2	100%	--	--	11	14	522					60			
PCB 155	pg/g	2	2	100%	--	--	1.2	1.6	522					60			
PCB 156	pg/g	2	2	100%	--	--	42	70		113				60	1		1.17
PCB 158	pg/g	2	2	100%	--	--	58	74	522					60	1		1.23
PCB 159	pg/g	2	2	100%	--	--	4.13	7.12	522					60			
PCB 160	pg/g	--	2	0%	1.61	1.7	--	--	522					60			
PCB 161	pg/g	--	2	0%	1.64	1.8	--	--	522					60			
PCB 162	pg/g	2	2	100%	--	--	3	6	522					60			
PCB 164	pg/g	2	2	100%	--	--	39	48	522					60			
PCB 165	pg/g	--	2	0%	1.52	1.8	--	--	522					60			
PCB 167	pg/g	2	2	100%	--	--	19	31	522					60			
PCB 169	pg/g	1	2	50%	1.2	1.2	8.3	8.3		0.13	1	63.85	63.85	60			
PCB 170	pg/g	2	2	100%	--	--	105	233	522					60	2	1.75	3.88
PCB 171	pg/g	2	2	100%	--	--	45	79	522					60	1		1.32
PCB 172	pg/g	2	2	100%	--	--	27	54	522					60			
PCB 174	pg/g	2	2	100%	--	--	116	164	522					60	2	1.93	2.73
PCB 175	pg/g	2	2	100%	--	--	6.8	11	522					60			
PCB 176	pg/g	2	2	100%	--	--	10.30	17.3	522					60			
PCB 177	pg/g	2	2	100%	--	--	96.8	169	522					60	2	1.61	2.82
PCB 178	pg/g	2	2	100%	--	--	48	69	522					60	1		1.14
PCB 179	pg/g	2	2	100%	--	--	52.6	85	522					60	1		1.41
PCB 180	pg/g	2	2	100%	--	--	253	585	522					60	2	4.22	9.75
PCB 181	pg/g	2	2	100%	--	--	1.85	13.4	522					60			
PCB 182	pg/g	2	2	100%	--	--	139.0	268	522					60	2	2.32	4.47
PCB 183	pg/g	--	2	0%	0.961	2.66	--	--	522					60			
PCB 184	pg/g	--	2	0%	1.4	1.4	--	--	522					60			
PCB 186	pg/g	--	2	0%	0.89	1.0	--	--	522					60			
PCB 187	pg/g	2	2	100%	--	--	258	441	522					60	2	4.30	7.35

TABLE A-9
Analytical Results Summary and Comparison Value Evaluation, Hatchery Rainbow Trout Whole Body
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
		Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 188	pg/g	--	2	0%	0.832	1.25	--	--	522					60			
PCB 189	pg/g	1	2	50%	4.83	4.83	2.1	2		113				60			
PCB 190	pg/g	2	2	100%	--	--	18	40	522					60			
PCB 191	pg/g	1	2	50%	10	10	4	4	522					60			
PCB 192	pg/g	--	2	0%	0.8	2.2	--	--	522					60			
PCB 194	pg/g	2	2	100%	--	--	33	63	522					60	1		1.04
PCB 195	pg/g	2	2	100%	--	--	17	43	522					60			
PCB 196	pg/g	2	2	100%	--	--	33	90	522					60	1		1.50
PCB 197	pg/g	2	2	100%	--	--	6	13	522					60			
PCB 198	pg/g	2	2	100%	--	--	85	185	522					60	2	1.42	3.08
PCB 201	pg/g	2	2	100%	--	--	10.7	25	522					60			
PCB 202	pg/g	2	2	100%	--	--	23	39	522					60			
PCB 203	pg/g	2	2	100%	--	--	40	85	522					60	1		1.41
PCB 204	pg/g	--	2	0%	0.55	0.7	--	--	522					60			
PCB 205	pg/g	2	2	100%	--	--	2	4	522					60			
PCB 206	pg/g	2	2	100%	--	--	19	40	522					60			
PCB 207	pg/g	1	2	50%	7.6	7.6	4	4	522					60			
PCB 208	pg/g	2	2	100%	--	--	8	16	522					60			
PCB 209	pg/g	1	2	50%	9.2	9.2	7	7	522					60			
Dioxin/Furans																	
2,3,7,8-TCDD	pg/g	--	12	0%	0.216	0.64	--	--		0.004				6			
1,2,3,7,8-PeCDD	pg/g	--	12	0%	0.424	0.70	--	--		0.004				6			
1,2,3,6,7,8-HxCDD	pg/g	--	12	0%	0.546	0.90	--	--		0.040				6			
1,2,3,4,7,8-HxCDD	pg/g	--	12	0%	0.563	0.89	--	--		0.040				6			
1,2,3,7,8,9-HxCDD	pg/g	--	12	0%	0.57	0.92	--	--		0.040				6			
1,2,3,4,6,7,8-HpCDD	pg/g	--	12	0%	0.66	1.38	--	--		0.40				6			
OCDD	pg/g	1	12	8%	0.84	2.8	2.07	2.1		13.3				6			
2,3,7,8-TCDF	pg/g	11	12	92%	1.24	1.24	0.91	1.6		0.040	11	22.65	39.50	6			
1,2,3,7,8-PeCDF	pg/g	--	12	0%	0.27	0.42	--	--		0.13				6			
2,3,4,7,8-PeCDF	pg/g	--	12	0%	0.25	0.39	--	--		0.013				6			
1,2,3,6,7,8-HxCDF	pg/g	--	12	0%	0.292	0.46	--	--		0.04				6			
1,2,3,4,7,8-HxCDF	pg/g	--	12	0%	0.313	0.48	--	--		0.04				6			
2,3,4,6,7,8-HxCDF	pg/g	--	12	0%	0.320	0.49	--	--		0.04				6			
1,2,3,4,6,7,8-HpCDF	pg/g	--	12	0%	0.375	0.70	--	--		0.40				6			
1,2,3,4,7,8,9-HpCDF	pg/g	--	12	0%	0.562	0.98	--	--		0.40				6			
OCDF	pg/g	--	12	0%	0.60	1.89	--	--		13.3				6			

mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
pg/g = picograms
PRG = Preliminary Remediation Goal
TAL = Target Analyte List
WW = wet weight
µg/kg = micrograms per kilogram

TABLE A-10
Analytical Results Summary and Comparison Value Evaluation, Largescale Sucker Whole Body
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
		Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USPEA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
TAL Metals																	
Aluminum	mg/kg WW	45	51	88%	3.6540	4.8000	3.6	138.2	25		16		5.5	4.4	38		31.4
Antimony	mg/kg WW	2	51	4%	0.07	0.13	0.1837	0.5838						0.03	2	6.1	19.5
Arsenic	mg/kg WW	51	51	100%	--	--	0.08	0.33		0.0039	51	20.8	85.5	1.6			
Barium	mg/kg WW	51	51	100%	--	--	0.97	11.59	5.2		2		2.2				
Beryllium	mg/kg WW	--	51	0%	0.004	0.007	--	--	0.050					0.1			
Cadmium	mg/kg WW	51	51	100%	--	--	0.029	0.475	0.025		51	1.2	19.1	0.04	1		11.3
Calcium	mg/kg WW	51	51	100%	--	--	6826	15662									
Chromium	mg/kg WW	51	51	100%	--	--	0.3	3.1	38					0.18	51	1.8	17.0
Cobalt	mg/kg WW	51	51	100%	--	--	0.016	0.361	0.50								
Copper	mg/kg WW	51	51	100%	--	--	0.4	12.57	1.0		14		12.9	3.0	3		4.2
Iron	mg/kg WW	51	51	100%	--	--	9.7	1064.7	15		42		70.2				
Lead	mg/kg WW	51	51	100%	--	--	0.118	13.490	0.05		51	2.4	277.8	0.06	51	2.0	224.8
Magnesium	mg/kg WW	51	51	100%	--	--	289	412									
Manganese	mg/kg WW	51	51	100%	--	--	1.98	27.58	3.5		47		7.8				
Nickel	mg/kg WW	51	51	100%	--	--	0.21	0.93	0.50		21		1.9	0.39	23		2.4
Potassium	mg/kg WW	51	51	100%	--	--	2673	3767									
Selenium	mg/kg WW	51	51	100%	--	--	0.30	0.77	0.13		51	2.3	6.0	0.56	22		1.4
Silver	mg/kg WW	--	51	0%	0.04	0.08	--	--	0.13					0.37			
Sodium	mg/kg WW	51	51	100%	--	--	836	1488									
Thallium	mg/kg WW	--	51	0%	0.04	0.08	--	--	0.002					4.6			
Uranium	mg/kg WW	51	51	100%	--	--	0.003	0.0325	0.005		51		6.7				
Vanadium	mg/kg WW	29	51	57%	0.10	0.12	0.10	0.33	0.025		51	4.1	13.4				
Zinc	mg/kg WW	51	51	100%	--	--	13.3	125.7	7.5		51	1.8	16.7	20	31		6.3
Mercury	µg/kg WW	29	29	100%	--	--	77	300	3		12	30.8	120.0	60	29	1.3	5.0
PCB Aroclors																	
PCB-1016	µg/kg WW	--	29	0	10	49	--	--	0.85					440			
PCB-1221	µg/kg WW	--	29	0	10	49	--	--		0.3				440			
PCB-1232	µg/kg WW	--	29	0	20	98	--	--		0.3				440			
PCB-1242	µg/kg WW	--	29	0	10	49	--	--		0.3				440			
PCB-1248	µg/kg WW	--	29	0	10	49	--	--		0.3				440			
PCB-1254	µg/kg WW	10	10	1	--	--	10.0	68		0.3	10	33.3	226.7	440			
PCB-1260	µg/kg WW	10	10	1	--	--	21.0	78		0.3	10	70.0	260.0	440			
PCB-1254/1260	µg/kg WW	19	19	1	--	--	55.0	419		0.3	19	183.3	1396.7	440			
PCB-1262	µg/kg WW	--	29	0	10	49	--	--		0.3				440			
PCB-1268	µg/kg WW	--	29	0	10	49	--	--		0.3				440			
PCB Congeners																	
PCB 1	pg/g	--	6	0%	0.27	2.86	--	--	522					60			
PCB 2	pg/g	--	6	0%	1.05	3.5	--	--	522					60			
PCB 3	pg/g	--	6	0%	0.96	1.7	--	--	522					60			
PCB 4	pg/g	4	6	67%	1.95	13.8	2.5	6.1	522					60			
PCB 5	pg/g	--	6	0%	0.21	2.92	--	--	522					60			
PCB 6	pg/g	1	6	17%	1.13	7.03	1.58	1.58	522					60			
PCB 7	pg/g	1	6	17%	0.50	1.44	1.66	1.66	522					60			
PCB 8	pg/g	3	6	50%	4.9	16.8	3.81	18	522					60			
PCB 9	pg/g	1	6	17%	0.27	2.81	3.42	3.42	522					60			
PCB 10	pg/g	--	6	0%	0.48	1.87	--	--	522					60			
PCB 11	pg/g	1	6	17%	27	61	55.1	55.1	522					60			
PCB 12	pg/g	2	6	33%	0.20	0.81	1.17	1.66	522					60			
PCB 14	pg/g	--	6	0%	0.21	0.87	--	--	522					60			
PCB 15	pg/g	--	6	0%	4.5	10.7	--	--	522					60			
PCB 16	pg/g	5	6	83%	30.1	30.1	12.8	51	522					60			
PCB 17	pg/g	5	6	83%	37.5	37.5	18.8	63.7	522					60	1		1.06
PCB 18	pg/g	5	6	83%	70.4	70.4	29.2	113	522					60	3		1.88
PCB 19	pg/g	5	6	83%	4.13	4.1	2.52	7.56	522					60			
PCB 20	pg/g	6	6	100%	--	--	152	382	522					60	6	2.53	6.37
PCB 21	pg/g	6	6	100%	--	--	40.9	128.0	522					60	2		2.13
PCB 22	pg/g	6	6	100%	--	--	19.9	65.2	522					60	1		1.09
PCB 23	pg/g	--	6	0%	0.40	0.75	--	--	522					60			
PCB 24	pg/g	2	6	33%	0.88	1.53	2.26	2.56	522					60			
PCB 25	pg/g	6	6	100%	--	--	6	14	522					60			
PCB 26	pg/g	6	6	100%	--	--	18.9	42	522					60			

TABLE A-10
Analytical Results Summary and Comparison Value Evaluation, Largescale Sucker Whole Body
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USPEA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 27	pg/g	6	6	100%	--	--	3.24	9.33	522					60			
PCB 31	pg/g	6	6	100%	--	--	68	188	522					60	6	1.13	3.13
PCB 32	pg/g	6	6	100%	--	--	8.1	39.2	522					60			
PCB 34	pg/g	5	6	83%	0.82	0.82	0.68	1.61	522					60			
PCB 35	pg/g	--	6	0%	0.39	1.19	--	--	522					60			
PCB 36	pg/g	--	6	0%	0.36	1.08	--	--	522					60			
PCB 37	pg/g	6	6	100%	--	--	11	21.9	522					60			
PCB 38	pg/g	--	6	0%	0.38	1.08	--	--	522					60			
PCB 39	pg/g	5	6	83%	1.59	1.59	2.03	4.17	522					60			
PCB 40	pg/g	6	6	100%	--	--	88.2	606	522					60	6	1.47	10.10
PCB 41	pg/g	6	6	100%	--	--	18.4	86.7	522					60	1		1.45
PCB 42	pg/g	6	6	100%	--	--	94.7	538	522		1		1.03	60	6	1.58	8.97
PCB 43	pg/g	4	6	67%	12.6	20.5	29.0	48	522					60			
PCB 44	pg/g	6	6	100%	--	--	490	2210	522		4		4.23	60	2	8.17	36.83
PCB 45	pg/g	6	6	100%	--	--	19.9	78.7	522					60			1.31
PCB 46	pg/g	5	6	83%	9.23	9.23	6.97	19.3	522					60			
PCB 48	pg/g	6	6	100%	--	--	59.4	270	522					60	5		4.50
PCB 49	pg/g	6	6	100%	--	--	378	1990	522		4		3.81	60	6	6.30	33.17
PCB 50	pg/g	6	6	100%	--	--	24.9	71	522					60	1		1.18
PCB 52	pg/g	6	6	100%	--	--	490	1360	522		5		2.61	60	6	8.17	22.67
PCB 54	pg/g	1	6	17%	0.21	0.47	0.564	0.564	522					60			
PCB 55	pg/g	5	6	83%	3.53	3.53	30.3	127	522					60	2		2.12
PCB 56	pg/g	6	6	100%	--	--	92.8	383	522					60	6	1.55	6.38
PCB 57	pg/g	1	6	17%	3.51	13.50	8.78	8.8	522					60			
PCB 58	pg/g	2	6	33%	3.21	19.4	7.38	12.00	522					60			
PCB 59	pg/g	6	6	100%	--	--	30.4	219	522					60	4		3.65
PCB 60	pg/g	6	6	100%	--	--	120	806	522		1		1.54	60	6	2.00	13.43
PCB 61	pg/g	6	6	100%	--	--	958	3720	522		6	1.84	7.13	60	6	15.97	62.00
PCB 63	pg/g	6	6	100%	--	--	38.4	265	522					60	4		4.42
PCB 64	pg/g	6	6	100%	--	--	249	1380	522		2		2.64	60	6	4.15	23.00
PCB 66	pg/g	6	6	100%	--	--	751	4180	522		6	1.44	8.01	60	6	12.52	69.67
PCB 67	pg/g	2	6	33%	1.33	10.20	5.97	7.5	522					60			
PCB 68	pg/g	6	6	100%	--	--	13.2	44.5	522					60			
PCB 72	pg/g	6	6	100%	--	--	16.4	55	522					60			
PCB 73	pg/g	5	6	83%	1.1	1.1	17.5	28.0	522					60			
PCB 77	pg/g	6	6	100%	--	--	19.9	66		40	2		1.66	60	1		1.10
PCB 78	pg/g	--	6	0%	1.46	3.43	--	--	522					60			
PCB 79	pg/g	6	6	100%	--	--	24.2	150	522					60	5		2.50
PCB 80	pg/g	--	6	0%	1.19	3.00	--	--	522					60			
PCB 81	pg/g	--	6	0%	1.61	4.26	--	--		13				60			
PCB 82	pg/g	6	6	100%	--	--	188	570	522		1		1.09	60	6	3.13	9.50
PCB 83	pg/g	5	6	83%	10.8	10.8	359	1090	522		2		2.09	60	6	5.98	18.17
PCB 84	pg/g	6	6	100%	--	--	281.0	846	522		3		1.62	60	6	4.68	14.10
PCB 85	pg/g	6	6	100%	--	--	1030	2100	522		6	1.97	4.02	60	6	17.17	35.00
PCB 86	pg/g	6	6	100%	--	--	2340	5580	522		6	4.48	10.69	60	6	39.00	93.00
PCB 88	pg/g	6	6	100%	--	--	302.0	1060	522		2		2.03	60	6	5.03	17.67
PCB 89	pg/g	5	6	83%	10.10	10.1	11.7	61.2	522					60	1		1.02
PCB 90	pg/g	6	6	100%	--	--	4040	8340	522		6	7.74	15.98	60	6	67.33	139.00
PCB 92	pg/g	6	6	100%	--	--	599	1320	522		6	1.15	2.53	60	6	9.98	22.00
PCB 93	pg/g	6	6	100%	--	--	1170	2910	522		6	2.24	5.57	60	6	19.50	48.50
PCB 94	pg/g	5	6	83%	8.63	8.63	51.5	101	522					60	3		1.68
PCB 95	pg/g	4	6	67%	6.75	9.5	7.8	21.1	522					60			
PCB 96	pg/g	6	6	100%	--	--	4.14	18.5	522					60			
PCB 98	pg/g	6	6	100%	--	--	51.5	202.0	522					60	4		3.37
PCB 99	pg/g	6	6	100%	--	--	1830	4290	522		6	3.51	8.22	60	6	30.50	71.50
PCB 103	pg/g	6	6	100%	--	--	19.1	62	522					60	1		1.04
PCB 104	pg/g	--	6	0%	0.44	0.91	--	--	522					60			
PCB 105	pg/g	6	6	100%	--	--	1090	2760		113	6	9.62	24.36	60	6	18.17	46.00
PCB 106	pg/g	1	6	17%	3.51	6.5	195	195	522					60	1	3.25	3.25
PCB 107	pg/g	6	6	100%	--	--	100.0	202	522					60	6	1.67	3.37

TABLE A-10
Analytical Results Summary and Comparison Value Evaluation, Largescale Sucker Whole Body
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
		Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USPEA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 109	pg/g	6	6	100%	--	--	344	712	522		2		1.36	60	6	5.73	11.87
PCB 110	pg/g	5	6	83%	1.13	1.13	141	7230	522		4		13.85	60	5	2.35	120.50
PCB 111	pg/g	2	6	33%	5.8	11.4	5.4	7.4	522					60			
PCB 112	pg/g	5	6	83%	6.28	6.28	242	639	522		1		1.22	60	5	4.03	10.65
PCB 114	pg/g	6	6	100%	--	--	81	211		113	4		1.86	60	6	1.34	3.52
PCB 118	pg/g	6	6	100%	--	--	4000	7650		113	6	35.30	67.52	60	6	66.67	127.50
PCB 120	pg/g	5	6	83%	15	15	18.4	39	522					60			
PCB 121	pg/g	1	6	17%	1.3	6.7	2.38	2.4	522					60			
PCB 122	pg/g	--	6	0%	3.61	29.5	--	--	522					60			
PCB 123	pg/g	6	6	100%	--	--	55	216		113	2		1.91	60	5		3.60
PCB 126	pg/g	5	6	83%	11.7	11.7	13.0	76		0.41	5	31.71	185.37	60	1		1.27
PCB 127	pg/g	--	6	0%	3.27	6.6	--	--	522					60			
PCB 128	pg/g	6	6	100%	--	--	738	1730	522		6	1.41	3.31	60	6	12.30	28.83
PCB 129	pg/g	6	6	100%	--	--	10300	17800	522		6	19.73	34.10	60	6	171.67	296.67
PCB 130	pg/g	6	6	100%	--	--	674	1030	522		2		1.97	60	6	11.23	17.17
PCB 131	pg/g	5	6	83%	56.9	56.9	54.7	79.4	522					60	3		1.32
PCB 132	pg/g	6	6	100%	--	--	1490.0	2600	522		6	2.85	4.98	60	6	24.83	43.33
PCB 133	pg/g	6	6	100%	--	--	169	281	522					60	6	2.82	4.68
PCB 134	pg/g	6	6	100%	--	--	145.0	647	522		1		1.24	60	6	2.42	10.78
PCB 135	pg/g	6	6	100%	--	--	1740	3300	522		6	3.33	6.32	60	6	29.00	55.00
PCB 136	pg/g	6	6	100%	--	--	346.0	732	522		1		1.40	60	6	5.77	12.20
PCB 137	pg/g	6	6	100%	--	--	489	755	522		5		1.45	60	6	8.15	12.58
PCB 139	pg/g	6	6	100%	--	--	165	246	522					60	6	2.75	4.10
PCB 141	pg/g	6	6	100%	--	--	977	2130	522		6	1.87	4.08	60	6	16.28	35.50
PCB 142	pg/g	2	6	33%	11.5	27.1	41.9	48.3	522					60			
PCB 143	pg/g	6	6	100%	--	--	75.4	304.0	522					60	6	1.26	5.07
PCB 144	pg/g	6	6	100%	--	--	5200	8770	522		6	9.96	16.80	60	6	86.67	146.17
PCB 145	pg/g	--	6	0%	0.99	2.3	--	--	522					60			
PCB 146	pg/g	6	6	100%	--	--	1370	2940	522		6	2.62	5.63	60	6	22.83	49.00
PCB 147	pg/g	--	6	0%	6.75	15.6	--	--	522					60			
PCB 148	pg/g	3	6	50%	1.5	7.8	14.6	20.5	522					60			
PCB 150	pg/g	4	6	67%	2.29	6.8	5.49	14.7	522					60			
PCB 152	pg/g	3	6	50%	2.40	4.8	3.45	4.81	522					60			
PCB 153	pg/g	6	6	100%	--	--	9980	20600	522		2	19.12	39.46	60	6	166.33	343.33
PCB 154	pg/g	6	6	100%	--	--	50	143	522					60	5		2.38
PCB 155	pg/g	4	6	67%	1.9	2.3	2.5	4.8	522					60			
PCB 156	pg/g	6	6	100%	--	--	796	1200		113	6	7.03	10.59	60	6	13.27	20.00
PCB 158	pg/g	5	6	83%	7.3	7.3	918	1320	522		5	1.76	2.53	60	5	15.30	22.00
PCB 159	pg/g	5	6	83%	4.8	4.8	61.2	65	522					60	5	1.02	1.08
PCB 160	pg/g	--	6	0%	4.64	10.7	--	--	522					60			
PCB 161	pg/g	--	6	0%	4.69	10.8	--	--	522					60			
PCB 162	pg/g	4	6	67%	5.8	12	35	134	522					60	3		2.23
PCB 164	pg/g	6	6	100%	--	--	295	603	522		1		1.16	60	6	4.92	10.05
PCB 165	pg/g	--	6	0%	4.50	10.4	--	--	522					60			
PCB 167	pg/g	6	6	100%	--	--	374	522	522					60	6	6.23	8.70
PCB 169	pg/g	4	6	67%	4.3	26.9	27.6	77.9		0.13	6	212.31	599.23	60	1		1.30
PCB 170	pg/g	6	6	100%	--	--	2850	4100	522		6	5.46	7.85	60	6	47.50	68.33
PCB 171	pg/g	6	6	100%	--	--	827	1310	522		6	1.58	2.51	60	6	13.78	21.83
PCB 172	pg/g	6	6	100%	--	--	682	1300	522		6	1.31	2.49	60	6	11.37	21.67
PCB 174	pg/g	6	6	100%	--	--	1340	2400	522		6	2.57	4.60	60	6	22.33	40.00
PCB 175	pg/g	6	6	100%	--	--	19.8	206	522					60	5		3.43
PCB 176	pg/g	5	6	83%	2.99	2.99	227.00	395.0	522					60	5	3.78	6.58
PCB 177	pg/g	6	6	100%	--	--	1530.0	2590	522		6	2.93	4.96	60	6	25.50	43.17
PCB 178	pg/g	6	6	100%	--	--	264	1040	522		5		1.99	60	6	4.40	17.33
PCB 179	pg/g	6	6	100%	--	--	305.0	1060	522		5		2.03	60	6	5.08	17.67
PCB 180	pg/g	6	6	100%	--	--	8410	16100	522		6	16.11	30.84	60	6	140.17	268.33
PCB 181	pg/g	5	6	83%	3.5	3.5	397	1230	522		4		2.36	60	5	6.62	20.50
PCB 182	pg/g	6	6	100%	--	--	3040.0	5520	522		6	5.82	10.57	60	6	50.67	92.00
PCB 183	pg/g	1	6	17%	2.53	6.99	85	85	522					60	6	1.41	1.41
PCB 184	pg/g	4	6	67%	1.6	2.6	4.0	10.0	522					60			

TABLE A-10
Analytical Results Summary and Comparison Value Evaluation, Largescale Sucker Whole Body
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USPEA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 186	pg/g	--	6	0%	1.43	3.7	--	--	522					60			
PCB 187	pg/g	6	6	100%	--	--	2700	6980	522		6	5.17	13.37	60	6	45.00	116.33
PCB 188	pg/g	4	6	67%	3.15	10.9	4.7	9.2	522					60			
PCB 189	pg/g	6	6	100%	--	--	67.3	124		113	1	1.00	1.09	60	6	1.12	2.07
PCB 190	pg/g	6	6	100%	--	--	343	544	522		2		1.04	60	6	5.72	9.07
PCB 191	pg/g	6	6	100%	--	--	112	239	522					60	6	1.87	3.98
PCB 192	pg/g	--	6	0%	2.2	6.0	--	--	522					60			
PCB 194	pg/g	6	6	100%	--	--	916	2140	522		6	1.75	4.10	60	6	15.27	35.67
PCB 195	pg/g	6	6	100%	--	--	485	967	522		5		1.85	60	6	8.08	16.12
PCB 196	pg/g	6	6	100%	--	--	961	1600	522		6	1.84	3.07	60	6	16.02	26.67
PCB 197	pg/g	6	6	100%	--	--	191	409	522					60	6	3.18	6.82
PCB 198	pg/g	6	6	100%	--	--	1910	2940	522		6	3.66	5.63	60	6	31.83	49.00
PCB 201	pg/g	6	6	100%	--	--	209.0	465	522					60	6	3.48	7.75
PCB 202	pg/g	6	6	100%	--	--	303	633	522		1		1.21	60	6	5.05	10.55
PCB 203	pg/g	6	6	100%	--	--	1270	2260	522		6	2.43	4.33	60	6	21.17	37.67
PCB 204	pg/g	--	6	0%	0.84	2.0	--	--	522					60			
PCB 205	pg/g	6	6	100%	--	--	50	111	522					60	5		1.85
PCB 206	pg/g	6	6	100%	--	--	538	1170	522		6	1.03	2.24	60	6	8.97	19.50
PCB 207	pg/g	6	6	100%	--	--	95	163	522					60	6	1.58	2.72
PCB 208	pg/g	6	6	100%	--	--	197	383	522					60	6	3.28	6.38
PCB 209	pg/g	6	6	100%	--	--	86	162	522					60	6	1.44	2.70
Dioxin/Furans																	
2,3,7,8-TCDD	pg/g	1	29	3%	0.164	0.73	0.224	0.224		0.004	1	56.00	56.00	6			
1,2,3,7,8-PeCDD	pg/g	6	29	21%	0.147	0.87	0.17	1.47		0.004	6	42.75	367.50	6			
1,2,3,6,7,8-HxCDD	pg/g	--	29	0%	0.174	1.09	--	--		0.040				6			
1,2,3,4,7,8-HxCDD	pg/g	--	29	0%	0.181	1.02	--	--		0.040				6			
1,2,3,7,8,9-HxCDD	pg/g	--	29	0%	0.19	1.11	--	--		0.040				6			
1,2,3,4,6,7,8-HpCDD	pg/g	1	29	3%	0.20	0.86	0.54	0.54		0.40	1	1.36	1.36	6			
OCDD	pg/g	7	29	24%	0.88	2.9	1.14	2.3		13.3				6			
2,3,7,8-TCDF	pg/g	29	29	100%	--	--	0.92	11.5		0.040	29	22.90	287.50	6	5		1.92
1,2,3,7,8-PeCDF	pg/g	1	29	3%	0.09	0.85	0.478	0.48		0.13	1	3.68	3.68	6			
2,3,4,7,8-PeCDF	pg/g	8	29	28%	0.16	0.27	0.26	0.48		0.013	8	20.08	36.85	6			
1,2,3,6,7,8-HxCDF	pg/g	--	29	0%	0.091	0.54	--	--		0.04				6			
1,2,3,4,7,8-HxCDF	pg/g	--	29	0%	0.099	0.55	--	--		0.04				6			
2,3,4,6,7,8-HxCDF	pg/g	--	29	0%	0.106	0.58	--	--		0.04				6			
1,2,3,4,6,7,8-HpCDF	pg/g	1	29	3%	0.142	1.03	0.150	0.15		0.40				6			
1,2,3,4,7,8,9-HpCDF	pg/g	--	29	0%	0.202	0.71	--	--		0.40				6			
OCDF	pg/g	1	29	3%	0.32	2.11	0.396	0.396		13.3				6			

mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
pg/g = picograms
PRG = Preliminary Remediation Goal
TAL = Target Analyte List
WW = wet weight
µg/kg = micrograms per kilogram

TABLE A-11
Analytical Results Summary and Comparison Value Evaluation, Mountain Whitefish Body
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
TAL Metals																	
Aluminum	mg/kg WW	7	7	100%	--	--	4.9	22.0	25					4.4	7	1.12	4.99
Antimony	mg/kg WW	--	7	0%	0.14	0.15	--	--						0.03			
Arsenic	mg/kg WW	7	7	100%	--	--	0.12	0.17		0.0039	7	30.7	43.3	1.6			
Barium	mg/kg WW	7	7	100%	--	--	0.46	2.79	5.2								
Beryllium	mg/kg WW	--	7	0%	0.007	0.007	--	--	0.050					0.1			
Cadmium	mg/kg WW	7	7	100%	--	--	0.092	0.135	0.025		7	3.7	5.4	0.04			
Calcium	mg/kg WW	7	7	100%	--	--	4118	6851									
Chromium	mg/kg WW	7	7	100%	--	--	1.0	1.2	38					0.18	7	5.29	6.63
Cobalt	mg/kg WW	7	7	100%	--	--	0.028	0.083	0.50								
Copper	mg/kg WW	7	7	100%	--	--	0.6	2.62	1.0		5		2.7	3.0			
Iron	mg/kg WW	7	7	100%	--	--	30.2	187.9	15		7	2.0	12.4				
Lead	mg/kg WW	7	7	100%	--	--	0.176	0.449	0.05		7	3.6	9.2	0.06	7	2.93	7.48
Magnesium	mg/kg WW	7	7	100%	--	--	296	344									
Manganese	mg/kg WW	7	7	100%	--	--	1.55	4.90	3.5		6		1.4				
Nickel	mg/kg WW	7	7	100%	--	--	0.17	0.31	0.50					0.39			
Potassium	mg/kg WW	7	7	100%	--	--	3022	3433									
Selenium	mg/kg WW	7	7	100%	--	--	0.84	1.24	0.13		7	6.6	9.7	0.56	7	1.51	2.21
Silver	mg/kg WW	--	7	0%	0.05	0.05	--	--	0.13					0.37			
Sodium	mg/kg WW	7	7	100%	--	--	648	779									
Thallium	mg/kg WW	--	7	0%	0.09	0.09	--	--	0.002					4.6			
Uranium	mg/kg WW	7	7	100%	--	--	0.005	0.0122	0.005		5		2.5				
Vanadium	mg/kg WW	--	7	0%	0.14	0.15	--	--	0.025								
Zinc	mg/kg WW	7	7	100%	--	--	20.1	40.1	7.5		7	2.7	5.3	20	7	1.01	2.01
Mercury	µg/kg WW	7	7	100%	--	--	63	84	3		7	25.3	33.6	60	7	1.06	1.40
PCB Aroclors																	
PCB-1016	µg/kg WW	2	7	29%	13	14	14	14	0.85		2	16.47	16.47	440			
PCB-1221	µg/kg WW	--	7	0%	13	14	--	--		0.3				440			
PCB-1232	µg/kg WW	--	7	0%	26	28	--	--		0.3				440			
PCB-1242	µg/kg WW	--	7	0%	13	14	--	--		0.3				440			
PCB-1248	µg/kg WW	--	7	0%	13	14	--	--		0.3				440			
PCB-1254	µg/kg WW	6	6	100%	--	--	38	58		0.3	6	125.3	194.0	440			
PCB-1260	µg/kg WW	--	7	0%	13	14	--	--		0.3				440			
PCB-1254/1260	µg/kg WW	--	7	0%	13	14	--	--		0.3				440			
PCB-1262	µg/kg WW	--	24	1000%	15	--	--			0.3				440			
PCB-1268	µg/kg WW	--	24	1000%	15	--	--			0.3				440			
PCB Congeners																	
PCB 1	pg/g	1	1	100%	--	--	2.310	2.310	522					60			
PCB 2	pg/g	--	1	0%	2.390	2.390	--	--	522					60			
PCB 3	pg/g	--	1	0%	2.050	2.050	--	--	522					60			
PCB 4	pg/g	1	1	100%	--	--	11.600	11.600	522					60			
PCB 5	pg/g	--	1	0%	0.971	0.971	--	--	522					60			
PCB 6	pg/g	1	1	100%	--	--	5.760	5.760	522					60			
PCB 7	pg/g	--	1	0%	0.904	0.904	--	--	522					60			
PCB 8	pg/g	1	1	100%	--	--	8.510	8.510	522					60			
PCB 9	pg/g	--	1	0%	2.810	2.810	--	--	522					60			
PCB 10	pg/g	1	1	100%	--	--	0.692	0.692	522					60			
PCB 11	pg/g	1	1	100%	--	--	73.000	73.000	522					60	1	1.22	1.22
PCB 12	pg/g	--	1	0%	0.906	0.906	--	--	522					60			
PCB 14	pg/g	--	1	0%	0.981	0.981	--	--	522					60			
PCB 15	pg/g	1	1	100%	--	--	16.400	16.400	522					60			
PCB 16	pg/g	1	1	100%	--	--	31.800	31.800	522					60			
PCB 17	pg/g	1	1	100%	--	--	48.600	48.600	522					60			
PCB 18	pg/g	1	1	100%	--	--	116.000	116.000	522					60	1	1.93	1.93
PCB 19	pg/g	1	1	100%	--	--	9.830	9.830	522					60			
PCB 20	pg/g	1	1	100%	--	--	369.000	369.000	522					60	1	6.15	6.15
PCB 21	pg/g	1	1	100%	--	--	14.900	14.900	522					60			
PCB 22	pg/g	1	1	100%	--	--	59.300	59.300	522					60			
PCB 23	pg/g	--	1	0%	0.906	0.906	--	--	522					60			
PCB 24	pg/g	1	1	100%	--	--	1.990	1.990	522					60			
PCB 25	pg/g	1	1	100%	--	--	25.400	25.400	522					60			
PCB 26	pg/g	1	1	100%	--	--	45.200	45.200	522					60			

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		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 27	pg/g	1	1	100%	--	--	6.980	6.980	522					60			
PCB 31	pg/g	1	1	100%	--	--	254.000	254.000	522					60	1	4.23	4.23
PCB 32	pg/g	1	1	100%	--	--	27.100	27.100	522					60			
PCB 34	pg/g	--	1	0%	1.290	1.290	--	--	522					60			
PCB 35	pg/g	--	1	0%	1.830	1.830	--	--	522					60			
PCB 36	pg/g	--	1	0%	1.100	1.100	--	--	522					60			
PCB 37	pg/g	1	1	100%	--	--	33.700	33.700	522					60			
PCB 38	pg/g	--	1	0%	1.220	1.220	--	--	522					60			
PCB 39	pg/g	--	1	0%	3.910	3.910	--	--	522					60			
PCB 40	pg/g	1	1	100%	--	--	99.100	99.100	522					60	1	1.65	1.65
PCB 41	pg/g	1	1	100%	--	--	27.500	27.500	522					60			
PCB 42	pg/g	1	1	100%	--	--	86.400	86.400	522					60	1	1.44	1.44
PCB 43	pg/g	--	1	0%	12.700	12.700	--	--	522					60			
PCB 44	pg/g	1	1	100%	--	--	330.000	330.000	522					60	1	5.50	5.50
PCB 45	pg/g	1	1	100%	--	--	31.800	31.800	522					60			
PCB 46	pg/g	1	1	100%	--	--	13.900	13.900	522					60			
PCB 48	pg/g	1	1	100%	--	--	66.400	66.400	522					60	1	1.11	1.11
PCB 49	pg/g	1	1	100%	--	--	379.000	379.000	522					60	1	6.32	6.32
PCB 50	pg/g	1	1	100%	--	--	40.500	40.500	522					60			
PCB 52	pg/g	1	1	100%	--	--	859.000	859.000	522		1	1.00	1.65	60	1	14.32	14.32
PCB 54	pg/g	1	1	100%	--	--	0.836	0.836	522					60			
PCB 55	pg/g	1	1	100%	--	--	16.700	16.700	522					60			
PCB 56	pg/g	1	1	100%	--	--	128.000	128.000	522					60	1	2.13	2.13
PCB 57	pg/g	--	1	0%	4.750	4.750	--	--	522					60			
PCB 58	pg/g	--	1	0%	6.260	6.260	--	--	522					60			
PCB 59	pg/g	1	1	100%	--	--	47.900	47.900	522					60			
PCB 60	pg/g	1	1	100%	--	--	222.000	222.000	522					60	1	3.70	3.70
PCB 61	pg/g	1	1	100%	--	--	1630.000	1630.000	522		1	3.12	3.12	60	1	27.17	27.17
PCB 63	pg/g	1	1	100%	--	--	45.500	45.500	522					60			
PCB 64	pg/g	1	1	100%	--	--	275.000	275.000	522					60	1	4.58	4.58
PCB 66	pg/g	1	1	100%	--	--	1080.000	1080.000	522		1	2.07	2.07	60	1	18.00	18.00
PCB 67	pg/g	1	1	100%	--	--	21.700	21.700	522					60			
PCB 68	pg/g	1	1	100%	--	--	19.700	19.700	522					60			
PCB 72	pg/g	1	1	100%	--	--	24.200	24.200	522					60			
PCB 73	pg/g	--	1	0%	5.150	5.150	--	--	522					60			
PCB 77	pg/g	1	1	100%	--	--	57.500	57.500		40				60			
PCB 78	pg/g	--	1	0%	3.140	3.140	--	--	522					60			
PCB 79	pg/g	1	1	100%	--	--	84.200	84.200	522					60	1	1.40	1.40
PCB 80	pg/g	--	1	0%	2.540	2.540	--	--	522					60			
PCB 81	pg/g	1	1	100%	--	--	4.570	4.570		13.3				60			
PCB 82	pg/g	1	1	100%	--	--	146.000	146.000	522					60	1	2.43	2.43
PCB 83	pg/g	1	1	100%	--	--	421.000	421.000	522					60	1	7.02	7.02
PCB 84	pg/g	1	1	100%	--	--	310.000	310.000	522					60	1	5.17	5.17
PCB 85	pg/g	1	1	100%	--	--	1260.000	1260.000	522		1	2.41	2.41	60	1	21.00	21.00
PCB 86	pg/g	1	1	100%	--	--	1930.000	1930.000	522		1	3.70	3.70	60	1	32.17	32.17
PCB 88	pg/g	1	1	100%	--	--	646.000	646.000	522		1	1.24	1.24	60	1	10.77	10.77
PCB 89	pg/g	1	1	100%	--	--	6.200	6.200	522					60			
PCB 90	pg/g	1	1	100%	--	--	3050.000	3050.000	522		1	5.84	5.84	60	1	50.83	50.83
PCB 92	pg/g	1	1	100%	--	--	686.000	686.000	522		1	1.31	1.31	60	1	11.43	11.43
PCB 93	pg/g	--	1	0%	5.880	5.880	--	--	522					60			
PCB 94	pg/g	1	1	100%	--	--	1230.000	1230.000	522		1	2.36	2.36	60	1	20.50	20.50
PCB 95	pg/g	1	1	100%	--	--	27.000	27.000	522					60			
PCB 96	pg/g	1	1	100%	--	--	4.960	4.960	522					60			
PCB 98	pg/g	1	1	100%	--	--	45.200	45.200	522					60			
PCB 99	pg/g	1	1	100%	--	--	3120.000	3120.000	522		1	5.98	5.98	60	1	52.00	52.00
PCB 103	pg/g	1	1	100%	--	--	21.300	21.300	522					60			
PCB 104	pg/g	--	1	0%	0.801	0.801	--	--	522					60			
PCB 105	pg/g	1	1	100%	--	--	2010.000	2010.000		113	1	17.74	17.74	60	1	33.50	33.50
PCB 106	pg/g	--	1	0%	5.080	5.080	--	--	522					60			
PCB 107	pg/g	1	1	100%	--	--	163.000	163.000	522					60	1	2.72	2.72

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PCB 109	pg/g	1	1	100%	--	--	447.000	447.000	522					60	1	7.45	7.45
PCB 110	pg/g	1	1	100%	--	--	5440.000	5440.000	522		1	10.42	10.42	60	1	90.67	90.67
PCB 111	pg/g	1	1	100%	--	--	13.800	13.800	522					60			
PCB 112	pg/g	1	1	100%	--	--	262.000	262.000	522					60	1	4.37	4.37
PCB 114	pg/g	1	1	100%	--	--	129.000	129.000		113	1	1.14	1.14	60	1	2.15	2.15
PCB 118	pg/g	1	1	100%	--	--	5330.000	5330.000		113	1	47.04	47.04	60	1	88.83	88.83
PCB 120	pg/g	1	1	100%	--	--	40.600	40.600	522					60			
PCB 121	pg/g	1	1	100%	--	--	3.100	3.100	522					60			
PCB 122	pg/g	--	1	0%	5.590	5.590	--	--	522					60			
PCB 123	pg/g	1	1	100%	--	--	58.900	58.900		113				60			
PCB 126	pg/g	1	1	100%	--	--	60.200	60.200		0.41	1	146.83	146.83	60	1	1.00	1.00
PCB 127	pg/g	1	1	100%	--	--	33.900	33.900	522					60			
PCB 128	pg/g	1	1	100%	--	--	662.000	662.000	522		1	1.27	1.27	60	1	11.03	11.03
PCB 129	pg/g	1	1	100%	--	--	8960.000	8960.000	522		1	17.16	17.16	60	1	149.33	149.33
PCB 130	pg/g	1	1	100%	--	--	524.000	524.000	522		1	1.00	1.00	60	1	8.73	8.73
PCB 131	pg/g	1	1	100%	--	--	30.100	30.100	522					60			
PCB 132	pg/g	1	1	100%	--	--	1300.000	1300.000	522		1	2.49	2.49	60	1	21.67	21.67
PCB 133	pg/g	1	1	100%	--	--	207.000	207.000	522					60	1	3.45	3.45
PCB 134	pg/g	1	1	100%	--	--	116.000	116.000	522					60	1	1.93	1.93
PCB 135	pg/g	1	1	100%	--	--	1430.000	1430.000	522		1	2.74	2.74	60	1	23.83	23.83
PCB 136	pg/g	1	1	100%	--	--	285.000	285.000	522					60	1	4.75	4.75
PCB 137	pg/g	1	1	100%	--	--	737.000	737.000	522		1	1.41	1.41	60	1	12.28	12.28
PCB 139	pg/g	1	1	100%	--	--	185.000	185.000	522					60	1	3.08	3.08
PCB 141	pg/g	1	1	100%	--	--	825.000	825.000	522		1	1.58	1.58	60	1	13.75	13.75
PCB 142	pg/g	1	1	100%	--	--	4110.000	4110.000	522		1	7.87	7.87	60	1	68.50	68.50
PCB 143	pg/g	--	1	0%	13.100	13.100	--	--	522					60			
PCB 144	pg/g	--	1	0%	12.700	12.700	--	--	522					60			
PCB 145	pg/g	--	1	0%	2.900	2.900	--	--	522					60			
PCB 146	pg/g	1	1	100%	--	--	1170.000	1170.000	522		1	2.24	2.24	60	1	19.50	19.50
PCB 147	pg/g	1	1	100%	--	--	214.000	214.000	522					60	1	3.57	3.57
PCB 148	pg/g	1	1	100%	--	--	8.170	8.170	522					60			
PCB 150	pg/g	--	1	0%	4.540	4.540	--	--	522					60			
PCB 152	pg/g	--	1	0%	3.300	3.300	--	--	522					60			
PCB 153	pg/g	1	1	100%	--	--	13300.000	13300.000	522		1	25.48	25.48	60	1	221.67	221.67
PCB 154	pg/g	1	1	100%	--	--	117.000	117.000	522					60	1	1.95	1.95
PCB 155	pg/g	1	1	100%	--	--	8.310	8.310	522					60			
PCB 156	pg/g	1	1	100%	--	--	1250.000	1250.000		113	1	11.03	11.03	60	1	20.83	20.83
PCB 158	pg/g	1	1	100%	--	--	368.000	368.000	522					60	1	6.13	6.13
PCB 159	pg/g	1	1	100%	--	--	66.500	66.500	522					60	1	1.11	1.11
PCB 160	pg/g	--	1	0%	10.100	10.100	--	--	522					60			
PCB 161	pg/g	--	1	0%	9.810	9.810	--	--	522					60			
PCB 162	pg/g	1	1	100%	--	--	107.000	107.000	522					60	1	1.78	1.78
PCB 164	pg/g	1	1	100%	--	--	291.000	291.000	522					60	1	4.85	4.85
PCB 165	pg/g	--	1	0%	9.350	9.350	--	--	522					60			
PCB 167	pg/g	1	1	100%	--	--	407.000	407.000	522					60	1	6.78	6.78
PCB 169	pg/g	1	1	100%	--	--	23.600	23.600		0.13	1	181.54	181.54	60			
PCB 170	pg/g	1	1	100%	--	--	3200.000	3200.000	522		1	6.13	6.13	60	1	53.33	53.33
PCB 171	pg/g	1	1	100%	--	--	818.000	818.000	522		1	1.57	1.57	60	1	13.63	13.63
PCB 172	pg/g	1	1	100%	--	--	558.000	558.000	522		1	1.07	1.07	60	1	9.30	9.30
PCB 174	pg/g	1	1	100%	--	--	1230.000	1230.000	522		1	2.36	2.36	60	1	20.50	20.50
PCB 175	pg/g	1	1	100%	--	--	36.100	36.100	522					60			
PCB 176	pg/g	1	1	100%	--	--	40.600	40.600	522					60			
PCB 177	pg/g	1	1	100%	--	--	1120.000	1120.000	522		1	2.15	2.15	60	1	18.67	18.67
PCB 178	pg/g	1	1	100%	--	--	201.000	201.000	522					60	1	3.35	3.35
PCB 179	pg/g	1	1	100%	--	--	251.000	251.000	522					60	1	4.18	4.18
PCB 180	pg/g	1	1	100%	--	--	8780.000	8780.000	522		1	16.82	16.82	60	1	146.33	146.33
PCB 181	pg/g	1	1	100%	--	--	21.000	21.000	522					60			
PCB 182	pg/g	1	1	100%	--	--	16.500	16.500	522					60			
PCB 183	pg/g	1	1	100%	--	--	2590.000	2590.000	522		1	4.96	4.96	60	1	43.17	43.17
PCB 184	pg/g	1	1	100%	--	--	10.000	10.000	522					60			

TABLE A-11
Analytical Results Summary and Comparison Value Evaluation, Mountain Whitefish Body
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 186	pg/g	--	1	0%	3.220	3.220	--	--	522					60			
PCB 187	pg/g	1	1	100%	--	--	647.000	647.000	522		1	1.24	1.24	60	1	10.78	10.78
PCB 188	pg/g	1	1	100%	--	--	4.780	4.780	522					60			
PCB 189	pg/g	1	1	100%	--	--	92.200	92.200		113	1	0.81	0.81	60	1	1.54	1.54
PCB 190	pg/g	1	1	100%	--	--	645.000	645.000	522		1	1.24	1.24	60	1	10.75	10.75
PCB 191	pg/g	1	1	100%	--	--	125.000	125.000	522					60	1	2.08	2.08
PCB 192	pg/g	--	1	0%	8.810	8.810	--	--	522					60			
PCB 194	pg/g	1	1	100%	--	--	1380.000	1380.000	522		1	2.64	2.64	60	1	23.00	23.00
PCB 195	pg/g	1	1	100%	--	--	461.000	461.000	522					60	1	7.68	7.68
PCB 196	pg/g	1	1	100%	--	--	818.000	818.000	522		1	1.57	1.57	60	1	13.63	13.63
PCB 197	pg/g	1	1	100%	--	--	126.000	126.000	522					60	1	2.10	2.10
PCB 198	pg/g	1	1	100%	--	--	1530.000	1530.000	522		1	2.93	2.93	60	1	25.50	25.50
PCB 201	pg/g	1	1	100%	--	--	127.000	127.000	522					60	1	2.12	2.12
PCB 202	pg/g	1	1	100%	--	--	252.000	252.000	522					60	1	4.20	4.20
PCB 203	pg/g	1	1	100%	--	--	1160.000	1160.000	522		1	2.22	2.22	60	1	19.33	19.33
PCB 204	pg/g	--	1	0%	4.150	4.150	--	--	522					60			
PCB 205	pg/g	1	1	100%	--	--	55.000	55.000	522					60			
PCB 206	pg/g	1	1	100%	--	--	498.000	498.000	522					60	1	8.30	8.30
PCB 207	pg/g	1	1	100%	--	--	60.600	60.600	522					60	1	1.01	1.01
PCB 208	pg/g	1	1	100%	--	--	113.000	113.000	522					60	1	1.88	1.88
PCB 209	pg/g	1	1	100%	--	--	36.900	36.900	522					60			
Dioxin/Furans																	
2,3,7,8-TCDD	pg/g	1	7	14%	0.19	0.44	0.191	0.191		0.004	1	47.75	47.75	6			
1,2,3,7,8-PeCDD	pg/g	1	7	14%	0.26	0.57	0.274	0.274		0.004	1	68.50	68.50	6			
1,2,3,6,7,8-HxCDD	pg/g	5	7	71%	0.24	0.28	0.23	0.54		0.040	5	5.63	13.58	6			
1,2,3,4,7,8-HxCDD	pg/g	--	7	0%	0.233	0.57	--	--		0.040				6			
1,2,3,7,8,9-HxCDD	pg/g	1	7	14%	0.232	0.57	0.228	0.23		0.040	1	5.70	5.70	6			
1,2,3,4,6,7,8-HpCDD	pg/g	7	7	100%	--	--	0.28	2.92		0.40	5		7.30	6			
OCDD	pg/g	1	7	14%	0.95	4.5	6.54	6.54		13.3				6	1	1.09	1.09
2,3,7,8-TCDF	pg/g	7	7	100%	--	--	2.6	6.0		0.040	7	64.50	150.00	6	1		1.00
1,2,3,7,8-PeCDF	pg/g	2	7	29%	0.14	0.63	0.16	0.18		0.13	2	1.19	1.39	6			
2,3,4,7,8-PeCDF	pg/g	--	7	0%	0.25	0.63	--	--		0.013				6			
1,2,3,6,7,8-HxCDF	pg/g	--	7	0%	0.138	0.50	--	--		0.04				6			
1,2,3,4,7,8-HxCDF	pg/g	--	7	0%	0.139	0.52	--	--		0.04				6			
2,3,4,6,7,8-HxCDF	pg/g	1	7	14%	0.135	0.21	0.4	0.4		0.04	1	9.41	9.41	6			
1,2,3,4,6,7,8-HpCDF	pg/g	4	7	57%	0.160	0.17	0.12	0.88		0.40	1		2.20	6			
1,2,3,4,7,8,9-HpCDF	pg/g	--	7	0%	0.202	0.731	--	--		0.40				6			
OCDF	pg/g	1	7	14%	0.368	0.861	1.72	1.72		13.3				6			

mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
pg/g = picograms
PRG = Preliminary Remediation Goal
TAL = Target Analyte List
WW = wet weight
µg/kg = micrograms per kilogram

TABLE A-12
Analytical Results Summary and Comparison Value Evaluation, Lake Whitefish Whole Body
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics: Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	Human Health Comparison Value Evaluation: USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Comparison Value Evaluation: Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
TAL Metals																	
Aluminum	mg/kg WW	11	24	46%	3.4870	4.2240	3.9	7.8	25					4.4	11		1.77
Antimony	mg/kg WW	--	24	0%	0.11	0.15	--	--						0.03			
Arsenic	mg/kg WW	24	24	100%	--	--	0.18	0.31		0.0039	24	47.4	79.9	1.6			
Barium	mg/kg WW	24	24	100%	--	--	0.32	0.85	5.2								
Beryllium	mg/kg WW	--	24	0%	0.006	0.008	--	--	0.050					0.1			
Cadmium	mg/kg WW	16	24	67%	0.0154	0.0173	0.016	0.032	0.025		2		1.3	0.04			
Calcium	mg/kg WW	24	24	100%	--	--	4416	7498									
Chromium	mg/kg WW	24	24	100%	--	--	0.5	0.9	38					0.18	24	2.88	5.22
Cobalt	mg/kg WW	24	24	100%	--	--	0.019	0.037	0.50								
Copper	mg/kg WW	24	24	100%	--	--	0.4	0.85	1.0					3.0			
Iron	mg/kg WW	24	24	100%	--	--	10.6	22.4	15		11		1.5				
Lead	mg/kg WW	24	24	100%	--	--	0.038	0.123	0.05		5		2.5	0.06	23		2.06
Magnesium	mg/kg WW	24	24	100%	--	--	258	297									
Manganese	mg/kg WW	24	24	100%	--	--	0.63	3.75	3.5		1		1.1				
Nickel	mg/kg WW	24	24	100%	--	--	0.16	0.30	0.50					0.39			
Potassium	mg/kg WW	24	24	100%	--	--	2747	3169									
Selenium	mg/kg WW	24	24	100%	--	--	0.44	0.87	0.13		24	3.4	6.9	0.56	13		1.56
Silver	mg/kg WW	--	24	0%	0.07	0.09	--	--	0.13					0.37			
Sodium	mg/kg WW	24	24	100%	--	--	642	809									
Thallium	mg/kg WW	--	24	0%	0.07	0.09	--	--	0.002					4.6			
Uranium	mg/kg WW	18	24	75%	0.0014	0.0018	0.002	0.0047	0.005								
Vanadium	mg/kg WW	3	24	13%	0.11	0.15	0.13	0.16	0.025		3	5.4	6.2				
Zinc	mg/kg WW	24	24	100%	--	--	10.7	13.9	7.5		24	1.4	1.9	20			
Mercury	µg/kg WW	24	24	100%	--	--	45	95	3		24	17.9	37.8	60	11		1.58
PCB Aroclors																	
PCB-1016	µg/kg WW	--	24	0%	10	15	--	--	0.85					440			
PCB-1221	µg/kg WW	--	24	0%	10	15	--	--		0.3				440			
PCB-1232	µg/kg WW	--	24	0%	21	31	--	--		0.3				440			
PCB-1242	µg/kg WW	--	24	0%	10	15	--	--		0.3				440			
PCB-1248	µg/kg WW	--	24	0%	10	15	--	--		0.3				440			
PCB-1254	µg/kg WW	5	5	100%	--	--	3.0	31		0.3	5	32.0	32.0	440			
PCB-1260	µg/kg WW	19	19	100%	--	--	9.5	38		0.3	19	34.0	34.0	440			
PCB-1254/1260	µg/kg WW	5	5	100%	--	--	2.5	17		0.3	5	22.0	116.0	440			
PCB-1262	µg/kg WW	--	24	0%	10	15	--	--		0.3				440			
PCB-1268	µg/kg WW	--	24	0%	10	15	--	--		0.3				440			
PCB Congeners																	
PCB 1	pg/g	1	5	20%	0.93	2.25	2.37	2.37	522					60			
PCB 2	pg/g	--	5	0%	1.84	4.1	--	--	522					60			
PCB 3	pg/g	--	5	0%	1.06	2.2	--	--	522					60			
PCB 4	pg/g	5	5	100%	--	--	8.6	11.3	522					60			
PCB 5	pg/g	--	5	0%	0.60	1.31	--	--	522					60			
PCB 6	pg/g	2	5	40%	5.32	6.28	2.17	4.9	522					60			
PCB 7	pg/g	--	5	0%	0.55	1.81	--	--	522					60			
PCB 8	pg/g	1	5	20%	3.8	9.5	9.12	9.12	522					60			
PCB 9	pg/g	--	5	0%	0.60	4.51	--	--	522					60			
PCB 10	pg/g	--	5	0%	0.83	1.39	--	--	522					60			
PCB 11	pg/g	5	5	100%	--	--	85.6	226	522					60	5	1.43	3.77
PCB 12	pg/g	--	5	0%	0.56	2.69	--	--	522					60			
PCB 14	pg/g	--	5	0%	0.60	1.40	--	--	522					60			
PCB 15	pg/g	5	5	100%	--	--	16.9	24.3	522					60			
PCB 16	pg/g	5	5	100%	--	--	22.3	35.4	522					60			
PCB 17	pg/g	5	5	100%	--	--	28.3	50.5	522					60			
PCB 18	pg/g	5	5	100%	--	--	68.5	127	522					60	5	1.14	2.12
PCB 19	pg/g	4	5	80%	5.47	5.5	7.34	12.20	522					60			
PCB 20	pg/g	5	5	100%	--	--	166	285	522					60	5	2.77	4.75
PCB 21	pg/g	5	5	100%	--	--	8.0	15.3	522					60			
PCB 22	pg/g	5	5	100%	--	--	34.6	47.1	522					60			
PCB 23	pg/g	1	5	20%	0.31	0.86	0.436	0.436	522					60			
PCB 24	pg/g	2	5	40%	1.48	1.70	0.83	1.96	522					60			
PCB 25	pg/g	5	5	100%	--	--	42	60	522					60	1		1.01
PCB 26	pg/g	5	5	100%	--	--	21.6	39	522					60			

TABLE A-12
Analytical Results Summary and Comparison Value Evaluation, Lake Whitefish Whole Body
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 27	pg/g	5	5	100%	--	--	5.80	13.00	522					60			
PCB 31	pg/g	5	5	100%	--	--	138	215	522					60	5	2.30	3.58
PCB 32	pg/g	5	5	100%	--	--	8.9	17.5	522					60			
PCB 34	pg/g	5	5	100%	--	--	1.04	2.79	522					60			
PCB 35	pg/g	3	5	60%	0.81	1.80	1.2	3.51	522					60			
PCB 36	pg/g	1	5	20%	0.69	0.83	2.4	2.4	522					60			
PCB 37	pg/g	5	5	100%	--	--	32.9	52.5	522					60			
PCB 38	pg/g	2	5	40%	0.71	0.84	0.703	1.33	522					60			
PCB 39	pg/g	4	5	80%	2.15	2.15	2.04	4.30	522					60			
PCB 40	pg/g	5	5	100%	--	--	66.5	167	522					60	5	1.11	2.78
PCB 41	pg/g	5	5	100%	--	--	17.0	35.7	522					60			
PCB 42	pg/g	5	5	100%	--	--	69.0	184	522					60	5	1.15	3.07
PCB 43	pg/g	5	5	100%	--	--	11.9	37	522					60			
PCB 44	pg/g	5	5	100%	--	--	331	847	522		3		1.62	60	5	5.52	14.12
PCB 45	pg/g	5	5	100%	--	--	25.3	48.5	522					60			
PCB 46	pg/g	5	5	100%	--	--	10.10	18.9	522					60			
PCB 48	pg/g	5	5	100%	--	--	41.7	108	522					60	4		1.80
PCB 49	pg/g	5	5	100%	--	--	236	623	522		1		1.19	60	5	3.93	10.38
PCB 50	pg/g	5	5	100%	--	--	32.0	64	522					60	2		1.07
PCB 52	pg/g	5	5	100%	--	--	506	1240	522		4		1.44	60	5	8.43	20.67
PCB 54	pg/g	--	5	0%	0.46	1.18	--	--	522					60			
PCB 55	pg/g	5	5	100%	--	--	5.4	13	522					60			
PCB 56	pg/g	5	5	100%	--	--	108.0	266	522					60	5	1.80	4.43
PCB 57	pg/g	3	5	60%	1.70	4.35	2.62	4.6	522					60			
PCB 58	pg/g	2	5	40%	4.84	6.4	3.18	3.68	522					60			
PCB 59	pg/g	5	5	100%	--	--	31.3	84	522					60	2		1.40
PCB 60	pg/g	5	5	100%	--	--	68	167	522					60	5	1.13	2.78
PCB 61	pg/g	5	5	100%	--	--	654	1540	522		5	1.25	1.79	60	5	10.90	25.67
PCB 63	pg/g	5	5	100%	--	--	18.0	55	522					60			
PCB 64	pg/g	5	5	100%	--	--	154	426	522					60	5	2.57	7.10
PCB 66	pg/g	5	5	100%	--	--	361	1030	522		3		1.20	60	5	6.02	17.17
PCB 67	pg/g	5	5	100%	--	--	9.90	22.3	522					60			
PCB 68	pg/g	5	5	100%	--	--	6.1	15.0	522					60			
PCB 72	pg/g	4	5	80%	10.8	10.8	7.7	20	522					60			
PCB 73	pg/g	2	5	40%	4.4	4.8	2.9	6.7	522					60			
PCB 77	pg/g	5	5	100%	--	--	25.6	58		40	3		1.45	60			
PCB 78	pg/g	--	5	0%	0.78	2.45	--	--	522					60			
PCB 79	pg/g	5	5	100%	--	--	29.0	66	522					60	1		1.10
PCB 80	pg/g	--	5	0%	0.69	1.98	--	--	522					60			
PCB 81	pg/g	--	5	0%	1.19	4.74	--	--		13				60			
PCB 82	pg/g	5	5	100%	--	--	75	141	522					60	5	1.25	2.35
PCB 83	pg/g	5	5	100%	--	--	129	433	522					60	5	2.15	7.22
PCB 84	pg/g	5	5	100%	--	--	161.0	369	522					60	5	2.68	6.15
PCB 85	pg/g	5	5	100%	--	--	249	767	522		1		1.47	60	5	4.15	12.78
PCB 86	pg/g	5	5	100%	--	--	675	1580	522		5		1.84	60	5	11.25	26.33
PCB 88	pg/g	5	5	100%	--	--	113.0	568	522		1		1.09	60	5	1.88	9.47
PCB 89	pg/g	3	5	60%	5.81	15.4	9.68	14.6	522					60			
PCB 90	pg/g	5	5	100%	--	--	1060	2,580	522		5	1.23	3.00	60	5	17.67	43.00
PCB 92	pg/g	5	5	100%	--	--	263	609	522		1		1.17	60	5	4.38	10.15
PCB 93	pg/g	3	5	60%	3.12	5.39	5	8	522					60			
PCB 94	pg/g	5	5	100%	--	--	655.0	1480	522		5	1.25	1.72	60	5	10.92	24.67
PCB 95	pg/g	1	5	20%	10.70	22.1	16.9	16.9	522					60			
PCB 96	pg/g	3	5	60%	3.69	4.79	4.97	7.68	522					60			
PCB 98	pg/g	5	5	100%	--	--	21.7	56.0	522					60			
PCB 99	pg/g	5	5	100%	--	--	453	1190	522		4		1.38	60	5	7.55	19.83
PCB 103	pg/g	4	5	80%	13	13	9.6	23	522					60			
PCB 104	pg/g	--	5	0%	0.48	1.04	--	--	522					60			
PCB 105	pg/g	5	5	100%	--	--	368	751		113	5	5.49	11.21	60	5	6.13	12.52
PCB 106	pg/g	1	5	20%	4.20	5.8	33.4	33.4	522					60			
PCB 107	pg/g	4	5	80%	47.00	47.00	41.3	81	522					60	1		1.34
PCB 109	pg/g	5	5	100%	--	--	109	218	522					60	5	1.82	3.63

TABLE A-12
Analytical Results Summary and Comparison Value Evaluation, Lake Whitefish Whole Body
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 110	pg/g	5	5	100%	--	--	1030	4960	522		5	1.20	5.77	60	5	17.17	82.67
PCB 111	pg/g	2	5	40%	1.8	3.5	2.8	5.3	522					60			
PCB 112	pg/g	5	5	100%	--	--	27	139	522					60	2		2.32
PCB 114	pg/g	5	5	100%	--	--	24	52		113	5	1.84	28.12	60			
PCB 118	pg/g	5	5	100%	--	--	0,940	2,030		113	5	14.03	144.69	60	5	15.67	33.83
PCB 120	pg/g	3	5	60%	12	18	7.8	8	522					60			
PCB 121	pg/g	--	5	0%	1.3	2.6	--	--	522					60			
PCB 122	pg/g	--	5	0%	2.67	6.4	--	--	522					60			
PCB 123	pg/g	4	5	80%	18.0	18.0	15	29		113				60			
PCB 126	pg/g	4	5	80%	2.5	2.5	12.0	31		0.41	4	17.91	45.67	60			
PCB 127	pg/g	--	5	0%	4.35	8.3	--	--	522					60			
PCB 128	pg/g	5	5	100%	--	--	229	428	522					60	5	3.82	7.13
PCB 129	pg/g	5	5	100%	--	--	1,900	3,990	522		5	2.21	4.64	60	5	31.67	66.50
PCB 130	pg/g	5	5	100%	--	--	126	252	522					60	5	2.10	4.20
PCB 131	pg/g	2	5	40%	8.8	16.2	9.2	10.6	522					60			
PCB 132	pg/g	5	5	100%	--	--	394.0	757	522		2		1.45	60	5	6.57	12.62
PCB 133	pg/g	5	5	100%	--	--	33	78	522					60	1		1.30
PCB 134	pg/g	5	5	100%	--	--	55.8	113	522					60	3		1.88
PCB 135	pg/g	5	5	100%	--	--	606	1250	522		5	1.16	1.45	60	5	10.10	20.83
PCB 136	pg/g	5	5	100%	--	--	144.0	278	522					60	5	2.40	4.63
PCB 137	pg/g	5	5	100%	--	--	100	185	522					60	5	1.67	3.08
PCB 139	pg/g	5	5	100%	--	--	32	70	522					60	1		1.17
PCB 141	pg/g	5	5	100%	--	--	183	393	522					60	5	3.05	6.55
PCB 142	pg/g	5	5	100%	--	--	1060	2130	522		5	1.23	2.48	60	5	17.67	35.50
PCB 143	pg/g	--	5	0%	3.6	5.6	--	--	522					60			
PCB 144	pg/g	2	5	40%	5.1	7.66	6	8	522					60			
PCB 145	pg/g	--	5	0%	1.06	3.3	--	--	522					60			
PCB 146	pg/g	5	5	100%	--	--	279	582	522		1		1.11	60	5	4.65	9.70
PCB 147	pg/g	5	5	100%	--	--	73	143	522					60	5	1.22	2.38
PCB 148	pg/g	2	5	40%	3.0	8.3	4.8	5.5	522					60			
PCB 150	pg/g	2	5	40%	2.63	3.2	2.41	4.2	522					60			
PCB 152	pg/g	--	5	0%	2.13	4.2	--	--	522					60			
PCB 153	pg/g	5	5	100%	--	--	1,480	3,200	522		5	1.72	3.72	60	5	24.67	53.33
PCB 154	pg/g	4	5	80%	23.9	23.9	21	53	522					60			
PCB 155	pg/g	2	5	40%	2.4	2.9	3.6	5.5	522					60			
PCB 156	pg/g	5	5	100%	--	--	105	255		113	4		2.25	60	5	1.75	4.25
PCB 158	pg/g	5	5	100%	--	--	125	242	522					60	5	2.08	4.03
PCB 159	pg/g	4	5	80%	10.7	10.7	8.6	17.7	522					60			
PCB 160	pg/g	--	5	0%	2.42	4.2	--	--	522					60			
PCB 161	pg/g	--	5	0%	2.49	4.1	--	--	522					60			
PCB 162	pg/g	2	5	40%	9.9	17	14	32	522					60			
PCB 164	pg/g	5	5	100%	--	--	65	158	522					60	5	1.08	2.63
PCB 165	pg/g	--	5	0%	2.45	4.1	--	--	522					60			
PCB 167	pg/g	5	5	100%	--	--	39	91	522					60	2		1.52
PCB 169	pg/g	--	5	0%	1.6	4.5	--	--		0.13				60			
PCB 170	pg/g	5	5	100%	--	--	276	540	522		1		1.03	60	5	4.60	9.00
PCB 171	pg/g	5	5	100%	--	--	113	214	522					60	5	1.88	3.57
PCB 172	pg/g	5	5	100%	--	--	59	116	522					60	3		1.93
PCB 174	pg/g	5	5	100%	--	--	231	422	522					60	5	3.85	7.03
PCB 175	pg/g	3	5	60%	14	15.3	11.5	17	522					60			
PCB 176	pg/g	5	5	100%	--	--	33.40	59.5	522					60			
PCB 177	pg/g	5	5	100%	--	--	248.0	472	522					60	5	4.13	7.87
PCB 178	pg/g	5	5	100%	--	--	108	213	522					60	5	1.80	3.55
PCB 179	pg/g	5	5	100%	--	--	171.0	337	522					60	5	2.85	5.62
PCB 180	pg/g	5	5	100%	--	--	692	1350	522		5	1.33	1.57	60	5	11.53	22.50
PCB 181	pg/g	--	5	0%	2.3	6.5	--	--	522					60			
PCB 182	pg/g	2	5	40%	4.31	5.31	4.1	8	522					60			
PCB 183	pg/g	5	5	100%	--	--	337	693	522		2		1.33	60	5	5.62	11.55
PCB 184	pg/g	2	5	40%	3.1	5.5	2.6	4.1	522					60			
PCB 186	pg/g	--	5	0%	2.12	4.2	--	--	522					60			
PCB 187	pg/g	5	5	100%	--	--	519	1090	522		4		1.27	60	5	8.65	18.17

TABLE A-12
Analytical Results Summary and Comparison Value Evaluation, Lake Whitefish Whole Body
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > Human Health Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 188	pg/g	1	5	20%	1.86	4.43	3.6	3.6	522					60			
PCB 189	pg/g	4	5	80%	11.9	11.9	6.0	9		113				60			
PCB 190	pg/g	5	5	100%	--	--	48	131	522					60	4		2.18
PCB 191	pg/g	4	5	80%	13	13	14	19	522					60			
PCB 192	pg/g	--	5	0%	2.0	5.6	--	--	522					60			
PCB 194	pg/g	5	5	100%	--	--	87	147	522					60	5	1.45	2.45
PCB 195	pg/g	5	5	100%	--	--	52	102	522					60	5		1.70
PCB 196	pg/g	5	5	100%	--	--	97	174	522					60	5	1.61	2.90
PCB 197	pg/g	5	5	100%	--	--	21	40	522					60			
PCB 198	pg/g	5	5	100%	--	--	150	360	522					60	5	2.50	6.00
PCB 201	pg/g	5	5	100%	--	--	29.6	61	522					60	1		1.01
PCB 202	pg/g	5	5	100%	--	--	52	113	522					60	5		1.88
PCB 203	pg/g	5	5	100%	--	--	120	226	522					60	5	2.00	3.77
PCB 204	pg/g	--	5	0%	0.70	2.9	--	--	522					60			
PCB 205	pg/g	3	5	60%	4.71	5.74	4	10	522					60			
PCB 206	pg/g	5	5	100%	--	--	54	85	522					60	3		1.42
PCB 207	pg/g	5	5	100%	--	--	11	24	522					60			
PCB 208	pg/g	5	5	100%	--	--	24	46	522					60			
PCB 209	pg/g	5	5	100%	--	--	12	26	522					60			
Dioxin/Furans																	
2,3,7,8-TCDD	pg/g	7	24	29%	0.10	0.70	0.182	0.228		0.004	7	182.00	228.00	6			
1,2,3,7,8-PeCDD	pg/g	9	24	38%	0.43	1.22	0.289	0.585		0.004	9	289.00	585.00	6			
1,2,3,6,7,8-HxCDD	pg/g	14	24	58%	0.31	1.28	0.27	0.48		0.040	14	38.86	68.86	6			
1,2,3,4,7,8-HxCDD	pg/g	4	24	17%	0.192	1.36	0.23	0.456		0.040	4	32.86	65.14	6			
1,2,3,7,8,9-HxCDD	pg/g	4	24	17%	0.186	1.36	0.134	0.28		0.040	4	19.14	39.29	6			
1,2,3,4,6,7,8-HpCDD	pg/g	--	24	0%	0.49	3.80	--	--		0.40				6			
OCDD	pg/g	2	24	8%	1.02	14.0	18.6	19.8		13.3	2	1.40	1.49	6	2	3.10	3.30
2,3,7,8-TCDF	pg/g	24	24	100%	--	--	2.1	8.4		0.040	24	302.86	1192.86	6			
1,2,3,7,8-PeCDF	pg/g	1	24	4%	0.20	0.63	0.38	0.38		0.13	1	2.89	2.89	6			
2,3,4,7,8-PeCDF	pg/g	4	24	17%	0.29	0.67	0.344	0.827		0.013	4	34.40	82.70	6			
1,2,3,6,7,8-HxCDF	pg/g	--	24	0%	0.065	1.07	--	--		0.04				6			
1,2,3,4,7,8-HxCDF	pg/g	--	24	0%	0.071	1.02	--	--		0.04				6			
2,3,4,6,7,8-HxCDF	pg/g	--	24	0%	0.087	0.99	--	--		0.04				6			
1,2,3,4,6,7,8-HpCDF	pg/g	--	24	0%	0.163	1.03	--	--		0.40				6			
1,2,3,4,7,8,9-HpCDF	pg/g	--	24	0%	0.093	1.56	--	--		0.40				6			
OCDF	pg/g	--	24	0%	0.585	3.47	--	--		13.3				6			

mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
pg/g = picograms
PRG = Preliminary Remediation Goal
TAL = Target Analyte List
WW = wet weight
µg/kg = micrograms per kilogram

TABLE A-13
Analytical Results Summary and Comparison Value Evaluation, Burbot Whole Body
Upper Columbia River RI/FS

Analyte	Units	Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
		Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > HH Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
TAL Metals																	
Aluminum	mg/kg WW	24	24	100%	--	--	3.7	19.8	25					4.4	22		4.49
Antimony	mg/kg WW	--	24	0%	0.07	0.09	--	--						0.03			
Arsenic	mg/kg WW	24	24	100%	--	--	0.52	0.96		0.0039	24	133.3	245.7	1.6			
Barium	mg/kg WW	24	24	100%	--	--	3.19	8.46	5.2		18		1.6				
Beryllium	mg/kg WW	--	24	0%	0.005	4.560	--	--	0.050					0.1			
Cadmium	mg/kg WW	24	24	100%	--	--	0.020	0.088	0.025		20		3.5	0.04			
Calcium	mg/kg WW	24	24	100%	--	--	4904	11571									
Chromium	mg/kg WW	24	24	100%	--	--	0.3	1.5	38					0.18	24	1.45	8.25
Cobalt	mg/kg WW	24	24	100%	--	--	0.027	0.046	0.50								
Copper	mg/kg WW	24	24	100%	--	--	0.8	1.51	1.0		16.0		1.6	3.0			
Iron	mg/kg WW	24	24	100%	--	--	17.3	38.0	15		24	1.1	2.5				
Lead	mg/kg WW	24	24	100%	--	--	0.056	0.192	0.05		24	1.2	4.0	0.06	23		3.20
Magnesium	mg/kg WW	24	24	100%	--	--	294	373									
Manganese	mg/kg WW	24	24	100%	--	--	1.34	3.42	3.5								
Nickel	mg/kg WW	24	24	100%	--	--	0.18	0.42	0.50					0.39	1		1.07
Potassium	mg/kg WW	24	24	100%	--	--	2595	3175									
Selenium	mg/kg WW	24	24	100%	--	--	0.39	0.85	0.13		24	3.0	6.7	0.56	13		1.52
Silver	mg/kg WW	--	24	0%	0.05	0.06	--	--	0.13					0.37			
Sodium	mg/kg WW	24	24	100%	--	--	1216	1636									
Thallium	mg/kg WW	--	24	0%	0.05	0.06	--	--	0.002					4.6			
Uranium	mg/kg WW	24	24	100%	--	--	0.003	0.0126	0.005		11		2.6				
Vanadium	mg/kg WW	16	24	67%	0.08	0.90	0.08	0.19	0.025		16	3.2	7.5				
Zinc	mg/kg WW	24	24	100%	--	--	11.2	13.9	7.5		24	1.5	1.9	20			
Mercury	µg/kg WW	24	24	100%	--	--	112	242	3		24	44.8	96.8	60	24	1.87	4.03
PCB Aroclors																	
PCB-1016	µg/kg WW	--	24	0%	11	11	--	--	0.85					440			
PCB-1221	µg/kg WW	--	24	0%	11	11	--	--		0.3				440			
PCB-1232	µg/kg WW	--	24	0%	21	22	--	--		0.3				440			
PCB-1242	µg/kg WW	--	24	0%	11	11	--	--		0.3				440			
PCB-1248	µg/kg WW	--	24	0%	11	11	--	--		0.3				440			
PCB-1254	µg/kg WW	1	2	50%	11	11	16	16		0.3	1	32.0	32.0	440			
PCB-1260	µg/kg WW	1	1	100%	--	--	17	17		0.3	1	34.0	34.0	440			
PCB-1254/1260	µg/kg WW	23	23	100%	--	--	11	58		0.3	23	22.0	116.0	440			
PCB-1262	µg/kg WW	--	24	0%	11	11	--	--		0.3				440			
PCB-1268	µg/kg WW	--	24	0%	11	11	--	--		0.3				440			
PCB Congeners																	
PCB 1	pg/g	1	5	20%	0.51	0.63	0.73	0.73	522					60			
PCB 2	pg/g	1	5	20%	0.78	1.9	0.64	0.64	522					60			
PCB 3	pg/g	1	5	20%	0.67	1.4	0.66	0.66	522					60			
PCB 4	pg/g	2	5	40%	0.80	1.1	1.3	1.7	522					60			
PCB 5	pg/g	--	5	0%	0.17	0.44	--	--	522					60			
PCB 6	pg/g	--	5	0%	0.26	1.00	--	--	522					60			
PCB 7	pg/g	--	5	0%	0.16	0.42	--	--	522					60			
PCB 8	pg/g	--	5	0%	4.1	5.9	--	--	522					60			
PCB 9	pg/g	--	5	0%	0.17	0.94	--	--	522					60			
PCB 10	pg/g	--	5	0%	0.30	0.78	--	--	522					60			
PCB 11	pg/g	--	5	0%	17	48	--	--	522					60			
PCB 12	pg/g	1	5	20%	0.25	0.64	0.62	0.62	522					60			
PCB 14	pg/g	--	5	0%	0.17	0.44	--	--	522					60			
PCB 15	pg/g	--	5	0%	2.6	6.3	--	--	522					60			
PCB 16	pg/g	--	5	0%	1.9	4.3	--	--	522					60			
PCB 17	pg/g	2	5	40%	2.5	3.9	5.2	7.7	522					60			
PCB 18	pg/g	4	5	80%	6.3	6.3	9.8	20	522					60			
PCB 19	pg/g	2	5	40%	0.45	1.1	0.52	0.72	522					60			
PCB 20	pg/g	5	5	100%	--	--	39	118	522					60	4		1.96
PCB 21	pg/g	4	5	80%	1.4	1.4	1.5	3.6	522					60			
PCB 22	pg/g	3	5	60%	4.5	7.7	5.3	7.6	522					60			
PCB 23	pg/g	--	5	0%	0.12	0.27	--	--	522					60			
PCB 24	pg/g	3	5	60%	0.21	0.27	0.32	0.48	522					60			
PCB 25	pg/g	1	5	20%	6.4	11	15	15	522					60			
PCB 26	pg/g	5	5	100%	--	--	3.8	11	522					60			
PCB 27	pg/g	3	5	60%	0.43	1.1	0.25	0.57	522					60			

TABLE A-13
Analytical Results Summary and Comparison Value Evaluation, Burbot Whole Body
Upper Columbia River RI/FS

Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	Human Health Comparison Value Evaluation: USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > HH Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Comparison Value Evaluation: Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 31	pg/g	5	5	100%	--	--	27	71	522					60	1		1.20
PCB 32	pg/g	1	5	20%	0.92	1.4	2.1	2.1	522					60			
PCB 34	pg/g	3	5	60%	0.22	0.29	0.22	0.69	522					60			
PCB 35	pg/g	--	5	0%	0.22	0.48	--	--	522					60			
PCB 36	pg/g	--	5	0%	0.20	0.27	--	--	522					60			
PCB 37	pg/g	--	5	0%	2.1	6.3	--	--	522					60			
PCB 38	pg/g	--	5	0%	0.21	0.30	--	--	522					60			
PCB 39	pg/g	2	5	40%	0.21	0.67	0.75	0.98	522					60			
PCB 40	pg/g	3	5	60%	1.8	5.7	2.9	13	522					60			
PCB 41	pg/g	2	5	40%	0.43	0.84	1.1	2.6	522					60			
PCB 42	pg/g	5	5	100%	--	--	8.8	59	522					60			
PCB 43	pg/g	4	5	80%	3.3	3.3	6.1	14	522					60			
PCB 44	pg/g	5	5	100%	--	--	88	335	522					60	5	1.50	5.60
PCB 45	pg/g	3	5	60%	3.9	13	1.4	6.9	522					60			
PCB 46	pg/g	2	5	40%	0.34	0.55	0.67	1.7	522					60			
PCB 48	pg/g	5	5	100%	--	--	5.9	29	522					60			
PCB 49	pg/g	5	5	100%	--	--	61	259	522					60	5	1.00	4.30
PCB 50	pg/g	5	5	100%	--	--	2.2	17	522					60			
PCB 52	pg/g	5	5	100%	--	--	135	480	522					60	5	2.25	8.00
PCB 54	pg/g	--	5	0%	0.14	0.21	--	--	522					60			
PCB 55	pg/g	5	5	100%	--	--	7.1	21	522					60			
PCB 56	pg/g	4	5	80%	6.5	6.5	7.8	34	522					60			
PCB 57	pg/g	2	5	40%	0.62	0.87	0.62	1.5	522					60			
PCB 58	pg/g	1	5	20%	0.63	2.4	0.53	0.53	522					60			
PCB 59	pg/g	5	5	100%	--	--	9.3	37	522					60			
PCB 60	pg/g	5	5	100%	--	--	40	107	522					60	4		1.78
PCB 61	pg/g	5	5	100%	--	--	289	751	522		4		1.44	60	5	4.82	12.52
PCB 63	pg/g	5	5	100%	--	--	8.2	28	522					60			
PCB 64	pg/g	5	5	100%	--	--	19	122	522					60	3		2.03
PCB 66	pg/g	5	5	100%	--	--	204	633	522		3		1.21	60	5	3.40	10.55
PCB 67	pg/g	4	5	80%	0.45	0.45	0.90	3.0	522					60			
PCB 68	pg/g	5	5	100%	--	--	3.8	9.1	522					60			
PCB 72	pg/g	4	5	80%	8.6	8.6	4.8	12	522					60			
PCB 73	pg/g	4	5	80%	5.9	5.9	3.4	7.4	522					60			
PCB 77	pg/g	4	5	80%	4.5	4.5	2.2	10		40				60			
PCB 78	pg/g	--	5	0%	0.33	0.82	--	--	522					60			
PCB 79	pg/g	5	5	100%	--	--	6.2	23	522					60			
PCB 80	pg/g	--	5	0%	0.29	0.71	--	--	522					60			
PCB 81	pg/g	--	5	0%	0.37	0.88	--	--		13				60			
PCB 82	pg/g	3	5	60%	3.9	10	14	33	522					60			
PCB 83	pg/g	5	5	100%	--	--	40	162	522					60	3		2.70
PCB 84	pg/g	5	5	100%	--	--	2.8	21	522					60			
PCB 85	pg/g	5	5	100%	--	--	217	495	522					60	5	3.62	8.25
PCB 86	pg/g	5	5	100%	--	--	201	647	522		1		1.24	60	5	3.35	10.78
PCB 88	pg/g	5	5	100%	--	--	6.3	54	522					60			
PCB 89	pg/g	--	5	0%	0.81	1.0	--	--	522					60			
PCB 90	pg/g	5	5	100%	--	--	484	1,410	522		4		2.70	60	5	8.07	23.50
PCB 92	pg/g	5	5	100%	--	--	145	358	522					60	5	2.42	5.97
PCB 93	pg/g	5	5	100%	--	--	18	158	522					60	2		2.63
PCB 94	pg/g	5	5	100%	--	--	5.7	17	522					60			
PCB 95	pg/g	2	5	40%	0.78	2.4	1.5	1.7	522					60			
PCB 96	pg/g	--	5	0%	0.43	0.77	--	--	522					60			
PCB 98	pg/g	3	5	60%	0.83	2.5	1.4	9.2	522					60			
PCB 99	pg/g	5	5	100%	--	--	500	1,180	522		4		2.26	60	5	8.33	19.67
PCB 103	pg/g	5	5	100%	--	--	6.6	19	522					60			
PCB 104	pg/g	--	5	0%	0.24	0.39	--	--	522					60			
PCB 105	pg/g	4	5	80%	1.1	1.1	431	931		113	4	3.80	8.22	60	5	7.18	15.52
PCB 106	pg/g	--	5	0%	0.93	1.7	--	--	522					60			
PCB 107	pg/g	4	5	80%	0.94	0.94	6.4	16	522					60			
PCB 109	pg/g	4	5	80%	0.77	0.77	61	133	522					60	4	1.02	2.22
PCB 110	pg/g	5	5	100%	--	--	135	731	522		1		1.40	60	5	2.25	12.18

TABLE A-13
Analytical Results Summary and Comparison Value Evaluation, Burbot Whole Body
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > HH Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 111	pg/g	2	5	40%	1.3	2.1	3.8	4.6	522					60			
PCB 112	pg/g	5	5	100%	--	--	41	114	522					60	3		1.90
PCB 114	pg/g	4	5	80%	1.1	1.1	31	53		113				60			
PCB 118	pg/g	4	5	80%	0.97	0.97	1,150	2,380		113	4	10.15	234.48	60	4	19.17	39.67
PCB 120	pg/g	4	5	80%	11	11	9.5	19	522					60			
PCB 121	pg/g	2	5	40%	1.3	1.5	0.91	1.4	522					60			
PCB 122	pg/g	--	5	0%	0.99	1.8	--	--	522					60			
PCB 123	pg/g	4	5	80%	1.0	1.0	19	35		113				60			
PCB 126	pg/g	3	5	60%	1.4	8.5	5.3	24		0.41	3	12.85	59.02	60			
PCB 127	pg/g	3	5	60%	0.92	1.7	3.3	4.2	522					60			
PCB 128	pg/g	5	5	100%	--	--	364	646	522		3		1.24	60	5	6.07	10.77
PCB 129	pg/g	5	5	100%	--	--	2,240	3,980	522		5	4.29	7.62	60	5	37.33	66.33
PCB 130	pg/g	3	5	60%	1.7	9.3	16	33	522					60			
PCB 131	pg/g	4	5	80%	9.2	9.2	2.2	7.1	522					60			
PCB 132	pg/g	4	5	80%	9.0	9.0	5.8	40	522					60			
PCB 133	pg/g	5	5	100%	--	--	46	86	522					60			1.43
PCB 134	pg/g	3	5	60%	3.3	10	7.0	21	522					60			
PCB 135	pg/g	5	5	100%	--	--	178	575	522		1		1.10	60	5	2.97	9.58
PCB 136	pg/g	4	5	80%	5.0	5.0	7.8	32	522					60			
PCB 137	pg/g	5	5	100%	--	--	99	183	522					60	5	1.64	3.05
PCB 139	pg/g	5	5	100%	--	--	47	83	522					60			1.39
PCB 141	pg/g	5	5	100%	--	--	145	540	522		1		1.03	60	5	2.42	9.00
PCB 142	pg/g	--	5	0%	1.2	9.5	--	--	522					60			
PCB 143	pg/g	1	5	20%	1.2	8.8	2.7	2.7	522					60			
PCB 144	pg/g	5	5	100%	--	--	18	67	522					60	1		1.11
PCB 145	pg/g	--	5	0%	0.65	1.1	--	--	522					60			
PCB 146	pg/g	5	5	100%	--	--	153	480	522					60	5	2.55	8.00
PCB 147	pg/g	5	5	100%	--	--	40	283	522					60	3		4.72
PCB 148	pg/g	3	5	60%	3.6	7.5	6.1	6.9	522					60			
PCB 150	pg/g	--	5	0%	0.64	1.0	--	--	522					60			
PCB 152	pg/g	--	5	0%	0.73	1.1	--	--	522					60			
PCB 153	pg/g	5	5	100%	--	--	2,370	4,200	522		5	4.54	8.05	60	5	39.50	70.00
PCB 154	pg/g	5	5	100%	--	--	45	84	522					60	4		1.40
PCB 155	pg/g	4	5	80%	3.3	3.3	2.3	3.7	522					60			
PCB 156	pg/g	5	5	100%	--	--	245	446		113	5	2.16	3.94	60	5	4.08	7.43
PCB 158	pg/g	5	5	100%	--	--	187	333	522					60	5	3.12	5.55
PCB 159	pg/g	--	5	0%	1.4	3.4	--	--	522					60			
PCB 160	pg/g	--	5	0%	0.85	7.3	--	--	522					60			
PCB 161	pg/g	1	5	20%	0.89	4.6	17	17	522					60			
PCB 162	pg/g	3	5	60%	8.2	13	12	16	522					60			
PCB 164	pg/g	4	5	80%	34	34	14	63	522					60	1		1.05
PCB 165	pg/g	--	5	0%	0.86	7.0	--	--	522					60			
PCB 167	pg/g	5	5	100%	--	--	26	77	522					60	1		1.28
PCB 169	pg/g	3	5	60%	4.1	4.9	5.6	8.5		0.13	3	43.00	65.08	60			
PCB 170	pg/g	5	5	100%	--	--	490	776	522		4		1.49	60	5	8.17	12.93
PCB 171	pg/g	5	5	100%	--	--	181	279	522					60	5	3.02	4.65
PCB 172	pg/g	5	5	100%	--	--	65	122	522					60	5	1.09	2.03
PCB 174	pg/g	3	5	60%	7.5	32	18	113	522					60	2		1.88
PCB 175	pg/g	5	5	100%	--	--	4.9	17	522					60			
PCB 176	pg/g	4	5	80%	0.49	0.49	0.68	6.0	522					60			
PCB 177	pg/g	2	5	40%	1.6	4.5	9.5	15	522					60			
PCB 178	pg/g	5	5	100%	--	--	104	221	522					60	5	1.73	3.68
PCB 179	pg/g	5	5	100%	--	--	8.1	48	522					60			
PCB 180	pg/g	5	5	100%	--	--	1,240	2,400	522		5	2.38	4.60	60	5	20.67	40.00
PCB 181	pg/g	--	5	0%	1.3	3.7	--	--	522					60			
PCB 182	pg/g	5	5	100%	--	--	5.5	45	522					60			
PCB 183	pg/g	5	5	100%	--	--	439	783	522		4		1.50	60	5	7.32	13.05
PCB 184	pg/g	3	5	60%	5.6	5.6	3.6	5.1	522					60			
PCB 186	pg/g	--	5	0%	0.38	1.4	--	--	522					60			
PCB 187	pg/g	5	5	100%	--	--	71	563	522		1		1.08	60	5	1.18	9.38
PCB 188	pg/g	5	5	100%	--	--	1.4	3.0	522					60			

TABLE A-13
Analytical Results Summary and Comparison Value Evaluation, Burbot Whole Body
Upper Columbia River RI/FS

		Summary Statistics							Human Health Comparison Value Evaluation					Ecological Comparison Value Evaluation			
Analyte	Units	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	USEPA Region 3 PRG Fish Noncancer	Region 3 PRG Fish Cancer 10E-6	Number of Detects > HH Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value	Ecological Risk Comparison Value	Number of Detects > Ecological Risk Comparison Value	Ratio Minimum Detected Value/ Comparison Value	Ratio Maximum Detected Value/ Comparison Value
PCB 189	pg/g	5	5	100%	--	--	9.5	24		113				60			
PCB 190	pg/g	4	5	80%	173	173	105	165	522					60	5	1.75	2.75
PCB 191	pg/g	3	5	60%	19	32	19	28	522					60			
PCB 192	pg/g	--	5	0%	1.1	3.2	--	--	522					60			
PCB 194	pg/g	5	5	100%	--	--	123	263	522					60	5	2.05	4.38
PCB 195	pg/g	5	5	100%	--	--	105	197	522					60	5	1.75	3.28
PCB 196	pg/g	5	5	100%	--	--	51	425	522					60			7.08
PCB 197	pg/g	5	5	100%	--	--	17	30	522					60			
PCB 198	pg/g	5	5	100%	--	--	131	518	522					60	5	2.18	8.63
PCB 201	pg/g	5	5	100%	--	--	9.8	48	522					60			
PCB 202	pg/g	5	5	100%	--	--	79	145	522					60	5	1.31	2.42
PCB 203	pg/g	5	5	100%	--	--	72	492	522					60	5	1.20	8.20
PCB 204	pg/g	--	5	0%	0.36	1.5	--	--	522					60			
PCB 205	pg/g	5	5	100%	--	--	11	20	522					60			
PCB 206	pg/g	5	5	100%	--	--	137	432	522					60	5	2.28	7.20
PCB 207	pg/g	5	5	100%	--	--	27	73	522					60	1		1.22
PCB 208	pg/g	5	5	100%	--	--	21	98	522					60	1		1.63
PCB 209	pg/g	5	5	100%	--	--	32	70	522					60	1		1.16
Dioxin/Furans																	
2,3,7,8-TCDD	pg/g	--	24	0%	0.11	0.30	--	--		0.004				6			
1,2,3,7,8-PeCDD	pg/g	--	24	0%	0.12	0.46	--	--		0.004				6			
1,2,3,6,7,8-HxCDD	pg/g	12	24	50%	0.24	0.43	0.15	0.42		0.040	12	3.65	10.50	6			
1,2,3,4,7,8-HxCDD	pg/g	--	24	0%	0.072	0.29	--	--		0.040				6			
1,2,3,7,8,9-HxCDD	pg/g	4	24	17%	0.082	0.29	0.098	0.16		0.040	4	2.46	3.93	6			
1,2,3,4,6,7,8-HpCDD	pg/g	12	24	50%	0.44	0.66	0.26	0.70		0.40	10		1.76	6			
OCDD	pg/g	--	24	0%	0.79	1.9	--	--		13.3				6			
2,3,7,8-TCDF	pg/g	24	24	100%	--	--	1.6	5.7		0.040	24	39.75	142.75	6			
1,2,3,7,8-PeCDF	pg/g	1	24	4%	0.17	0.31	0.28	0.28		0.13	1	2.18	2.18	6			
2,3,4,7,8-PeCDF	pg/g	--	24	0%	0.16	0.28	--	--		0.013				6			
1,2,3,6,7,8-HxCDF	pg/g	--	24	0%	0.076	0.15	--	--		0.04				6			
1,2,3,4,7,8-HxCDF	pg/g	--	24	0%	0.092	0.16	--	--		0.04				6			
2,3,4,6,7,8-HxCDF	pg/g	--	24	0%	0.071	0.19	--	--		0.04				6			
1,2,3,4,6,7,8-HpCDF	pg/g	--	24	0%	0.083	0.20	--	--		0.40				6			
1,2,3,4,7,8,9-HpCDF	pg/g	--	24	0%	0.043	0.27	--	--		0.40				6			
OCDF	pg/g	1	24	4%	0.055	0.56	0.27	0.27		13.3				6			

mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
pg/g = picograms
PRG = Preliminary Remediation Goal
TAL = Target Analyte List
WW = wet weight
µg/kg = micrograms per kilogram

APPENDIX B

Analytical Results

APPENDIX B

Analytical Results

This appendix contains the following tables:

Table B-1
Results of TAL Metals, Mercury, and Arsenic Speciation for Walleye Fillet and Offal Composites from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	WE1F[a]15 Primary Sample	WE1O[b]15 Primary Sample	WE1F25 Primary Sample	WE1O25 Primary Sample	WE1F35 Primary Sample	WE1O35 Primary Sample	WE1F45 Primary Sample	WE1O45 Primary Sample	WE1F55 Primary Sample	WE1O55 Primary Sample
TAL Metals											
Aluminum	mg/Kg WW	280.34	3.564 U	2.556 U	3.588 U	2.448 U	3.288 U	2.604 U	3.66 U	2.412 U	3.276 U
Antimony	mg/Kg WW	0.0856 U	0.1188 U	0.0852 U	0.1196 U	0.0816 U	0.1096 U	0.0868 U	0.122 U	0.0804 U	0.1092 U
Arsenic	mg/Kg WW	0.11128	0.11583	0.09585	0.09867	0.09996	0.11782	0.06944	0.07625	0.06231	0.06825 U
Barium	mg/Kg WW	0.0856 U	1.55628	0.0852 U	1.42922	0.0816 U	1.507	0.0868 U	1.29625	0.0804 U	1.48239
Beryllium	mg/Kg WW	0.00428 U	0.00594 U	0.00426 U	0.00598 U	0.00408 U	0.00548 U	0.00434 U	0.0061 U	0.00402 U	0.00546 U
Cadmium	mg/Kg WW	0.0107 U	0.03861	0.01065 U	0.0299	0.0102 U	0.02576	0.01085 U	0.03965	0.01005 U	0.03549
Calcium	mg/Kg WW	847.44	20077.2	547.41	20122.7	501.84	20933.6	392.77	18544	456.27	19765.2
Chromium	mg/Kg WW	0.5136	0.594	0.2556	0.8073	0.4488	0.5206	0.5208	0.5795	0.51858	0.4641
Cobalt	mg/Kg WW	0.00599	0.03267	0.00511	0.03289	0.0051	0.03288	0.00477	0.03355	0.00603	0.03276
Copper	mg/Kg WW	0.2354	0.4158	0.20661	0.4485	0.204	0.3836	0.2387	0.3965	0.2412	0.4095
Iron	mg/Kg WW	4.708	15.8598	2.343	15.5779	3.264	14.6042	3.689	15.555	3.417	17.8269
Lead	mg/Kg WW	0.0107 U	0.04455	0.01065 U	0.04485	0.0102 U	0.06302	0.01085 U	0.061	0.01005 U	0.06552
Magnesium	mg/Kg WW	280.34	445.5	281.16	439.53	269.28	452.1	282.1	408.7	277.38	428.61
Manganese	mg/Kg WW	0.19474	2.47995	0.16401	2.21559	0.1632	1.92348	0.19096	1.60735	0.201	1.82364
Nickel	mg/Kg WW	0.16906	0.6831	0.10011	0.78338	0.14688	0.68774	0.10416	0.61	0.15678	0.6279
Potassium	mg/Kg WW	4387	2429.46	4387.8	2380.04	4161.6	2364.62	4470.2	2369.85	4462.2	2355.99
Selenium	mg/Kg WW	0.3852	0.4455	0.3195	0.4485	0.3672	0.4658	0.3689	0.4575	0.3819	0.4641
Silver	mg/Kg WW	0.0321 U	0.04455 U	0.03195 U	0.04485 U	0.0306 U	0.0411 U	0.03255 U	0.04575 U	0.03015 U	0.04095 U
Sodium	mg/Kg WW	410.88	1410.75	391.92	1354.47	377.4	1364.52	388.43	1332.85	389.94	1400.49
Thallium	mg/Kg WW	0.0535 U	0.07425 U	0.05325 U	0.07475 U	0.051 U	0.0685 U	0.05425 U	0.07625 U	0.05025 U	0.06825 U
Uranium	mg/Kg WW	0.00054 U	0.00127	0.00053 U	0.00103	0.00051 U	0.0011	0.00054 U	0.00101	0.0005 U	0.0017
Vanadium	mg/Kg WW	0.0856 U	0.1188 U	0.0852 U	0.1196 U	0.0816 U	0.1096 U	0.0868 U	0.122 U	0.0804 U	0.1092 U
Zinc	mg/Kg WW	7.6826	17.8497	7.668	16.7141	6.7116	18.0018	7.3129	17.995	6.9747	17.5266
Mercury											
Mercury	µg/Kg WW	186	91	229	96	181	78	267	112	273	127
Arsenic Species											
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	8.774 U	12.177 J	-	-	-	-	-	-	-	-
ASB + Cation	µg/Kg WW	46.224 J	18.414 J	-	-	-	-	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	8.774 U	9.504 J	-	-	-	-	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	8.774 U	12.177 U	-	-	-	-	-	-	-	-
Unknown	µg/Kg WW	8.774 UJ	12.177 UJ	-	-	-	-	-	-	-	-
Conventionals											
Lipids	%	0.1	5.2	0.2	4.5	0.11	2.3	0.23	5.3	0.11	2.1
Moisture	%	78.6	70.3	78.7	70.1	79.6	72.6	78.3	69.5	79.9	72.7

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-2
Results of TAL Metals, Mercury, and Arsenic Speciation for Walleye Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	WE2W[a]15 Primary Sample	WE2W25 Primary Sample	WE2W35 Primary Sample	WE2W45 Primary Sample	WE2W55 Primary Sample	WE2W55 Field Duplicate	WE2W55 Field Triplicate
TAL Metals								
Aluminum	mg/Kg WW	5.12	5.698	3.108 U	3.108 U	3.108 U	3.096 U	3.168 U
Antimony	mg/Kg WW	0.1024 U	0.1036 U	0.1036 U	0.1036 U	0.1036 U	0.1032 U	0.10296 U
Arsenic	mg/Kg WW	0.15104	0.09324	0.13209	0.10619	0.09065	0.08256	0.10296
Barium	mg/Kg WW	0.95488	0.87801	0.79772	0.87801	0.79513	0.82302	0.76296
Beryllium	mg/Kg WW	0.00512 U	0.00518 U	0.00518 U	0.00518 U	0.00518 U	0.00516 U	0.00528 U
Cadmium	mg/Kg WW	0.0384	0.01658	0.01839	0.0259	0.01891	0.0178	0.01927
Calcium	mg/Kg WW	12441.6	13209	10774.4	12147.1	11421.9	11790.6	10903.2
Chromium	mg/Kg WW	0.4096	0.4403	0.96866	0.4144	0.3626	0.2838	0.5016
Cobalt	mg/Kg WW	0.0256	0.02279	0.02072	0.02305	0.0202	0.01961	0.02112
Copper	mg/Kg WW	0.384	0.3367	0.2849	0.3626	0.2849	0.2838	0.2904
Iron	mg/Kg WW	9.1904	9.065	11.5773	9.065	8.806	7.998	7.92
Lead	mg/Kg WW	0.03328	0.02305	0.03626	0.04662	0.03367	0.06192	0.06864
Magnesium	mg/Kg WW	394.24	383.32	352.24	372.96	367.78	366.36	359.04
Manganese	mg/Kg WW	1.50016	1.12147	1.00492	1.23802	1.08003	1.12488	1.02168
Nickel	mg/Kg WW	0.4096	0.4403	0.3367	0.3626	0.3626	0.3096	0.3168
Potassium	mg/Kg WW	3686.4	3237.5	3367	3315.2	3315.2	3173.4	3511.2
Selenium	mg/Kg WW	0.512	0.4662	0.518	0.4403	0.4662	0.4386	0.528
Silver	mg/Kg WW	0.0384 U	0.03885 U	0.03885 U	0.03885 U	0.03885 U	0.0387 U	0.0396 U
Sodium	mg/Kg WW	1103.36	1004.92	1041.18	979.02	934.99	936.54	1042.8
Thallium	mg/Kg WW	0.064 U	0.06475 U	0.06475 U	0.06475 U	0.06475 U	0.0645 U	0.066 U
Uranium	mg/Kg WW	0.0008	0.0007	0.00065 U	0.00065 U	0.00065 U	0.00064 U	0.00066 U
Vanadium	mg/Kg WW	0.1024 U	0.1036 U	0.1036 U	0.1036 U	0.1036 U	0.1032 U	0.10296 U
Zinc	mg/Kg WW	13.4912	13.5975	11.4996	13.3126	13.1572	12.384	12.0648
Mercury								
Mercury	µg/Kg WW	139	128	157	114	137	137	135
Arsenic Species								
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	-	10.619 U	10.578 U	-
ASB + Cation	µg/Kg WW	-	-	-	-	13.986 J	9.03 J	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	10.619 U	10.578 U	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	10.619 U	10.578 U	-
Unknown	µg/Kg WW	-	-	-	-	25.5115 J	25.026 J	-
Conventionals								
Lipids	%	2.1	2.2	2.6	2.1	2.3	2.3	2.2
Moisture	%	74.4	74.1	74.1	74.1	74.1	74.2	73.6

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-3

Results of TAL Metals, Mercury, and Arsenic Speciation for Walleye Fillet and Offal Composites from FSCA 3

Upper Columbia River RI/FS

Analyte	Units	WE3F15 Primary Sample	WE3O15 Primary Sample	WE3F25 Primary Sample	WE3O25 Primary Sample	WE3F35 Primary Sample	WE3O35 Primary Sample	WE3F45 Primary Sample	WE3O45 Primary Sample	WE3F55 Primary Sample	WE3O55 Primary Sample
TAL Metals											
Aluminum	mg/Kg WW	2.58 U	3.576 U	2.436 U	3.432 U	2.532 U	5.567	2.472 U	6.04	2.532 U	4.88
Antimony	mg/Kg WW	0.086 U	0.1192 U	0.0812 U	0.1144 U	0.0844 U	0.1172 U	0.0824 U	0.1208 U	0.0844 U	0.122 U
Arsenic	mg/Kg WW	0.1075	0.12218	0.12586	0.14872	0.1055	0.17873	0.09682	0.25368	0.12238	0.1769
Barium	mg/Kg WW	0.086 U	1.26054	0.0812 U	1.53296	0.0844 U	1.35073	0.0824 U	1.44658	0.0844 U	1.58905
Beryllium	mg/Kg WW	0.0043 U	0.00596 U	0.00406 U	0.00572 U	0.00422 U	0.00586 U	0.00412 U	0.00604 U	0.00422 U	0.0061 U
Cadmium	mg/Kg WW	0.01075 U	0.02444	0.01015 U	0.02517	0.01055 U	0.04102	0.0103 U	0.05436	0.01055 U	0.03355
Calcium	mg/Kg WW	516	16777.4	263.9	22565.4	559.15	16613.1	424.36	17395.2	550.71	20984
Chromium	mg/Kg WW	0.56975	0.5066	0.3857	0.3718	0.4009	0.5274	0.90022	0.7248	0.4009	0.671
Cobalt	mg/Kg WW	0.00559	0.0298	0.00365	0.03718	0.00443	0.03809	0.00742	0.0453	0.0038	0.0427
Copper	mg/Kg WW	0.1763	0.4172	0.18067	0.3432	0.19412	0.4981	0.2472	0.5436	0.19834	0.5185
Iron	mg/Kg WW	3.44	13.1716	2.639	11.4972	2.532	18.459	5.5826	16.9422	2.532	16.165
Lead	mg/Kg WW	0.0215	0.03874	0.05278	0.03718	0.01182	0.06153	0.0103 U	0.08456	0.01055 U	0.08845
Magnesium	mg/Kg WW	279.5	402.3	263.9	477.62	280.63	398.48	267.8	401.66	274.3	436.15
Manganese	mg/Kg WW	0.1505	1.57046	0.1218	2.18504	0.1477	1.80195	0.4738	1.91468	0.14981	2.0252
Nickel	mg/Kg WW	0.16125	0.5364	0.07105	0.6292	0.07807	0.5274	0.14214	0.6342	0.09495	0.732
Potassium	mg/Kg WW	4364.5	2586.64	4344.2	2379.52	4431	2713.18	4223	2588.14	4304.4	2424.75
Selenium	mg/Kg WW	0.3655	0.4768	0.3857	0.429	0.422	0.586	0.4326	0.82144	0.4431	0.7015
Silver	mg/Kg WW	0.03225 U	0.0447 U	0.03045 U	0.0429 U	0.03165 U	0.04395 U	0.0309 U	0.0453 U	0.03165 U	0.04575 U
Sodium	mg/Kg WW	430	1367.82	434.42	1364.22	478.97	1371.24	374.92	1277.46	485.3	1351.15
Thallium	mg/Kg WW	0.05375 U	0.0745 U	0.05075 U	0.0715 U	0.05275 U	0.07325 U	0.0515 U	0.0755 U	0.05275 U	0.07625 U
Uranium	mg/Kg WW	0.00054 U	0.001	0.00051 U	0.00133	0.00053 U	0.00141	0.00051 U	0.00169	0.00053 U	0.00227
Vanadium	mg/Kg WW	0.086 U	0.1192 U	0.0812 U	0.1144 U	0.0844 U	0.1172 U	0.0824 U	0.1208 U	0.0844 U	0.122 U
Zinc	mg/Kg WW	6.2995	14.453	5.684	16.302	6.3511	17.5507	5.1912	16.1268	6.7309	17.4765
Mercury											
Mercury	µg/Kg WW	251	135	201	86	281	128	232	118	238	112
Arsenic Species											
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	-	-	-	-	-	8.651 U	49.41
ASB + Cation	µg/Kg WW	-	-	-	-	-	-	-	-	22.577 J	12.505 UJ
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	-	-	-	-	8.651 U	14.03 J
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	-	-	-	-	8.651 U	12.505 U
Unknown	µg/Kg WW	-	-	-	-	-	-	-	-	13.715 J	14.03 J
Conventionals											
Lipids	%	0.5	5.9	0.4	4.6	0.5	5.5	0.3 U	3.9	0.4	6.3
Moisture	%	78.5	70.2	79.7	71.4	78.9	70.7	79.4	69.8	78.9	69.5

[a] The F indicates that the sample consisted of fillets.

[b] The O indicates that the sample consisted of offal.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-4

Results of TAL Metals, Mercury, and Arsenic Speciation for Walleye Whole Body Composites from FSCA 4

Upper Columbia River RI/FS

Analyte	Units	WE4W15 Primary Sample	WE4W25 Primary Sample	WE4W35 Primary Sample	WE4W45 Primary Sample	WE4W55 Primary Sample
TAL Metals						
Aluminum	mg/Kg WW	3.324 U	6.5	5.016	6.816	5.225
Antimony	mg/Kg WW	0.1108 U	0.104 U	0.1056 U	0.1136 U	0.11 U
Arsenic	mg/Kg WW	0.21329	0.312	0.22968	0.20164	0.2475
Barium	mg/Kg WW	1.05537	1.0348	0.96624	0.94572	0.87725
Beryllium	mg/Kg WW	0.00554 U	0.0052 U	0.00528 U	0.00568 U	0.0055 U
Cadmium	mg/Kg WW	0.02244	0.0416	0.03168	0.0284	0.02558
Calcium	mg/Kg WW	13628.4	11674	11827.2	11700.8	12375
Chromium	mg/Kg WW	0.5263	0.468	0.528	0.6248	0.6325
Cobalt	mg/Kg WW	0.02465	0.039	0.02904	0.0284	0.03025
Copper	mg/Kg WW	0.3601	0.572	0.4488	0.4828	0.44
Iron	mg/Kg WW	9.695	13.13	10.032	10.224	9.35
Lead	mg/Kg WW	0.07202	0.1066	0.08448	0.12212	0.22275
Magnesium	mg/Kg WW	387.8	356.2	369.6	363.52	368.5
Manganese	mg/Kg WW	1.93346	2.2542	1.87704	1.56768	1.52625
Nickel	mg/Kg WW	0.3601	0.39	0.4224	0.3976	0.44
Potassium	mg/Kg WW	3296.3	3198	3220.8	3322.8	3245
Selenium	mg/Kg WW	0.71466	0.754	0.79992	0.5396	0.80025
Silver	mg/Kg WW	0.04155 U	0.039 U	0.0396 U	0.0426 U	0.04125 U
Sodium	mg/Kg WW	1005.51	936	913.44	948.56	973.5
Thallium	mg/Kg WW	0.06925 U	0.065 U	0.066 U	0.071 U	0.06875 U
Uranium	mg/Kg WW	0.00103	0.00115	0.00094	0.00097	0.00069
Vanadium	mg/Kg WW	0.1108 U	0.104 U	0.1056 U	0.1136 U	0.11 U
Zinc	mg/Kg WW	14.1547	15.912	14.4144	12.4108	11.99
Mercury						
Mercury	µg/Kg WW	200	157	114	214	136
Arsenic Species						
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	38.016	-	-
ASB + Cation	µg/Kg WW	-	-	10.824 UJ	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	12.672 J	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	10.824 U	-	-
Unknown	µg/Kg WW	-	-	23.232 J	-	-
Conventionals						
Lipids	%	2.7	3	3.5	5.1 U	4
Moisture	%	72.3	74	73.6	71.6	72.5

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-5
Results of TAL Metals, Mercury, and Arsenic Speciation for Walleye Whole Body Composites from FSCA 5
Upper Columbia River RI/FS

Analyte	Units	WE5W15 Primary Sample	WE5W25 Primary Sample	WE5W35 Primary Sample
TAL Metals				
Aluminum	mg/Kg WW	3.132 U	25.9055	3.024 U
Antimony	mg/Kg WW	0.1044 U	0.1052 U	0.1008 U
Arsenic	mg/Kg WW	0.16182	0.11835	0.189
Barium	mg/Kg WW	1.01529	0.8153	0.7938
Beryllium	mg/Kg WW	0.00522 U	0.00526 U	0.00504 U
Cadmium	mg/Kg WW	0.02192	0.01946	0.01411
Calcium	mg/Kg WW	12214.8	11861.3	11995.2
Chromium	mg/Kg WW	0.4698	0.4471	0.4788
Cobalt	mg/Kg WW	0.01957	0.01999	0.01966
Copper	mg/Kg WW	0.3393	0.3945	0.3024
Iron	mg/Kg WW	8.613	8.679	7.056
Lead	mg/Kg WW	0.16182	0.01315 U	0.04788
Magnesium	mg/Kg WW	362.79	368.2	360.36
Manganese	mg/Kg WW	1.35198	1.44387	1.34568
Nickel	mg/Kg WW	0.3393	0.3682	0.3528
Potassium	mg/Kg WW	3288.6	3182.3	3225.6
Selenium	mg/Kg WW	0.5481	0.3682	0.5796
Silver	mg/Kg WW	0.03915 U	0.03945 U	0.0378 U
Sodium	mg/Kg WW	1088.37	1020.44	937.44
Thallium	mg/Kg WW	0.06525 U	0.06575 U	0.063 U
Uranium	mg/Kg WW	0.00076	0.00119	0.00068
Vanadium	mg/Kg WW	0.1044 U	0.1052 U	0.1008 U
Zinc	mg/Kg WW	12.3453	13676	11.466
Mercury				
Mercury	µg/Kg WW	228	231	155
Arsenic Species				
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	10.332 U
ASB + Cation	µg/Kg WW	-	-	29.988 J
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	11.844 J
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	10.332 U
Unknown	µg/Kg WW	-	-	23.436 J
Conventionals				
Lipids	%	3.1	3.6	3
Moisture	%	73.9	73.7	74.8

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-6
Results of TAL Metals, Mercury, and Arsenic Speciation for Walleye Fillet and Offal Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE6F[a]15 Primary Sample	WE6O[b]15 Primary Sample	WE6F25 Primary Sample	WE6O25 Primary Sample	WE6F35 Primary Sample	WE6O35 Primary Sample	WE6F45 Primary Sample	WE6O45 Primary Sample	WE6F55 Primary Sample	WE6O55 Primary Sample	WE6W65 Primary Sample	WE6W65 Field Duplicate
TAL Metals													
Aluminum	mg/Kg WW	2.496 U	3.504	2.532 U	8.25	2.508 U	5.681	2.592 U	5.98	2.532 U	4.47	7.511	3.204 U
Antimony	mg/Kg WW	0.0832 U	0.1168 U	0.0844 U	0.1287 U	0.0836 U	0.1196 U	0.0864 U	0.1196 U	0.0844 U	0.1192 U	0.1036 U	0.1068 U
Arsenic	mg/Kg WW	0.17888	0.14308	0.13504	0.1881	0.12331	0.19136	0.09936	0.14053	0.12449	0.12814	0.19684	0.15753
Barium	mg/Kg WW	0.0832 U	1.4162	0.0844 U	1.5114	0.0836 U	1.41427	0.0864 U	1.74616	0.0844 U	1.47808	0.78218	0.89979
Beryllium	mg/Kg WW	0.00416 U	0.00584 U	0.00422 U	0.0066 U	0.00418 U	0.00598 U	0.00432 U	0.00598 U	0.00422 U	0.00596 U	0.00518 U	0.00534 U
Cadmium	mg/Kg WW	0.0104 U	0.0292	0.01055 U	0.03069	0.01045 U	0.03588	0.0108 U	0.03588	0.01055 U	0.03576	0.01684	0.01655
Calcium	mg/Kg WW	468	20294	396.68	19569	392.92	18657.6	540	22275.5	873.54	20979.2	10463.6	12175.2
Chromium	mg/Kg WW	0.4576	1.17092	0.422	0.66	0.53713	0.78936	0.3888	0.5382	0.4642	0.3874	0.4662	0.4005
Cobalt	mg/Kg WW	0.00437	0.03796	0.00401	0.0363	0.00523	0.03588	0.00475	0.03887	0.0057	0.03576	0.0202	0.02109
Copper	mg/Kg WW	0.20384	0.4672	0.20889	0.495	0.2299	0.5083	0.21384	0.5382	0.211	0.4768	0.3108	0.3738
Iron	mg/Kg WW	2.288	19.6808	2.11	17.424	2.926	15.3088	3.024	15.3686	2.954	12.9332	11.2147	9.078
Lead	mg/Kg WW	0.0624	0.04088	0.01055 U	0.0363	0.03971	0.03289	0.0108 U	0.02781	0.01055 U	0.02116	0.01502	0.01468
Magnesium	mg/Kg WW	266.24	440.92	259.53	415.8	265.43	415.61	272.16	454.48	270.08	435.08	344.47	368.46
Manganese	mg/Kg WW	0.13312	2.0878	0.13504	2.409	0.15257	2.49067	0.14472	2.82854	0.1688	1.99958	1.11629	1.16679
Nickel	mg/Kg WW	0.06032	0.6132	0.05908	0.66	0.13167	0.7475	0.09936	0.7475	0.1266	0.6854	0.3367	0.3471
Potassium	mg/Kg WW	4326.4	2552.08	4241.1	2349.6	4284.5	2598.31	4298.4	2374.06	4241.1	2336.32	3315.2	3310.8
Selenium	mg/Kg WW	0.56992	0.438	0.422	0.561	0.3762	0.6279	0.3024	0.4784	0.2954	0.3576	0.6216	0.5073
Silver	mg/Kg WW	0.0312 U	0.0438 U	0.03165 U	0.0495 U	0.03135 U	0.04485 U	0.0324 U	0.04485 U	0.03165 U	0.0447 U	0.03885 U	0.04005 U
Sodium	mg/Kg WW	459.68	1401.6	428.33	1412.4	499.51	1366.43	529.2	1417.26	476.86	1311.2	919.45	1014.6
Thallium	mg/Kg WW	0.06032	0.073 U	0.07385	0.0825 U	0.06897	0.07475 U	0.06264	0.07475 U	0.05908	0.0745 U	0.06475 U	0.06675 U
Uranium	mg/Kg WW	0.00052 U	0.00109	0.00053 U	0.00116	0.00052 U	0.00093	0.00054 U	0.00189	0.00053 U	0.00119	0.00197	0.00126
Vanadium	mg/Kg WW	0.0832 U	0.1168 U	0.0844 U	0.1287 U	0.0836 U	0.1196 U	0.0864 U	0.1196 U	0.0844 U	0.1192 U	0.1036 U	0.1068 U
Zinc	mg/Kg WW	6.3648	17.4616	6.6043	18.183	6.4163	16.5646	6.2208	16.9533	6.4988	15.5258	11.4478	11.7747
Mercury													
Mercury	µg/Kg WW	256	132	417	179	327	168	395	191	273	139	216	219
Arsenic Species													
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	-	-	-	12.259 U	12.259 U	-	-	-	-
ASB + Cation	µg/Kg WW	-	-	-	-	-	-	12.259 UJ	12.259 UJ	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	-	-	16.146 J	16.146 J	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	-	-	12.259 U	12.259 U	-	-	-	-
Unknown	µg/Kg WW	-	-	-	-	-	-	15.847 J	15.847 J	-	-	-	-
Conventionals													
Lipids	%	0.6	3.7	0.7	9.6	0.4	6	0.6	6.5	0.4	5.3	3.3	3.5
Moisture	%	79.2	70.8	78.9	67	79.1	70.1	78.4	70.1	78.9	70.2	74.1	73.3

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-7
Results of PCB Aroclors and Conventionals for Walleye Fillet and Offal Composites from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	WE1F15 Primary Sample	WE1O15 Primary Sample	WE1F25 Primary Sample	WE1O25 Primary Sample	WE1F35 Primary Sample	WE1O35 Primary Sample	WE1F45 Primary Sample	WE1O45 Primary Sample	WE1F55 Primary Sample	WE1O55 Primary Sample
PCB Aroclor											
PCB-1016	µg/Kg WW	1.3 U	2.9 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
PCB-1221	µg/Kg WW	1.3 U	2.9 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
PCB-1232	µg/Kg WW	2.6 U	5.8 U	2.9 U	2.8 U	2.8 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U
PCB-1242	µg/Kg WW	1.3 U	2.9 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
PCB-1248	µg/Kg WW	1.3 U	2.9 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
PCB-1254	µg/Kg WW	1.3 U	2.9 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
PCB-1254/1260	µg/Kg WW	1.9 J	-	3.5 J	-	3.8 J	-	4.3 J	-	3.9 J	-
PCB-1260	µg/Kg WW	1.9 NJ	57 J	3.5 NJ	40 J	3.8 NJ	29 J	4.3 NJ	45 J	3.9 NJ	29 J
PCB-1262	µg/Kg WW	-	-	-	-	-	-	-	-	-	-
PCB-1268	µg/Kg WW	-	-	-	-	-	-	-	-	-	-
Conventionals											
Lipids	%	0.1	5.2	0.2	4.5	0.11	2.3	0.23	5.3	0.11	2.1
Moisture	%	78.6	70.3	78.7	70.1	79.6	72.6	78.3	69.5	79.9	72.7

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-8
Results of PCB Aroclors and Conventionals for Walleye Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	WE2W15 Primary Sample	WE2W25 Primary Sample	WE2W35 Primary Sample	WE2W45 Primary Sample	WE2W55 Primary Sample	WE2W55 Field Duplicate	WE2W55 Field Triplicate
PCB Aroclor								
PCB-1016	µg/Kg WW	14 U	14 U	14 U	13 U	14 U	14 U	14 U
PCB-1221	µg/Kg WW	14 U	14 U	14 U	13 U	14 U	14 U	14 U
PCB-1232	µg/Kg WW	28 U	27 U	28 U	27 U	28 U	27 U	28 U
PCB-1242	µg/Kg WW	14 U	14 U	14 U	13 U	14 U	14 U	14 U
PCB-1248	µg/Kg WW	14 U	14 U	14 U	13 U	14 U	14 U	14 U
PCB-1254	µg/Kg WW	-	-	-	-	-	-	-
PCB-1254/1260	µg/Kg WW	33 J	22 J	26 J	27 J	44 J	51 J	48 J
PCB-1260	µg/Kg WW	-	-	-	-	-	-	-
PCB-1262	µg/Kg WW	14 U	14 U	14 U	13 U	14 U	14 U	14 U
PCB-1268	µg/Kg WW	14 U	14 U	14 U	13 U	14 U	14 U	14 U
Conventionals								
Lipids	%	2.1	2.2	2.6	2.1	2.3	2.3	2.2
Moisture	%	74.4	74.1	74.1	74.1	74.1	74.2	73.6

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-9
Results of PCB Aroclors and Conventionals for Walleye Fillet and Offal Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	WE3F15 Primary Sample	WE3O15 Primary Sample	WE3F25 Primary Sample	WE3O25 Primary Sample	WE3F35 Primary Sample	WE3O35 Primary Sample	WE3F45 Primary Sample	WE3O45 Primary Sample	WE3F55 Primary Sample	WE3O55 Primary Sample
PCB Aroclor											
PCB-1016	µg/Kg WW	13 U	13 U	14 U	14 U	13 U	14 U	1.4 U	13 U	13 U	14 U
PCB-1221	µg/Kg WW	13 U	13 U	14 U	14 U	13 U	14 U	14 U	13 U	13 U	14 U
PCB-1232	µg/Kg WW	26 U	13 U	27 U	27 U	25 U	27 U	28 U	27 U	26 U	28 U
PCB-1242	µg/Kg WW	13 U	13 U	14 U	14 U	13 U	14 U	14 U	13 U	13 U	14 U
PCB-1248	µg/Kg WW	13 U	13 U	14 U	14 U	13 U	14 U	14 U	13 U	13 U	14 U
PCB-1254	µg/Kg WW	-	11.7	-	-	-	-	-	-	-	9.6 J
PCB-1254/1260	µg/Kg WW	2 J	-	2.7 J	15 J	2.6 J	10 J	14 J	8.1 J	2.5 J	-
PCB-1260	µg/Kg WW	-	9.9 J	-	-	-	-	-	-	-	9.4 J
PCB-1262	µg/Kg WW	13 U	13 U	14 U	14 U	13 U	14 U	14 U	13 U	13 U	14 U
PCB-1268	µg/Kg WW	13 U	13 U	14 U	14 U	13 U	14 U	14 U	13 U	13 U	14 U
Conventionals											
Lipids	%	0.5	5.9	0.4	4.6	0.5	5.5	0.3 U	3.9	0.4	6.3
Moisture	%	78.5	70.2	79.7	71.4	78.9	70.7	79.4	69.8	78.9	69.5

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-10

Results of PCB Aroclors and Conventionals for Walleye Whole Body Composites from FSCA 4

Upper Columbia River RI/FS

Analyte	Units	WE4W15 Primary Sample		WE4W25 Primary Sample		WE4W35 Primary Sample		WE4W45 Primary Sample		WE4W55 Primary Sample	
PCB Aroclor											
PCB-1016	µg/Kg WW	14	U	14	U	14	U	14	U	14	U
PCB-1221	µg/Kg WW	14	U	14	U	14	U	14	U	14	U
PCB-1232	µg/Kg WW	28	U	28	U	28	U	28	U	28	U
PCB-1242	µg/Kg WW	14	U	14	U	14	U	14	U	14	U
PCB-1248	µg/Kg WW	14	U	14	U	14	U	14	U	14	U
PCB-1254	µg/Kg WW	9.7	J	11	J	5.4	J	7.8	J	8.7	J
PCB-1254/1260	µg/Kg WW	-		-		-		-		-	
PCB-1260	µg/Kg WW	8.6	J	9.9	J	11	J	13	J	7.8	J
PCB-1262	µg/Kg WW	14	U	14	U	14	U	14	U	14	U
PCB-1268	µg/Kg WW	14	U	14	U	14	U	14	U	14	U
Conventionals											
Lipids	%	2.7		3		3.5		5.1	U	4	
Moisture	%	72.3		74		73.6		71.6		72.5	

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-11
Results of PCB Aroclors and Conventionals for Walleye Whole Body Composites from FSCA 5
Upper Columbia River RI/FS

Analyte	Units	WE5W15 Primary Sample	WE5W25 Primary Sample	WE5W35 Primary Sample
PCB Aroclor				
PCB-1016	µg/Kg WW	10 U	9.8 U	11 U
PCB-1221	µg/Kg WW	10 U	9.8 U	11 U
PCB-1232	µg/Kg WW	21 U	20 U	22 U
PCB-1242	µg/Kg WW	10 U	9.8 U	11 U
PCB-1248	µg/Kg WW	10 U	9.8 U	11 U
PCB-1254	µg/Kg WW	5 J		15
PCB-1254/1260	µg/Kg WW	-	33 J	-
PCB-1260	µg/Kg WW	16	-	13
PCB-1262	µg/Kg WW	10 U	9.8 U	11 U
PCB-1268	µg/Kg WW	10 U	9.8 U	11 U
Conventionals				
Lipids	%	3.1	3.6	3
Moisture	%	73.9	73.7	74.8

[a] The W signifies that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-12
Results of PCB Aroclors and Conventionals for Walleye Fillet and Offal Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE6F15 Primary Sample	WE6O15 Primary Sample	WE6F25 Primary Sample	WE6O25 Primary Sample	WE6F35 Primary Sample	WE6O35 Primary Sample	WE6F45 Primary Sample	WE6O45 Primary Sample	WE6F55 Primary Sample	WE6O55 Primary Sample	WE6W65 Primary Sample	WE6W65 Field Duplicate
PCB Aroclor													
PCB-1016	µg/Kg WW	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	11 U	10 U
PCB-1221	µg/Kg WW	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	11 U	10 U
PCB-1232	µg/Kg WW	27 U	28 U	28 U	28 U	27 U	28 U	27 U	28 U	28 U	28 U	22 U	21 U
PCB-1242	µg/Kg WW	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	11 U	10 U
PCB-1248	µg/Kg WW	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	11 U	10 U
PCB-1254	µg/Kg WW	-	7.9 J	-	-	-	21 J	-	19 J	-	20 J	10 J	11
PCB-1254/1260	µg/Kg WW	1.7 J	-	3.7 J	101 J	4.2 J	-	4.5 J	-	3.3 J	-	-	-
PCB-1260	µg/Kg WW	-	28 J	-	-	-	25 J	-	40 J	-	28 J	12	22
PCB-1262	µg/Kg WW	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	11 U	10 U
PCB-1268	µg/Kg WW	14 U	14 U	14 U	14 U	13.7 U	14 U	14 U	14 U	14 U	14 U	11 U	10 U
Conventionals													
Lipids	%	0.6	3.7	0.7	9.6	0.4	6	0.6	6.5	0.4	5.3	3.3	3.5
Moisture	%	79.2	70.8	78.9	67	79.1	70.1	78.4	70.1	78.9	70.2	74.1	73.3

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-13
Results of PCB Congeners for Walleye Fillet, Offal, and Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, FSCA 4, FSCA 5, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE1F45 Primary Sample	WE1O45 Primary Sample	WE1F55 Primary Sample	WE2W55 Primary Sample	WE3F25 Primary Sample	WE3O25 Primary Sample	WE4W45 Primary Sample	WE5W25 Primary Sample	WE6F35 Primary Sample	WE6O35 Primary Sample
PCB Congener											
PCB 1	µg/Kg WW	0.000439 JQ	0.00345 UQ	0.000429 JKQ	0.000572 JQ	0.00047 JQ	0.00191	0.000728 JQ	0.000599 JKQ	0.000542 JQ	0.00176 J
PCB 10	µg/Kg WW	0.000329 U	0.0173 U	0.000397 U	0.000543 U	0.000582 U	0.000477 U	0.00156 U	0.000465 U	0.001 U	0.000529 U
PCB 103	µg/Kg WW	0.00232	0.0887	0.0019	0.00688	0.0023	0.0271	0.0114	0.0139	0.00234	0.0225
PCB 104	µg/Kg WW	0.000215 U	0.00551 U	0.000142 U	0.000393 U	0.000334 U	0.00068 U	0.000581 U	0.000368 J	0.000598 U	0.000768 U
PCB 105	µg/Kg WW	0.167	7.56	0.13	0.574	0.0965	1.08	0.605	0.567	0.116	1
PCB 106	µg/Kg WW	0.000471 U	0.0309 U	0.000378 U	0.00114 U	0.000674 U	0.00296 U	0.0223	0.0281	0.00516	0.00343 U
PCB 107	µg/Kg WW	0.0105 C	0.5 C	0.00842 C	0.0421 C	0.007 C	0.0967 C	0.0387 K	0.0451 C	0.00758 C	0.0645 C
PCB 109	µg/Kg WW	0.054	2.03	0.0391	0.155	0.0313	0.353	0.199	0.211	0.038	0.339
PCB 11	µg/Kg WW	0.0436	0.217	0.0467	0.023	0.0605	0.0572 B	0.0407 B	0.0267 B	0.0201 B	0.0695 B
PCB 110	µg/Kg WW	0.311 C	14.5 C	0.258 C	1.18 C	0.255 C	6.55 C	1.32 C	1.52 C	0.274 C	4.73 C
PCB 111	µg/Kg WW	0.000704 JK	0.00879 JK	0.000583 J	0.00245	0.000861 U	0.00656	0.00108 U	0.00445	0.000653 J	0.00663
PCB 112	µg/Kg WW	0.015	1.15	0.0205	0.0181	0.0126	0.368	0.00122 U	0.0698	0.0368	0.174
PCB 114	µg/Kg WW	0.011	0.475	0.00888	0.0458	0.00632	0.0741	0.0414	0.0452	0.00793	0.0786
PCB 118	µg/Kg WW	0.485	21.9 E	0.344	1.61	0.273	3.02	1.72	1.62	0.326	2.92
PCB 12	µg/Kg WW	0.000672 JK	0.0139 U	0.000411 U	0.000518 JK	0.000401 U	0.00142 J	0.000774 U	0.000631 JK	0.000592 U	0.00139 J
PCB 120	µg/Kg WW	0.00515	0.205	0.00286	0.0127	0.00259	0.0323	0.0178	0.0178	0.0037	0.0373 K
PCB 121	µg/Kg WW	0.000425 J	0.0133 JK	0.00045 U	0.0012 K	0.000887 U	0.0017 JK	0.00183	0.00131	0.000528 U	0.00249
PCB 122	µg/Kg WW	0.000524 U	0.0375 U	0.000421 U	0.00121 U	0.000751 U	0.00325 U	0.0023 U	0.00147 U	0.00131 U	0.00378 U
PCB 123	µg/Kg WW	0.00529 K	0.448	0.00669	0.0215	0.0062	0.0498	0.0182	0.0208	0.00399	0.0358 K
PCB 126	µg/Kg WW	0.00207	0.117 K	0.000479 U	0.00807	0.00132	0.0425	0.00217 U	0.0287	0.00284	0.0426
PCB 127	µg/Kg WW	0.000495 U	0.0462	0.000398 U	0.00112 U	0.000709 U	0.0123	0.00206 U	0.00141 U	0.00111 U	0.0124
PCB 128	µg/Kg WW	0.142 C	6.62 Q	0.113 Q	0.61 C	0.0893 C	0.94 C	0.648 C	0.576 C	0.101 C	1.12 C
PCB 129	µg/Kg WW	1.25 C	63.2 E	1.06 C	5.32 E	0.666 C	6.42 C	5.01 E	4.3 E	0.742 C	7.53 E
PCB 130	µg/Kg WW	0.0591	2.8	0.0491	0.253	0.0356	0.382	0.239	0.23	0.0358	0.383
PCB 131	µg/Kg WW	0.00469	0.182	0.00336	0.0129	0.00324 K	0.0276	0.0107 U	0.0117	0.00183	0.0175 K
PCB 132	µg/Kg WW	0.111	4.86	0.0966	0.495	0.0847	0.878	0.394	0.409	0.06	0.593
PCB 133	µg/Kg WW	0.0223	1.14	0.0169	0.0906	0.0118	0.129	0.101	0.091	0.0156	0.158
PCB 134	µg/Kg WW	0.0133	0.673	0.013	0.0592	0.0101	0.103	0.0473	0.0497	0.00783	0.0907
PCB 135	µg/Kg WW	0.187 C	8.78 C	0.168 C	0.988 C	0.135 C	1.39 C	0.852 C	0.779 C	0.126 C	1.4 C
PCB 136	µg/Kg WW	0.0343	1.57	0.0303	0.143	0.0283	0.286	0.165	0.151	0.0224	0.266
PCB 137	µg/Kg WW	0.0707	3.16	0.0509	0.237	0.0325	0.349	0.246	0.224	0.0438	0.362
PCB 139	µg/Kg WW	0.0193 C	0.924 C	0.0145 C	0.0727 C	0.00931 C	0.103 C	0.0728 C	0.0693 C	0.0116 C	0.118 C
PCB 14	µg/Kg WW	0.000274 U	0.0149 U	0.000425 U	0.000282 U	0.000415 U	0.000534 U	0.000844 U	0.000571 U	0.000642 U	0.000912 U
PCB 141	µg/Kg WW	0.138	5.28	0.0948 K	0.496	0.0679	0.632	0.336	0.365	0.0587	0.646
PCB 142	µg/Kg WW	0.00125 U	0.0934 U	0.00203 U	0.00329 U	0.0013 U	0.00769 U	0.0111 U	0.00265 U	0.00152 U	0.00835 U
PCB 143	µg/Kg WW	0.00125	0.0802 U	0.00178 U	0.00779	0.00114 U	0.00746 U	0.0107 U	0.00431 K	0.00154 U	0.0081 U
PCB 144	µg/Kg WW	0.0248	1.16	0.0218	0.125	0.0161	0.179	0.09	0.0876	0.0137	0.147
PCB 145	µg/Kg WW	0.000312 U	0.0126 U	0.000562 U	0.000496 U	0.000783 U	0.00211 U	0.00125 U	0.000839 U	0.000429 U	0.00177 U
PCB 146	µg/Kg WW	0.189 Q	9.66	0.154 Q	0.764	0.0944	1.03	0.755	0.682	0.114	1.17
PCB 147	µg/Kg WW	0.297 C	14.2 C	0.27 C	1.47 C	0.228 C	2.42 C	0.986 C	1.17 C	0.149 C	1.52 C

Table B-13
Results of PCB Congeners for Walleye Fillet, Offal, and Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, FSCA 4, FSCA 5, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE1F45 Primary Sample	WE1O45 Primary Sample	WE1F55 Primary Sample	WE2W55 Primary Sample	WE3F25 Primary Sample	WE3O25 Primary Sample	WE4W45 Primary Sample	WE5W25 Primary Sample	WE6F35 Primary Sample	WE6O35 Primary Sample
PCB 148	µg/Kg WW	0.00107 K	0.0624	0.000836 J	0.00491	0.00103 U	0.00941	0.00167 U	0.00583	0.00124	0.0117
PCB 15	µg/Kg WW	0.0046	0.355 K	0.00439	0.00456	0.00485	0.0112	0.00476	0.00425	0.00386	0.0116
PCB 150	µg/Kg WW	0.000416 J	0.0225 J	0.000514 U	0.0014 K	0.000717 U	0.00423	0.00122 U	0.00222	0.000391 U	0.0032 K
PCB 152	µg/Kg WW	0.00034 J	0.0132 JK	0.000549 U	0.00106 K	0.000765 U	0.00217 U	0.00127 U	0.000937 J	0.00042 U	0.00194 K
PCB 153	µg/Kg WW	1.29 Q	66.6 QE	1.1 C	5.14 E	0.595 C	6.48 C	4.65 E	3.89 E	0.676 C	7.07 C
PCB 154	µg/Kg WW	0.0133	0.62 K	0.00908	0.0484	0.00725	0.0845	0.0526	0.0552	0.0101	0.111
PCB 155	µg/Kg WW	0.000949	0.0439	0.000689 J	0.00289	0.000542 JK	0.00563	0.00404	0.00461	0.000738 JK	0.00847 K
PCB 156	µg/Kg WW	0.109 C	5.21 C	0.0791 C	0.362 C	0.0397 C	0.405 C	0.306 C	0.27 C	0.0547 C	0.527 C
PCB 158	µg/Kg WW	0.0735	3.83 Q	0.0705 Q	0.372	0.0455	0.481	0.335	0.298	0.0517	0.548
PCB 159	µg/Kg WW	0.00362 K	0.179	0.0047	0.0157	0.00114 U	0.00551 U	0.0173 K	0.0149	0.00218	0.0194
PCB 16	µg/Kg WW	0.00329	0.0662 K	0.00309	0.00602	0.00303	0.0178	0.0105	0.00741	0.0023	0.0149
PCB 160	µg/Kg WW	0.000886 U	0.0648 U	0.00144 U	0.00253 U	0.00092 U	0.00592 U	0.00771 U	0.00183 U	0.00102 U	0.00642 U
PCB 161	µg/Kg WW	0.000886 U	0.066 U	0.00144 U	0.00244 U	0.00092 U	0.00577 U	0.00804 U	0.00191 U	0.00105 U	0.00627 U
PCB 162	µg/Kg WW	0.0105	0.407	0.00782	0.0376	0.00457 K	0.05	0.0387	0.00797	0.00204	0.0534
PCB 164	µg/Kg WW	0.0366	1.88 K	0.0354	0.174	0.0191 K	0.198	0.135	0.105	0.016	0.215 K
PCB 165	µg/Kg WW	0.000924 U	0.0686 U	0.0015 U	0.00242 U	0.000959 U	0.0055 U	0.00799 U	0.00187 U	0.00104 U	0.00598 U
PCB 167	µg/Kg WW	0.0273	1.36	0.02	0.115	0.0136	0.159	0.0959	0.0868	0.0161	0.162
PCB 169	µg/Kg WW	0.00245 K	0.0656 U	0.00173 K	0.00958	0.0015 U	0.00427 U	0.00281 U	0.00579 K	0.00111 U	0.00855 KQ
PCB 17	µg/Kg WW	0.0042	0.109	0.00315	0.00852	0.00325	0.0236	0.0148	0.00955	0.00255	0.0182
PCB 170	µg/Kg WW	0.281 Q	12.6 Q	0.237 Q	0.969	0.107 Q	1.18	0.797 Q	0.71	0.138	1.46 Q
PCB 171	µg/Kg WW	0.0899 C	4 C	0.0788 C	0.31 C	0.0417 C	0.404 C	0.297 C	0.282 C	0.0516 C	0.524 C
PCB 172	µg/Kg WW	0.0613	2.68	0.0524	0.2	0.0273	0.28	0.164	0.175	0.0329	0.343
PCB 174	µg/Kg WW	0.0899	4.16	0.0963	0.343	0.0713	0.621	0.239	0.275	0.0424	0.444
PCB 175	µg/Kg WW	0.00771	0.331	0.0088	0.0379	0.00491	0.0612	0.0321	0.0256	0.00614 K	0.0631
PCB 176	µg/Kg WW	0.00737	0.369	0.0115 Q	0.0504	0.0094	0.0835	0.0425	0.0426	0.006	0.0677
PCB 177	µg/Kg WW	0.118	5.14	0.105	0.476	0.0731	0.622	0.425	0.37	0.0591	0.648
PCB 178	µg/Kg WW	0.0518 Q	2.4 Q	0.0591 Q	0.268	0.0434	0.414	0.304	0.261	0.0488	0.53
PCB 179	µg/Kg WW	0.0467 Q	2.21 Q	0.0494	0.272	0.0453	0.423	0.321	0.25	0.0424	0.442
PCB 18	µg/Kg WW	0.00722 C	0.192 C	0.00561 C	0.0155 C	0.00596 C	0.0431 C	0.0272 C	0.0202 C	0.00476 C	0.0356 C
PCB 180	µg/Kg WW	0.792 C	36.2 E	0.678 C	2.55 C	0.288 C	3.06 C	1.72 Q	1.87 C	0.353 C	3.74 C
PCB 181	µg/Kg WW	0.00222	0.133	0.00138 U	0.00164 U	0.00194 U	0.00737 U	0.00728 U	0.00194 U	0.00235 U	0.00751 U
PCB 182	µg/Kg WW	0.00269	0.0947 K	0.00167 K	0.00674	0.00106 K	0.0138	0.00853	0.0072	0.00184 K	0.0165 K
PCB 183	µg/Kg WW	0.267 C	12 C	0.236 C	0.984 C	0.118 C	1.22 C	0.895 C	0.831 C	0.141 C	1.5 C
PCB 184	µg/Kg WW	0.00124	0.0681	0.000916	0.00401	0.00073 JK	0.00824	0.00499 K	0.00576	0.00117 K	0.0109
PCB 186	µg/Kg WW	0.000447 U	0.0161 U	0.000534 U	0.000415 U	0.000734 U	0.00122 U	0.00106 U	0.000546 U	0.000748 U	0.00321 U
PCB 187	µg/Kg WW	0.325 Q	13.1 Q	0.356	1.66	0.246	2.11	1.6	1.26	0.208	2.45
PCB 188	µg/Kg WW	0.000496 JK	0.0234	0.000512 JK	0.00214	0.000533 U	0.00545	0.0031	0.00384	0.000814 J	0.00575
PCB 189	µg/Kg WW	0.00756	0.345	0.00586	0.0286	0.00253 K	0.0242	0.0177 Q	0.0151 Q	0.00329	0.029
PCB 19	µg/Kg WW	0.000629 JK	0.0164 U	0.000547 J	0.00108	0.000633 JK	0.00396	0.00237	0.00178	0.00054 J	0.00344
PCB 190	µg/Kg WW	0.0591 Q	2.7 Q	0.0491 Q	0.214	0.0236 Q	0.256	0.197 Q	0.179	0.0371	0.299 Q
PCB 191	µg/Kg WW	0.0102	0.597	0.00912	0.0323	0.00451	0.0424	0.00627 U	0.0267	0.00572	0.0544

Table B-13
Results of PCB Congeners for Walleye Fillet, Offal, and Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, FSCA 4, FSCA 5, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE1F45 Primary Sample	WE1O45 Primary Sample	WE1F55 Primary Sample	WE2W55 Primary Sample	WE3F25 Primary Sample	WE3O25 Primary Sample	WE4W45 Primary Sample	WE5W25 Primary Sample	WE6F35 Primary Sample	WE6O35 Primary Sample
PCB 192	µg/Kg WW	0.00084 U	0.0533 U	0.0012 U	0.00141 U	0.00169 U	0.00632 U	0.00606 U	0.00164 U	0.00199 U	0.00644 U
PCB 194	µg/Kg WW	0.0916 Q	5.05	0.0791 Q	0.361 Q	0.024 Q	0.333 Q	0.186 Q	0.156 Q	0.0373 Q	0.368 Q
PCB 195	µg/Kg WW	0.0495	2.13	0.0456	0.212 Q	0.0179	0.212	0.163	0.157 Q	0.0282	0.267
PCB 196	µg/Kg WW	0.0983 Q	3.74	0.0855	0.387	0.0415 Q	0.418	0.3	0.348	0.0562	0.462
PCB 197	µg/Kg WW	0.0138 C	0.518 C	0.0142 C	0.0565 C	0.00792 C	0.066 C	0.0362 Q	0.0493 C	0.00801 K	0.0705 C
PCB 198	µg/Kg WW	0.182 Q	6.68 C	0.165 C	0.721 C	0.0851 Q	0.832 C	0.608 C	0.608 C	0.096 C	0.697 C
PCB 2	µg/Kg WW	0.000866 JK	0.0101 JK	0.000843 J	0.00108 K	0.00107 K	0.00301 K	0.00101 K	0.0013 K	0.000726 JK	0.00343 K
PCB 20	µg/Kg WW	0.0379 C	1.13 C	0.0291 C	0.0921 C	0.0337 C	0.24 C	0.129 C	0.111 C	0.019 C	0.141 C
PCB 201	µg/Kg WW	0.0192	0.798	0.0183	0.0771	0.0117	0.0974	0.0776	0.074	0.0122	0.12
PCB 202	µg/Kg WW	0.0395	1.69	0.0328	0.168	0.0209	0.196	0.164	0.138	0.0286	0.256
PCB 203	µg/Kg WW	0.164 Q	6.24	0.125	0.472	0.0521 Q	0.484	0.317	0.331	0.0603	0.552
PCB 204	µg/Kg WW	0.000466 U	0.00884 U	0.000527 U	0.000616 U	0.000683 U	0.00181 U	0.00082 U	0.000657 U	0.000701 U	0.00201 U
PCB 205	µg/Kg WW	0.00585 KQ	0.286	0.00532 Q	0.0241 Q	0.00202 U	0.0179 Q	0.0134 Q	0.0119 Q	0.00244 Q	0.0258 Q
PCB 206	µg/Kg WW	0.081 Q	3.03	0.0591	0.257	0.0236 Q	0.202	0.159 Q	0.128 Q	0.0289 Q	0.236
PCB 207	µg/Kg WW	0.0101 Q	0.364	0.00729	0.0355	0.00373 K	0.0376	0.0273 Q	0.0303 Q	0.00516 Q	0.0487
PCB 208	µg/Kg WW	0.018 Q	0.778	0.0169 Q	0.0717 Q	0.00828 KQ	0.0715	0.0628 Q	0.0498 Q	0.0104 Q	0.0959 Q
PCB 209	µg/Kg WW	0.00843	0.281 K	0.00844	0.0278	0.00481 Q	0.0354	0.0274 Q	0.0282 Q	0.00864	0.0534
PCB 21	µg/Kg WW	0.0114 C	0.19 C	0.0119 C	0.0188 C	0.012 C	0.0449 C	0.0228 C	0.0165 C	0.00643 C	0.0282 C
PCB 22	µg/Kg WW	0.00807	0.16	0.00765	0.0165 Q	0.00897	0.0362	0.0217	0.0171	0.00496 K	0.0243
PCB 23	µg/Kg WW	0.000182 U	0.0145 U	0.000162 U	0.000247 U	0.000247 U	0.000302 U	0.00024 U	0.000145 U	0.000147 U	0.000358 U
PCB 24	µg/Kg WW	0.000245 JK	0.0144 U	0.000223 J	0.00033 J	0.000232 U	0.00131 JK	0.000598 J	0.00054 JK	0.000182 JK	0.000942 JK
PCB 25	µg/Kg WW	0.0013	0.0304	0.00145	0.00277	0.00147	0.00771	0.00349	0.00359	0.00078 JK	0.00508
PCB 26	µg/Kg WW	0.00471 C	0.127 C	0.00327 C	0.00944 C	0.00395 C	0.027 C	0.0137 C	0.0111 C	0.00223 K	0.016 C
PCB 27	µg/Kg WW	0.000734 J	0.0187	0.000586 JK	0.0014	0.000635 J	0.00459 K	0.0029	0.00234	0.000571 JK	0.00334
PCB 3	µg/Kg WW	0.000907	0.00469 JK	0.000746 JK	0.000785 J	0.000758 J	0.00203	0.000761 J	0.000959	0.000797 J	0.00235
PCB 31	µg/Kg WW	0.0276	0.699	0.0219	0.0577	0.0246	0.157	0.0863	0.0682	0.0138	0.0925
PCB 32	µg/Kg WW	0.00269	0.0646	0.00231	0.00486	0.00216	0.0101	0.00469	0.00269	0.00109	0.00652
PCB 34	µg/Kg WW	0.000199 U	0.0167 U	0.000178 U	0.000367 J	0.000271 U	0.00132 J	0.000698 JK	0.000704 J	0.000166 U	0.00109 JK
PCB 35	µg/Kg WW	0.0004 J	0.00961 U	0.000399 JK	0.000228 U	0.000419 J	0.000593 U	0.000566 JK	0.000347 U	0.000698 U	0.000793 JK
PCB 36	µg/Kg WW	0.000114 U	0.00898 U	0.000157 U	0.000214 U	0.000216 U	0.000511 U	0.000291 U	0.000361 U	0.000651 U	0.000566 U
PCB 37	µg/Kg WW	0.00516	0.0133	0.00422	0.00746	0.00485	0.0169	0.00805	0.00832	0.00356	0.0142
PCB 38	µg/Kg WW	0.000113 U	0.00896 U	0.000154 U	0.000221 U	0.000213 U	0.000563 U	0.000297 U	0.000434 J	0.000681 U	0.000624 U
PCB 39	µg/Kg WW	0.000162 J	0.00844 U	0.000159 J	0.000395 JK	0.000192 U	0.00179 JK	0.000679 JK	0.00121	0.000608 U	0.000842 J
PCB 4	µg/Kg WW	0.0012 KQ	0.0229 U	0.00129 K	0.00166	0.00159 K	0.00645	0.00284 K	0.00202	0.00138 U	0.00593
PCB 40	µg/Kg WW	0.00909 C	0.00505 C	0.00759 C	0.0241 C	0.0104 C	0.122 C	0.0456 C	0.0464 C	0.00638 K	0.0496 C
PCB 41	µg/Kg WW	0.00296	0.00851	0.00196	0.00543	0.0029	0.0302	0.0113	0.0111 K	0.00197	0.0123
PCB 42	µg/Kg WW	0.00834	0.00565	0.00619	0.0281	0.0111	0.178	0.0587	0.0646	0.00793	0.0695
PCB 43	µg/Kg WW	0.00144	0.00638 K	0.00131	0.0043 K	0.00146 K	0.0105	0.00923	0.00591	0.00121 K	0.008 K
PCB 44	µg/Kg WW	0.047 C	0.00544 C	0.0364 C	0.163 C	0.0601 C	0.738 C	0.283 C	0.331 C	0.0444 C	0.393 C
PCB 45	µg/Kg WW	0.00266 C	0.0899 C	0.0021 C	0.00709 C	0.00261 K	0.0333 C	0.0153 C	0.0143 C	0.0017 JK	0.018 C
PCB 46	µg/Kg WW	0.000679 J	0.014 J	0.000531 JK	0.00104	0.000335 U	0.00361 K	0.00253 K	0.00195	0.000565 U	0.0027

Table B-13
Results of PCB Congeners for Walleye Fillet, Offal, and Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, FSCA 4, FSCA 5, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE1F45 Primary Sample	WE1O45 Primary Sample	WE1F55 Primary Sample	WE2W55 Primary Sample	WE3F25 Primary Sample	WE3O25 Primary Sample	WE4W45 Primary Sample	WE5W25 Primary Sample	WE6F35 Primary Sample	WE6O35 Primary Sample
PCB 48	µg/Kg WW	0.00531	0.198	0.00353	0.0135	0.00381	0.0391	0.0197	0.0197	0.00239 K	0.0237
PCB 49	µg/Kg WW	0.0378 C	1.55 C	0.0274 C	0.133 C	0.0446 C	0.621 C	0.232 C	0.261 C	0.0335 C	0.31 C
PCB 5	µg/Kg WW	0.000393 JK	0.0165 U	0.000496 U	0.000281 U	0.000484 U	0.000529 U	0.000827 U	0.000579 U	0.000637 U	0.000903 U
PCB 50	µg/Kg WW	0.00215 C	0.0674 Q	0.00136 JK	0.00566 C	0.00174 J	0.0279 C	0.0135 C	0.0125 C	0.00116 J	0.0138 C
PCB 52	µg/Kg WW	0.0966	3.23	0.0632	0.275	0.0947	1.06	0.491	0.476	0.0682	0.637
PCB 54	µg/Kg WW	0.000147 U	0.00283 U	0.00016 U	0.0000979 JK	0.00018 U	0.000477 U	0.000353 U	0.000208 J	0.000387 U	0.000432 U
PCB 55	µg/Kg WW	0.00255	0.26	0.0048	0.00774	0.00336	0.0209	0.0027	0.00582	0.00114 K	0.0099
PCB 56	µg/Kg WW	0.0059	0.194	0.00489	0.0229	0.0092	0.115	0.0435	0.0541	0.00637	0.0568
PCB 57	µg/Kg WW	0.00088 U	0.0402 U	0.000966 U	0.00131 K	0.00183 U	0.00496 K	0.00223	0.00278	0.000467 J	0.00245 K
PCB 58	µg/Kg WW	0.000856 U	0.041 U	0.00094 U	0.00165	0.00178 U	0.0068 K	0.00183	0.0029	0.000613 JK	0.00332
PCB 59	µg/Kg WW	0.00425 C	0.135 C	0.00308 C	0.0142 C	0.00504 K	0.0699 C	0.0265 C	0.0318 C	0.00431 C	0.0382 C
PCB 6	µg/Kg WW	0.000853 J	0.0142 U	0.000841 J	0.00126 KQ	0.00113 K	0.00422	0.00186 K	0.00116 K	0.000641 U	0.00388
PCB 60	µg/Kg WW	0.0169	0.609	0.0133	0.0618	0.0186	0.216	0.0899	0.0993	0.014	0.132
PCB 61	µg/Kg WW	0.134 C	4.96 C	0.11 C	0.462 C	0.143 C	1.78 C	0.758 C	0.784 C	0.11 C	1.02 C
PCB 63	µg/Kg WW	0.00437	0.179	0.00349	0.0177	0.00519	0.0728	0.0291	0.0339	0.00493	0.046
PCB 64	µg/Kg WW	0.0225	0.829	0.0182	0.0783	0.0297	0.368	0.144	0.157	0.0221	0.201
PCB 66	µg/Kg WW	0.073	2.74	0.0602	0.256	0.102	1.43	0.487	0.561	0.0805	0.765
PCB 67	µg/Kg WW	0.000723 U	0.0332 U	0.000794 U	0.00204 K	0.00151 U	0.00798	0.00409	0.00442	0.000556 J	0.0055
PCB 68	µg/Kg WW	0.00135	0.05	0.00108	0.00483	0.00155 U	0.0185	0.00822	0.00825	0.00161 K	0.0137
PCB 7	µg/Kg WW	0.000246 U	0.0142 U	0.000381 U	0.000267 U	0.000371 U	0.000789 J	0.000776 U	0.00153 K	0.000581 U	0.00107 JK
PCB 72	µg/Kg WW	0.00222	0.082	0.00159	0.00683	0.002	0.0267	0.0126	0.0135	0.00192	0.0194
PCB 73	µg/Kg WW	0.00157	0.0742	0.00136	0.00345	0.00142	0.00395 K	0.000571 U	0.00185	0.00051 JK	0.00292 K
PCB 77	µg/Kg WW	0.0023	0.0786	0.00193	0.00847	0.00267	0.0391	0.00984	0.0155	0.000294 U	0.0193
PCB 78	µg/Kg WW	0.000868 U	0.0423 U	0.000953 U	0.000538 U	0.00181 U	0.00246 U	0.00112 U	0.000661 U	0.00031 U	0.0014 U
PCB 79	µg/Kg WW	0.00626	0.283	0.00631	0.0243	0.00637	0.0922	0.0411	0.0449	0.00486	0.058
PCB 8	µg/Kg WW	0.00254 Q	0.0132 U	0.00319 K	0.00447 Q	0.00526	0.0207 B	0.00774	0.00554	0.0041	0.0204 B
PCB 80	µg/Kg WW	0.000774 U	0.0367 U	0.000849 U	0.000469 U	0.00161 U	0.00199 U	0.000974 U	0.000594 U	0.000273 U	0.00113 U
PCB 81	µg/Kg WW	0.00109 K	0.051 U	0.00105 U	0.00155	0.00198 U	0.00365	0.00102 U	0.00063 U	0.000288 U	0.00118 U
PCB 82	µg/Kg WW	0.0159	0.772	0.0149	0.0646	0.0212	0.302	0.0699	0.0971	0.0139	0.138
PCB 83	µg/Kg WW	0.0173	1.17	0.0202	0.023	0.0222	0.24	0.0017 U	0.182	0.0267	0.21
PCB 84	µg/Kg WW	0.019	0.775	0.015	0.0549	0.0187	0.26	0.0883	0.11	0.0152	0.139
PCB 85	µg/Kg WW	0.0782 C	4.02 C	0.0623 C	0.27 C	0.0615 C	0.782 C	0.346 C	0.459 C	0.0633 C	0.694 C
PCB 86	µg/Kg WW	0.188 Q	8.82 Q	0.156 C	0.718 C	0.155 C	2.12 C	0.84 C	0.89 C	0.149 C	1.42 C
PCB 88	µg/Kg WW	0.0227 C	0.896 C	0.0191 C	0.0774 C	0.026 C	0.752 C	0.107 C	0.137 C	0.0195 C	0.383 C
PCB 89	µg/Kg WW	0.000394 U	0.015 J	0.000656 U	0.00162 K	0.00129 U	0.00834	0.00306	0.00384 K	0.0008 U	0.00515 K
PCB 9	µg/Kg WW	0.000315 J	0.0167 U	0.000462 U	0.000599 JK	0.000575 JK	0.00311 K	0.00118 K	0.00181 K	0.000636 U	0.00324 K
PCB 90	µg/Kg WW	0.366 C	16.2 C	0.297 C	1.39 C	0.272 C	3.63 C	1.59 C	1.65 C	0.267 C	2.71 C
PCB 92	µg/Kg WW	0.0827	3.51	0.0627	0.272	0.0618	0.782	0.375	0.385	0.0652	0.679
PCB 93	µg/Kg WW	0.00343 C	0.191 C	0.00306 C	0.0112 C	0.003 C	0.0286 C	0.0116 C	0.0156 C	0.00252 C	0.025 C
PCB 94	µg/Kg WW	0.000373 JK	0.0124 U	0.000604 U	0.00101 K	0.00119 U	0.0033	0.00154 U	0.00139	0.000738 U	0.00199 U
PCB 95	µg/Kg WW	0.106	4.91	0.0879	0.393	0.098	1.34	0.543	0.596	0.0933	0.899

Table B-13
Results of PCB Congeners for Walleye Fillet, Offal, and Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, FSCA 4, FSCA 5, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE1F45 Primary Sample	WE1O45 Primary Sample	WE1F55 Primary Sample	WE2W55 Primary Sample	WE3F25 Primary Sample	WE3O25 Primary Sample	WE4W45 Primary Sample	WE5W25 Primary Sample	WE6F35 Primary Sample	WE6O35 Primary Sample
PCB 96	µg/Kg WW	0.000412 J	0.0121 JK	0.000246 JK	0.00125	0.000549 U	0.00545	0.00214	0.00237	0.000992 U	0.00347
PCB 98	µg/Kg WW	0.0017 JK	0.068 K	0.00125 JK	0.00552 K	0.00184 K	0.0245 C	0.00741 C	0.00851 C	0.000845 J	0.00855 C
PCB 99	µg/Kg WW	0.252	11.3	0.164	0.865	0.155	1.94	1.06	0.949	0.139	1.72

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
[c] The W signifies that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-14
Results of Dioxins/Furans Analysis and Conventionals for Walleye Fillet and Offal Composites from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	WE1F15 Primary Sample	WE1O15 Primary Sample	WE1F25 Primary Sample	WE1O25 Primary Sample	WE1F35 Primary Sample	WE1O35 Primary Sample	WE1F45 Primary Sample	WE1O45 Primary Sample	WE1F55 Primary Sample	WE1O55 Primary Sample
Dioxins/Furans											
2,3,7,8-TCDD	µg/Kg WW	0.000122 U	0.000148 EMPC	9.92E-05 U	0.00016 EMPC	0.000111 U	0.000119 U	0.000121 U	9.02E-05 U	9.56E-05 U	0.000119 EMPC
1,2,3,7,8-PeCDD	µg/Kg WW	0.000122 U	0.000335 EMPC	7.29E-05 U	0.000583 EMPC	0.000115 U	0.00048 EMPC	9.13E-05 EMPC	0.000624 EMPC	7.64E-05 U	0.000501
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000268 U	0.000295 U	0.000196 U	0.000261 U	0.000215 U	0.000198 U	0.000203 U	0.00021 U	0.000193 U	0.000331 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.0003 U	0.000251	0.000211 U	0.000263 U	0.000198 U	0.000208 U	0.000214 U	0.000158 EMPC	0.000204 U	0.000308 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000293 U	0.000295 U	0.00021 U	0.00027 U	0.000212 U	0.000209 U	0.000215 U	0.000216 U	0.000205 U	0.000328 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000317 U	0.000201 EMPC	0.000165 U	0.000276	0.000198 U	0.000218	0.000185 U	0.000267	0.00011	0.000238
OCDD	µg/Kg WW	0.000932	0.000825	0.000846	0.00157	0.00142	0.00109	0.00149	0.00156	0.000707	0.00105 EMPC
2,3,7,8-TCDF	µg/Kg WW	0.000338	0.00179	0.000355	0.0021	0.00033	0.00142	0.000276	0.00165	0.000204	0.00105
1,2,3,7,8-PeCDF	µg/Kg WW	9.35E-05	0.000142	7.72E-05	0.000129 EMPC	8.17E-05	0.000133 EMPC	5.62E-05 EMPC	0.00013 EMPC	6.21E-05	0.000117 EMPC
2,3,4,7,8-PeCDF	µg/Kg WW	8.14E-05	0.000157	8.92E-05 EMPC	0.000187	8.52E-05	0.000165 EMPC	0.000114 EMPC	0.000162	8.16E-05	0.000158 EMPC
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000128 U	0.000121 U	0.00011 U	0.00012 U	0.000105 U	8.83E-05 U	0.000072	9.77E-05 U	0.000085 U	0.000143 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000126 U	0.000121 U	9.41E-05 U	0.000101 U	9.91E-05 U	8.72E-05 U	7.73E-05	8.99E-05 U	7.86E-05 U	0.000125 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000182 U	0.000188 U	0.000148 U	0.000143 U	0.000134 U	0.000123 U	0.000144 U	0.00014 U	0.000116 U	0.000179 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000133 U	0.00013 U	0.000109 U	0.000107 U	9.83E-05 U	9.64E-05 U	4.57E-05	9.42E-05 U	8.61E-05 U	0.000141 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000149 U	0.000129 U	9.55E-05 U	0.000109 U	0.000105 U	0.000195	0.000112 U	0.000106 U	0.000101 U	0.000111 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000238 U	0.000196 U	0.000147 U	0.000155 U	0.000168 U	0.000162 U	0.000165 U	0.000161 U	0.000145 U	0.000171 U
OCDF	µg/Kg WW	0.000366 U	0.000362 U	0.000271 U	0.000262 U	0.000311 U	0.000379 U	0.000298 U	0.000356 U	0.000299 U	0.000381 U
TCDD	µg/Kg WW	0.000122 U	0.000114 U	9.92E-05 U	0.000115 U	0.000111 U	0.000119 U	0.000121 U	9.02E-05 U	9.56E-05 U	0.000105 U
TCDF	µg/Kg WW	0.000338	0.00179	0.000355	0.0021	0.00033	0.00142	0.000276	0.00165	0.000204	0.00105
PeCDD	µg/Kg WW	0.000122 U	0.000328	7.29E-05 U	0.000431	0.000115 U	0.000135 U	7.55E-05 U	0.000102 U	7.64E-05 U	0.000839
PeCDF	µg/Kg WW	0.000175	0.000299	7.72E-05	0.000327	0.000167	0.000066 U	5.75E-05 U	0.000162	0.000144	9.96E-05
HxCDD	µg/Kg WW	0.000268 U	0.000251	0.000196 U	0.000261 U	0.000198 U	0.000198 U	0.000203 U	0.000209 U	0.000193 U	0.000308 U
HxCDF	µg/Kg WW	0.000126 U	0.000121 U	9.41E-05 U	0.000101 U	9.83E-05 U	0.000112	0.000072	8.99E-05 U	7.86E-05 U	0.000125 U
HpCDD	µg/Kg WW	0.000317 U	0.000198 U	0.000165 U	0.000276	0.000198 U	0.000218	0.000185 U	0.000267	0.00011	0.000238
HpCDF	µg/Kg WW	0.000149 U	0.000129 U	9.55E-05 U	0.000109 U	0.000105 U	0.000195	0.000112 U	0.000106 U	0.000101 U	0.000111 U
Conventionals											
Lipids	%	0.1	5.2	0.2	4.5	0.11	2.3	0.23	5.3	0.11	2.1
Moisture	%	78.6	70.3	78.7	70.1	79.6	72.6	78.3	69.5	79.9	72.7

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-15
Results of Dioxins/Furans Analysis and Conventionals for Walleye Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	WE2W15 Primary Sample	WE2W25 Primary Sample	WE2W35 Primary Sample	WE2W45 Primary Sample	WE2W55 Primary Sample	WE2W55 Field Duplicate	WE2W55 Field Triplicate
Dioxins/Furans								
2,3,7,8-TCDD	µg/Kg WW	0.000148 EMPC	0.0001 U	0.000104 U	9.63E-05 U	9.01E-05 U	0.000113 U	0.000106 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000127	0.000169	9.56E-05 EMPC	0.000168	0.000405 EMPC	0.00027 EMPC	0.000318
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000188 U	0.000145 U	0.000205 U	0.000142 U	0.000252 U	0.000129 U	0.000176 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000203 U	0.000156 U	0.000205 U	0.000188 EMPC	0.000292 U	0.000151 EMPC	0.000178 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000201 U	0.000155 U	0.000212 U	0.000149 U	0.00028 U	0.000136 U	0.000183 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000281 EMPC	0.000247 EMPC	0.000314	0.000306	0.000604	0.000625	0.000507
OCDD	µg/Kg WW	0.00126	0.00159	0.00156	0.00173	0.00525	0.00476	0.0032
2,3,7,8-TCDF	µg/Kg WW	0.00113	0.00089	0.00136	0.00127	0.00113	0.00108	0.00121
1,2,3,7,8-PeCDF	µg/Kg WW	0.000158	0.000105	0.00016	0.000121	0.000101 U	0.000115	0.000106 EMPC
2,3,4,7,8-PeCDF	µg/Kg WW	0.000144	0.000123	0.000164	0.000143	0.000115 EMPC	0.000109	0.00013
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000122 U	9.87E-05 U	9.56E-05	0.000104 U	0.000156 U	0.000095 U	0.000095 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000124 U	9.74E-05 U	8.78E-05	0.000101 U	0.000136 U	9.07E-05 U	9.45E-05 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000158 U	0.000119 U	9.56E-05	0.000134 U	0.000194 U	0.000121 U	0.000118 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000125 U	0.000102 U	6.63E-05	0.000102 U	0.000158 U	9.83E-05 U	9.62E-05 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	7.96E-05 U	9.15E-05 EMPC	0.000125	0.000102	0.000221	0.000228	0.000172
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000102 U	8.08E-05 U	0.000123 EMPC	7.64E-05 U	0.000234 U	0.000181 U	0.000145 U
OCDF	µg/Kg WW	0.000206 U	0.00016	0.000205 EMPC	0.000194	0.000846	0.000925	0.00103
TCDD	µg/Kg WW	0.000114 U	0.0001 U	0.000104 U	9.63E-05 U	9.01E-05 U	0.000113 U	0.000106 U
TCDF	µg/Kg WW	0.00147	0.00108	0.00157	0.00143	0.00113	0.00108	0.00121
PeCDD	µg/Kg WW	0.000127	0.000169	9.71E-05 U	0.000168	0.000165 U	0.00015 U	0.000318
PeCDF	µg/Kg WW	0.000303	0.000228	0.000324	0.000264	0.000101 U	0.000224	0.00013
HxCDD	µg/Kg WW	0.000188 U	0.000145 U	0.000205 U	0.000142 U	0.000252 U	0.000129 U	0.000176 U
HxCDF	µg/Kg WW	0.000122 U	9.74E-05 U	0.000345	0.000101 U	0.000136 U	9.07E-05 U	9.45E-05 U
HpCDD	µg/Kg WW	9.03E-05 U	9.14E-05 U	0.000435	0.000456	0.00102	0.00106	0.000738
HpCDF	µg/Kg WW	7.96E-05 U	6.28E-05 U	0.000125	0.000188	0.000694	0.000694	0.000556
Conventionals								
Lipids	%	2.1	2.2	2.6	2.1	2.3	2.3	2.2
Moisture	%	74.4	74.1	74.1	74.1	74.1	74.2	73.6

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-16
Results of Dioxins/Furans Analysis and Conventionals for Walleye Fillet and Offal Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	WE3F15 Primary Sample	WE3O15 Primary Sample	WE3F25 Primary Sample	WE3O25 Primary Sample	WE3F35 Primary Sample	WE3O35 Primary Sample	WE3F45 Primary Sample	WE3O45 Primary Sample	WE3F55 Primary Sample	WE3O55 Primary Sample
Dioxins/Furans											
2,3,7,8-TCDD	µg/Kg WW	0.000106 U	0.000149 EMPC	8.85E-05 U	0.000164 EMPC	0.000114 U	0.000108 U	8.46E-05 U	8.71E-05 U	0.000108 U	0.000164 EMPC
1,2,3,7,8-PeCDD	µg/Kg WW	0.000105 U	0.000142	0.000135 U	0.000256 EMPC	7.98E-05 EMPC	0.00118 EMPC	8.56E-05 U	0.000219 EMPC	0.000127 U	0.000252 EMPC
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000216 U	0.000187 U	0.0003 U	0.000161 U	0.000145 U	0.000305	0.00015 U	0.000188 U	0.000218 U	0.000137 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.00021 U	0.000185 EMPC	0.000279 U	0.000146 U	0.000146 U	0.000282	0.000158 U	0.000185 U	0.000213 U	0.000268
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000219 U	0.000192 U	0.000298 U	0.000158 U	0.00015 U	0.000267 U	0.000159 U	0.000192 U	0.000221 U	0.000142 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.00134	0.000221	0.00022	0.000273	0.000173 U	0.000247	0.000228 U	0.000445	0.000156 EMPC	0.000268
OCDD	µg/Kg WW	0.00881	0.00114	0.002	0.00133	0.00145 EMPC	0.000858	0.00106	0.00386	0.00141	0.001
2,3,7,8-TCDF	µg/Kg WW	0.000364	0.00209	0.000342	0.00188	0.000385	0.00181	0.000404	0.0021	0.000298	0.00175
1,2,3,7,8-PeCDF	µg/Kg WW	0.000136	0.000145	8.85E-05	0.000166	9.19E-05	0.000147	8.46E-05	0.000118	7.88E-05 U	0.000134
2,3,4,7,8-PeCDF	µg/Kg WW	0.000145	0.000178	0.000113 EMPC	0.000191	0.000113 EMPC	0.000165	0.000108 EMPC	0.000176	9.09E-05 EMPC	0.000164
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000125 U	9.68E-05 U	0.00018 U	9.65E-05 U	9.97E-05 U	0.000142 U	9.84E-05 U	9.85E-05 U	0.000103 U	7.99E-05 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000117 U	9.69E-05 U	0.000162 U	9.77E-05 U	0.000097 U	0.000131 U	9.39E-05 U	9.84E-05 U	0.000103 U	7.49E-05 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000177 U	0.000143 U	0.000198 U	0.000124 U	0.000137 U	0.000163 U	0.000141 U	0.000144 U	0.000151 U	0.000112 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.00012 U	9.84E-05 U	0.000174 U	0.0001 U	9.81E-05 U	0.000144 U	0.000099 U	0.000102 U	0.000107 U	8.44E-05 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000212	0.000082 U	0.000102 U	8.93E-05 U	0.000101 U	9.11E-05 U	0.000114 U	0.000138	0.000083 U	7.12E-05 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000147 U	0.000123 U	0.000158 U	0.000117 U	0.000154 U	0.000137 U	0.000173 U	0.00012 U	0.000127 U	0.000105 U
OCDF	µg/Kg WW	0.00143	0.000382 U	0.000369	0.000138 U	0.000537 U	0.000299 U	0.000355 U	0.000359	0.000335 U	0.000225 U
TCDD	µg/Kg WW	0.000106 U	6.94E-05 U	8.85E-05 U	0.000114 U	0.000114 U	0.000108 U	8.46E-05 U	0.000103 U	0.000108 U	0.000102 U
TCDF	µg/Kg WW	0.000364	0.00209	0.000342	0.00235	0.000385	0.00181	0.000404	0.00174	0.000298	0.00175
PeCDD	µg/Kg WW	0.000105 U	0.000142	0.000135 U	0.000089 U	8.57E-05 U	0.000767 U	8.56E-05 U	0.000134 U	0.000127 U	0.000132 U
PeCDF	µg/Kg WW	0.000282	0.000323	8.85E-05	0.000357	9.19E-05	0.000312	8.46E-05	0.00026	7.58E-05 U	0.00036
HxCDD	µg/Kg WW	0.00021 U	0.000186 U	0.000279 U	0.000146 U	0.000145 U	0.000282	0.00015 U	0.000185 U	0.000213 U	0.000268
HxCDF	µg/Kg WW	0.000117 U	9.68E-05 U	0.000162 U	9.65E-05 U	0.000097 U	0.000131 U	9.39E-05 U	9.84E-05 U	0.000103 U	7.49E-05 U
HpCDD	µg/Kg WW	0.0018	0.000221	0.00022	0.000273	0.000173 U	0.000247	0.000228 U	0.000142 U	0.000148 U	0.000268
HpCDF	µg/Kg WW	0.000742	0.000082 U	0.000102 U	8.93E-05 U	0.000101 U	9.11E-05 U	0.000114 U	8.07E-05 U	0.000083 U	7.12E-05 U
Conventionals											
Lipids	%	0.5	5.9	0.4	4.6	0.5	5.5	0.3 U	3.9	0.4	6.3
Moisture	%	78.5	70.2	79.7	71.4	78.9	70.7	79.4	69.8	78.9	69.5

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-17

Results of Dioxins/Furans Analysis and Conventionals for Walleye Whole Body Composites from FSCA 4

Upper Columbia River RI/FS

Analyte	Units	WE4W15 Primary Sample	WE4W25 Primary Sample	WE4W35 Primary Sample	WE4W45 Primary Sample	WE4W55 Primary Sample
Dioxins/Furans						
2,3,7,8-TCDD	µg/Kg WW	8.53E-05 U	9.19E-05 U	0.000127 U	0.00011 EMPC	0.000127 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000284 EMPC	0.00017 EMPC	0.000174 EMPC	0.000132 EMPC	0.000136 EMPC
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000239 U	0.000175 U	0.000138 U	0.000175 U	0.000172 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000224 U	0.000265	0.000144 U	0.000201	0.000197 EMPC
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000238 U	0.00018 U	0.000146 U	0.000184 U	0.000177 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.00024	0.000282	0.0003	0.000529	0.000262 EMPC
OCDD	µg/Kg WW	0.00183	0.00138	0.00169	0.003	0.00131
2,3,7,8-TCDF	µg/Kg WW	0.00262	0.00235	0.00159	0.00237	0.00129
1,2,3,7,8-PeCDF	µg/Kg WW	0.000106 EMPC	0.000153	0.000128	0.000154	0.000122
2,3,4,7,8-PeCDF	µg/Kg WW	0.000163	0.000205	0.000148	0.000177	0.000115
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000128 U	9.12E-05 U	9.03E-05 U	9.73E-05 U	0.000109 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000128 U	9.09E-05 U	8.64E-05 U	9.14E-05 U	0.000102 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000188 U	0.000113 U	0.000104 U	0.000121 U	0.000133 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.00013 U	9.09E-05 U	8.56E-05 U	9.74E-05 U	0.000104 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000104 U	8.71E-05	6.67E-05	0.000111 U	7.21E-05 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.00016 U	9.66E-05 U	8.92E-05 U	0.000143 U	9.65E-05 U
OCDF	µg/Kg WW	0.00047 U	0.000164 U	0.000206 EMPC	0.0003	0.000176 U
TCDD	µg/Kg WW	8.53E-05 U	9.19E-05 U	0.000127 U	8.79E-05 U	0.000127 U
TCDF	µg/Kg WW	0.00262	0.00293	0.00179	0.00283	0.00156
PeCDD	µg/Kg WW	0.000142 U	9.67E-05 U	9.14E-05 U	0.000109 U	0.000106 U
PeCDF	µg/Kg WW	0.000163	0.000437	0.000276	0.000331	0.000237
HxCDD	µg/Kg WW	0.000224 U	0.000265	0.000138 U	0.000201	0.00017 U
HxCDF	µg/Kg WW	0.000128 U	9.09E-05 U	8.56E-05 U	9.14E-05 U	0.000102 U
HpCDD	µg/Kg WW	0.00024	0.000451	0.0003	0.00069	0.00014
HpCDF	µg/Kg WW	0.000104 U	0.000197	0.000139	0.000157	7.21E-05 U
Conventionals						
Lipids	%	2.7	3	3.5	5.1 U	4
Moisture	%	72.3	74	73.6	71.6	72.5

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less tha

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater tl

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-18
Results of Dioxins/Furans Analysis and Conventionals for Walleye Whole Body Composites from FSCA 5
Upper Columbia River RI/FS

Analyte	Units	WE5W15 Primary Sample		WE5W25 Primary Sample		WE5W35 Primary Sample	
Dioxins/Furans							
2,3,7,8-TCDD	µg/Kg WW	0.000132	EMPC	0.000108	U	0.00014	EMPC
1,2,3,7,8-PeCDD	µg/Kg WW	0.000329	EMPC	0.000403	EMPC	0.000136	EMPC
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000231	U	0.000226	U	0.00013	U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000243	U	0.000224	U	0.000124	U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000244	U	0.000232	U	0.000131	U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000444		0.000494		0.00019	
OCDD	µg/Kg WW	0.00346		0.0044		0.00135	
2,3,7,8-TCDF	µg/Kg WW	0.00157		0.00156		0.00198	
1,2,3,7,8-PeCDF	µg/Kg WW	0.00013	EMPC	0.000117		0.000154	
2,3,4,7,8-PeCDF	µg/Kg WW	0.000134		0.000127		0.000173	
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000132	U	0.000117	U	8.34E-05	EMPC
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000129	U	0.000118	U	7.58E-05	
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.00017	U	0.000146	U	0.000111	U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000133	U	0.000128	U	8.44E-05	U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000136		0.000146		8.72E-05	
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000114	U	0.00012	U	0.000105	U
OCDF	µg/Kg WW	0.000606		0.00109		0.00015	U
TCDD	µg/Kg WW	9.26E-05	U	0.000108	U	0.00011	U
TCDF	µg/Kg WW	0.00157		0.00196		0.00221	
PeCDD	µg/Kg WW	7.84E-05	U	8.44E-05	U	7.82E-05	U
PeCDF	µg/Kg WW	0.000134		0.000244		0.000326	
HxCDD	µg/Kg WW	0.000231	U	0.000224	U	0.000124	U
HxCDF	µg/Kg WW	0.000129	U	0.000117	U	7.58E-05	
HpCDD	µg/Kg WW	0.000697		0.000757		0.00019	
HpCDF	µg/Kg WW	0.000424		0.000471		8.72E-05	
Conventionals							
Lipids	%	3.1		3.6		3	
Moisture	%	73.9		73.7		74.8	

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-19
Results of Dioxins/Furans Analysis and Conventionals for Walleye Fillet and Offal Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE6F15 Primary Sample	WE6O15 Primary Sample	WE6F25 Primary Sample	WE6O25 Primary Sample	WE6F35 Primary Sample	WE6O35 Primary Sample	WE6F45 Primary Sample	WE6O45 Primary Sample	WE6F55 Primary Sample	WE6O55 Primary Sample	WE6W65 Primary Sample	WE6W65 Field Duplicate
Dioxins/Furans													
2,3,7,8-TCDD	µg/Kg WW	0.000117 U	0.000158 U	0.000112 U	0.000134 U	0.000125 U	0.000237 EMPC	0.000113 U	0.000188 EMPC	9.12E-05 U	0.00011 U	0.000429 U	0.000262 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000102 U	0.000188 EMPC	0.000103 U	0.000351 EMPC	8.27E-05 U	0.000402 EMPC	0.000106 U	0.000381	0.000109 U	0.000451 EMPC	0.000447 U	0.00046 U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000176 U	0.000121 U	0.000142 U	0.000191 U	0.000154 U	0.00022 U	0.000167 U	0.000177 U	0.000183 U	0.000124 U	0.000436 U	0.00089 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000177 U	0.000128 U	0.000155 U	0.000188 U	0.000164 U	0.000365 EMPC	0.000169 U	0.000274	0.000179 U	0.000174	0.00045 U	0.000967 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000182 U	0.000128 U	0.000153 U	0.000195 U	0.000164 U	0.000229 U	0.000173 U	0.000186 U	0.000187 U	0.000132 U	0.000457 U	0.000957 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000246	0.00029	0.000295 EMPC	0.000273	0.000215	0.000217	0.000266	0.000308	0.000221	0.000249	0.000588 U	0.000936 U
OCDD	µg/Kg WW	0.00172	0.00204	0.00266	0.00175	0.00129	0.00139	0.00145	0.00123	0.00137	0.00214	0.0012	0.000647 U
2,3,7,8-TCDF	µg/Kg WW	0.000508	0.00214	0.000796	0.0046	0.00067	0.00372	0.000648	0.00314	0.000468	0.00234	0.00205	0.00206
1,2,3,7,8-PeCDF	µg/Kg WW	0.000106	0.000172 EMPC	9.69E-05	0.000208	8.62E-05 EMPC	0.000198	9.78E-05 EMPC	0.000186	9.59E-05	0.000169	0.0002	0.000277 U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000129 EMPC	0.00017 EMPC	0.000116 EMPC	0.000312	8.24E-05	0.000223	0.00011 EMPC	0.000251	0.000094 EMPC	0.000203	0.00017	0.000285 U
1,2,3,4,7,8-HxCDF	µg/Kg WW	8.91E-05	7.95E-05 U	8.81E-05 U	9.25E-05 U	0.000104 U	0.000117 U	0.000102 U	0.000127 U	0.000103 U	5.75E-05	0.000248 U	0.000386 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000104	7.36E-05 U	8.31E-05 U	0.00009 U	0.000101 U	0.00011 U	0.000102 U	0.000124 U	9.38E-05 U	6.71E-05	0.000261 U	0.000424 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000119 U	0.000092 U	0.000108 U	0.000109 U	0.00013 U	0.000153 U	0.000124 U	0.000154 U	0.000129 U	9.76E-05 U	0.000333 U	0.000522 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	9.67E-05 U	7.37E-05 U	0.00012 U	0.000094 U	0.00011 U	0.000116 U	0.000108 U	0.000125 U	0.000107 U	5.94E-05	0.000281 U	0.000411 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	7.96E-05	9.99E-05 U	7.19E-05 U	0.000122 U	7.04E-05 U	0.000109 U	7.44E-05	0.000106 U	9.59E-05	7.09E-05	0.000285 U	0.000517 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000102 U	0.000126 U	9.74E-05 U	0.000166 U	0.000092 U	0.000135 U	8.87E-05 U	0.000143 U	9.68E-05 U	7.77E-05 U	0.000388 U	0.000725 U
OCDF	µg/Kg WW	0.000282 U	0.000261	0.000307 U	0.000379 U	0.000125	0.000269 U	0.000243 U	0.000286 U	0.000194 EMPC	0.00017 U	0.00068 U	0.00132 U
TCDD	µg/Kg WW	0.000117 U	0.000158 U	0.000112 U	0.000134 U	0.000125 U	0.000205 U	0.000113 U	0.000134 U	9.12E-05 U	0.00011 U	0.000429 U	0.00088 U
TCDF	µg/Kg WW	0.000508	0.00258	0.000796	0.00601	0.00067	0.00451	0.000648	0.00402	0.000468	0.00325	0.00268	0.00286
PeCDD	µg/Kg WW	0.000102 U	0.00023	0.000103 U	0.000171	8.27E-05 U	9.72E-05 U	0.000106 U	0.000381	0.000109 U	0.000159	0.000447 U	0.00046 U
PeCDF	µg/Kg WW	0.000106	6.32E-05 U	9.69E-05	0.00052	8.24E-05	0.000421	5.19E-05 U	0.000438	9.59E-05	0.000372	0.00037	0.000277 U
HxCDD	µg/Kg WW	0.000176 U	0.000121 U	0.000142 U	0.000188 U	0.000154 U	0.00022 U	0.000167 U	0.000274	0.000179 U	0.000174	0.000436 U	0.00089 U
HxCDF	µg/Kg WW	0.000193	6.39E-05	8.31E-05 U	0.00009 U	0.000101 U	0.00011 U	0.000102 U	0.000124 U	9.38E-05 U	0.000184	0.000248 U	0.000386 U
HpCDD	µg/Kg WW	0.000402	0.00029	0.000125	0.000273	0.000215	0.000217	0.000395	0.000308	0.000353	0.000249	0.000588 U	0.000936 U
HpCDF	µg/Kg WW	0.000197	9.99E-05 U	8.01E-05	0.000122 U	9.39E-05	0.000134	7.44E-05	0.000106 U	0.000209	7.09E-05	0.000285 U	0.000517 U
Conventionals													
Lipids	%	0.6	3.7	0.7	9.6	0.4	6	0.6	6.5	0.4	5.3	3.3	3.5
Moisture	%	79.2	70.8	78.9	67	79.1	70.1	78.4	70.1	78.9	70.2	74.1	73.3

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-20

Results of TAL Metals, Mercury, and Arsenic Speciation for Wild Rainbow Trout Fillet and Offal Composites from FSCA 1

Upper Columbia River RI/FS

Analyte	Units	RW1F15 Primary Sample	RW1O15 Primary Sample	RW1F25 Primary Sample	RW1O25 Primary Sample	RW1F35 Primary Sample	RW1O35 Primary Sample	RW1O35 Field Duplicate	RW1O35 Field Triplicate	RW1F45 Primary Sample	RW1O45 Primary Sample	RW1F55 Primary Sample	RW1F55 Field Duplicate
TAL Metals													
Aluminum	mg/Kg WW	4.155 U	5.19 U	3.81 U	9.3275	3.93 U	4.845 U	7.1928	10.2	4.05 U	4.785 U	4.02 U	3.975 U
Antimony	mg/Kg WW	0.1108 U	0.1384 U	0.1016 U	0.13 U	0.10218 U	0.1292 U	0.1332 U	0.136 U	0.108 U	0.1276 U	0.1072 U	0.106 U
Arsenic	mg/Kg WW	0.09695	0.21452	0.06604	0.21125	0.07074	0.18088	0.21312	0.2278	0.0972	0.15631	0.09916	0.1007
Barium	mg/Kg WW	0.1385 U	1.3667	0.127 U	1.77775	0.12838 U	1.39536	1.32201	2.4922	0.135 U	1.07184	0.134 U	0.1325 U
Beryllium	mg/Kg WW	0.00554 U	0.00692 U	0.00508 U	0.0065 U	0.00524 U	0.00646 U	0.00666 U	0.0068 U	0.0054 U	0.00638 U	0.00536 U	0.0053 U
Cadmium	mg/Kg WW	0.01385 U	0.03356	0.0635 U	0.0455	0.01284 U	0.0323	0.0323	0.0374	0.0135 U	0.02775	0.0134 U	0.01325 U
Calcium	mg/Kg WW	296.39 J	10656.8 J	340.36 J	11765 J	272.48 J	12952.3 J	9224.1 J	10744 J	369.9 J	9123.4 J	407.36 J	352.45 J
Chromium	mg/Kg WW	0.5263	1.10374	0.508	1.10175	0.5764	0.98192	1.25541	1.3396	0.54	0.92829	0.7236	0.71815
Cobalt	mg/Kg WW	0.00776 U	0.04498	0.00991 U	0.052	0.00734 U	0.04199	0.03996	0.0646	0.00675 U	0.02999	0.00804 U	0.00795 U
Copper	mg/Kg WW	0.3601	2.01372	0.3302	3.4775	0.3406	1.91862	2.31102	3.0328	0.351	1.83106	0.3216	0.318
Iron	mg/Kg WW	4.1273	37.022	6.3246	50.7	5.2138	44.897	57.609	99.96	5.481	36.685	5.0652	4.7435
Lead	mg/Kg WW	0.01801	0.22144	0.01575	0.29575	0.01284 U	0.21964	0.26307	0.51	0.01755	0.20097	0.01447	0.01643
Magnesium	mg/Kg WW	265.366	342.886	261.62	328.25	272.48	381.14	283.383	325.38	275.4	298.584	264.516	251.22
Manganese	mg/Kg WW	0.1385	2.63306	0.127	2.63575	0.12314	2.54847	2.25108	3.944	0.1458	1.83106	0.13936	0.1272
Nickel	mg/Kg WW	0.04155 U	0.3806	0.05334	0.4875	0.0393 U	0.4845	0.3663	0.374	0.0405 U	0.31262	0.0402 U	0.03975 U
Potassium	mg/Kg WW	4099.6	2678.04	4165.6	2525.25	4296.8	2548.47	2357.64	2458.2	4266	2446.73	4207.6	4107.5
Selenium	mg/Kg WW	0.6094	1.03454	0.4318	1.06925	0.4454	1.05944	1.0323	1.088	0.486	0.90915	0.4824	0.5035
Silver	mg/Kg WW	0.06925 U	0.0865 U	0.0635 U	0.08125 U	0.0655 U	0.08075 U	0.08325 U	0.085 U	0.0675 U	0.07975 U	0.067 U	0.06625 U
Sodium	mg/Kg WW	382.26	1259.44	434.34	1381.25	390.38	1295.23	1208.79	1295.4	423.9	1279.19	404.68	389.55
Thallium	mg/Kg WW	0.06925 U	0.0865 U	0.0635 U	0.08125 U	0.0655 U	0.08075 U	0.08325 U	0.085 U	0.0675 U	0.07975 U	0.067 U	0.06625 U
Uranium	mg/Kg WW	0.00139 U	0.00439	0.00127 U	0.0064	0.00131 U	0.00423	0.0042	0.00547	0.00135 U	0.00317	0.00134 U	0.00132 U
Vanadium	mg/Kg WW	0.1108 U	0.1384 U	0.1016 U	0.1365	0.10218 U	0.1292 U	0.1332 U	0.136 U	0.108 U	0.1276 U	0.1072 U	0.106 U
Zinc	mg/Kg WW	8.4762	40.136	7.9248	51.025	7.991	44.897	40.959	45.9	8.37	41.151	8.978	8.162
Mercury													
Mercury	µg/Kg WW	65.4	47.8	108	64	80.4	53.6	54.6	46.8	87.1	57.6	92.4	86.3
Arsenic Species													
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	-	-	-	13.653 U	13.94 U	-	-	10.988 U	10.865 U
ASB + Cation	µg/Kg WW	-	-	-	-	-	-	9.657 J	14.62 J	-	-	7.504 J	8.48 J
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	-	-	7.992 J	18.36 J	-	-	10.988 U	10.865 U
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	-	-	13.653 U	13.94 U	-	-	10.988 U	10.865 U
Unknown	µg/Kg WW	-	-	-	-	-	-	13.653 UJ	13.94 UJ	-	-	10.988 UJ	10.865 UJ
Conventionals													
Lipids	%	6	11.9	3.1	9.9	4.1	6.6	11.2	11.6	4.5	7.1	4.6	4.3
Moisture	%	72.3	65.4	74.6	67.5	73.8	67.7	66.7	66	73	68.1	73.2	73.5

[a] The F indicates that the sample consisted of fillets.

[b] The O indicates that the sample consisted of offal.

Table B-21
Results of TAL Metals, Mercury, and Arsenic Speciation for Wild Rainbow Trout Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	RW2W15 Primary Sample	RW2W25 Primary Sample	RW2W35 Primary Sample	RW2W35 Field Duplicate	RW2W35 Field Triplicate	RW2W45 Primary Sample	RW2W53 Primary Sample
TAL Metals								
Aluminum	mg/Kg WW	4.425 U	4.8 U	4.785 U	4.815 U	4.77 U	4.814	9.2584
Antimony	mg/Kg WW	0.118 U	0.128 U	0.1276 U	0.1284 U	0.1272 U	0.116 U	0.1136 U
Arsenic	mg/Kg WW	0.1003	0.1088	0.14036	0.14766	0.1113	0.1102	0.15904
Barium	mg/Kg WW	0.60475	0.688	0.61567	0.46866	0.42612	1.1977	1.73808
Beryllium	mg/Kg WW	0.0059 U	0.0064 U	0.00638 U	0.00642 U	0.00636 U	0.0058 U	0.00568 U
Cadmium	mg/Kg WW	0.03245	0.0352	0.04147	0.03852	0.03816	0.0348	0.04828
Calcium	mg/Kg WW	3805.5 J	5600 J	5518.7 J	4173 J	3339 J	5046 J	8605.2 J
Chromium	mg/Kg WW	0.6195	0.576	0.80388	0.89238	0.7314	0.7337	0.90596
Cobalt	mg/Kg WW	0.01534 U	0.01568 U	0.01244 U	0.01059 U	0.01113 U	0.01653 U	0.02187
Copper	mg/Kg WW	1.2685	1.3024	1.63328	1.4124	1.39602	1.798	1.92552
Iron	mg/Kg WW	19.293	19.072	17.1622	18.2649	17.013	23.954	30.388
Lead	mg/Kg WW	0.0649	0.1152	0.08613	0.07383	0.07314	0.1131	0.1136
Magnesium	mg/Kg WW	289.395	309.12	317.086	293.715	276.024	292.9	309.56
Manganese	mg/Kg WW	1.23605	1.6864	1.41636	1.12992	1.03986	2.088	2.1868
Nickel	mg/Kg WW	0.15635	0.2048	0.21373	0.15729	0.12402	0.2117	0.3692
Potassium	mg/Kg WW	3540	3360	3349.5	3338.4	3370.8	3393	3464.8
Selenium	mg/Kg WW	0.6195	0.576	0.6699	0.6741	0.5724	0.638	0.5964
Silver	mg/Kg WW	0.07375 U	0.08 U	0.07975 U	0.08025 U	0.0795 U	0.0725 U	0.071 U
Sodium	mg/Kg WW	811.25	819.2	797.5	760.77	785.46	785.9	857.68
Thallium	mg/Kg WW	0.07375 U	0.08 U	0.07975 U	0.08025 U	0.0795 U	0.0725 U	0.071 U
Uranium	mg/Kg WW	0.00148	0.00323	0.00204	0.0016	0.00171	0.00348	0.00415
Vanadium	mg/Kg WW	0.118 U	0.128 U	0.1276 U	0.1284 U	0.1272 U	0.116 U	0.1136 U
Zinc	mg/Kg WW	20.06	21.632	20.7031	22.5663	19.398	22.707	22.0668
Mercury								
Mercury	µg/Kg WW	51.4	40.6	39.6	36.1	38.7	47.5	36
Arsenic Species								
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	32.219	37.878	-	-	-
ASB + Cation	µg/Kg WW	-	-	19.459 J	18.297 J	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	13.079 U	13.161 U	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	13.079 U	13.161 U	-	-	-
Unknown	µg/Kg WW	-	-	13.079 UJ	13.161 UJ	-	-	-
Conventionals								
Lipids	%	7.6	10.7	10	9.9	9.7	6.7	4.8
Moisture	%	70.5	68	68.1	67.9	68.2	71	71.6

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-22
Results of TAL Metals, Mercury, and Arsenic Speciation for Wild Rainbow Trout Fillet and Offal Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	RW3F15 Primary Sample	RW3O15 Primary Sample	RW3F25 Primary Sample	RW3O25 Primary Sample
TAL Metals					
Aluminum	mg/Kg WW	3.63 U	13.584	3.78 U	8.874
Antimony	mg/Kg WW	0.0968 U	0.10754 U	0.1008 U	0.1102 U
Arsenic	mg/Kg WW	0.07986	0.22923	0.06804	0.2146
Barium	mg/Kg WW	0.121 U	0.98484	0.126 U	0.7627
Beryllium	mg/Kg WW	0.00484 U	0.00538 U	0.00504 U	0.00551 U
Cadmium	mg/Kg WW	0.0121 U	0.09056	0.0126 U	0.0725
Calcium	mg/Kg WW	341.22	8631.5	196.056	10034
Chromium	mg/Kg WW	0.4114	0.92258	0.4032	0.8033
Cobalt	mg/Kg WW	0.00363 U	0.03396	0.00378 U	0.029
Copper	mg/Kg WW	0.3388	2.1791	0.3276	1.6356
Iron	mg/Kg WW	3.8236	45.563	4.0572	32.48
Lead	mg/Kg WW	0.0121 U	0.05094	0.0126 U	0.0522
Magnesium	mg/Kg WW	283.14 J	322.62 J	267.12 J	342.2 J
Manganese	mg/Kg WW	0.13552	2.32626	0.11844	1.9372
Nickel	mg/Kg WW	0.0684	0.0439	0.0838 U	0.0577
Potassium	mg/Kg WW	0.03872	0.3396	0.0378	0.348
Selenium	mg/Kg WW	4573.8	2943.2	4435.2	2844.9
Silver	mg/Kg WW	0.4598 U	0.94522 U	0.4032 U	0.9048 U
Sodium	mg/Kg WW	0.0605	0.06509	0.063	0.0696
Thallium	mg/Kg WW	406.56 U	1318.78 U	430.92 U	1334 U
Uranium	mg/Kg WW	0.0605 U	0.06509	0.063 U	0.0696
Vanadium	mg/Kg WW	0.00121 U	0.00331	0.00126 U	0.00266
Zinc	mg/Kg WW	0.0968	0.13584	0.1008	0.116
Mercury					
Mercury	µg/Kg WW	68.4	43.9	83.8	57.7
Arsenic Species					
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	10.332 U	20.59 J
ASB + Cation	µg/Kg WW	-	-	10.332 UJ	11.89 UJ
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	10.332 U	12.18 J
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	10.332 U	11.89 U
Unknown	µg/Kg WW	-	-	21.672 J	32.48 J
Conventionals					
Lipids	%	2.1	6.1	2.8	7.3
Moisture	%	75.8	71.7	74.8	71

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-23
Results of TAL Metals, Mercury, and Arsenic Speciation for Wild Rainbow Trout
Whole Body Composites from FSCA 5
Upper Columbia River RI/FS

Analyte	Units	RW5W15 Primary Sample
TAL Metals		
Aluminum	mg/Kg WW	5.1019
Antimony	mg/Kg WW	0.12207 U
Arsenic	mg/Kg WW	0.17528
Barium	mg/Kg WW	0.38186
Beryllium	mg/Kg WW	0.00595 U
Cadmium	mg/Kg WW	0.06573
Calcium	mg/Kg WW	4194.2
Chromium	mg/Kg WW	0.6886
Cobalt	mg/Kg WW	0.01784
Copper	mg/Kg WW	0.5634
Iron	mg/Kg WW	17.215
Lead	mg/Kg WW	0.01534 U
Magnesium	mg/Kg WW	303.61 J
Manganese	mg/Kg WW	1.28643
Nickel	mg/Kg WW	0.13772
Potassium	mg/Kg WW	3411.7
Selenium	mg/Kg WW	0.5321
Silver	mg/Kg WW	0.07512 U
Sodium	mg/Kg WW	807.54
Thallium	mg/Kg WW	0.07512 U
Uranium	mg/Kg WW	0.00156 U
Vanadium	mg/Kg WW	0.12207 U
Zinc	mg/Kg WW	21.7535
Mercury		
Mercury	µg/Kg WW	69.5
Arsenic Species		
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	12.833 U
ASB + Cation	µg/Kg WW	12.833 UJ
Dimethylarsonic acid (DMA)	µg/Kg WW	18.154 J
Monomethylarsonic acid (MMA)	µg/Kg WW	12.833 U
Unknown	µg/Kg WW	23.162 J
Conventionals		
Lipids	%	8.2
Moisture	%	68.7

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-24
Results of TAL Metals, Mercury, and Arsenic Speciation for Wild Rainbow Trout Fillet and Offal Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RW6F14 Primary Sample	RW6O14 Primary Sample
TAL Metals			
Aluminum	mg/Kg WW	3.108 U	8.1972
Antimony	mg/Kg WW	0.08436 U	0.10764 U
Arsenic	mg/Kg WW	0.07992	0.20424
Barium	mg/Kg WW	0.10656 U	1.41588
Beryllium	mg/Kg WW	0.00422 U	0.00524 U
Cadmium	mg/Kg WW	0.01066 U	0.08556
Calcium	mg/Kg WW	248.64	13634.4
Chromium	mg/Kg WW	0.444	0.5244
Cobalt	mg/Kg WW	0.00533	0.04416
Copper	mg/Kg WW	0.2664	0.5796
Iron	mg/Kg WW	5.217	38.364
Lead	mg/Kg WW	0.01066 U	0.03864
Magnesium	mg/Kg WW	273.06 J	397.44 J
Manganese	mg/Kg WW	0.1665	4.5264
Nickel	mg/Kg WW	0.0333	0.4416
Potassium	mg/Kg WW	4528.8	2555.76
Selenium	mg/Kg WW	0.3774	0.70104
Silver	mg/Kg WW	0.05328 U	0.06624 U
Sodium	mg/Kg WW	497.28	1570.44
Thallium	mg/Kg WW	0.05328 U	0.06624 U
Uranium	mg/Kg WW	0.00111 U	0.00272
Vanadium	mg/Kg WW	0.08436 U	0.14904
Zinc	mg/Kg WW	6.327	49.68
Mercury			
Mercury	µg/Kg WW	120	75.7
Arsenic Species			
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-
ASB + Cation	µg/Kg WW	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-
Unknown	µg/Kg WW	-	-
Conventionals			
Lipids	%	1.4	6.3
Moisture	%	77.8	72.4

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-25
Results of PCB Aroclors and Conventionals for Wild Rainbow Trout Fillet and Offal Composites from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	RW1F15 Primary Sample	RW1O15 Primary Sample	RW1F25 Primary Sample	RW1O25 Primary Sample	RW1F35 Primary Sample	RW1O35 Primary Sample	RW1O35 Field Duplicate	RW1O35 Field Triplicate	RW1F45 Primary Sample	RW1O45 Primary Sample	RW1F55 Primary Sample	RW1F55 Field Duplicate
PCB Aroclor													
PCB-1016	µg/Kg WW	13 U	14 U	13 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U
PCB-1221	µg/Kg WW	13 U	14 U	13 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U
PCB-1232	µg/Kg WW	26 U	28 U	27 U	27 U	28 U	28 U	28 U	28 U	28 U	29 U	28 U	28 U
PCB-1242	µg/Kg WW	13 U	14 U	13 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U
PCB-1248	µg/Kg WW	13 U	14 U	13 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U
PCB-1254	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-
PCB-1254/1260	µg/Kg WW	36.6 J	83.4 J	23 J	46.7 J	20.7 J	23.2 J	35 J	39.2 J	21.3 J	23.9 J	21.6 J	19.1 J
PCB-1260	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-
PCB-1262	µg/Kg WW	13 U	14 U	13 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U
PCB-1268	µg/Kg WW	13 U	14 U	13 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U
Conventionals													
Lipids	%	6	11.9	3.1	9.9	4.1	6.6	11.2	11.6	4.5	7.1	4.6	4.3
Moisture	%	72.3	65.4	74.6	67.5	73.8	67.7	66.7	66	73	68.1	73.2	73.5

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-26

Results of PCB Aroclors and Conventionals for Wild Rainbow Trout Whole Body Composites from FSCA 2

Upper Columbia River RI/FS

Analyte	Units	RW2W15 Primary Sample	RW2W25 Primary Sample	RW2W35 Primary Sample	RW2W35 Field Duplicate	RW2W35 Field Triplicate	RW2W45 Primary Sample	RW2W53 Primary Sample
PCB Aroclor								
PCB-1016	µg/Kg WW	11 U	11 U	11 U	11 U	11 U	10.8 U	11 U
PCB-1221	µg/Kg WW	11 U	11 U	11 U	11 U	11 U	10.8 U	11 U
PCB-1232	µg/Kg WW	22 U	22 U	21 U	22 U	22 U	21.7 U	22 U
PCB-1242	µg/Kg WW	11 U	11 U	11 U	11 U	11 U	10.8 U	11 U
PCB-1248	µg/Kg WW	11 U	11 U	11 U	11 U	11 U	10.8 U	11 U
PCB-1254	µg/Kg WW	7.5 J	9.9 J	8.9 J	11	9.2 J	11 J	9
PCB-1254/1260	µg/Kg WW	-	-	-	-	-	-	-
PCB-1260	µg/Kg WW	18	18	20	20	22	23.3	15
PCB-1262	µg/Kg WW	11 U	11 U	11 U	11 U	11 U	10.8 U	11 U
PCB-1268	µg/Kg WW	11 U	11 U	11 U	11 U	11 U	10.8 U	11 U
Conventionals								
Lipids	%	7.6	10.7	10	9.9	9.7	6.7	4.8
Moisture	%	70.5	68	68.1	67.9	68.2	71	71.6

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-27

Results of PCB Aroclors and Conventionals for Wild Rainbow Trout Fillet and Offal Composites from FSCA 3

Upper Columbia River RI/FS

Analyte	Units	RW3F15 Primary Sample		RW3O15 Primary Sample		RW3F25 Primary Sample		RW3O25 Primary Sample	
PCB Aroclor									
PCB-1016	µg/Kg WW	11	U	11	U	11	U	11	U
PCB-1221	µg/Kg WW	11	U	11	U	11	U	11	U
PCB-1232	µg/Kg WW	22	U	22	U	22	U	22	U
PCB-1242	µg/Kg WW	11	U	11	U	11	U	11	U
PCB-1248	µg/Kg WW	11	U	11	U	11	U	11	U
PCB-1254	µg/Kg WW	-		-		-		-	
PCB-1254/1260	µg/Kg WW	8.2	J	16	J	8.8	J	15	J
PCB-1260	µg/Kg WW	-		-		-		-	
PCB-1262	µg/Kg WW	11	U	11	U	11	U	11	U
PCB-1268	µg/Kg WW	11	U	11	U	11	U	11	U
Conventionals									
Lipids	%	2.1		6.1		2.8		7.3	
Moisture	%	75.8		71.7		74.8		71	

[a] The F indicates that the sample consisted of fillets.

[b] The O indicates that the sample consisted of the offal.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-28
Results of PCB Aroclors and Conventionals for Wild Rainbow Trout
Whole Body Composites from FSCA 5
Upper Columbia River RI/FS

Analyte	Units	RW5W15 Primary Sample	
PCB Aroclor			
PCB-1016	µg/Kg WW	11	U
PCB-1221	µg/Kg WW	11	U
PCB-1232	µg/Kg WW	21	U
PCB-1242	µg/Kg WW	11	U
PCB-1248	µg/Kg WW	11	U
PCB-1254	µg/Kg WW	-	
PCB-1254/1260	µg/Kg WW	16	J
PCB-1260	µg/Kg WW	-	
PCB-1262	µg/Kg WW	11	U
PCB-1268	µg/Kg WW	11	U
Conventionals			
Lipids	%	8.2	
Moisture	%	68.7	

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-29

Results of PCB Aroclors and Conventionals for Wild Rainbow Trout Fillet and Offal Composites from FSCA 6

Upper Columbia River RI/FS

Analyte	Units	RW6F14 Primary Sample	RW6O14 Primary Sample
PCB Aroclor			
PCB-1016	µg/Kg WW	11 U	6.8 U
PCB-1221	µg/Kg WW	11 U	11 U
PCB-1232	µg/Kg WW	21 U	22 U
PCB-1242	µg/Kg WW	11 U	11 U
PCB-1248	µg/Kg WW	11 U	11 U
PCB-1254	µg/Kg WW	-	-
PCB-1254/1260	µg/Kg WW	5.7 J	15 J
PCB-1260	µg/Kg WW	-	-
PCB-1262	µg/Kg WW	11 U	11 U
PCB-1268	µg/Kg WW	11 U	11 U
Conventionals			
Lipids	%	1.4	6.3
Moisture	%	77.8	72.4

[a] The F indicates that the sample consisted of fillets.

[b] The O indicates that the sample consisted of the offal.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-30
Results of PCB Congeners for Wild Rainbow Trout Fillet, Offal, and Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, and FSCA 4
Upper Columbia River RI/FS

Analyte	Units	RW1F25 Primary Sample		RW1O25 Primary Sample		RW2W45 Primary Sample		RW3F15 Primary Sample		RW3O15 Primary Sample		RW5W15 Primary Sample	
PCB Congener													
PCB 1	µg/Kg WW	0.000908	KQ	0.00282	Q	0.00213	Q	0.000743	JQ	0.000999	UQ	0.00191	UQ
PCB 10	µg/Kg WW	0.000857	U	0.0019	U	0.00154	U	0.000544	U	0.000951	U	0.00222	U
PCB 103	µg/Kg WW	0.00807		0.0291		0.0192		0.00138		0.004		0.00632	
PCB 104	µg/Kg WW	0.000657	U	0.00144	U	0.00157	U	0.000205	U	0.000328	U	0.00109	U
PCB 105	µg/Kg WW	0.436		1.26	Q	1.01		0.0888		0.207		0.203	
PCB 106	µg/Kg WW	0.00289	U	0.0672		0.026	K	0.0007	U	0.00166	U	0.00181	U
PCB 107	µg/Kg WW	0.0502	C	0.147	C	0.0708	C	0.00934	C	0.0228	C	0.0236	K
PCB 109	µg/Kg WW	0.153		0.391		0.29		0.0216		0.0536		0.0603	
PCB 11	µg/Kg WW	0.0605		0.0671	B	0.0549	B	0.0472		0.0663		0.0658	B
PCB 110	µg/Kg WW	1.21	C	2.52	Q	2.2	C	0.2	C	0.479	C	0.786	C
PCB 111	µg/Kg WW	0.00297	K	0.00608	K	0.00132	U	0.000419	U	0.00109	U	0.00137	U
PCB 112	µg/Kg WW	0.0231		0.147		0.00133	U	0.00579	K	0.0232		0.00138	U
PCB 114	µg/Kg WW	0.0257		0.0773	Q	0.0655		0.00541	K	0.0127		0.0125	
PCB 118	µg/Kg WW	1.23		3.54	Q	2.09		0.245		0.596		0.552	
PCB 12	µg/Kg WW	0.000836	U	0.00141	U	0.00102	U	0.00037	U	0.000376	U	0.0011	U
PCB 120	µg/Kg WW	0.0177		0.0392	K	0.0184		0.00243		0.00582		0.00614	
PCB 121	µg/Kg WW	0.00122	U	0.00193	U	0.00229	K	0.000428	U	0.00112	U	0.00147	U
PCB 122	µg/Kg WW	0.00297	U	0.00329	U	0.00559	U	0.000742	U	0.00176	U	0.00201	U
PCB 123	µg/Kg WW	0.0168		0.0557		0.0218	K	0.00371	K	0.00954		0.0123	K
PCB 126	µg/Kg WW	0.00955	K	0.0343	Q	0.0082	U	0.00176	K	0.00343		0.00177	U
PCB 127	µg/Kg WW	0.00269	U	0.00299	UQ	0.00507	U	0.000685	U	0.00162	U	0.00183	U
PCB 128	µg/Kg WW	0.349	Q	0.146	KQ	0.491	Q	0.0741	C	0.165	C	0.174	C
PCB 129	µg/Kg WW	2.58	C	4.5	Q	5.97	Q	0.556	C	1.36	C	1.1	C
PCB 130	µg/Kg WW	0.144		0.462	Q	0.354		0.0293		0.0743		0.0627	
PCB 131	µg/Kg WW	0.00513		0.0129	K	0.00695	U	0.00122	U	0.00332	K	0.00439	U
PCB 132	µg/Kg WW	0.223		0.632		0.498		0.0505		0.129		0.172	
PCB 133	µg/Kg WW	0.0516		0.129	Q	0.124		0.0107		0.0232	K	0.0221	
PCB 134	µg/Kg WW	0.034		0.0853	Q	0.0674		0.00906		0.0222	K	0.0273	
PCB 135	µg/Kg WW	0.455	C	1.41	C	1.49	C	0.118	C	0.273	C	0.334	C
PCB 136	µg/Kg WW	0.0564		0.182	Q	0.117		0.0158		0.0411		0.0554	
PCB 137	µg/Kg WW	0.181		0.436	Q	0.354		0.0275		0.0547		0.00376	U
PCB 139	µg/Kg WW	0.044	C	0.115	C	0.0939	C	0.00698	C	0.0173	C	0.0185	K
PCB 14	µg/Kg WW	0.000884	U	0.00152	U	0.0011	U	0.000392	U	0.000399	U	0.00118	U
PCB 141	µg/Kg WW	0.237		0.669		0.8		0.0535		0.164		0.144	

Table B-30
Results of PCB Congeners for Wild Rainbow Trout Fillet, Offal, and Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, and FSCA 4
Upper Columbia River RI/FS

Analyte	Units	RW1F25 Primary Sample		RW1O25 Primary Sample		RW2W45 Primary Sample		RW3F15 Primary Sample		RW3O15 Primary Sample		RW5W15 Primary Sample	
PCB 142	µg/Kg WW	0.00318	U	0.00834	U	0.00708	U	0.00126	U	0.00232	U	0.00446	U
PCB 143	µg/Kg WW	0.00499		0.0125	K	0.00728	U	0.00117	U	0.0024		0.00459	U
PCB 144	µg/Kg WW	0.058		0.0958	Q	0.162		0.0138		0.0343		0.0339	
PCB 145	µg/Kg WW	0.00181	U	0.00462	U	0.00339	U	0.00049	U	0.00091	U	0.00367	U
PCB 146	µg/Kg WW	0.442	Q	1.11	Q	1.13		0.0867		0.202		0.185	
PCB 147	µg/Kg WW	0.986	C	2.61	C	2.51	C	0.219	C	0.55	C	0.612	C
PCB 148	µg/Kg WW	0.00393		0.00826		0.00575		0.000749	JK	0.00162		0.00487	U
PCB 15	µg/Kg WW	0.00801		0.012	QB	0.0101	KQE	0.00632		0.00903	Q	0.0122	B
PCB 150	µg/Kg WW	0.00186	U	0.00453	U	0.00333	U	0.000476	U	0.000885	U	0.0036	U
PCB 152	µg/Kg WW	0.00173	U	0.00473	U	0.00348	U	0.000523	U	0.000973	U	0.00376	U
PCB 153	µg/Kg WW	2.79	C	3.9	Q	8.21	E	0.571	C	1.39	C	1.15	C
PCB 154	µg/Kg WW	0.031		0.0873		0.0606		0.00562	K	0.0128		0.0156	
PCB 155	µg/Kg WW	0.00334		0.00871		0.00393	K	0.000626	J	0.00117	K	0.00236	U
PCB 156	µg/Kg WW	0.235	C	0.646	C	0.614	C	0.041	C	0.097	C	0.0545	C
PCB 158	µg/Kg WW	0.17		0.107	KQ	0.373	Q	0.0399		0.094		0.0773	
PCB 159	µg/Kg WW	0.0092		0.0251	K	0.0459		0.00272		0.00166	U	0.00281	U
PCB 16	µg/Kg WW	0.00534		0.0178	B	0.0152	B	0.00356		0.0063	Q	0.0182	B
PCB 160	µg/Kg WW	0.00218	U	0.00642	U	0.00545	U	0.000969	U	0.00178	U	0.00344	U
PCB 161	µg/Kg WW	0.0022	U	0.00607	U	0.00515	U	0.000937	U	0.00172	U	0.00325	U
PCB 162	µg/Kg WW	0.0222		0.0681		0.086		0.00491		0.0119		0.0106	K
PCB 164	µg/Kg WW	0.0945		0.212	KQ	0.269		0.0201		0.0591		0.0535	
PCB 165	µg/Kg WW	0.00212	U	0.00605	U	0.00514	U	0.000927	U	0.0017	U	0.00324	U
PCB 167	µg/Kg WW	0.0898		0.233		0.112		0.0188		0.0423		0.0265	
PCB 169	µg/Kg WW	0.00464		0.0103	K	0.00412	U	0.00104	U	0.00165	U	0.00242	U
PCB 17	µg/Kg WW	0.0112		0.0372	B	0.0227	B	0.00468		0.0105		0.0222	B
PCB 170	µg/Kg WW	0.446		1.27	Q	2.14		0.129		0.257	Q	0.173	
PCB 171	µg/Kg WW	0.128	C	0.411	C	0.625	C	0.0364	C	0.0803	C	0.0645	C
PCB 172	µg/Kg WW	0.105		0.23	Q	0.428	Q	0.0297	Q	0.0531	Q	0.0482	
PCB 174	µg/Kg WW	0.231		0.562		0.837		0.0761		0.162	K	0.174	
PCB 175	µg/Kg WW	0.0213		0.0174		0.0557		0.00596	K	0.0117	K	0.0129	
PCB 176	µg/Kg WW	0.0112		0.00908	Q	0.00222	U	0.00647		0.0129		0.0151	
PCB 177	µg/Kg WW	0.234		0.839		1.11		0.0836		0.194		0.142	
PCB 178	µg/Kg WW	0.0981	Q	0.0957	Q	0.272	Q	0.0395		0.0856		0.0737	
PCB 179	µg/Kg WW	0.063	Q	0.123	Q	0.247	Q	0.0298		0.0657		0.0796	
PCB 18	µg/Kg WW	0.0255	C	0.0806	B	0.0527	B	0.00935	C	0.0211	C	0.0477	B
PCB 180	µg/Kg WW	1.27	C	3.46	Q	6.1	C	0.342	C	0.705	C	0.444	C

Table B-30
Results of PCB Congeners for Wild Rainbow Trout Fillet, Offal, and Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, and FSCA 4
Upper Columbia River RI/FS

Analyte	Units	RW1F25 Primary Sample	RW1O25 Primary Sample	RW2W45 Primary Sample	RW3F15 Primary Sample	RW3O15 Primary Sample	RW5W15 Primary Sample
PCB 181	µg/Kg WW	0.00362	0.00621 U	0.00533 U	0.000689 U	0.00168 U	0.00266 U
PCB 182	µg/Kg WW	0.00351	0.231	0.00262 U	0.00099	0.0106	0.00582 U
PCB 183	µg/Kg WW	0.422 C	1.29 C	2.05 C	0.114 C	0.255 C	0.206 C
PCB 184	µg/Kg WW	0.0015 U	0.00781 KQ	0.0031 K	0.000598 JK	0.00108	0.00433 U
PCB 186	µg/Kg WW	0.00164 U	0.00685 U	0.00211 U	0.000605 U	0.000454 U	0.00469 U
PCB 187	µg/Kg WW	0.7 Q	0.142	1.81 Q	0.252	0.52	0.401
PCB 188	µg/Kg WW	0.00164 U	0.00706 U	0.00195 U	0.000494 U	0.001	0.00391 U
PCB 189	µg/Kg WW	0.0157	0.0441	0.0608	0.00395	0.00691	0.00296 U
PCB 19	µg/Kg WW	0.00131 K	0.00576 Q	0.00418 KQ	0.000885 JK	0.00159	0.00441
PCB 190	µg/Kg WW	0.105	0.233 Q	0.418	0.0271	0.046 Q	0.031
PCB 191	µg/Kg WW	0.0214	0.0511 K	0.102	0.00476	0.0197	0.00231 U
PCB 192	µg/Kg WW	0.00197 U	0.0053 U	0.00456 U	0.000595 U	0.00145 U	0.00227 U
PCB 194	µg/Kg WW	0.22	0.523 Q	0.95 Q	0.0523	0.0859 Q	0.0431
PCB 195	µg/Kg WW	0.081	0.241	0.389	0.0216	0.0447	0.0268
PCB 196	µg/Kg WW	0.143	0.531 Q	0.71	0.0453	0.0751	0.0591
PCB 197	µg/Kg WW	0.0152 C	0.0459 Q	0.0703 Q	0.00582 C	0.0115 C	0.00873 C
PCB 198	µg/Kg WW	0.306 C	0.695 Q	1.28 C	0.108 C	0.181 C	0.133 C
PCB 2	µg/Kg WW	0.00185 K	0.00465 K	0.00501 K	0.0019 K	0.00214 K	0.00692 K
PCB 20	µg/Kg WW	0.107 C	0.225 Q	0.213 C	0.0416 C	0.0724 Q	0.123 B
PCB 201	µg/Kg WW	0.0307	0.109	0.139	0.0111	0.0209	0.0165
PCB 202	µg/Kg WW	0.0571	0.143	0.208	0.0218	0.043	0.0334
PCB 203	µg/Kg WW	0.228	0.65 Q	0.859	0.051	0.0976	0.0664
PCB 204	µg/Kg WW	0.000834 U	0.00238 U	0.00139 U	0.000533 U	0.00103 U	0.00217 U
PCB 205	µg/Kg WW	0.00898	0.0243 Q	0.0428 Q	0.00296	0.00549 Q	0.00198 K
PCB 206	µg/Kg WW	0.115	0.256	0.297	0.0347	0.0637	0.0259
PCB 207	µg/Kg WW	0.0136	0.0254	0.0412	0.00527	0.00857	0.00522 K
PCB 208	µg/Kg WW	0.0268	0.0612 Q	0.0828	0.0129	0.0222	0.013
PCB 209	µg/Kg WW	0.0104	0.0184 KQ	0.0283 Q	0.00878	0.0147	0.00664
PCB 21	µg/Kg WW	0.0152 C	0.0279 B	0.0201 B	0.00872 C	0.0161 C	0.0211 B
PCB 22	µg/Kg WW	0.0126 Q	0.0149 QB	0.0124 QB	0.00764 Q	0.0152 Q	0.0222 QB
PCB 23	µg/Kg WW	0.000379 U	0.000786 U	0.000523 U	0.00019 U	0.000308 U	0.000448 U
PCB 24	µg/Kg WW	0.000478 JK	0.0012 J	0.000494 U	0.000201 J	0.000524 J	0.000644 JK
PCB 25	µg/Kg WW	0.00442	0.011	0.00754	0.00162	0.00373 Q	0.00511
PCB 26	µg/Kg WW	0.0152 C	0.0393 C	0.0239 C	0.0042 C	0.00987 Q	0.0173 C
PCB 27	µg/Kg WW	0.0012	0.00432	0.00295	0.000722 J	0.00167	0.00354
PCB 3	µg/Kg WW	0.00167	0.00208	0.00177 J	0.00128	0.0016 K	0.00215

Table B-30
Results of PCB Congeners for Wild Rainbow Trout Fillet, Offal, and Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, and FSCA 4
Upper Columbia River RI/FS

Analyte	Units	RW1F25 Primary Sample		RW1O25 Primary Sample		RW2W45 Primary Sample		RW3F15 Primary Sample		RW3O15 Primary Sample		RW5W15 Primary Sample	
PCB 31	µg/Kg WW	0.0901		0.196	Q	0.137	QB	0.0296		0.0544	Q	0.0843	QB
PCB 32	µg/Kg WW	0.00808		0.0212	B	0.0142	B	0.00233		0.00484		0.00853	B
PCB 34	µg/Kg WW	0.000377	U	0.000865	U	0.000576	U	0.000196	U	0.000317	U	0.000539	J
PCB 35	µg/Kg WW	0.000677	JK	0.00155	U	0.00114	U	0.000517	JK	0.000584	JK	0.000502	U
PCB 36	µg/Kg WW	0.000406	U	0.00141	U	0.00104	U	0.000216	U	0.000377	U	0.000456	U
PCB 37	µg/Kg WW	0.0159		0.0276	B	0.0196	B	0.00779		0.0118		0.0175	B
PCB 38	µg/Kg WW	0.000411	U	0.00141	U	0.00103	U	0.000223	U	0.000389	U	0.000455	U
PCB 39	µg/Kg WW	0.00106		0.00298	KQ	0.00209		0.000324	JK	0.000549	JK	0.00212	
PCB 4	µg/Kg WW	0.000982	UQ	0.0138	BQ	0.0126	QB	0.00148	KQ	0.00299	KQ	0.0126	QB
PCB 40	µg/Kg WW	0.0313	C	0.0801	C	0.0559	C	0.00769	C	0.0183	C	0.0433	C
PCB 41	µg/Kg WW	0.00496		0.0127		0.00603	K	0.00107	K	0.00232		0.00772	K
PCB 42	µg/Kg WW	0.0237		0.0577		0.0411		0.00585		0.0141		0.0269	
PCB 43	µg/Kg WW	0.00455		0.0106		0.0107	K	0.00121		0.00391	K	0.0071	K
PCB 44	µg/Kg WW	0.153	C	0.37	Q	0.392	C	0.0432	C	0.107	C	0.218	C
PCB 45	µg/Kg WW	0.0112	C	0.0295	Q	0.0226	C	0.00336	K	0.00691	Q	0.0196	C
PCB 46	µg/Kg WW	0.00249		0.00672	Q	0.00435	K	0.000603	JKQ	0.00153	KQ	0.00358	K
PCB 48	µg/Kg WW	0.0292		0.0794	Q	0.048		0.00676		0.0167		0.0348	
PCB 49	µg/Kg WW	0.126	C	0.367	C	0.33	C	0.0314	C	0.0828	C	0.161	C
PCB 5	µg/Kg WW	0.000873	U	0.0015	U	0.00108	U	0.00188	KQ	0.000398	U	0.00605	KQ
PCB 50	µg/Kg WW	0.0127	C	0.0363	C	0.028	C	0.00278	C	0.00642	Q	0.0164	C
PCB 52	µg/Kg WW	0.304		0.956		0.828		0.0731		0.183		0.401	
PCB 54	µg/Kg WW	0.000407	U	0.000545	JKQ	0.000449	U	0.000134	U	0.000153	U	0.000511	U
PCB 55	µg/Kg WW	0.00939		0.0141	K	0.00284	U	0.00253	K	0.00607		0.00222	K
PCB 56	µg/Kg WW	0.0154	K	0.0388		0.0324		0.00599	K	0.013		0.0298	
PCB 57	µg/Kg WW	0.00158	K	0.00417	K	0.00282	U	0.000623	J	0.00105	K	0.00141	U
PCB 58	µg/Kg WW	0.00284		0.00486		0.00258	U	0.000778	JK	0.00173		0.00129	U
PCB 59	µg/Kg WW	0.0138	C	0.0404	C	0.0322	C	0.00414	C	0.0102	C	0.0218	C
PCB 6	µg/Kg WW	0.000868	U	0.00581	BQ	0.00591	QB	0.00099		0.00145		0.00483	B
PCB 60	µg/Kg WW	0.0471		0.134		0.146		0.0129	Q	0.0324		0.0533	
PCB 61	µg/Kg WW	0.532	C	1.47	C	1.12	C	0.117	C	0.285	C	0.442	C
PCB 63	µg/Kg WW	0.0178		0.0405		0.0398		0.00392		0.00676	K	0.0139	K
PCB 64	µg/Kg WW	0.0896		0.242		0.223		0.0198		0.0525		0.121	
PCB 66	µg/Kg WW	0.236	Q	0.636	Q	0.623		0.0583		0.153		0.293	
PCB 67	µg/Kg WW	0.00647		0.0148		0.00925		0.00149	K	0.0029		0.00551	K
PCB 68	µg/Kg WW	0.0067	K	0.019		0.0123		0.00121		0.00295		0.00412	K
PCB 7	µg/Kg WW	0.000785	U	0.00138	U	0.00188	K	0.000372	U	0.000546	JK	0.00197	K

Table B-30
Results of PCB Congeners for Wild Rainbow Trout Fillet, Offal, and Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, and FSCA 4
Upper Columbia River RI/FS

Analyte	Units	RW1F25 Primary Sample	RW1O25 Primary Sample	RW2W45 Primary Sample	RW3F15 Primary Sample	RW3O15 Primary Sample	RW5W15 Primary Sample
PCB 72	µg/Kg WW	0.00822	0.0258	0.0148	0.00155	0.00351	0.00586
PCB 73	µg/Kg WW	0.00327	0.00552	0.00108 U	0.000803 J	0.00376	0.00412 K
PCB 77	µg/Kg WW	0.0152	0.0408	0.0244	0.00509	0.0111	0.0188
PCB 78	µg/Kg WW	0.000803 U	0.00219 U	0.00276 U	0.000425 U	0.000526 U	0.00138 U
PCB 79	µg/Kg WW	0.0175	0.0468 Q	0.04	0.00422	0.00908	0.0194
PCB 8	µg/Kg WW	0.00459 KQ	0.00778 KQE	0.00967 KQE	0.00348 Q	0.00549 Q	0.00899 KB
PCB 80	µg/Kg WW	0.000658 U	0.00191 U	0.00242 U	0.00037 U	0.000458 U	0.00121 U
PCB 81	µg/Kg WW	0.00186 K	0.0034 Q	0.00286 U	0.0005 U	0.000634 U	0.00131 U
PCB 82	µg/Kg WW	0.0168	0.0308	0.0225	0.00527	0.00979	0.00216 U
PCB 83	µg/Kg WW	0.0383	0.16	0.00229 U	0.00656 K	0.0201	0.00238 U
PCB 84	µg/Kg WW	0.0518	0.158	0.0967	0.0129	0.032	0.0532
PCB 85	µg/Kg WW	0.168 C	0.928 Q	0.575 C	0.0409 C	0.128 C	0.147 C
PCB 86	µg/Kg WW	0.551 C	1.48 Q	1.01 Q	0.105 C	0.258 C	0.386 C
PCB 88	µg/Kg WW	0.0813 C	0.26 C	0.188 C	0.0166 C	0.0384 C	0.0694 C
PCB 89	µg/Kg WW	0.00231 K	0.00472	0.00514 K	0.000914 J	0.0021 K	0.00492 K
PCB 9	µg/Kg WW	0.00116 K	0.00253 KQE	0.0028 KQE	0.000897 JK	0.000697 JK	0.00497 KB
PCB 90	µg/Kg WW	1.14 C	3.46 C	2.59 C	0.234 C	0.594 C	0.808 C
PCB 92	µg/Kg WW	0.257	0.824	0.576	0.0433	0.109 Q	0.173
PCB 93	µg/Kg WW	0.00937 C	0.0264 C	0.0147 C	0.00233 C	0.00644 Q	0.00614 C
PCB 94	µg/Kg WW	0.00175 U	0.00445 K	0.00255 K	0.000602 U	0.00157 U	0.00208 U
PCB 95	µg/Kg WW	0.435	1.31 Q	1.08	0.0916	0.19 Q	0.435
PCB 96	µg/Kg WW	0.00106 U	0.00347	0.00292 U	0.000393 U	0.000574 U	0.00198 U
PCB 98	µg/Kg WW	0.0153 C	0.0369 C	0.0366 C	0.00372 C	0.00743 C	0.0161 C
PCB 99	µg/Kg WW	0.748	2.1	1.9	0.121	0.298	0.451

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
[c] The W signifies that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-31

Results of Dioxins/Furans Analysis and Conventionals for Wild Rainbow Trout Fillet and Offal Composites from FSCA 1

Upper Columbia River RI/FS

Analyte	Units	RW1F15 Primary Sample	RW1O15 Primary Sample	RW1F25 Primary Sample	RW1O25 Primary Sample	RW1F35 Primary Sample	RW1O35 Primary Sample	RW1O35 Field Duplicate	RW1O35 Field Triplicate	RW1F45 Primary Sample	RW1O45 Primary Sample	RW1F55 Primary Sample	RW1F55 Field Duplicate
Dioxins/Furans													
2,3,7,8-TCDD	µg/Kg WW	0.000153 EMPC	0.000203 U	0.000214 U	0.000179 U	0.000204 U	0.000204 U	-	-	0.000227 U	0.000278 U	0.000202 U	0.000157 U
1,2,3,7,8-PeCDD	µg/Kg WW	9.97E-05 EMPC	0.000424	0.000267 EMPC	0.000637 EMPC	0.00027 EMPC	0.000528 EMPC	-	-	0.000174 EMPC	0.00065 EMPC	0.000253 EMPC	0.000148 U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000223 U	0.000217 U	0.00023 U	0.000199 U	0.000254 U	0.000217 U	-	-	0.000198 U	0.000368 U	0.000257 U	0.000239 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000208 U	0.000225	0.000211 U	0.00028	0.000239 U	0.000299	-	-	0.000185 U	0.000348 U	0.000242 U	0.000219 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000221 U	0.00023	0.000226 U	0.000198 U	0.000252 U	0.000219 U	-	-	0.000196 U	0.000367 U	0.000256 U	0.000234 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000224 EMPC	0.000261	0.000191	0.000327	0.000148	0.000321	-	-	0.000318	0.000414	0.000297	0.000192
OCDD	µg/Kg WW	0.00124	0.00119	0.00115	0.000915	0.000995	0.00094	-	-	0.00138	0.00116	0.00109	0.000824
2,3,7,8-TCDF	µg/Kg WW	0.00242	0.00442	0.000543	0.00146	0.000662	0.00139	-	-	0.000534	0.00135	0.000631	0.000632
1,2,3,7,8-PeCDF	µg/Kg WW	0.000113 EMPC	0.00016	9.55E-05	0.000161	9.51E-05	0.000194	-	-	0.0000947	0.000212	0.000118	0.000104
2,3,4,7,8-PeCDF	µg/Kg WW	0.000171	0.000237	0.000132	0.000269 EMPC	0.000129	0.000231	-	-	0.000152	0.000271	0.000155	0.000135
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000134 U	0.000124 U	0.000128 U	0.000119 U	0.000154 U	0.000131 U	-	-	0.00012 U	0.000181 U	0.000159 U	0.000109 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000127 U	0.000119 U	0.000124 U	0.000113 U	0.000144 U	0.000123 U	-	-	0.000122 U	0.000179 U	0.00016 U	0.000107 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000213 U	0.000193 U	0.000193 U	0.000173 U	0.000246 U	0.000192 U	-	-	0.000185 U	0.000292 U	0.000246 U	0.00018 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000136 U	0.000127 U	0.000127 U	0.000118 U	0.00015 U	0.000135 U	-	-	0.000131 U	0.000187 U	0.00016 U	0.000115 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	7.67E-05	0.000121 U	0.000167 U	0.000132 U	0.000132 U	0.00011 U	-	-	0.000128 U	0.000134 U	0.000196	0.000162 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000233 U	0.000181 U	0.000245 U	0.000195 U	0.000203 U	0.000159 U	-	-	0.000193 U	0.000206 U	0.000227 U	0.000242 U
OCDF	µg/Kg WW	0.000462 U	0.00045 U	0.000633 U	0.000423 U	0.000426 U	0.00039 U	-	-	0.000417 U	0.00031 U	0.000496 U	0.000442 U
TCDD	µg/Kg WW	0.000165 U	0.000203 U	0.000214 U	0.000179 U	0.000204 U	0.000204 U	-	-	0.000227 U	0.000278 U	0.000202 U	0.000157 U
TCDF	µg/Kg WW	0.00242	0.00496	0.000543	0.00207	0.000662	0.00201	-	-	0.000778	0.00206	0.000631	0.000844
PeCDD	µg/Kg WW	0.000143 U	0.000609	0.000139 U	0.000363	0.000104 U	0.000123 U	-	-	0.0000889 U	0.000164 U	0.000109 U	0.000148 U
PeCDF	µg/Kg WW	0.000171	0.000489	0.000227	0.000443	0.000225	0.000613	-	-	0.000246	0.000636	0.000273	0.000239
HxCDD	µg/Kg WW	0.000208 U	0.000455	0.000211 U	0.00028	0.000239 U	0.000299	-	-	0.000185 U	0.000348 U	0.000242 U	0.000219 U
HxCDF	µg/Kg WW	0.000127 U	0.000125	0.000124 U	9.59E-05	0.000144 U	0.000123 U	-	-	0.00012 U	0.00012	0.000159 U	0.000107 U
HpCDD	µg/Kg WW	0.000287 U	0.00172	0.000191	0.000522	0.000148	0.000556	-	-	0.000318	0.00196	0.000297	0.000192
HpCDF	µg/Kg WW	7.67E-05	0.000121 U	0.000167 U	0.000132 U	0.000132 U	0.00011 U	-	-	0.000128 U	0.000134 U	0.000196	0.000162 U
Conventionals													
Lipids	%	6	11.9	3.1	9.9	4.1	6.6	11.2	11.6	4.5	7.1	4.6	4.3
Moisture	%	72.3	65.4	74.6	67.5	73.8	67.7	66.7	66	73	68.1	73.2	73.5

[a] The F indicates that the sample consisted of fillets.

[b] The O indicates that the sample consisted of offal.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-32
Results of Dioxins/Furans Analysis and Conventionals for Wild Rainbow Trout Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	RW2W15 Primary Sample	RW2W25 Primary Sample	RW2W35 Primary Sample	RW2W35 Field Duplicate	RW2W35 Field Triplicate	RW2W45 Primary Sample	RW2W53 Primary Sample
Dioxins/Furans								
2,3,7,8-TCDD	µg/Kg WW	0.000376 U	0.000373 U	0.000379 U	0.000358 U	0.000337 U	0.000368 U	0.000288 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000772 EMPC	0.000541	0.000689	0.000603 EMPC	0.000527 EMPC	0.000726	0.000351 EMPC
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000413 U	0.00046 U	0.000387 U	0.000446 U	0.000504 U	0.000555 U	0.000404 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000491	0.000494 U	0.000393	0.000435 U	0.000521	0.000555 U	0.000354 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000427 U	0.000503 U	0.000391 U	0.000464 U	0.000514 U	0.000585 U	0.000398 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000552	0.000773	0.00037	0.000492 EMPC	0.000376 EMPC	0.000582	0.000605
OCDD	µg/Kg WW	0.0012 EMPC	0.00142	0.00133	0.00128	0.00145	0.00189	0.00221
2,3,7,8-TCDF	µg/Kg WW	0.00225	0.00154	0.00324	0.00328	0.00331	0.00395	0.00467
1,2,3,7,8-PeCDF	µg/Kg WW	0.000216	0.000178	0.000207	0.000232 EMPC	0.00019	0.000189	0.000176 U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000231 EMPC	0.000247	0.000256	0.000242	0.000243	0.000195 EMPC	0.000195
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000238 U	0.000282 U	0.000167 U	0.000295 U	0.00028 U	0.000316 U	0.000205 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000229 U	0.000265 U	0.000164 U	0.000254 U	0.000268 U	0.000305 U	0.000189 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000323 U	0.00041 U	0.000238 U	0.000372 U	0.000372 U	0.000423 U	0.000258 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000241 U	0.000302 U	0.000188 U	0.000278 U	0.000278 U	0.000302 U	0.000193 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000258	0.000276 U	0.000257 U	0.000228 U	0.000333 U	0.00018 U	0.00025 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000424 U	0.000406 U	0.000378 U	0.000348 U	0.000462 U	0.000259 U	0.000379 U
OCDF	µg/Kg WW	0.000602 U	0.00077 U	0.000696 U	0.000663 U	0.000612 U	0.000618 U	0.000644 U
TCDD	µg/Kg WW	0.000376 U	0.000373 U	0.000379 U	0.000358 U	0.000337 U	0.000368 U	0.000288 U
TCDF	µg/Kg WW	0.00225	0.00198	0.00324	0.00328	0.00357	0.00395	0.00467
PeCDD	µg/Kg WW	0.000283 U	0.000541	0.000689	0.00025 U	0.000277 U	0.000726	0.000266 U
PeCDF	µg/Kg WW	0.000216	0.000576	0.000978	0.000523	0.001	0.000189	0.000195
HxCDD	µg/Kg WW	0.000491	0.00046 U	0.000393	0.000435 U	0.000521	0.000555 U	0.000354 U
HxCDF	µg/Kg WW	0.000229 U	0.000265 U	0.000164 U	0.000254 U	0.000268 U	0.000302 U	0.000189 U
HpCDD	µg/Kg WW	0.000552	0.000773	0.000742	0.000246	0.00111	0.000582	0.000605
HpCDF	µg/Kg WW	0.000258	0.000276 U	0.000257 U	0.000228 U	0.000333 U	0.00018 U	0.00025 U
Conventionals								
Lipids	%	7.6	10.7	10	9.9	9.7	6.7	4.8
Moisture	%	70.5	68	68.1	67.9	68.2	71	71.6

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-33

Results of Dioxins/Furans Analysis and Conventionals for Wild Rainbow Trout Fillet and Offal Composites from FSCA 3

Upper Columbia River RI/FS

Analyte	Units	RW3F15 Primary Sample	RW3O15 Primary Sample	RW3F25 Primary Sample	RW3O25 Primary Sample
Dioxins/Furans					
2,3,7,8-TCDD	µg/Kg WW	0.000433 U	0.000369 U	0.000394 U	0.000399 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000195	0.000264 EMPC	0.000248	0.00104 EMPC
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000493 U	0.00038 U	0.00037 U	0.000408 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000465 U	0.000418	0.00036 U	0.000327
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000504 U	0.000402 U	0.000383 U	0.000437 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000628 U	0.000402	0.00055 U	0.000507
OCDD	µg/Kg WW	0.000613	0.000973	0.00129 U	0.00109 U
2,3,7,8-TCDF	µg/Kg WW	0.000684	0.00136	0.000843	0.00145
1,2,3,7,8-PeCDF	µg/Kg WW	0.000172 U	0.000129 U	0.000182 U	0.000158 U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000134	0.000178	0.000176 U	0.000217
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.00025 U	0.000205 U	0.000255 U	0.00023 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000231 U	0.000188 U	0.000243 U	0.00022 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000324 U	0.000268 U	0.000328 U	0.000294 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000254 U	0.0002 U	0.000244 U	0.000224 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000377 U	0.000315 U	0.000343 U	0.000189 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000549 U	0.000459 U	0.000464 U	0.000283 U
OCDF	µg/Kg WW	0.000812 U	0.000682 U	0.000606 U	0.000737 U
TCDD	µg/Kg WW	0.000433 U	0.000369 U	0.000394 U	0.000399 U
TCDF	µg/Kg WW	0.000684	0.00136	0.000843	0.00145
PeCDD	µg/Kg WW	0.000195	0.000168 U	0.000248	0.000372 U
PeCDF	µg/Kg WW	0.000134	0.000178	0.000176 U	0.000217
HxCDD	µg/Kg WW	0.000465 U	0.000418	0.00036 U	0.000327
HxCDF	µg/Kg WW	0.000231 U	0.000188 U	0.000243 U	0.00022 U
HpCDD	µg/Kg WW	0.000628 U	0.000402	0.00055 U	0.000507
HpCDF	µg/Kg WW	0.000377 U	0.000315 U	0.000343 U	0.000189 U
Conventionals					
Lipids	%	2.1	6.1	2.8	7.3
Moisture	%	75.8	71.7	74.8	71

[a] The F indicates that the sample consisted of fillets.

[b] The O indicates that the sample consisted of offal.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-34
Results of Dioxins/Furans Analysis and Conventionals for Wild Rainbow Trout
Whole Body Composites from FSCA 5
Upper Columbia River RI/FS

Analyte	Units	RW5W15 Primary Sample	
Dioxins/Furans			
2,3,7,8-TCDD	µg/Kg WW	0.000204	U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000317	EMPC
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000388	U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000359	U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000393	U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000268	
OCDD	µg/Kg WW	0.00078	
2,3,7,8-TCDF	µg/Kg WW	0.00184	
1,2,3,7,8-PeCDF	µg/Kg WW	0.000218	EMPC
2,3,4,7,8-PeCDF	µg/Kg WW	0.000239	
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000105	
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.0000899	
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000126	
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.00017	U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000145	U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000215	U
OCDF	µg/Kg WW	0.000448	U
TCDD	µg/Kg WW	0.000204	U
TCDF	µg/Kg WW	0.00184	
PeCDD	µg/Kg WW	0.000147	U
PeCDF	µg/Kg WW	0.000239	
HxCDD	µg/Kg WW	0.000359	U
HxCDF	µg/Kg WW	0.000321	
HpCDD	µg/Kg WW	0.000268	
HpCDF	µg/Kg WW	0.000145	U
Conventionals			
Lipids	%	8.2	
Moisture	%	68.7	

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-35
Results of Dioxins/Furans Analysis and Conventionals for Wild Rainbow Trout Fillet and Offal Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RW6F14 Primary Sample		RW6O14 Primary Sample	
Dioxins/Furans					
2,3,7,8-TCDD	µg/Kg WW	9.42E-05	U	0.000308	U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000179	EMPC	0.000662	EMPC
1,2,3,4,7,8-HxCDD	µg/Kg WW	8.84E-05	U	0.000319	U
1,2,3,6,7,8-HxCDD	µg/Kg WW	9.05E-05	U	0.000288	U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000076		0.000318	U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000152		0.000303	
OCDD	µg/Kg WW	0.000616		0.000688	
2,3,7,8-TCDF	µg/Kg WW	0.000559		0.00137	
1,2,3,7,8-PeCDF	µg/Kg WW	0.000123		0.000248	
2,3,4,7,8-PeCDF	µg/Kg WW	0.00014	EMPC	0.000198	
1,2,3,4,7,8-HxCDF	µg/Kg WW	7.41E-05		0.000174	U
1,2,3,6,7,8-HxCDF	µg/Kg WW	8.97E-05		0.000167	U
1,2,3,7,8,9-HxCDF	µg/Kg WW	6.24E-05		0.000273	U
2,3,4,6,7,8-HxCDF	µg/Kg WW	6.63E-05		0.000179	U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	6.63E-05		0.000148	U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	8.58E-05		0.000223	U
OCDF	µg/Kg WW	0.000135	U	0.000466	U
TCDD	µg/Kg WW	9.42E-05	U	0.000308	U
TCDF	µg/Kg WW	0.000559		0.00137	
PeCDD	µg/Kg WW	0.000056	U	0.000218	U
PeCDF	µg/Kg WW	0.000123		0.000446	
HxCDD	µg/Kg WW	0.000076		0.000288	U
HxCDF	µg/Kg WW	0.000292		0.000167	U
HpCDD	µg/Kg WW	0.000244		0.000303	
HpCDF	µg/Kg WW	0.000152		0.000148	U
Conventionals					
Lipids	%	1.4		6.3	
Moisture	%	77.8		72.4	

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-36
Results of TAL Metals, Mercury, and Arsenic Speciation for Hatchery Rainbow Trout Fillet and Offal Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	RH3F15 Primary Sample	RH3O15 Primary Sample	RH3F25 Primary Sample	RH3O25 Primary Sample	RH3F35 Primary Sample	RH3O35 Primary Sample
TAL Metals							
Aluminum	mg/Kg WW	3.765 U	54.6	3.645 U	22.4954	3.66 U	60.554
Antimony	mg/Kg WW	0.1004 U	0.1092 U	0.0972 U	0.1096 U	0.0976 U	0.1096 U
Arsenic	mg/Kg WW	0.06275 U	0.14469	0.06075 U	0.13152	0.061 U	0.14796
Barium	mg/Kg WW	0.1255 U	3.0303	0.1215 U	1.18368	0.122 U	2.8496
Beryllium	mg/Kg WW	0.00502 U	0.00546 U	0.00486 U	0.00548 U	0.00488 U	0.00548 U
Cadmium	mg/Kg WW	0.01255 U	0.12285	0.01215 U	0.12056	0.0122 U	0.10138
Calcium	mg/Kg WW	341.36 J	14687.4 J	250.29 J	9973.6 J	441.64 J	12330 J
Chromium	mg/Kg WW	0.5271	1.01829	0.2673	0.6028	0.2684	1.11244
Cobalt	mg/Kg WW	0.00878	0.06006	0.00632	0.03836	0.00634	0.05754
Copper	mg/Kg WW	0.4016	4.6137	0.3159	2.9866	0.3172	4.5484
Iron	mg/Kg WW	4.9698	81.354	3.3777	41.922	3.9528	81.378
Lead	mg/Kg WW	0.01255 U	0.4095	0.01215 U	0.12604	0.0122 U	0.3836
Magnesium	mg/Kg WW	306.22	404.04	272.16	342.5	283.04	375.38
Manganese	mg/Kg WW	0.16315	4.7229	0.11178	2.7948	0.17812	5.3156
Nickel	mg/Kg WW	0.13303	0.6006	0.05589	0.411	0.0366 U	0.69596
Potassium	mg/Kg WW	4869.4	2784.6	4325.4	2822.2	4587.2	2904.4
Selenium	mg/Kg WW	0.4267	0.6825	0.3402	0.6028	0.3172	0.6576
Silver	mg/Kg WW	0.06275 U	0.06825 U	0.06075 U	0.0685 U	0.061 U	0.0685 U
Sodium	mg/Kg WW	414.15	1381.38	349.92	1233	373.32	1323.42
Thallium	mg/Kg WW	0.06275 U	0.06825 U	0.06075 U	0.0685 U	0.061 U	0.0685 U
Uranium	mg/Kg WW	0.00125 U	0.01553	0.00122 U	0.00444	0.00122 U	0.01523
Vanadium	mg/Kg WW	0.1004 U	0.16107	0.0972 U	0.1096 U	0.0976 U	0.1644
Zinc	mg/Kg WW	7.7308	41.223	6.5367	36.168	8.0032	36.716
Mercury							
Mercury	µg/Kg WW	63.1	45.2	74.1	45.8	63.1	44.6
Arsenic Species							
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	28.222	-	-
ASB + Cation	µg/Kg WW	-	-	-	11.234 UJ	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	2.466 J	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	11.234 U	-	-
Unknown	µg/Kg WW	-	-	-	27.126 J	-	-
Conventionals							
Lipids	%	11	4.4	2	5	1.9	5.2
Moisture	%	74.9	72.7	75.7	72.6	75.6	72.6

[a] The F indicates that the sample consisted of fillets.

[b] The O indicates that the sample consisted of offal.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-37
Results of TAL Metals, Mercury, and Arsenic Speciation for Hatchery Rainbow Trout Whole Body Composites from FSCA 4
Upper Columbia River RI/FS

Analyte	Units	RH4W15 Primary Sample	RH4W25 Primary Sample	RH4W35 Primary Sample	RH4W45 Primary Sample	RH4W55 Primary Sample
TAL Metals						
Aluminum	mg/Kg WW	4.51	17.8514	8.232	5.44	8.8548
Antimony	mg/Kg WW	0.11 U	0.1148 U	0.112 U	0.10608 U	0.1128 U
Arsenic	mg/Kg WW	0.08525	0.09184	0.126	0.08976	0.1269
Barium	mg/Kg WW	0.3465	0.61705	0.336	0.28288	0.4653
Beryllium	mg/Kg WW	0.0055 U	0.00574 U	0.0056 U	0.00544 U	0.00564 U
Cadmium	mg/Kg WW	0.0605	0.05453	0.0588	0.03808	0.03948
Calcium	mg/Kg WW	3932.5 J	4333.7 J	3612 J	3427.2	5583.6
Chromium	mg/Kg WW	0.495	0.5166	0.532	0.408	0.5076
Cobalt	mg/Kg WW	0.01705	0.02239	0.01764	0.01414	0.01692
Copper	mg/Kg WW	0.605	0.89544	0.7056	0.544	0.564
Iron	mg/Kg WW	15.345	27.4659	18.396	14.8784	15.8484
Lead	mg/Kg WW	0.01375 U	0.01665	0.01456	0.0136	0.0141 U
Magnesium	mg/Kg WW	302.5	324.31	302.4	285.6	307.38
Manganese	mg/Kg WW	0.98175	1.56702	1.0248	0.86768	1.09134
Nickel	mg/Kg WW	0.15125	0.18081	0.14	0.1224	0.18894
Potassium	mg/Kg WW	3547.5	3817.1	3472	3808	3525
Selenium	mg/Kg WW	0.4125	0.4592	0.504	0.408	0.5358
Silver	mg/Kg WW	0.06875 U	0.07175 U	0.07 U	0.068 U	0.0705 U
Sodium	mg/Kg WW	811.25	840.91	837.2	905.76	916.5
Thallium	mg/Kg WW	0.06875 U	0.07175 U	0.07 U	0.068 U	0.0705 U
Uranium	mg/Kg WW	0.00138 U	0.00144 U	0.0014 U	0.00136 U	0.00141 U
Vanadium	mg/Kg WW	0.11 U	0.1148 U	0.112 U	0.10608 U	0.1128 U
Zinc	mg/Kg WW	21.23	24.4237	24.5	22.2496	22.842
Mercury						
Mercury	µg/Kg WW	71.5	75.2	56.6	57.6	64.8
Arsenic Species						
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	11.48 U	-
ASB + Cation	µg/Kg WW	-	-	-	11.48 UJ	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	3.08 J	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	11.48 U	-
Unknown	µg/Kg WW	-	-	-	21.28 J	-
Conventionals						
Lipids	%	5.2	5.2	5.2	4.9	6.2
Moisture	%	72.5	71.3	72	72.8	71.8

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-38
Results of TAL Metals, Mercury, and Arsenic Speciation for Hatchery Rainbow Trout Whole Body Composites from FSCA 5
Upper Columbia River RI/FS

Analyte	Units	RH5W15 Primary Sample	RH5W25 Primary Sample	RH5W35 Primary Sample	RH5W45 Primary Sample	RH5W55 Primary Sample	RH5W55 Field Duplicate	RH5W55 Field Triplicate
TAL Metals								
Aluminum	mg/Kg WW	10.998	4.788	23.54	4.6956	7.378	5.082	7.0143
Antimony	mg/Kg WW	0.1128 U	0.112 U	0.11 U	0.1092 U	0.124 U	0.1232 U	0.12051 U
Arsenic	mg/Kg WW	0.141	0.1064	0.1375	0.1365	0.1674	0.16016	0.15759
Barium	mg/Kg WW	0.68526	0.3948	0.87725	0.3549	0.403	0.41272	0.46968
Beryllium	mg/Kg WW	0.00564 U	0.0056 U	0.0055 U	0.00546 U	0.0062 U	0.00616 U	0.00618 U
Cadmium	mg/Kg WW	0.05076	0.02156	0.04675	0.04095	0.0372	0.03388	0.03708
Calcium	mg/Kg WW	5245.2	5852	4950	4013.1	3782	4466	4758.6
Chromium	mg/Kg WW	0.3948	0.532	0.6325	0.546	0.62	0.5544	0.5253
Cobalt	mg/Kg WW	0.02482	0.01764	0.033	0.02048	0.01922	0.02125	0.02101
Copper	mg/Kg WW	0.564	0.448	0.85525	0.546	0.62	0.5852	0.5253
Iron	mg/Kg WW	18.8658	15.4	33.825	15.7521	16.771	17.4636	16.3152
Lead	mg/Kg WW	0.0141 U	0.014 U	0.02172	0.01365 U	0.0155 U	0.0154 U	0.01514 U
Magnesium	mg/Kg WW	307.38	319.2	302.5	292.11	281.17	301.224	291.696
Manganese	mg/Kg WW	1.79916	1.2488	1.837	1.51515	1.4911	1.53692	1.64388
Nickel	mg/Kg WW	0.1833	0.2072	0.242	0.15015	0.1364	0.154	0.16686
Potassium	mg/Kg WW	3778.8	3612	3657.5	3740.1	3534	3603.6	3460.8
Selenium	mg/Kg WW	0.3948	0.308	0.385	0.4368	0.403	0.3696	0.3399
Silver	mg/Kg WW	0.0705 U	0.07 U	0.06875 U	0.06825 U	0.0775 U	0.077 U	0.07725 U
Sodium	mg/Kg WW	975.72	868	924	868.14	852.5	853.16	825.03
Thallium	mg/Kg WW	0.0705 U	0.07 U	0.06875 U	0.06825 U	0.0775 U	0.077 U	0.07725 U
Uranium	mg/Kg WW	0.00141	0.0014 U	0.00204	0.00136 U	0.00155 U	0.00154 U	0.00155 U
Vanadium	mg/Kg WW	0.1128 U	0.112 U	0.11 U	0.1092 U	0.124 U	0.1232 U	0.12051 U
Zinc	mg/Kg WW	24.534	23.464	26.235	22.9047	19.84	24.2088	21.8154
Mercury								
Mercury	µg/Kg WW	70.7	67.3	58.5	60.1	60.4	62.8	63.5
Arsenic Species								
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	11.48 U	-	-	-	-	-
ASB + Cation	µg/Kg WW	-	11.48 UJ	-	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	3.92 J	-	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	11.48 U	-	-	-	-	-
Unknown	µg/Kg WW	-	8.68 J	-	-	-	-	-
Conventionals								
Lipids	%	6.3	6.5	5.3	5.2	9	9.4	9.7
Moisture	%	71.8	72	72.5	72.7	69	69.2	69.1

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-39

Results of TAL Metals, Mercury, and Arsenic Speciation for Hatchery Rainbow Trout Fillet and Offal Composites from FSCA 6

Upper Columbia River RI/FS

Analyte	Units	RH6F15 Primary Sample	RH6F15 Field Duplicate	RH6O15 Primary Sample	RH6O15 Field Duplicate	RH6F25 Primary Sample	RH6O25 Primary Sample	RH6F35 Primary Sample	RH6O35 Primary Sample	RH6F45 Primary Sample	RH6O45 Primary Sample
TAL Metals											
Aluminum	mg/Kg WW	3.675 U	3.645 U	9.4783	10.0548	3.645 U	7.5438	3.645 U	7.6095	3.705 U	7.493
Antimony	mg/Kg WW	0.098 U	0.0972 U	0.1196 U	0.1176 U	0.0972 U	0.1188 U	0.0972 U	0.114 U	0.0988 U	0.118 U
Arsenic	mg/Kg WW	0.08085	0.06075 U	0.16146	0.1323	0.06075 U	0.12771	0.06075 U	0.10545	0.06175 U	0.1475
Barium	mg/Kg WW	0.1225 U	0.1215 U	0.90597	0.8526	0.1215 U	1.03653	0.1215 U	0.7011	0.1235 U	0.75815
Beryllium	mg/Kg WW	0.0049 U	0.00486 U	0.00598 U	0.00588 U	0.00486 U	0.00594 U	0.00486 U	0.0057 U	0.00494 U	0.0059 U
Cadmium	mg/Kg WW	0.01225 U	0.01215 U	0.10465	0.11172	0.01215 U	0.09801	0.01215 U	0.06555	0.01235 U	0.0767
Calcium	mg/Kg WW	242.795	381.51	10046.4	8790.6	217.485	13186.8	311.04	8607	311.22	11416.5
Chromium	mg/Kg WW	0.3675	0.3159	0.3887	0.4116	0.3402	0.3564	0.3645	0.342	0.2964	0.3245
Cobalt	mg/Kg WW	0.00588	0.00632	0.04186	0.03528	0.00608	0.03861	0.00559	0.03135	0.0084	0.04425
Copper	mg/Kg WW	0.2695	0.2916	0.598	0.5586	0.243	0.4752	0.2673	0.57	0.2717	0.59
Iron	mg/Kg WW	3.283	4.6656	29.4515	34.692	4.374	31.779	3.9123	30.495	3.5815	27.2875
Lead	mg/Kg WW	0.01225 U	0.01215 U	0.01555	0.02881	0.01215 U	0.02822	0.01215 U	0.01482	0.01235 U	0.02094
Magnesium	mg/Kg WW	257.25	267.3	325.91	320.46	250.29	386.1	264.87	316.35	261.82	356.95
Manganese	mg/Kg WW	0.1421	0.16524	2.64615	2.31378	0.11907	2.9997	0.12879	2.0805	0.18525	2.85855
Nickel	mg/Kg WW	0.03675 U	0.04617	0.3289	0.3234	0.03645 U	0.4455	0.03645 U	0.285	0.03705 U	0.354
Potassium	mg/Kg WW	4263	4422.6	2499.64	2654.82	4276.8	2465.1	4398.3	2727.45	4297.8	2492.75
Selenium	mg/Kg WW	0.294	0.2187	0.3588	0.3528	0.21141	0.3564	0.243	0.3705	0.21489	0.3245
Silver	mg/Kg WW	0.06125 U	0.06075 U	0.07475 U	0.0735 U	0.06075 U	0.07425 U	0.06075 U	0.07125 U	0.06175 U	0.07375 U
Sodium	mg/Kg WW	409.15	493.29	1441.18	1608.18	478.71	1648.35	454.41	1425	412.49	1401.25
Thallium	mg/Kg WW	0.06125 U	0.06075 U	0.07475 U	0.0735 U	0.06075 U	0.07425 U	0.06075 U	0.07125 U	0.06175 U	0.07375 U
Uranium	mg/Kg WW	0.00122 U	0.00122 U	0.00208	0.00217	0.00122 U	0.00279	0.00122 U	0.00143 U	0.00124 U	0.00148 U
Vanadium	mg/Kg WW	0.098 U	0.0972 U	0.1196 U	0.1176 U	0.0972 U	0.1188 U	0.0972 U	0.114 U	0.0988 U	0.118 U
Zinc	mg/Kg WW	6.517	8.1891	41.561	42.63	7.6545	45.738	7.047	44.46	6.3973	45.725
Mercury											
Mercury	µg/Kg WW	79.7	101	53.5	67.7	122	82.5	107	63.9	81.1	54.1
Arsenic Species											
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	-	-	-	-	-	-	12.095 U
ASB + Cation	µg/Kg WW	-	-	-	-	-	-	-	-	-	12.095 UJ
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	-	-	-	-	-	13.275 J
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	-	-	-	-	-	12.095 U
Unknown	µg/Kg WW	-	-	-	-	-	-	-	-	-	22.715 J
Conventionals											
Lipids	%	2.7	2.8	9	9.5	2.5	8.6	2.2	8.2	2.2	8.9
Moisture	%	75.5	75.7	70.1	70.6	75.7	70.3	75.7	71.5	75.3	70.5

[a] The F indicates that the sample consisted of fillets.

[b] The O indicates that the sample consisted of offal.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-40
Results of PCB Aroclors, and Conventionals for Hatchery Rainbow Trout Fillet and Offal Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	RH3F15 Primary Sample	RH3O15 Primary Sample	RH3F25 Primary Sample	RH3O25 Primary Sample	RH3F35 Primary Sample	RH3O35 Primary Sample
PCB Aroclor							
PCB-1016	µg/Kg WW	11 U	11 U	10 U	11 U	10 U	10 U
PCB-1221	µg/Kg WW	11 U	11 U	10 U	11 U	10 U	10 U
PCB-1232	µg/Kg WW	22 U	22 U	20 U	22 U	20 U	21 U
PCB-1242	µg/Kg WW	11 U	11 U	10 U	11 U	10 U	10 U
PCB-1248	µg/Kg WW	11 U	11 U	10 U	11 U	10 U	10 U
PCB-1254	µg/Kg WW	-	-	-	-	-	-
PCB-1254/1260	µg/Kg WW	10 J	11 J	5 J	9.7 J	6.1 J	9.1 J
PCB-1260	µg/Kg WW	-	-	-	-	-	-
PCB-1262	µg/Kg WW	11 U	11 U	10 U	11 U	10 U	10 U
PCB-1268	µg/Kg WW	11 U	11 U	10 U	11 U	10 U	10 U
Conventionals							
Lipids	%	11	4.4	2	5	1.9	5.2
Moisture	%	74.9	72.7	75.7	72.6	75.6	72.6

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-41
Results of PCB Aroclors and Conventionals for Hatchery Rainbow Trout Whole Body Composites from FSCA 4
Upper Columbia River RI/FS

Analyte	Units	RH4W15 Primary Sample	RH4W25 Primary Sample	RH4W35 Primary Sample	RH4W45 Primary Sample	RH4W55 Primary Sample
PCB Aroclor						
PCB-1016	µg/Kg WW	10 U	11 U	11 U	11 U	11 U
PCB-1221	µg/Kg WW	10 U	11 U	11 U	11 U	11 U
PCB-1232	µg/Kg WW	21 U	22 U	22 U	22 U	22 U
PCB-1242	µg/Kg WW	10 U	11 U	11 U	11 U	11 U
PCB-1248	µg/Kg WW	10 U	11 U	11 U	11 U	11 U
PCB-1254	µg/Kg WW	-	-	-	-	-
PCB-1254/1260	µg/Kg WW	12 J	7.6 J	6.7 J	7.4 J	7.5 J
PCB-1260	µg/Kg WW	-	-	-	-	-
PCB-1262	µg/Kg WW	10 U	11 U	11 U	11 U	11 U
PCB-1268	µg/Kg WW	10 U	11 U	11 U	11 U	11 U
Conventionals						
Lipids	%	5.2	5.2	5.2	4.9	6.2
Moisture	%	72.5	71.3	72	72.8	71.8

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-42

Results of PCB Aroclors and Conventionals for Hatchery Rainbow Trout Whole Body Composites from FSCA 5

Upper Columbia River RI/FS

Analyte	Units	RH5W15 Primary Sample	RH5W25 Primary Sample	RH5W35 Primary Sample	RH5W45 Primary Sample	RH5W55 Primary Sample	RH5W55 Field Duplicate	RH5W55 Field Triplicate
PCB Aroclor								
PCB-1016	µg/Kg WW	11 U	11 U	11 U	10 U	10.5 U	10.7 U	11 U
PCB-1221	µg/Kg WW	11 U	11 U	11 U	10 U	10.5 U	10.7 U	11 U
PCB-1232	µg/Kg WW	22 U	22 U	22 U	21 U	21.1 U	21.4 U	22 U
PCB-1242	µg/Kg WW	11 U	11 U	11 U	10 U	10.5 U	10.7 U	11 U
PCB-1248	µg/Kg WW	11 U	11 U	11 U	10 U	10.5 U	10.7 U	11 U
PCB-1254	µg/Kg WW	-	-	7.9 J	-	4.3 J	5 J	5.7 J
PCB-1254/1260	µg/Kg WW	7.3 J	9.2 J	-	6.3 J	-	-	-
PCB-1260	µg/Kg WW	-	-	9.2 J	-	4.2 J	6.7 J	5 J
PCB-1262	µg/Kg WW	11 U	11 U	11 U	10 U	10.5 U	10.7 U	11 U
PCB-1268	µg/Kg WW	11 U	11 U	11 U	10 U	10.5 U	10.7 U	11 U
Conventionals								
Lipids	%	6.3	6.5	5.3	5.2	9	9.4	9.7
Moisture	%	71.8	72	72.5	72.7	69	69.2	69.1

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-43
Results of PCB Aroclors and Conventionals for Hatchery Rainbow Trout Fillet and Offal Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RH6F15 Primary Sample	RH6F15 Field Duplicate	RH6O15 Primary Sample	RH6O15 Field Duplicate	RH6F25 Primary Sample	RH6O25 Primary Sample	RH6F35 Primary Sample	RH6O35 Primary Sample	RH6F45 Primary Sample	RH6O45 Primary Sample
PCB Aroclor											
PCB-1016	µg/Kg WW	10.6 U	10.3 U	10.3 U	11 U	10.5 U	10.9 U	10.6 U	11 U	10.4 U	11 U
PCB-1221	µg/Kg WW	10.6 U	10.3 U	10.3 U	11 U	10.5 U	10.9 U	10.6 U	11 U	10.4 U	11 U
PCB-1232	µg/Kg WW	21.2 U	20.6 U	20.7 U	22 U	21.1 U	21.8 U	21.2 U	22.1 U	20.8 U	22 U
PCB-1242	µg/Kg WW	10.6 U	10.3 U	10.3 U	11 U	10.5 U	10.9 U	10.6 U	11 U	10.4 U	11 U
PCB-1248	µg/Kg WW	10.6 U	10.3 U	10.3 U	11 U	10.5 U	10.9 U	10.6 U	11 U	10.4 U	11 U
PCB-1254	µg/Kg WW	3.2 J	3.3 J	6 J	6.3 J	4.2 J	8 J	5 J	10 J	2.4 J	6.9 J
PCB-1254/1260	µg/Kg WW	-	-	-	-	-	-	-	-	-	-
PCB-1260	µg/Kg WW	3.5 J	3.3 J	5.5 J	8 J	5.2 J	9.9 J	5.8 J	11 J	3.3 J	9.4 J
PCB-1262	µg/Kg WW	10.6 U	10.3 U	10.3 U	11 U	10.5 U	10.9 U	10.6 U	11 U	10.4 U	11 U
PCB-1268	µg/Kg WW	10.6 U	10.3 U	10.3 U	11 U	10.5 U	10.9 U	10.6 U	11 U	10.4 U	11 U
Conventionals											
Lipids	%	2.7	2.8	9	9.5	2.5	8.6	2.2	8.2	2.2	8.9
Moisture	%	75.5	75.7	70.1	70.6	75.7	70.3	75.7	71.5	75.3	70.5

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-44
Results of PCB Congeners for Hatchery Rainbow Trout Fillet, Offal, and Whole Body Composites from FSCA 3, FSCA 4, FSCA 5, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RH3F35 Primary Sample	RH3O35 Primary Sample	RH4W45 Primary Sample	RH5W55 Primary Sample	RH6F35 Primary Sample	RH6O35 Primary Sample
PCB Congener							
PCB 1	µg/Kg WW	0.000819 JKQ	0.00216 Q	0.000789 UQ	0.000936 U	0.000681 UQ	0.00122 UQ
PCB 10	µg/Kg WW	0.00136 U	0.000287 U	0.000864 U	0.000591 U	0.00104 U	0.00114 U
PCB 103	µg/Kg WW	0.00266	0.00724	0.00403 K	0.00382 K	0.00406	0.00175 U
PCB 104	µg/Kg WW	0.000843 U	0.000652 U	0.000311 U	0.000452 U	0.000629 U	0.00103 U
PCB 105	µg/Kg WW	0.148	0.341	0.188	0.149	0.141	0.398
PCB 106	µg/Kg WW	0.00155 U	0.00149 U	0.00067 U	0.0018 U	0.00138 U	0.0224
PCB 107	µg/Kg WW	0.0137 C	0.037 C	0.0209 C	0.0153 C	0.0128 C	0.0377 C
PCB 109	µg/Kg WW	0.0368	0.0949	0.0502	0.0401	0.0403	0.121
PCB 11	µg/Kg WW	0.024 B	0.0419 B	0.0233 B	0.0663	0.0519	0.0606
PCB 110	µg/Kg WW	0.289 C	1.6 C	0.471 C	0.54 C	0.55 C	1.53 C
PCB 111	µg/Kg WW	0.00118 U	0.00247	0.00172 K	0.000994 U	0.00097 U	0.0031
PCB 112	µg/Kg WW	0.00816	0.103	0.0467	0.0176	0.0104 K	0.0932
PCB 114	µg/Kg WW	0.00811 K	0.0221	0.00966	0.00713 K	0.00768	0.0248
PCB 118	µg/Kg WW	0.436	1.01	0.514	0.4	0.395	1.08
PCB 12	µg/Kg WW	0.000973 U	0.00141 JK	0.000763 U	0.000483 U	0.000802 U	0.00102 U
PCB 120	µg/Kg WW	0.00418	0.0112	0.00467	0.00361	0.00394 K	0.0111
PCB 121	µg/Kg WW	0.0012 U	0.00134 U	0.00142 U	0.00103 U	0.001 U	0.00141 K
PCB 122	µg/Kg WW	0.00172 U	0.00164 U	0.00074 U	0.00184 U	0.0014 U	0.00261 U
PCB 123	µg/Kg WW	0.00764 K	0.0133 K	0.0098	0.00876	0.00807	0.0189
PCB 126	µg/Kg WW	0.00462	0.0131	0.0106	0.00264	0.00233	0.00774
PCB 127	µg/Kg WW	0.00157 U	0.00144 U	0.000676 U	0.00171 U	0.00131 U	0.00236 U
PCB 128	µg/Kg WW	0.118 C	0.31 C	0.166 C	0.117 C	0.107 C	0.329 C
PCB 129	µg/Kg WW	0.922 C	2.56 C	1.08 C	0.88 C	0.768 C	2.44 C
PCB 130	µg/Kg WW	0.0399	0.117	0.0658	0.0488	0.0402	0.132
PCB 131	µg/Kg WW	0.00217 U	0.00353 U	0.00433	0.0035	0.00233 U	0.00708
PCB 132	µg/Kg WW	0.0669	0.163	0.185	0.135	0.101	0.354
PCB 133	µg/Kg WW	0.0158	0.0387	0.0242	0.016	0.0134	0.046
PCB 134	µg/Kg WW	0.014	0.0314	0.0289	0.02	0.0193	0.0597
PCB 135	µg/Kg WW	0.159 C	0.493 C	0.271 C	0.222 C	0.179 C	0.643 C
PCB 136	µg/Kg WW	0.02	0.0534	0.0477	0.0415	0.0266	0.105
PCB 137	µg/Kg WW	0.0368	0.106	0.0552	0.0429	0.0432	0.127
PCB 139	µg/Kg WW	0.0108 C	0.0291 C	0.018 C	0.0136 C	0.0119 C	0.0433 C
PCB 14	µg/Kg WW	0.00111 U	0.000356 U	0.000872 U	0.000513 U	0.000852 U	0.00108 U
PCB 141	µg/Kg WW	0.0846	0.232	0.119 K	0.104	0.0742	0.277

Table B-44
Results of PCB Congeners for Hatchery Rainbow Trout Fillet, Offal, and Whole Body Composites from FSCA 3, FSCA 4, FSCA 5, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RH3F35 Primary Sample	RH3O35 Primary Sample	RH4W45 Primary Sample	RH5W55 Primary Sample	RH6F35 Primary Sample	RH6O35 Primary Sample
PCB 142	µg/Kg WW	0.00222 U	0.00373 U	0.00248 U	0.00211 U	0.0024 U	0.00654 U
PCB 143	µg/Kg WW	0.00208 U	0.00362 U	0.00318	0.00216 U	0.00245 U	0.00674
PCB 144	µg/Kg WW	0.0192	0.0558	0.0249	0.0271	0.0221	0.079
PCB 145	µg/Kg WW	0.000583 U	0.00222 U	0.000701 U	0.00142 U	0.00139 U	0.00174 U
PCB 146	µg/Kg WW	0.141	0.352 Q	0.2	0.127	0.118	0.4
PCB 147	µg/Kg WW	0.299 C	0.805 C	0.639 C	0.479 C	0.39 C	1.45 C
PCB 148	µg/Kg WW	0.00106	0.00314 K	0.00208	0.00189 U	0.00185 U	0.0044
PCB 15	µg/Kg WW	0.00692	0.0139	0.00514	0.00848	0.00519	0.0068
PCB 150	µg/Kg WW	0.000658 JK	0.00214 U	0.00127	0.0014 U	0.00137 U	0.00274
PCB 152	µg/Kg WW	0.000609 U	0.00229 U	0.000732 U	0.00141 U	0.00139 U	0.00166 U
PCB 153	µg/Kg WW	0.987 C	2.59 C	1.26 C	0.865 C	0.812 C	2.63 C
PCB 154	µg/Kg WW	0.00846	0.0259	0.0137	0.0111	0.0105	0.0331
PCB 155	µg/Kg WW	0.00112 K	0.00269 K	0.00164	0.00119	0.00135 K	0.00362 K
PCB 156	µg/Kg WW	0.0752 C	0.176 C	0.0704 C	0.0416 C	0.0373 C	0.107 C
PCB 158	µg/Kg WW	0.064	0.182	0.0739	0.0578	0.0514	0.165
PCB 159	µg/Kg WW	0.00486 K	0.00278 U	0.00712	0.00413	0.00351 K	0.00231 U
PCB 16	µg/Kg WW	0.00333	0.00992	0.006	0.00868	0.0042	0.0102 K
PCB 160	µg/Kg WW	0.00148 U	0.00287 U	0.00165 U	0.00161 U	0.00183 U	0.00449 U
PCB 161	µg/Kg WW	0.00161 U	0.0028 U	0.0018 U	0.00164 U	0.00186 U	0.00454 U
PCB 162	µg/Kg WW	0.00868	0.0206	0.00303	0.00618	0.00651	0.0176
PCB 164	µg/Kg WW	0.0336 K	0.0843	0.0478 K	0.039	0.0272 K	0.102
PCB 165	µg/Kg WW	0.00156 U	0.00267 U	0.00175 U	0.00152 U	0.00173 U	0.00436 U
PCB 167	µg/Kg WW	0.0313	0.0723	0.0311 K	0.0185	0.0193	0.0514
PCB 169	µg/Kg WW	0.00591 K	0.00195 U	0.0083 K	0.00122 U	0.00119 U	0.00176 U
PCB 17	µg/Kg WW	0.00516	0.0134	0.00878	0.0146	0.00669	0.0183
PCB 170	µg/Kg WW	0.216	0.56	0.233	0.105 Q	0.135	0.301 Q
PCB 171	µg/Kg WW	0.0692 C	0.154 C	0.0789 C	0.0449 C	0.0451 C	0.124 C
PCB 172	µg/Kg WW	0.041	0.0705 Q	0.0537	0.027 Q	0.033	0.083
PCB 174	µg/Kg WW	0.103	0.241	0.164	0.116	0.0962	0.3
PCB 175	µg/Kg WW	0.00809 K	0.0201	0.0107	0.00682	0.00709 K	0.0223
PCB 176	µg/Kg WW	0.00899	0.0219	0.0173	0.0103	0.00946	0.0277
PCB 177	µg/Kg WW	0.125	0.28	0.169	0.0968 Q	0.0978	0.254
PCB 178	µg/Kg WW	0.0507	0.144	0.0686	0.0475	0.0487	0.142
PCB 179	µg/Kg WW	0.0444	0.116	0.0846	0.0526	0.0471	0.148
PCB 18	µg/Kg WW	0.0104 C	0.0279 C	0.0182 C	0.0273 C	0.0133 C	0.0383 C
PCB 180	µg/Kg WW	0.56 C	1.35 C	0.585 C	0.253 Q	0.35 C	0.84 C

Table B-44
Results of PCB Congeners for Hatchery Rainbow Trout Fillet, Offal, and Whole Body Composites from FSCA 3, FSCA 4, FSCA 5, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RH3F35 Primary Sample	RH3O35 Primary Sample	RH4W45 Primary Sample	RH5W55 Primary Sample	RH6F35 Primary Sample	RH6O35 Primary Sample
PCB 181	µg/Kg WW	0.00234 U	0.00448 U	0.00266 U	0.000961 U	0.00213 U	0.0027 U
PCB 182	µg/Kg WW	0.00343 K	0.00401 K	0.0134	0.00185	0.0019	0.00602
PCB 183	µg/Kg WW	0.192 C	0.457 C	0.268 C	0.139 C	0.149 C	0.411 C
PCB 184	µg/Kg WW	0.00127 U	0.00236 U	0.00142 K	0.00143 K	0.00121	0.00421
PCB 186	µg/Kg WW	0.00132 U	0.00251 U	0.000969 U	0.000891 U	0.00127 U	0.00289 U
PCB 187	µg/Kg WW	0.355	0.862	0.441	0.258	0.281	0.779
PCB 188	µg/Kg WW	0.00128 U	0.0024 U	0.00125 K	0.000832 U	0.00116 U	0.00244 U
PCB 189	µg/Kg WW	0.00667	0.0133	0.00483 U	0.00207	0.00209	0.00618
PCB 19	µg/Kg WW	0.000751 J	0.00211 K	0.00106 K	0.00188 KQ	0.00106	0.00185
PCB 190	µg/Kg WW	0.0468	0.124	0.0404	0.0179 Q	0.0224	0.0469 Q
PCB 191	µg/Kg WW	0.00848	0.0231	0.0101 K	0.00373	0.00448 K	0.0105 K
PCB 192	µg/Kg WW	0.00191 U	0.00385 U	0.00217 U	0.000808 U	0.00179 U	0.00234 U
PCB 194	µg/Kg WW	0.0813 Q	0.152 Q	0.0626 Q	0.0328 Q	0.0467 Q	0.0853 Q
PCB 195	µg/Kg WW	0.0509	0.116	0.0427	0.0172	0.0178	0.0473
PCB 196	µg/Kg WW	0.0692	0.166	0.09	0.0329 Q	0.0415	0.103 Q
PCB 197	µg/Kg WW	0.00924 C	0.0208 Q	0.0129 C	0.00597 C	0.00655 K	0.0169 C
PCB 198	µg/Kg WW	0.164 C	0.375 C	0.185 C	0.0853 Q	0.0996 C	0.221 Q
PCB 2	µg/Kg WW	0.00135 K	0.00293 K	0.0013 K	0.00205 K	0.00377 K	0.00275 K
PCB 20	µg/Kg WW	0.0832 Q	0.149 Q	0.0524 Q	0.104 Q	0.0602 C	0.157 C
PCB 201	µg/Kg WW	0.0192	0.04	0.0253	0.0107	0.0115	0.0328
PCB 202	µg/Kg WW	0.0368	0.0752	0.0387	0.0225	0.0246	0.056
PCB 203	µg/Kg WW	0.106	0.235	0.0847	0.0398 Q	0.0452	0.123 Q
PCB 204	µg/Kg WW	0.00141 U	0.00144 U	0.000547 U	0.000655 U	0.000792 U	0.00106 U
PCB 205	µg/Kg WW	0.00409 KQ	0.0104 Q	0.0042 Q	0.00152	0.00119 KQ	0.00431 Q
PCB 206	µg/Kg WW	0.0612	0.116	0.0401 Q	0.0192 Q	0.0232	0.0505
PCB 207	µg/Kg WW	0.00956	0.0181	0.0076 KQ	0.00358	0.00392 K	0.00926
PCB 208	µg/Kg WW	0.0231	0.0419	0.0155 Q	0.00786 Q	0.00934	0.0223
PCB 209	µg/Kg WW	0.0144	0.0261	0.0092 KQ	0.00657	0.00753 K	0.016
PCB 21	µg/Kg WW	0.0101 C	0.015 KQ	0.0114 C	0.0153 C	0.00997 C	0.0168 C
PCB 22	µg/Kg WW	0.0102	0.0167 Q	0.0101 Q	0.0175 Q	0.00955	0.0227
PCB 23	µg/Kg WW	0.000495 U	0.000617 U	0.000267 U	0.000368 U	0.000334 U	0.000594 U
PCB 24	µg/Kg WW	0.000481 U	0.000625 J	0.00071 J	0.000699 J	0.000356 J	0.000818 J
PCB 25	µg/Kg WW	0.00323 K	0.00601	0.00254	0.00425	0.00261	0.00616
PCB 26	µg/Kg WW	0.00674 C	0.0135 Q	0.00756 Q	0.0128 C	0.00741 C	0.0189 C
PCB 27	µg/Kg WW	0.000791 JK	0.00208	0.00124	0.0021	0.00113	0.00298 K
PCB 3	µg/Kg WW	0.000836 J	0.00177 J	0.000914 JK	0.00171 K	0.00123	0.00149

Table B-44
Results of PCB Congeners for Hatchery Rainbow Trout Fillet, Offal, and Whole Body Composites from FSCA 3, FSCA 4, FSCA 5, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RH3F35 Primary Sample	RH3O35 Primary Sample	RH4W45 Primary Sample	RH5W55 Primary Sample	RH6F35 Primary Sample	RH6O35 Primary Sample
PCB 31	µg/Kg WW	0.0437 Q	0.104 Q	0.034 Q	0.0635 Q	0.0444	0.114
PCB 32	µg/Kg WW	0.00293 K	0.00676	0.00268	0.00411	0.00311	0.00669
PCB 34	µg/Kg WW	0.000522 U	0.000692 U	0.000281 U	0.000382 JKQ	0.000346 U	0.000592 U
PCB 35	µg/Kg WW	0.000445 U	0.000871 U	0.000342 U	0.000669 JK	0.00044 U	0.000485 U
PCB 36	µg/Kg WW	0.000409 U	0.000751 U	0.000314 U	0.00032 U	0.000404 U	0.000442 U
PCB 37	µg/Kg WW	0.00678	0.0134	0.0081	0.0161	0.00652	0.0124
PCB 38	µg/Kg WW	0.000442 U	0.000827 U	0.00034 U	0.000335 U	0.000424 U	0.000448 U
PCB 39	µg/Kg WW	0.000532 JK	0.000968 J	0.000678 JK	0.00117	0.000805 J	0.0029
PCB 4	µg/Kg WW	0.00175 UQ	0.00596 Q	0.00108 UQ	0.00234 Q	0.00135 U	0.00139 U
PCB 40	µg/Kg WW	0.00822 C	0.0261 C	0.0203 C	0.0313 C	0.027 C	0.0847 C
PCB 41	µg/Kg WW	0.00137 K	0.00415 K	0.00408	0.00538	0.00335 K	0.0105
PCB 42	µg/Kg WW	0.00686	0.0174	0.0139	0.0225	0.0163	0.0502
PCB 43	µg/Kg WW	0.00201	0.00292 K	0.00466	0.00759	0.00452 K	0.0137 K
PCB 44	µg/Kg WW	0.059 C	0.135 C	0.105 C	0.177 C	0.129 C	0.406 C
PCB 45	µg/Kg WW	0.00388 K	0.00777 Q	0.00721 Q	0.0126 C	0.00825 C	0.0246 C
PCB 46	µg/Kg WW	0.000747 U	0.00152 JKQ	0.00169	0.00226 K	0.000971	0.00245
PCB 48	µg/Kg WW	0.00915	0.0201	0.0166	0.0264	0.0209 K	0.064
PCB 49	µg/Kg WW	0.0476 C	0.111 C	0.0756 C	0.121 C	0.0977 C	0.299 C
PCB 5	µg/Kg WW	0.00109 U	0.000353 U	0.000858 U	0.000531 U	0.000881 U	0.00107 U
PCB 50	µg/Kg WW	0.00345 K	0.00819 KQ	0.00687 C	0.0121 Q	0.00759 C	0.0216 C
PCB 52	µg/Kg WW	0.102	0.247	0.195	0.272	0.202	0.598
PCB 54	µg/Kg WW	0.000341 U	0.000368 U	0.000198 U	0.000248 U	0.00028 U	0.000469 U
PCB 55	µg/Kg WW	0.00301 K	0.00393	0.00491	0.00665	0.00496	0.0136
PCB 56	µg/Kg WW	0.0075	0.0156	0.0126	0.0245	0.0114	0.0328
PCB 57	µg/Kg WW	0.0013 U	0.00272 K	0.000777 J	0.00179 Q	0.000782 U	0.00356
PCB 58	µg/Kg WW	0.00112 U	0.00128 JK	0.00156	0.0019 Q	0.00143	0.00449
PCB 59	µg/Kg WW	0.00621 C	0.0136 K	0.00967 C	0.0162 C	0.0127 C	0.04 C
PCB 6	µg/Kg WW	0.00106 U	0.00344 Q	0.000829 U	0.00137 K	0.000845 U	0.00106 U
PCB 60	µg/Kg WW	0.0176 Q	0.0431	0.0218	0.0407	0.0318	0.0946
PCB 61	µg/Kg WW	0.188 C	0.286 C	0.25 C	0.334 C	0.274 C	0.842 C
PCB 63	µg/Kg WW	0.00606	0.0123	0.00746	0.0106	0.00969	0.0276
PCB 64	µg/Kg WW	0.0261	0.0719	0.0468	0.0877	0.0674	0.224
PCB 66	µg/Kg WW	0.0984	0.204	0.111	0.196	0.181	0.554
PCB 67	µg/Kg WW	0.0021 K	0.00398 K	0.00259	0.00358 K	0.0035	0.00975
PCB 68	µg/Kg WW	0.00234 K	0.00481	0.0029 K	0.00307	0.00282	0.00801
PCB 7	µg/Kg WW	0.000978 U	0.00101 JK	0.000767 U	0.000466 U	0.000773 U	0.000958 U

Table B-44

Results of PCB Congeners for Hatchery Rainbow Trout Fillet, Offal, and Whole Body Composites from FSCA 3, FSCA 4, FSCA 5, and FSCA 6

Upper Columbia River RI/FS

Analyte	Units	RH3F35 Primary Sample	RH3O35 Primary Sample	RH4W45 Primary Sample	RH5W55 Primary Sample	RH6F35 Primary Sample	RH6O35 Primary Sample
PCB 72	µg/Kg WW	0.00288	0.00584 K	0.00378	0.00398	0.00344	0.0104
PCB 73	µg/Kg WW	0.00179	0.00164 J	0.00291	0.00376	0.00279	0.00684
PCB 77	µg/Kg WW	0.0051	0.011	0.0104	0.0128	0.0104	0.0308
PCB 78	µg/Kg WW	0.00441	0.00146 U	0.000589 U	0.00119 U	0.000714 U	0.00105 U
PCB 79	µg/Kg WW	0.00769	0.0165	0.0144	0.0124	0.0114	0.0276
PCB 8	µg/Kg WW	0.000984 U	0.00629 QB	0.00258 KQ	0.00726 Q	0.00516 KQ	0.00585 KQ
PCB 80	µg/Kg WW	0.00104 U	0.00118 U	0.000475 U	0.00106 U	0.000638 U	0.000858 U
PCB 81	µg/Kg WW	0.00118 U	0.00125 U	0.000606 U	0.00146 K	0.00196	0.000979 U
PCB 82	µg/Kg WW	0.00293	0.0129	0.0148	0.0119	0.0086	0.0276
PCB 83	µg/Kg WW	0.0152	0.115	0.0391	0.0298	0.0185	0.129
PCB 84	µg/Kg WW	0.0108 K	0.0203 Q	0.0311	0.0419	0.0284	0.0889
PCB 85	µg/Kg WW	0.0595 C	0.215 C	0.0888 C	0.104 C	0.0991 C	0.435 C
PCB 86	µg/Kg WW	0.148 C	0.413 C	0.259 C	0.279 C	0.266 C	0.816 C
PCB 88	µg/Kg WW	0.0189 C	0.075 Q	0.041 C	0.0481 C	0.0446 C	0.139 C
PCB 89	µg/Kg WW	0.00189 U	0.00253 K	0.00225 U	0.00304 K	0.00293 K	0.0094 K
PCB 9	µg/Kg WW	0.00107 U	0.00167 JK	0.000839 U	0.000896 JK	0.0012 K	0.00134 K
PCB 90	µg/Kg WW	0.358 C	0.983 C	0.551 C	0.54 C	0.537 C	1.59 C
PCB 92	µg/Kg WW	0.0661 Q	0.186	0.0947	0.113	0.107	0.323
PCB 93	µg/Kg WW	0.00307 K	0.00602 C	0.0056 C	0.0084 Q	0.00527 C	0.0157 K
PCB 94	µg/Kg WW	0.00173 U	0.00186 U	0.00206 U	0.00143 U	0.00139 U	0.00203 K
PCB 95	µg/Kg WW	0.119	0.347	0.223	0.283 Q	0.251	0.764
PCB 96	µg/Kg WW	0.00141 U	0.00122 U	0.000533 U	0.000896 JK	0.00111 U	0.00174 U
PCB 98	µg/Kg WW	0.00374 C	0.0107 Q	0.00789 C	0.011 Q	0.0127 C	0.0371 C
PCB 99	µg/Kg WW	0.178	0.404	0.184	0.224	0.244	0.719

[a] The F indicates that the sample consisted of fillets.

[b] The O indicates that the sample consisted of offal.

[c] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-45
Results of Dioxins/Furans Analysis and Conventionals for Hatchery Rainbow Trout Fillet and Offal Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	RH3F15 Primary Sample	RH3O15 Primary Sample	RH3F25 Primary Sample	RH3O25 Primary Sample	RH3F35 Primary Sample	RH3O35 Primary Sample
Dioxins/Furans							
2,3,7,8-TCDD	µg/Kg WW	0.000417 U	0.000371 U	0.000491 U	0.000627 U	0.000376 U	0.000275 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000437 U	0.000448 U	0.000373 U	0.000528 U	0.000336 U	0.00052 U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000521 U	0.00074 U	0.00092 U	0.000818 U	0.00061 U	0.000569 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000509 U	0.000776 U	0.00094 U	0.000809 U	0.000643 U	0.000564 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.00053 U	0.000781 U	0.000957 U	0.000837 U	0.000646 U	0.000583 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000664 U	0.000905 U	0.000731 U	0.001 U	0.000906 U	0.00107 U
OCDD	µg/Kg WW	0.00178 U	0.00226 U	0.0019 U	0.00247 U	0.00149 U	0.0027 U
2,3,7,8-TCDF	µg/Kg WW	0.000727	0.00159	0.000653	0.00134	0.00116	0.0022
1,2,3,7,8-PeCDF	µg/Kg WW	0.000261 U	0.0003 U	0.000273 U	0.000318 U	0.000172 U	0.000281 U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000249 U	0.000314 U	0.000265 U	0.000312 U	0.00017 U	0.000304 U
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.00028 U	0.00039 U	0.000424 U	0.000381 U	0.000319 U	0.00024 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000273 U	0.000389 U	0.000415 U	0.000358 U	0.000306 U	0.000252 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000385 U	0.000553 U	0.000597 U	0.000531 U	0.000444 U	0.000342 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000295 U	0.000467 U	0.00046 U	0.000434 U	0.00034 U	0.000337 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000383 U	0.000499 U	0.000354 U	0.000561 U	0.000538 U	0.00049 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000541 U	0.000693 U	0.00052 U	0.000822 U	0.000771 U	0.000698 U
OCDF	µg/Kg WW	0.000992 U	0.00137 U	0.00127 U	0.00116 U	0.000953 U	0.0017 U
TCDD	µg/Kg WW	0.000568 U	0.000704 U	0.000491 U	0.000596 U	0.000681 U	0.000685 U
TCDF	µg/Kg WW	0.000194 U	0.000206 U	0.000653	0.00134	0.00116	0.000213 U
PeCDD	µg/Kg WW	0.000437 U	0.000448 U	0.000373 U	0.000528 U	0.000336 U	0.00052 U
PeCDF	µg/Kg WW	0.000249 U	0.0003 U	0.000265 U	0.000312 U	0.00017 U	0.000281 U
HxCDD	µg/Kg WW	0.000509 U	0.00074 U	0.00092 U	0.000809 U	0.00061 U	0.000564 U
HxCDF	µg/Kg WW	0.000273 U	0.000389 U	0.000415 U	0.000358 U	0.000306 U	0.00024 U
HpCDD	µg/Kg WW	0.000664 U	0.000905 U	0.000731 U	0.001 U	0.000906 U	0.00107 U
HpCDF	µg/Kg WW	0.000383 U	0.000499 U	0.000354 U	0.000561 U	0.000538 U	0.00049 U
Conventionals							
Lipids	%	11	4.4	2	5	1.9	5.2
Moisture	%	74.9	72.7	75.7	72.6	75.6	72.6

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-46
Results of Dioxins/Furans Analysis and Conventionals for Hatchery Rainbow Trout Fillet and Offal Composites from FSCA 4
Upper Columbia River RI/FS

Analyte	Units	RH4W15 Primary Sample	RH4W25 Primary Sample	RH4W35 Primary Sample	RH4W45 Primary Sample	RH4W55 Primary Sample
Dioxins/Furans						
2,3,7,8-TCDD	µg/Kg WW	0.000288 U	0.000319 U	0.000638 U	0.000479 U	0.000298 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000424 U	0.00048 U	0.000586 U	0.000539 U	0.000519 U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000894 U	0.000563 U	0.000572 U	0.000701 U	0.000758 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000896 U	0.000546 U	0.000567 U	0.000683 U	0.000756 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000921 U	0.00057 U	0.000586 U	0.000712 U	0.000778 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000662 U	0.000794 U	0.000956 U	0.000895 U	0.00113 U
OCDD	µg/Kg WW	0.00231 U	0.00276 U	0.00228 U	0.00203 U	0.00113 U
2,3,7,8-TCDF	µg/Kg WW	0.00124	0.00141	0.000906	0.00125	0.00125
1,2,3,7,8-PeCDF	µg/Kg WW	0.000279 U	0.00038 U	0.000373 U	0.000366 U	0.000308 U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000282 U	0.000387 U	0.000394 U	0.000352 U	0.000296 U
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000419 U	0.000346 U	0.000313 U	0.000392 U	0.000479 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.00043 U	0.000326 U	0.000292 U	0.000392 U	0.000457 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000599 U	0.000485 U	0.000429 U	0.000532 U	0.000691 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000446 U	0.000381 U	0.00034 U	0.00039 U	0.000488 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000375 U	0.000465 U	0.000595 U	0.000525 U	0.000561 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000562 U	0.000669 U	0.000811 U	0.000753 U	0.000811 U
OCDF	µg/Kg WW	0.0012 U	0.00189 U	0.00164 U	0.0014 U	0.000812 U
TCDD	µg/Kg WW	0.000587 U	0.000601 U	0.000638 U	0.000677 U	0.000766 U
TCDF	µg/Kg WW	0.000197 U	0.00141	0.000906	0.00125	0.00125
PeCDD	µg/Kg WW	0.000424 U	0.00048 U	0.000586 U	0.000539 U	0.000519 U
PeCDF	µg/Kg WW	0.000279 U	0.00038 U	0.000373 U	0.000352 U	0.000296 U
HxCDD	µg/Kg WW	0.000894 U	0.000546 U	0.000567 U	0.000683 U	0.000756 U
HxCDF	µg/Kg WW	0.000419 U	0.000326 U	0.000292 U	0.00039 U	0.000457 U
HpCDD	µg/Kg WW	0.000662 U	0.000794 U	0.000956 U	0.000895 U	0.00113 U
HpCDF	µg/Kg WW	0.000375 U	0.000465 U	0.000595 U	0.000525 U	0.000561 U
Conventionals						
Lipids	%	5.2	5.2	5.2	4.9	6.2
Moisture	%	72.5	71.3	72	72.8	71.8

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-47
Results of Dioxins/Furans Analysis and Conventionals for Hatchery Rainbow Trout Whole Body Composites from FSCA 5
Upper Columbia River RI/FS

Analyte	Units	RH5W15 Primary Sample	RH5W25 Primary Sample	RH5W35 Primary Sample	RH5W45 Primary Sample	RH5W55 Primary Sample	RH5W55 Field Duplicate	RH5W55 Field Triplicate
Dioxins/Furans								
2,3,7,8-TCDD	µg/Kg WW	0.00025 U	0.000226 U	0.000428 U	0.000368 U	0.000308 U	0.000273 U	0.000216 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000441 U	0.000626 U	0.00057 U	0.000701 U	0.000487 U	0.000524 U	0.000559 U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000608 U	0.000733 U	0.000763 U	0.000638 U	0.000738 U	0.000825 U	0.000655 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000649 U	0.000735 U	0.000748 U	0.000601 U	0.000736 U	0.000817 U	0.000634 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000648 U	0.000756 U	0.000777 U	0.000637 U	0.000759 U	0.000845 U	0.000662 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000729 U	0.000876 U	0.00138 U	0.000834 U	0.000916 U	0.000936 U	0.00091 U
OCDD	µg/Kg WW	0.000929 U	0.00102 U	0.000984 U	0.0012 U	0.0011 U	0.00084 U	0.00207
2,3,7,8-TCDF	µg/Kg WW	0.00155	0.0014	0.00154	0.00097	0.00142	0.00158	0.00149
1,2,3,7,8-PeCDF	µg/Kg WW	0.000268 U	0.000377 U	0.000366 U	0.00042 U	0.000308 U	0.000313 U	0.000306 U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000251 U	0.000347 U	0.000343 U	0.000393 U	0.000293 U	0.000286 U	0.000296 U
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000322 U	0.000346 U	0.000452 U	0.000339 U	0.000395 U	0.00045 U	0.000355 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000309 U	0.000337 U	0.000415 U	0.000346 U	0.00041 U	0.000446 U	0.000357 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000447 U	0.000467 U	0.000626 U	0.000494 U	0.000573 U	0.000641 U	0.000519 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.00032 U	0.000382 U	0.000473 U	0.000385 U	0.000416 U	0.000493 U	0.000377 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.00039 U	0.000498 U	0.000698 U	0.000425 U	0.000525 U	0.00051 U	0.000527 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000574 U	0.000682 U	0.000977 U	0.000594 U	0.000764 U	0.000726 U	0.00074 U
OCDF	µg/Kg WW	0.000755 U	0.000942 U	0.000799 U	0.000604 U	0.000647 U	0.000619 U	0.000646 U
TCDD	µg/Kg WW	0.000757 U	0.00086 U	0.000836 U	0.000902 U	0.000761 U	0.00084 U	0.000496 U
TCDF	µg/Kg WW	0.00155	0.0014	0.00154	0.00097	0.00142	0.00158	0.00149
PeCDD	µg/Kg WW	0.000441 U	0.000626 U	0.00057 U	0.000701 U	0.000487 U	0.000524 U	0.000559 U
PeCDF	µg/Kg WW	0.000251 U	0.000347 U	0.000343 U	0.000393 U	0.000293 U	0.000286 U	0.000296 U
HxCDD	µg/Kg WW	0.000608 U	0.000733 U	0.000748 U	0.000601 U	0.000736 U	0.000817 U	0.000634 U
HxCDF	µg/Kg WW	0.000309 U	0.000337 U	0.000415 U	0.000339 U	0.000395 U	0.000446 U	0.000355 U
HpCDD	µg/Kg WW	0.000729 U	0.000876 U	0.00138 U	0.000834 U	0.000916 U	0.000936 U	0.00091 U
HpCDF	µg/Kg WW	0.00039 U	0.000498 U	0.000698 U	0.000425 U	0.000525 U	0.00051 U	0.000527 U
Conventionals								
Lipids	%	6.3	6.5	5.3	5.2	9	9.4	9.7
Moisture	%	71.8	72	72.5	72.7	69	69.2	69.1

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-48
Results of Dioxins/Furans Analysis and Conventionals for Hatchery Rainbow Trout Fillet and Offal Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RH6F15 Primary Sample	RH6F15 Field Duplicate	RH6O15 Primary Sample	RH6O15 Field Duplicate	RH6F25 Primary Sample	RH6O25 Primary Sample	RH6F35 Primary Sample	RH6O35 Primary Sample	RH6F45 Primary Sample	RH6O45 Primary Sample
Dioxins/Furans											
2,3,7,8-TCDD	µg/Kg WW	0.000382 U	0.00105 U	0.000315 U	0.000581 U	0.000235 U	0.00045 U	0.000428 U	0.000428 U	0.000461 U	0.000355 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000453 U	0.0011 U	0.000412 U	0.00106 U	0.00052 U	0.000653 U	0.000615 U	0.000676 U	0.000628 U	0.000661 U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000624 U	0.000691 U	0.000835 U	0.000999 U	0.000543 U	0.000751 U	0.000766 U	0.00083 U	0.000936 U	0.000999 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000627 U	0.000761 U	0.000896 U	0.00106 U	0.000537 U	0.000758 U	0.000801 U	0.000871 U	0.000937 U	0.000989 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000644 U	0.000748 U	0.000892 U	0.00106 U	0.000555 U	0.000777 U	0.000807 U	0.000876 U	0.000965 U	0.00102 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.00076 U	0.00122 U	0.000963 U	0.000728 U	0.000952 U	0.00129 U	0.00142 U	0.000935 U	0.00112 U	0.000652 U
OCDD	µg/Kg WW	0.000651 U	0.00234 U	0.00136 U	0.00128 U	0.0017	0.000978 U	0.0012 U	0.00125 U	0.00403	0.000973 U
2,3,7,8-TCDF	µg/Kg WW	0.000688	0.00118 U	0.00231	0.00224	0.000697	0.00207	0.00119	0.00246	0.000372 U	0.00165
1,2,3,7,8-PeCDF	µg/Kg WW	0.000295 U	0.000508 U	0.000577 U	0.000638 U	0.000277 U	0.00033 U	0.00036 U	0.000372 U	0.000331 U	0.000404 U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000267 U	0.000533 U	0.000734 U	0.000728 U	0.000278 U	0.000426 U	0.000371 U	0.000392 U	0.000343 U	0.000413 U
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000338 U	0.000474 U	0.000561 U	0.000548 U	0.000318 U	0.000487 U	0.000454 U	0.000496 U	0.000525 U	0.000628 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000329 U	0.000464 U	0.000586 U	0.000585 U	0.00032 U	0.000485 U	0.000454 U	0.00051 U	0.000475 U	0.000645 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000486 U	0.000631 U	0.000678 U	0.000703 U	0.000469 U	0.000563 U	0.00063 U	0.000655 U	0.000666 U	0.000803 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000356 U	0.000486 U	0.000558 U	0.000555 U	0.000342 U	0.000478 U	0.00049 U	0.000522 U	0.000527 U	0.000667 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000425 U	0.0007 U	0.000545 U	0.000395 U	0.000494 U	0.000629 U	0.000816 U	0.000494 U	0.000595 U	0.000677 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000622 U	0.001 U	0.000761 U	0.000557 U	0.000711 U	0.000872 U	0.00115 U	0.000683 U	0.000777 U	0.000968 U
OCDF	µg/Kg WW	0.000428 U	0.00172 U	0.000907 U	0.000793 U	0.000626 U	0.000655 U	0.000884 U	0.000951 U	0.00123 U	0.000645 U
TCDD	µg/Kg WW	0.00086 U	0.00105 U	0.000822 U	0.000949 U	0.000753 U	0.000864 U	0.00106 U	0.000819 U	0.000902 U	0.000877 U
TCDF	µg/Kg WW	0.000688	0.000205 U	0.00231	0.00224	0.000697	0.00207	0.00119	0.00246	0.000194 U	0.00165
PeCDD	µg/Kg WW	0.000453 U	0.0011 U	0.000855 U	0.00106 U	0.00052 U	0.000653 U	0.000615 U	0.000676 U	0.000628 U	0.000661 U
PeCDF	µg/Kg WW	0.000267 U	0.000508 U	0.000577 U	0.000638 U	0.000277 U	0.00033 U	0.00036 U	0.000372 U	0.000331 U	0.000404 U
HxCDD	µg/Kg WW	0.000624 U	0.000691 U	0.000835 U	0.000999 U	0.000537 U	0.000751 U	0.000766 U	0.00083 U	0.000936 U	0.000989 U
HxCDF	µg/Kg WW	0.000329 U	0.000464 U	0.000558 U	0.000548 U	0.000318 U	0.000478 U	0.000454 U	0.000496 U	0.000475 U	0.000628 U
HpCDD	µg/Kg WW	0.00076 U	0.00122 U	0.000963 U	0.00163 U	0.000952 U	0.00129 U	0.00142 U	0.000935 U	0.00112 U	0.00139 U
HpCDF	µg/Kg WW	0.000425 U	0.0007 U	0.000545 U	0.000395 U	0.000494 U	0.000629 U	0.000816 U	0.000494 U	0.000595 U	0.000677 U
Conventionals											
Lipids	%	2.7	2.8	9	9.5	2.5	8.6	2.2	8.2	2.2	8.9
Moisture	%	75.5	75.7	70.1	70.6	75.7	70.3	75.7	71.5	75.3	70.5

[a] The F indicates that the sample consisted of fillets.
[b] The O indicates that the sample consisted of offal.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-49
Results of TAL Metals, Mercury, and Arsenic Speciation for Lake Whitefish Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	LW2W15 Primary Sample	LW2W25 Primary Sample	LW2W35 Primary Sample	LW2W45 Primary Sample	LW2W55 Primary Sample
TAL Metals						
Aluminum	mg/Kg WW	4.788	3.888 U	3.792 U	4.068 U	3.888 U
Antimony	mg/Kg WW	0.14706 U	0.1296 U	0.1264 U	0.1356 U	0.1296 U
Arsenic	mg/Kg WW	0.26676	0.20088	0.25912	0.26103	0.18468
Barium	mg/Kg WW	0.513	0.5508	0.4108	0.5424	0.4536
Beryllium	mg/Kg WW	0.00752 U	0.00648 U	0.00632 U	0.00678 U	0.00648 U
Cadmium	mg/Kg WW	0.02428	0.0162 U	0.0158 U	0.01695 U	0.02041
Calcium	mg/Kg WW	4548.6 J	5151.6 J	4645.2 J	4610.4 J	4957.2 J
Chromium	mg/Kg WW	0.7182	0.5184	0.6636	0.6441	0.5508
Cobalt	mg/Kg WW	0.02907 JK	0.02527 JK	0.02433 JK	0.02237 JK	0.023 JK
Copper	mg/Kg WW	0.8208	0.648	0.5372	0.6441	0.7452
Iron	mg/Kg WW	17.3394	12.312	11.06	14.9838	14.58
Lead	mg/Kg WW	0.07524	0.05832	0.06004	0.08136	0.06156
Magnesium	mg/Kg WW	277.362	284.472	269.232	274.251	271.188
Manganese	mg/Kg WW	1.07046	0.6804	0.632	0.85428	0.81
Nickel	mg/Kg WW	0.171	0.1782	0.1738	0.15933	0.17172
Potassium	mg/Kg WW	2978.82	3168.72	3109.44	3122.19	2993.76
Selenium	mg/Kg WW	0.855	0.7128	0.6952	0.7458	0.6156
Silver	mg/Kg WW	0.09234 U	0.081 U	0.079 U	0.08475 U	0.081 U
Sodium	mg/Kg WW	677.16	686.88	657.28	657.66	690.12
Thallium	mg/Kg WW	0.09234 U	0.081 U	0.079 U	0.08475 U	0.081 U
Uranium	mg/Kg WW	0.0025	0.00237	0.00215	0.00217	0.00181
Vanadium	mg/Kg WW	0.14706 U	0.1296 U	0.1264 U	0.1356 U	0.1296 U
Zinc	mg/Kg WW	13.8168	12.1824	11.85	12.204	12.8304
Mercury						
Mercury	µg/Kg WW	64.8	68.8	52.1	54.8	58.4
Arsenic Species						
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	13.899 U	-
ASB + Cation	µg/Kg WW	-	-	-	5.424 J	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	12.882 J	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	13.899 U	-
Unknown	µg/Kg WW	-	-	-	17.289 J	-
Conventionals						
Lipids	%	13	12	11	14	1.4
Moisture	%	65.8	67.6	68.4	66.1	67.6

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-50
Results of TAL Metals, Mercury, and Arsenic Speciation for Lake Whitefish Whole Body Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	LW3W15 Primary Sample	LW3W25 Primary Sample	LW3W25 Field Duplicate	LW3W25 Field Triplicate	LW3W35 Primary Sample	LW3W45 Primary Sample	LW3W55 Primary Sample
TAL Metals								
Aluminum	mg/Kg WW	3.792 U	3.768 U	3.924 U	3.756 U	3.924	3.487 U	5.831
Antimony	mg/Kg WW	0.12324 U	0.12246 U	0.12426 U	0.11894 U	0.12426 U	0.11412 U	0.12691 U
Arsenic	mg/Kg WW	0.2686	0.2826	0.27141	0.29422	0.23871	0.27579	0.24353
Barium	mg/Kg WW	0.5056	0.54322	0.5886	0.4695	0.5232	0.58328	0.6174
Beryllium	mg/Kg WW	0.006 U	0.00628 U	0.00621 U	0.00595 U	0.00621 U	0.00571 U	0.00652 U
Cadmium	mg/Kg WW	0.01864	0.01915	0.0157 U	0.01878	0.01995	0.01585	0.01681
Calcium	mg/Kg WW	5688	5652	5624.4	5133.2	4839.6	4976.9	4596.2
Chromium	mg/Kg WW	0.6636	0.6594	0.6867	0.7199	0.654	0.6974	0.93982
Cobalt	mg/Kg WW	0.02528 JK	0.02135 JK	0.02289 JK	0.02316 JK	0.01929 JK	0.02346 JK	0.03293 JK
Copper	mg/Kg WW	0.4424	0.471	0.5559	0.5634	0.654	0.5072	0.85407
Iron	mg/Kg WW	10.586	12.3402	11.772	13.146	15.0747	12.2362	22.3979
Lead	mg/Kg WW	0.08848	0.05338	0.05559	0.0626	0.04905	0.06657	0.12348
Magnesium	mg/Kg WW	297.356	273.18	277.95	276.066	277.623	275.79	270.97
Manganese	mg/Kg WW	0.8058 J	0.84466 J	0.99081 J	0.87014 J	0.87309 J	0.6657 J	1.62239 J
Nickel	mg/Kg WW	0.24332	0.18526	0.23544	0.19719	0.16023	0.16801	0.30184
Potassium	mg/Kg WW	3160	2904.5	2972.43	3089.31	3024.75	3074.9	3073.28
Selenium	mg/Kg WW	0.78368	0.6908	0.5232	0.7199	0.5886	0.79567	0.87465
Silver	mg/Kg WW	0.07584 U	0.0785 U	0.07848 U	0.07512 U	0.07848 U	0.07291 U	0.07889 U
Sodium	mg/Kg WW	761.56 JK	697.08 JK	673.62	704.25	673.62	729.1	699.72
Thallium	mg/Kg WW	0.07584 U	0.0785 U	0.07848 U	0.07512 U	0.07848 U	0.07291 U	0.07889 U
Uranium	mg/Kg WW	0.00474	0.00232	0.00239	0.0021	0.00173	0.00143 U	0.00377
Vanadium	mg/Kg WW	0.12324 U	0.12246 U	0.12426 U	0.11894 U	0.12426 U	0.11412 U	0.12691 U
Zinc	mg/Kg WW	13.588	13.659	12.9165	12.9269	13.0146	13.6627	13.9258
Mercury								
Mercury	µg/Kg WW	50.6	55.2	55.4	55.9	54.3	50.8	49.5
Arsenic Species								
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	12.874 U	13.407 U	-	-	-	-
ASB + Cation	µg/Kg WW	-	4.396 J	8.502 J	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	18.526 J	25.179 J	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	12.874 U	13.407 U	-	-	-	-
Unknown	µg/Kg WW	-	17.27 J	17.985 J	-	-	-	-
Conventionals								
Lipids	%	7.8	11	12	11	12	10.9	6
Moisture	%	68.4	68.6	67.3	68.7	67.3	68.3	65.7

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-51

Results of TAL Metals, Mercury, and Arsenic Speciation for Lake Whitefish Whole Body Composites from FSCA 4

Upper Columbia River RI/FS

Analyte	Units	LW4W15 Primary Sample	LW4W25 Primary Sample	LW4W35 Primary Sample	LW4W45 Primary Sample	LW4W55 Primary Sample
TAL Metals						
Aluminum	mg/Kg WW	7.106	5.868	4.788	5.216	7.776
Antimony	mg/Kg WW	0.1292 U	0.12714 U	0.1368 U	0.1304 U	0.1296 U
Arsenic	mg/Kg WW	0.2907	0.25754	0.21888	0.25102	0.23004
Barium	mg/Kg WW	0.70091	0.6194	0.5472	0.85086	0.69984
Beryllium	mg/Kg WW	0.00646 U	0.00619 U	0.00684 U	0.00652 U	0.00648 U
Cadmium	mg/Kg WW	0.02003	0.02869	0.02223	0.02412	0.03208
Calcium	mg/Kg WW	5071.1	4759.6	4651.2	6487.4	4503.6
Chromium	mg/Kg WW	0.87856	0.83782	0.85842	0.815	0.7452
Cobalt	mg/Kg WW	0.02519 JK	0.02901 JK	0.02428 JK	0.02771 JK	0.02851 JK
Copper	mg/Kg WW	0.6783	0.7172	0.7182	0.652	0.648
Iron	mg/Kg WW	17.9588	16.5608	14.7744	17.1802	18.6624
Lead	mg/Kg WW	0.06783	0.0489	0.04104	0.06194	0.1134
Magnesium	mg/Kg WW	285.532	289.162	266.76	296.334	269.568
Manganese	mg/Kg WW	1.73128 J	1.98208 J	1.2312 J	3.749 J	2.09304 J
Nickel	mg/Kg WW	0.2261	0.18582	0.18468	0.24776	0.16848
Potassium	mg/Kg WW	2997.44	3110.04	2896.74	3012.24	2997
Selenium	mg/Kg WW	0.86887	0.7824	0.7524	0.8639	0.7776
Silver	mg/Kg WW	0.08075 U	0.07824 U	0.0855 U	0.0815 U	0.081 U
Sodium	mg/Kg WW	665.38 JK	687.86 JK	656.64 JK	736.76 JK	641.52 JK
Thallium	mg/Kg WW	0.08075 U	0.07824 U	0.0855 U	0.0815 U	0.081 U
Uranium	mg/Kg WW	0.00187	0.00156 U	0.00171 U	0.00212	0.00172
Vanadium	mg/Kg WW	0.1292 U	0.12714 U	0.1368 U	0.1304 U	0.1296 U
Zinc	mg/Kg WW	13.6306	12.388	10.8756	11.8664	10.7244
Mercury						
Mercury	µg/Kg WW	44.7	58.4	69.8	65.7	56.7
Arsenic Species						
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	13.366 UJ	-
ASB + Cation	µg/Kg WW	-	-	-	13.366 UJ	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	9.454 JL	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	13.366 UJ	-
Unknown	µg/Kg WW	-	-	-	22.168 JL	-
Conventionals						
Lipids	%	11.3	11.7	14.7	12.8	11.6
Moisture	%	67.7	67.4	65.8	67.4	67.6

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-52
Results of TAL Metals, Mercury, and Arsenic Speciation for Lake Whitefish Whole Body Composites from FSCA 5
Upper Columbia River RI/FS

Analyte	Units	LW5W15 Primary Sample	LW5W25 Primary Sample	LW5W35 Primary Sample	LW5W45 Primary Sample	LW5W55 Primary Sample
TAL Metals						
Aluminum	mg/Kg WW	5.19	3.707 U	6.012	4.48	4.224 U
Antimony	mg/Kg WW	0.12802 U	0.12469 U	0.1336 U	0.1216 U	0.13728 U
Arsenic	mg/Kg WW	0.30102	0.3033	0.23046	0.3008	0.28512
Barium	mg/Kg WW	0.5536	0.63356	0.668	0.576	0.5632
Beryllium	mg/Kg WW	0.00623 U	0.00607 U	0.00668 U	0.00608 U	0.00704 U
Cadmium	mg/Kg WW	0.01765	0.0155 U	0.0167 U	0.01536 U	0.01725 U
Calcium	mg/Kg WW	5570.6	7414	6279.2	4416	7497.6
Chromium	mg/Kg WW	0.9169	0.81554	0.8016	0.896	0.9152
Cobalt	mg/Kg WW	0.03045 JK	0.03707 JK	0.03173 JK	0.0272 JK	0.03133 J
Copper	mg/Kg WW	0.7266	0.5392	0.668	0.672	0.5632
Iron	mg/Kg WW	16.781	13.0082	15.9986	19.36	10.56
Lead	mg/Kg WW	0.04844	0.04718	0.05344	0.0384	0.0528
Magnesium	mg/Kg WW	278.876	281.732	279.558	264.64	297.44
Manganese	mg/Kg WW	2.01718 J	1.66141 J	1.66666 J	2.4032 J	1.2672 J
Nickel	mg/Kg WW	0.2076	0.26623	0.25718	0.176	0.25344
Potassium	mg/Kg WW	3041.34	2746.55	2909.14	3014.4	2808.96
Selenium	mg/Kg WW	0.5882	0.6403	0.668	0.8384	0.704
Silver	mg/Kg WW	0.07958 U	0.07751 U	0.0835 U	0.0768 U	0.08448 U
Sodium	mg/Kg WW	719.68	808.8	698.06	707.2	753.28 JK
Thallium	mg/Kg WW	0.07958 U	0.07751 U	0.0835 U	0.0768 U	0.08448 U
Uranium	mg/Kg WW	0.00249	0.00307	0.00247	0.00208	0.00176 U
Vanadium	mg/Kg WW	0.13494	0.15502	0.14028	0.1216 U	0.13728 U
Zinc	mg/Kg WW	13.84	13.6148	13.1262	11.712	13.4464
Mercury						
Mercury	µg/Kg WW	79.5	67	65.4	68.7	65.7
Arsenic Species						
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	-	-
ASB + Cation	µg/Kg WW	-	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	-
Unknown	µg/Kg WW	-	-	-	-	-
Conventionals						
Lipids	%	10	13	13.5	11.5	15.8
Moisture	%	65.4	66.3	66.6	68	64.8

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-53
Results of TAL Metals, Mercury, and Arsenic Speciation for Lake Whitefish Whole Body Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	LW6W13 Primary Sample	LW6W23 Primary Sample
TAL Metals			
Aluminum	mg/Kg WW	3.888 U	4.02 U
Antimony	mg/Kg WW	0.1296 U	0.13065 U
Arsenic	mg/Kg WW	0.18468	0.31155
Barium	mg/Kg WW	0.34668	0.31825
Beryllium	mg/Kg WW	0.00648 U	0.0067 U
Cadmium	mg/Kg WW	0.01717	0.02345
Calcium	mg/Kg WW	4860	5996.5 J
Chromium	mg/Kg WW	0.91368	0.6365
Cobalt	mg/Kg WW	0.02009 JK	0.02546 JK
Copper	mg/Kg WW	0.4536	0.5695
Iron	mg/Kg WW	11.0808	18.1235
Lead	mg/Kg WW	0.07128	0.0402
Magnesium	mg/Kg WW	257.904	268
Manganese	mg/Kg WW	0.99792 J	0.9849
Nickel	mg/Kg WW	0.243	0.2144
Potassium	mg/Kg WW	2971.08	2790.55
Selenium	mg/Kg WW	0.486	0.4355
Silver	mg/Kg WW	0.081 U	0.08375 U
Sodium	mg/Kg WW	790.56 JK	690.1
Thallium	mg/Kg WW	0.081 U	0.08375 U
Uranium	mg/Kg WW	0.00162 U	0.00167 U
Vanadium	mg/Kg WW	0.1296 U	0.13065 U
Zinc	mg/Kg WW	12.5064	12.0935
Mercury			
Mercury	µg/Kg WW	93.7	94.5
Arsenic Species			
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-
ASB + Cation	µg/Kg WW	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-
Unknown	µg/Kg WW	-	-
Conventionals			
Lipids	%	12.8	14
Moisture	%	67.6	66.5

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-54
Results of PCB Aroclors and Conventionals for Lake Whitefish Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	LW2W15 Primary Sample	LW2W25 Primary Sample	LW2W35 Primary Sample	LW2W45 Primary Sample	LW2W55 Primary Sample
PCB Aroclor						
PCB-1016	µg/Kg WW	11 U	10 U	10 U	10 U	11 U
PCB-1221	µg/Kg WW	11 U	10 U	10 U	10 U	11 U
PCB-1232	µg/Kg WW	21 U	21 U	21 U	21 U	22 U
PCB-1242	µg/Kg WW	11 U	10 U	10 U	10 U	11 U
PCB-1248	µg/Kg WW	11 U	10 U	10 U	10 U	11 U
PCB-1254	µg/Kg WW	-	8 J	-	-	3 J
PCB-1254/1260	µg/Kg WW	31 J	-	15 J	15 J	-
PCB-1260	µg/Kg WW	-	6.9 J	-	-	2.5 J
PCB-1262	µg/Kg WW	11 U	10 U	10 U	10 U	11 U
PCB-1268	µg/Kg WW	11 U	10 U	10 U	10 U	11 U
Conventionals						
Lipids	%	13	12	11	14	1.4
Moisture	%	65.8	67.6	68.4	66.1	67.6

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-55
Results of PCB Aroclors and Conventionals for Lake Whitefish Whole Body Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	LW3W15 Primary Sample	LW3W25 Primary Sample	LW3W25 Field Duplicate	LW3W25 Field Triplicate	LW3W35 Primary Sample	LW3W45 Primary Sample	LW3W55 Primary Sample
PCB Aroclor								
PCB-1016	µg/Kg WW	14 U	14 U	11 U	14 U	14 U	14 U	14 U
PCB-1221	µg/Kg WW	14 U	14 U	11 U	14 U	14 U	14 U	14 U
PCB-1232	µg/Kg WW	28 U	28 U	21 U	28 U	28 U	27.9 U	28 U
PCB-1242	µg/Kg WW	14 U	14 U	11 U	14 U	14 U	14 U	14 U
PCB-1248	µg/Kg WW	14 U	14 U	11 U	14 U	14 U	14 U	14 U
PCB-1254	µg/Kg WW	-	8.9 J	-	6 J	-	-	-
PCB-1254/1260	µg/Kg WW	15 J	-	12 J	-	13.4 J	9.5 J	21.3 J
PCB-1260	µg/Kg WW	-	14 J	-	13 J	-	-	-
PCB-1262	µg/Kg WW	14 U	14 U	11 U	14 U	14 U	14 U	14 U
PCB-1268	µg/Kg WW	14 U	14 U	11 U	14 U	14 U	14 U	14 U
Conventionals								
Lipids	%	7.8	11	12	11	12	10.9	6
Moisture	%	68.4	68.6	67.3	68.7	67.3	68.3	65.7

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-56
Results of PCB Aroclors and Conventionals for Lake Whitefish Whole Body Composites from FSCA 4
Upper Columbia River RI/FS

Analyte	Units	LW4W15 Primary Sample	LW4W25 Primary Sample	LW4W35 Primary Sample	LW4W45 Primary Sample	LW4W55 Primary Sample
PCB Aroclor						
PCB-1016	µg/Kg WW	15 U	13 U	15 U	15 U	15 U
PCB-1221	µg/Kg WW	15 U	13 U	15 U	15 U	15 U
PCB-1232	µg/Kg WW	30 U	26 U	29 U	31 U	30 U
PCB-1242	µg/Kg WW	15 U	13 U	15 U	15 U	15 U
PCB-1248	µg/Kg WW	15 U	13 U	15 U	15 U	15 U
PCB-1254	µg/Kg WW	-	-	-	-	-
PCB-1254/1260	µg/Kg WW	20.6 J	13.7 J	17.3 J	11 J	18.9 J
PCB-1260	µg/Kg WW	-	-	-	-	-
PCB-1262	µg/Kg WW	15 U	13 U	15 U	15 U	15 U
PCB-1268	µg/Kg WW	15 U	13 U	15 U	15 U	15 U
Conventionals						
Lipids	%	11.3	11.7	14.7	12.8	11.6
Moisture	%	67.7	67.4	65.8	67.4	67.6

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-57
Results of PCB Aroclors and Conventionals for Lake Whitefish Whole Body Composites from FSCA 5
Upper Columbia River RI/FS

Analyte	Units	LW5W15 Primary Sample	LW5W25 Primary Sample	LW5W35 Primary Sample	LW5W45 Primary Sample	LW5W55 Primary Sample
PCB Aroclor						
PCB-1016	µg/Kg WW	14 U	11 U	14 U	14 U	15 U
PCB-1221	µg/Kg WW	14 U	11 U	14 U	14 U	15 U
PCB-1232	µg/Kg WW	28 U	21 U	28 U	28 U	29 U
PCB-1242	µg/Kg WW	14 U	11 U	14 U	14 U	15 U
PCB-1248	µg/Kg WW	14 U	11 U	14 U	14 U	15 U
PCB-1254	µg/Kg WW	-	31	-	-	-
PCB-1254/1260	µg/Kg WW	26.9 J	-	28.4 J	21.8 J	28.1 J
PCB-1260	µg/Kg WW	-	17	-	-	-
PCB-1262	µg/Kg WW	14 U	11 U	14 U	14 U	15 U
PCB-1268	µg/Kg WW	14 U	11 U	14 U	14 U	15 U
Conventionals						
Lipids	%	10	13	13.5	11.5	15.8
Moisture	%	65.4	66.3	66.6	68	64.8

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-58
Results of PCB Aroclors and Conventionals for Lake Whitefish Whole Body Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	LW6W13 Primary Sample		LW6W23 Primary Sample	
PCB Aroclor					
PCB-1016	µg/Kg WW	14	U	11	U
PCB-1221	µg/Kg WW	14	U	11	U
PCB-1232	µg/Kg WW	28	U	22	U
PCB-1242	µg/Kg WW	14	U	11	U
PCB-1248	µg/Kg WW	14	U	11	U
PCB-1254	µg/Kg WW	-		-	
PCB-1254/1260	µg/Kg WW	30.5	J	38	J
PCB-1260	µg/Kg WW	-		-	
PCB-1262	µg/Kg WW	14	U	11	U
PCB-1268	µg/Kg WW	14	U	11	U
Conventionals					
Lipids	%	12.8		14	
Moisture	%	67.6		66.5	

[a] The W signifies that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-59

Results of Dioxins/Furans Analysis and Conventionals for Lake Whitefish Whole Body Composites from FSCA 2

Upper Columbia River RI/FS

Analyte	Units	LW2W15 Primary Sample	LW2W25 Primary Sample	LW2W35 Primary Sample	LW2W45 Primary Sample	LW2W55 Primary Sample
Dioxins/Furans						
2,3,7,8-TCDD	µg/Kg WW	0.00021	0.000202 EMPC	0.000202 EMPC	0.000209 EMPC	0.000351 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000606 EMPC	0.000441	0.000315	0.00046	0.000554 U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000192 U	0.000215 U	0.000273	0.000327 U	0.000752 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000316	0.000387	0.000292	0.000482	0.000753 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000134	0.000222 U	0.000186 U	0.000275	0.000774 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000644	0.000841	0.00093	0.0038	0.00094 U
OCDD	µg/Kg WW	0.00401	0.00682	0.00627	0.0198	0.00102 U
2,3,7,8-TCDF	µg/Kg WW	0.00493	0.00492	0.00455	0.00467	0.00356
1,2,3,7,8-PeCDF	µg/Kg WW	0.000294	0.000273	0.000243	0.000284	0.000359 EMPC
2,3,4,7,8-PeCDF	µg/Kg WW	0.000498	0.000441	0.000363	0.000456	0.000344
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000138 U	7.12E-05	9.42E-05 U	0.000217 U	0.000413 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000132 U	6.54E-05	9.39E-05 U	0.000211 U	0.000407 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.00018 U	0.00015 U	0.00012 U	0.00026 U	0.000525 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.00015 U	8.66E-05	0.000104 U	0.00021 U	0.000416 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000163 EMPC	0.000244	0.000206	0.000242	0.000588 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000125 U	9.79E-05 U	9.34E-05 U	0.000168 U	0.000816 U
OCDF	µg/Kg WW	0.000761	0.00115	0.00173	0.000876	0.0018 U
TCDD	µg/Kg WW	0.000277	0.000266	0.000104 U	0.000333	0.000898 U
TCDF	µg/Kg WW	0.0095	0.00887	0.00777	0.00942	0.00491
PeCDD	µg/Kg WW	0.000126 U	0.000441	0.000315	0.00046	0.000554 U
PeCDF	µg/Kg WW	0.00169	0.00142	0.00115	0.00163	0.000344
HxCDD	µg/Kg WW	0.000451	0.000387	0.000292	0.00112	0.000752 U
HxCDF	µg/Kg WW	0.000153	0.000485	9.39E-05 U	0.00164	0.000407 U
HpCDD	µg/Kg WW	0.0011	0.00136	0.00135	0.00676	0.00094 U
HpCDF	µg/Kg WW	0.000362	0.000753	0.000894	0.000648	0.000588 U
Conventionals						
Lipids	%	13	12	11	14	1.4
Moisture	%	65.8	67.6	68.4	66.1	67.6

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-60
Results of Dioxins/Furans Analysis and Conventionals for Lake Whitefish Whole Body Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	LW3W15 Primary Sample	LW3W25 Primary Sample	LW3W25 Field Duplicate	LW3W25 Field Triplicate	LW3W35 Primary Sample	LW3W45 Primary Sample	LW3W55 Primary Sample
Dioxins/Furans								
2,3,7,8-TCDD	µg/Kg WW	0.000315 U	0.000113 U	0.000323 U	0.000478 U	0.000447 U	0.000469 U	0.000104 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.00122 U	0.000289	0.000799 U	0.000701 U	0.00102 U	0.00108 U	0.000339
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.00112 U	0.00023	0.00125 U	0.00103 U	0.00116 U	0.00115 U	0.00028 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.00113 U	0.000272	0.00126 U	0.00104 U	0.00117 U	0.00117 U	0.000416
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.00116 U	0.000364 U	0.00129 U	0.00107 U	0.0012 U	0.00119 U	0.00029 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000738 U	0.00236	0.00074 U	0.000486 U	0.000629 U	0.000621 U	0.00215
OCDD	µg/Kg WW	0.00119 U	0.014	0.00155 U	0.00103 U	0.00138 U	0.0011 U	0.011
2,3,7,8-TCDF	µg/Kg WW	0.00212	0.00282	0.00395	0.00342	0.00346	0.00415	0.00304
1,2,3,7,8-PeCDF	µg/Kg WW	0.000628 U	0.000196	0.000484 U	0.000331 U	0.000613 U	0.000622 U	0.000228
2,3,4,7,8-PeCDF	µg/Kg WW	0.00064 U	0.000289	0.000423 EMPC	0.000337 U	0.000645 U	0.00067 U	0.000328
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000617 U	0.000185 U	0.000758 U	0.000595 U	0.000559 U	0.000625 U	0.000184 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000607 U	0.00019 U	0.000747 U	0.000622 U	0.000532 U	0.000622 U	0.000189 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000772 U	0.00025 U	0.00103 U	0.000769 U	0.000721 U	0.000836 U	0.000232 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000591 U	0.000191 U	0.000768 U	0.000594 U	0.000593 U	0.000633 U	0.000188 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000704 U	0.000297	0.000563 U	0.000598 U	0.00065 U	0.000829 U	0.000207 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000908 U	0.000162 U	0.00075 U	0.00082 U	0.00086 U	0.00116 U	0.000281 U
OCDF	µg/Kg WW	0.000928 U	0.0011	0.000846 U	0.000889 U	0.000815 U	0.00123 U	0.000749
TCDD	µg/Kg WW	0.00963	0.000113 U	0.0676	0.00721	0.027	0.000929 U	0.00031
TCDF	µg/Kg WW	0.00304	0.00599	0.00503	0.00342	0.00346	0.00415	0.00636
PeCDD	µg/Kg WW	0.00122 U	0.000289	0.000799 U	0.000701 U	0.00102 U	0.00108 U	0.000339
PeCDF	µg/Kg WW	0.000628 U	0.00105	0.000473 U	0.000331 U	0.000613 U	0.000622 U	0.00129
HxCDD	µg/Kg WW	0.00112 U	0.000272	0.00125 U	0.00103 U	0.00116 U	0.00115 U	0.000416
HxCDF	µg/Kg WW	0.000591 U	0.000185 U	0.000747 U	0.000594 U	0.000532 U	0.000622 U	0.000119
HpCDD	µg/Kg WW	0.00137 U	0.00425	0.00172	0.00104 U	0.00125 U	0.00151 U	0.00356
HpCDF	µg/Kg WW	0.000704 U	0.000786	0.000563 U	0.000598 U	0.00065 U	0.000829 U	0.000625
Conventionals								
Lipids	%	7.8	11	12	11	12	10.9	6
Moisture	%	68.4	68.6	67.3	68.7	67.3	68.3	65.7

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-61

Results of Dioxins/Furans Analysis and Conventionals for Lake Whitefish Whole Body Composites from FSCA 4

Upper Columbia River RI/FS

Analyte	Units	LW4W15 Primary Sample	LW4W25 Primary Sample	LW4W35 Primary Sample	LW4W45 Primary Sample	LW4W55 Primary Sample
Dioxins/Furans						
2,3,7,8-TCDD	µg/Kg WW	0.000216 EMPC	0.00037 U	0.000695 U	0.00021	0.000609 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000451	0.000984 U	0.000651 U	0.000435	0.000426 U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000307 U	0.00114 U	0.00136 U	0.000297 U	0.000503 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000392	0.00121 U	0.00128 U	0.000402	0.000512 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000311 U	0.00121 U	0.00136 U	0.000301 U	0.000523 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.00133	0.000687 U	0.00142 U	0.00112	0.000683 U
OCDD	µg/Kg WW	0.00949	0.0014 U	0.00532 U	0.008	0.00214 U
2,3,7,8-TCDF	µg/Kg WW	0.00526	0.00679	0.00745	0.0048	0.00687
1,2,3,7,8-PeCDF	µg/Kg WW	0.000315	0.000376	0.000587 U	0.000281	0.000627 U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000449	0.000415	0.000827	0.000452	0.000648 U
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000183 U	0.000636 U	0.00102 U	0.000206 U	0.000672 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000179 U	0.000641 U	0.00107 U	0.000214 U	0.000677 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000234 U	0.000903 U	0.00134 U	0.000274 U	0.000978 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000184 U	0.00069 U	0.000993 U	0.000217 U	0.000706 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000258 U	0.000658 U	0.00103 U	0.000176 U	0.000939 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000358 U	0.000944 U	0.00156 U	0.000247 U	0.00137 U
OCDF	µg/Kg WW	0.000751	0.00122 U	0.00347 U	0.000636	0.00151 U
TCDD	µg/Kg WW	0.000317	0.0174	0.0605	0.00021	0.0528
TCDF	µg/Kg WW	0.0115	0.00679	0.00745	0.00862	0.00768
PeCDD	µg/Kg WW	0.000451	0.000984 U	0.00123 U	0.000435	0.00103 U
PeCDF	µg/Kg WW	0.0018	0.000791	0.000827	0.00151	0.000648 U
HxCDD	µg/Kg WW	0.000392	0.00114 U	0.00128 U	0.000402	0.000503 U
HxCDF	µg/Kg WW	0.000203	0.000636 U	0.000993 U	0.000206 U	0.000672 U
HpCDD	µg/Kg WW	0.00233	0.00128 U	0.00318	0.00194	0.00198 U
HpCDF	µg/Kg WW	0.000394	0.000658 U	0.00103 U	0.000176 U	0.000939 U
Conventionals						
Lipids	%	11.3	11.7	14.7	12.8	11.6
Moisture	%	67.7	67.4	65.8	67.4	67.6

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-62
Results of Dioxins/Furans Analysis and Conventionals for Lake Whitefish Whole Body Composites from FSCA 5
Upper Columbia River RI/FS

Analyte	Units	LW5W15 Primary Sample	LW5W25 Primary Sample	LW5W35 Primary Sample	LW5W45 Primary Sample	LW5W55 Primary Sample
Dioxins/Furans						
2,3,7,8-TCDD	µg/Kg WW	0.000199 EMPC	0.000224	0.000228	0.000216	0.000182
1,2,3,7,8-PeCDD	µg/Kg WW	0.000515	0.000491 EMPC	0.000483 EMPC	0.000585	0.000515 EMPC
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000343 U	0.000285 EMPC	0.000266 U	0.0004	0.000431 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000374	0.000306 EMPC	0.000383	0.000396	0.000431
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000193	0.000229 U	0.000283 U	0.000198 U	0.000454 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.00112	0.00074	0.000756	0.000816	0.000894
OCDD	µg/Kg WW	0.00825	0.00831	0.00445	0.00488	0.00561
2,3,7,8-TCDF	µg/Kg WW	0.00776	0.00819	0.00702	0.0053	0.00696
1,2,3,7,8-PeCDF	µg/Kg WW	0.000386	0.000351	0.000308	0.000318	0.000316
2,3,4,7,8-PeCDF	µg/Kg WW	0.000629	0.000639	0.000561	0.000542	0.000555
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.00025 U	9.11E-05 EMPC	0.000133 U	7.58E-05	0.000179 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000245 U	7.21E-05	0.000139 U	8.14E-05	0.000182 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000337 U	0.000152 U	0.000191 U	0.000139 U	0.000302 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000253 U	0.000121 U	0.000149 U	0.000107 U	0.000207 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000215 U	0.000192	0.000231	0.000186	0.000383
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000287 U	0.000096 U	0.000147 U	9.75E-05 U	0.000543 U
OCDF	µg/Kg WW	0.000585	0.0011	0.00107	0.000756	0.00157 U
TCDD	µg/Kg WW	0.000237	0.000484	0.00112	0.000216	0.00131
TCDF	µg/Kg WW	0.0142	0.0156	0.0148	0.011	0.013
PeCDD	µg/Kg WW	0.000515	8.54E-05	0.000327	0.00097	0.00192
PeCDF	µg/Kg WW	0.0022	0.00206	0.00203	0.00213	0.00202
HxCDD	µg/Kg WW	0.000567	0.000222 U	0.000383	0.000396	0.000431
HxCDF	µg/Kg WW	0.000245 U	0.000315	0.000176	0.000441	0.000179 U
HpCDD	µg/Kg WW	0.00202	0.00126	0.0019	0.00129	0.00351
HpCDF	µg/Kg WW	0.000381	0.000611	0.000747	0.000602	0.000383
Conventionals						
Lipids	%	10	13	13.5	11.5	15.8
Moisture	%	65.4	66.3	66.6	68	64.8

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-63
Results of Dioxins/Furans Analysis and Conventionals for Lake Whitefish Whole Body Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	LW6W13 Primary Sample	LW6W23 Primary Sample
Dioxins/Furans			
2,3,7,8-TCDD	µg/Kg WW	0.000228 EMPC	0.000198
1,2,3,7,8-PeCDD	µg/Kg WW	0.000626 EMPC	0.000663 EMPC
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000228 U	0.000456
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.00045	0.00041
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000214	0.00028 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.00138	0.000889
OCDD	µg/Kg WW	0.0186	0.00467
2,3,7,8-TCDF	µg/Kg WW	0.00735	0.00835
1,2,3,7,8-PeCDF	µg/Kg WW	0.00033	0.000301
2,3,4,7,8-PeCDF	µg/Kg WW	0.000529	0.000497
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000104	0.000128 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	9.86E-05	0.00012 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000169 U	0.000166 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000132 U	0.000132 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000414	0.000315
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000183 U	0.0003 U
OCDF	µg/Kg WW	0.00299	0.0016
TCDD	µg/Kg WW	9.89E-05 U	0.00114
TCDF	µg/Kg WW	0.0135	0.0155
PeCDD	µg/Kg WW	0.000106 U	0.00107
PeCDF	µg/Kg WW	0.00208	0.00175
HxCDD	µg/Kg WW	0.000848	0.00041
HxCDF	µg/Kg WW	0.000558	0.00034
HpCDD	µg/Kg WW	0.00224	0.00203
HpCDF	µg/Kg WW	0.0018	0.00119
Conventionals			
Lipids	%	12.8	14
Moisture	%	67.6	66.5

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-64
Results of TAL Metals, Mercury, and Arsenic Speciation for Mountain Whitefish Whole Body Composites from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	MW1W15 Primary Sample	MW1W25 Primary Sample	MW1W35 Primary Sample	MW1W45 Primary Sample	MW1W45 Field Duplicate	MW1W45 Field Triplicate	MW1W55 Primary Sample
TAL Metals								
Aluminum	mg/Kg WW	18.63	13.176	4.928	0.047	21.9726	20.414	16.544
Antimony	mg/Kg WW	0.138 U	0.1464 U	0.1408 U	0.0004 U	0.1404 U	0.1384 U	0.1408 U
Arsenic	mg/Kg WW	0.16905	0.15738	0.14432	0.00043	0.14742	0.1557	0.11968
Barium	mg/Kg WW	1.03845	1.76412	0.4576	0.00395	0.9828	1.65388	2.79136
Beryllium	mg/Kg WW	0.0069 U	0.00732 U	0.00704 U	0.00002 U	0.00702 U	0.00692 U	0.00704 U
Cadmium	mg/Kg WW	0.12765	0.11346	0.09152	0.00037	0.12636	0.13494	0.09152
Calcium	mg/Kg WW	6072	4867.8	4118.4	16.6	6247.8	6850.8	5491.2
Chromium	mg/Kg WW	1.15575	0.9516	1.02432	0.00308	1.09161	1.1937	1.11584
Cobalt	mg/Kg WW	0.05865	0.06222	0.02816	0.00018	0.0702	0.08304	0.06688
Copper	mg/Kg WW	1.1523 J	1.52622 J	0.5632 J	0.00442 J	1.77957 J	2.62268 J	1.34112 J
Iron	mg/Kg WW	112.47 J	113.46 J	30.2016 J	0.306 J	147.771 J	187.878 J	109.472 J
Lead	mg/Kg WW	0.4485	0.4026	0.176	0.001	0.351	0.33216	0.30272
Magnesium	mg/Kg WW	313.95	344.406	296.384	0.966	333.801	339.772	322.08
Manganese	mg/Kg WW	4.002	4.9044	1.54528	0.0106	4.5279	4.7056	3.7312
Nickel	mg/Kg WW	0.2691	0.20862	0.16896	0.0009	0.25623	0.29756	0.27104
Potassium	mg/Kg WW	3022.2	3433.08	3048.32	8.86	3029.13	3030.96	3220.8
Selenium	mg/Kg WW	1.035	1.07604	0.97504	0.00351	1.21446	1.23868	0.8448
Silver	mg/Kg WW	0.05175 U	0.0549 U	0.0528 U	0.00015 U	0.05265 U	0.0519 U	0.0528 U
Sodium	mg/Kg WW	741.75 J	732 J	647.68 J	2.13 J	733.59 J	778.5 J	721.6 J
Thallium	mg/Kg WW	0.08625 U	0.0915 U	0.088 U	0.00025 U	0.08775 U	0.0865 U	0.088 U
Uranium	mg/Kg WW	0.00963	0.01219	0.00458	0.0000267	0.00993	0.01208	0.00746
Vanadium	mg/Kg WW	0.138 U	0.1464 U	0.1408 U	0.0004 U	0.1404 U	0.1384 U	0.1408 U
Zinc	mg/Kg WW	29.2215 J	32.3178 J	20.1344 J	0.0808 J	25.3071 J	29.7214 J	40.128 J
Mercury								
Mercury	µg/Kg WW	81.8	82.7	63.3	84	81.4	74.2	74.7
Arsenic Species								
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	14.145 U		14.432 U	41 U	14.391 U		
ASB + Cation	µg/Kg WW	8.625 J		7.744 J	20 J	8.775 J		
Dimethylarsonic acid (DMA)	µg/Kg WW	15.525 J		15.136 J	38 J	10.53 J		
Monomethylarsonic acid (MMA)	µg/Kg WW	14.145 U		14.432 U	41 U	14.391 U		
Unknown	µg/Kg WW	14.145 UJ		11.616 J	27 J	10.179 J		
Conventionals								
Lipids	%	7.6	8.3	8.9	9.2	6.6	7.7	10.2
Moisture	%	65.5	63.4	64.8	65.3	64.9	65.4	64.8

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-65
Results of PCB Aroclors and Conventionals for Mountain Whitefish Whole Body Composites from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	MW1W15 Primary Sample	MW1W25 Primary Sample	MW1W35 Primary Sample	MW1W45 Primary Sample	MW1W45 Field Duplicate	MW1W45 Field Triplicate	MW1W55 Primary Sample
PCB Aroclor								
PCB-1016	µg/Kg WW	14	14 U	13 U	14	14 U	13 U	14 U
PCB-1221	µg/Kg WW	14 U	14 U	13 U	14 U	14 U	13 U	14 U
PCB-1232	µg/Kg WW	28 U	28 U	26 U	28 U	28 U	27 U	28 U
PCB-1242	µg/Kg WW	14 U	14 U	13 U	14 U	14 U	13 U	14 U
PCB-1248	µg/Kg WW	14 U	14 U	13 U	14 U	14 U	13 U	14 U
PCB-1254	µg/Kg WW	-	-	-	-	-	-	-
PCB-1254/1260	µg/Kg WW	57.3 J	49 J	55.7 J	-	37.6 J	53.1 J	58.2 J
PCB-1260	µg/Kg WW	-	-	-	-	-	-	-
PCB-1262	µg/Kg WW	14 U	14 U	13 U	-	14 U	13 U	14 U
PCB-1268	µg/Kg WW	14 U	14 U	13 U	-	14 U	13 U	14 U
Conventionals								
Lipids	%	7.6	8.3	8.9	9.2	6.6	7.7	10.2
Moisture	%	65.5	63.4	64.8	65.3	64.9	65.4	64.8

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-66
Results of PCB Congeners for Mountain Whitefish Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, FSCA 4, FSCA 5, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	MW1W15 Primary Sample	LW2W55 Primary Sample	LW3W25 Primary Sample	LW4W25 Primary Sample	LW5W45 Primary Sample	LW6W13 Primary Sample
PCB Congener							
PCB 1	µg/Kg WW	0.00231 Q	0.00237 Q	0.00225 KQ	0.0016 JQ	0.00104 Q	0.000927 UQ
PCB 10	µg/Kg WW	0.000692 J	0.000864 U	0.000834 JK	0.00139 U	0.000837 U	0.000868 U
PCB 103	µg/Kg WW	0.0213	0.013 K	0.0119	0.00961	0.0207	0.0227
PCB 104	µg/Kg WW	0.000801 U	0.000867 U	0.000476 U	0.00054 U	0.000834 U	0.00104 U
PCB 105	µg/Kg WW	2.01	0.466	0.368	0.372	0.643	0.751
PCB 106	µg/Kg WW	0.00508 U	0.00537 U	0.00487 U	0.0042 U	0.0334	0.00577 U
PCB 107	µg/Kg WW	0.163 C	0.047 K	0.0413 C	0.0439 C	0.0597 C	0.0806 C
PCB 109	µg/Kg WW	0.447	0.119	0.109	0.116	0.181	0.218
PCB 11	µg/Kg WW	0.073 B	0.0856 B	0.105 B	0.101 B	0.226	0.118 B
PCB 110	µg/Kg WW	5.44 C	1.28 C	1.32 C	1.03 C	2.44 C	4.96 C
PCB 111	µg/Kg WW	0.0138	0.00529	0.00276	0.00179 U	0.00351 K	0.00228 U
PCB 112	µg/Kg WW	0.262	0.0515	0.0306	0.0273	0.139	0.0804 K
PCB 114	µg/Kg WW	0.129 Q	0.0291	0.0239	0.0254	0.0453	0.0517
PCB 118	µg/Kg WW	5.33	1.13	0.94	0.978	1.62	2.03
PCB 12	µg/Kg WW	0.000906 U	0.00125 U	0.00269 JK	0.00117 U	0.000556 U	0.000935 U
PCB 120	µg/Kg WW	0.0406	0.00783	0.00822	0.00848	0.0119 K	0.0178 K
PCB 121	µg/Kg WW	0.0031	0.00184 U	0.00259 U	0.00191 U	0.00125 K	0.00239 U
PCB 122	µg/Kg WW	0.00559 U	0.00613 U	0.00556 U	0.0048 U	0.00267 U	0.00635 U
PCB 123	µg/Kg WW	0.0589	0.018 K	0.0182	0.0154	0.0267	0.0286
PCB 126	µg/Kg WW	0.0602 Q	0.0177	0.012	0.015 K	0.0025 U	0.0306
PCB 127	µg/Kg WW	0.0339	0.00557 U	0.00505 U	0.00435 U	0.00517 K	0.00832 K
PCB 128	µg/Kg WW	0.662 Q	0.233 Q	0.229 Q	0.254 Q	0.391 C	0.428 C
PCB 129	µg/Kg WW	8.96 QE	2.22 C	1.9 C	2.2 C	3.13 C	3.99 C
PCB 130	µg/Kg WW	0.524	0.137	0.126	0.143	0.205	0.252
PCB 131	µg/Kg WW	0.0301	0.00918	0.0106	0.00875 K	0.0146 K	0.0162 K
PCB 132	µg/Kg WW	1.3	0.469	0.394	0.408	0.611	0.757
PCB 133	µg/Kg WW	0.207	0.0405	0.0333	0.0414	0.0587	0.0781
PCB 134	µg/Kg WW	0.116	0.0601	0.0594	0.0558	0.0864	0.113
PCB 135	µg/Kg WW	1.43 C	0.768 C	0.606 C	0.648 C	0.905 C	1.25 C
PCB 136	µg/Kg WW	0.285	0.197	0.155	0.144	0.214	0.278
PCB 137	µg/Kg WW	0.737	0.1	0.111	0.108	0.181	0.185
PCB 139	µg/Kg WW	0.185 C	0.0401 C	0.0317 C	0.0336 C	0.0524 C	0.0699 C
PCB 14	µg/Kg WW	0.000981 U	0.0014 U	0.00094 U	0.00131 U	0.000602 U	0.00101 U
PCB 141	µg/Kg WW	0.825	0.183	0.197	0.2	0.243	0.393
PCB 142	µg/Kg WW	0.0131 U	0.00537 U	0.00556 U	0.00381 U	0.00359 U	0.00546 U
PCB 143	µg/Kg WW	0.0127 U	0.00829	0.0051 U	0.00766 K	0.00553	0.00703 K

Table B-66
Results of PCB Congeners for Mountain Whitefish Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, FSCA 4, FSCA 5, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	MW1W15 Primary Sample	LW2W55 Primary Sample	LW3W25 Primary Sample	LW4W25 Primary Sample	LW5W45 Primary Sample	LW6W13 Primary Sample
PCB 144	µg/Kg WW	0.214	0.0806	0.0729	0.0755	0.102	0.143
PCB 145	µg/Kg WW	0.0029 U	0.00329 U	0.00331 U	0.00218 U	0.00106 U	0.00257 U
PCB 146	µg/Kg WW	1.17	0.288	0.279	0.311	0.446	0.582
PCB 147	µg/Kg WW	4.11 C	1.24 C	1.06 C	1.12 C	1.82 C	2.13 C
PCB 148	µg/Kg WW	0.00817	0.00483	0.00453 U	0.00299 U	0.00547	0.00832 K
PCB 15	µg/Kg WW	0.0164	0.0169	0.0212	0.0184	0.0199	0.0243
PCB 150	µg/Kg WW	0.00454 K	0.00316 U	0.00317 U	0.00241	0.00263 K	0.0042
PCB 152	µg/Kg WW	0.0033 K	0.00421 U	0.00324 U	0.00213 U	0.00214 K	0.00265 U
PCB 153	µg/Kg WW	13.3 QE	1.48 Q	1.7 C	1.71 C	2.53 C	3.2 C
PCB 154	µg/Kg WW	0.117	0.0239 K	0.0214	0.0222	0.0342	0.0532
PCB 155	µg/Kg WW	0.00831	0.00287 U	0.00237 U	0.00275 K	0.00362	0.00553
PCB 156	µg/Kg WW	1.25 C	0.168 C	0.105 C	0.15 C	0.195 C	0.255 C
PCB 158	µg/Kg WW	0.368 Q	0.125 Q	0.126	0.141	0.204	0.242
PCB 159	µg/Kg WW	0.0665	0.00875	0.0086	0.00921	0.0107 K	0.0177
PCB 16	µg/Kg WW	0.0318	0.0297	0.0346	0.0223	0.0354 Q	0.0297
PCB 160	µg/Kg WW	0.0101 U	0.00403 U	0.00417 U	0.00286 U	0.00242 U	0.0042 U
PCB 161	µg/Kg WW	0.00981 U	0.00385 U	0.00399 U	0.00273 U	0.00249 U	0.0041 U
PCB 162	µg/Kg WW	0.107	0.0168 K	0.0139	0.0172 K	0.00988 K	0.0321
PCB 164	µg/Kg WW	0.291	0.094	0.0648	0.0826	0.0881	0.158
PCB 165	µg/Kg WW	0.00935 U	0.00392 U	0.00406 U	0.00278 U	0.00245 U	0.00391 U
PCB 167	µg/Kg WW	0.407	0.0463	0.0388	0.0451	0.0638	0.0913
PCB 169	µg/Kg WW	0.0236	0.00282 U	0.00223 U	0.00316 U	0.00163 U	0.00445 U
PCB 17	µg/Kg WW	0.0486	0.0416	0.0471	0.0283	0.0505	0.0475
PCB 170	µg/Kg WW	3.2	0.363 Q	0.276	0.296 Q	0.346 Q	0.54
PCB 171	µg/Kg WW	0.818 C	0.149 C	0.113 C	0.13 C	0.168 C	0.214 C
PCB 172	µg/Kg WW	0.558	0.066	0.0587	0.0596	0.0863	0.116
PCB 174	µg/Kg WW	1.23	0.244	0.231	0.237	0.287	0.422
PCB 175	µg/Kg WW	0.0361 Q	0.0153 KQ	0.0174 Q	0.0152	0.0115	0.014 K
PCB 176	µg/Kg WW	0.0406 Q	0.0343 Q	0.0334	0.0365 Q	0.0473	0.0595
PCB 177	µg/Kg WW	1.12	0.328	0.248	0.279	0.367	0.472
PCB 178	µg/Kg WW	0.201 Q	0.108 Q	0.11	0.121	0.15	0.213
PCB 179	µg/Kg WW	0.251 Q	0.209	0.171	0.19	0.234	0.337
PCB 18	µg/Kg WW	0.116 C	0.101 C	0.109 C	0.0685 C	0.127 C	0.109 C
PCB 180	µg/Kg WW	8.78 E	0.828 C	0.692 C	0.718 C	0.856 C	1.35 C
PCB 181	µg/Kg WW	0.021	0.00419 U	0.00244 U	0.00231 U	0.0031 U	0.00653 U
PCB 182	µg/Kg WW	0.0165	0.00531 U	0.00408	0.00431 U	0.00432 K	0.0083
PCB 183	µg/Kg WW	2.59 C	0.413 C	0.337 C	0.39 C	0.583 C	0.693 C

Table B-66
Results of PCB Congeners for Mountain Whitefish Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, FSCA 4, FSCA 5, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	MW1W15 Primary Sample	LW2W55 Primary Sample	LW3W25 Primary Sample	LW4W25 Primary Sample	LW5W45 Primary Sample	LW6W13 Primary Sample
PCB 184	µg/Kg WW	0.01	0.00382 U	0.00262	0.0031 U	0.00411	0.00548 K
PCB 186	µg/Kg WW	0.00322 U	0.00422 U	0.00212 U	0.00343 U	0.00222 U	0.00243 U
PCB 187	µg/Kg WW	0.647 Q	0.519 Q	0.588 Q	0.649 Q	0.759	1.09 Q
PCB 188	µg/Kg WW	0.00478	0.00443 U	0.00186 U	0.00301 U	0.00294 U	0.00358
PCB 189	µg/Kg WW	0.0922	0.00871	0.00599	0.00758	0.00923	0.0119 K
PCB 19	µg/Kg WW	0.00983 Q	0.00734	0.00735	0.00547 K	0.0122	0.0088
PCB 190	µg/Kg WW	0.645	0.083 Q	0.0615	0.0658 Q	0.0479 Q	0.131
PCB 191	µg/Kg WW	0.125	0.0139	0.0126 K	0.0136	0.0137	0.0192
PCB 192	µg/Kg WW	0.00881 U	0.00362 U	0.0021 U	0.002 U	0.00262 U	0.00561 U
PCB 194	µg/Kg WW	1.38	0.117	0.0871	0.0871	0.0952	0.147
PCB 195	µg/Kg WW	0.461	0.0778	0.052	0.0613	0.068	0.102
PCB 196	µg/Kg WW	0.818	0.121	0.0965	0.118	0.122	0.174
PCB 197	µg/Kg WW	0.126 C	0.0237 C	0.021 C	0.0242 C	0.0311 C	0.0399 C
PCB 198	µg/Kg WW	1.53 C	0.208 Q	0.197 C	0.154 Q	0.15 Q	0.36 C
PCB 2	µg/Kg WW	0.00239 K	0.00414 K	0.00351 K	0.00301 K	0.00184 K	0.00373 K
PCB 20	µg/Kg WW	0.369 C	0.22 C	0.268 C	0.166 C	0.272 Q	0.285 C
PCB 201	µg/Kg WW	0.127	0.0365	0.0296	0.0339	0.0398	0.0605
PCB 202	µg/Kg WW	0.252	0.0707	0.0524	0.0617	0.0833	0.113
PCB 203	µg/Kg WW	1.16	0.154	0.124	0.126	0.12	0.226
PCB 204	µg/Kg WW	0.00415 U	0.00171 U	0.000701 U	0.00127 U	0.00108 U	0.00286 U
PCB 205	µg/Kg WW	0.055	0.00471 K	0.00383	0.00574 K	0.00602	0.01
PCB 206	µg/Kg WW	0.498	0.0704	0.0542	0.0569	0.0662	0.0851
PCB 207	µg/Kg WW	0.0606	0.0158	0.0109	0.0132	0.0182 K	0.0241
PCB 208	µg/Kg WW	0.113	0.0328	0.024	0.027 Q	0.0334 Q	0.0464
PCB 209	µg/Kg WW	0.0369	0.0152	0.0116	0.0141	0.0222	0.0258
PCB 21	µg/Kg WW	0.0593 C	0.0446 C	0.0471 C	0.0346 C	0.0375 Q	0.0395 C
PCB 22	µg/Kg WW	0.0254 Q	0.0571	0.0603	0.0415	0.0465 Q	0.051
PCB 23	µg/Kg WW	0.000906 U	0.000864 U	0.000436 J	0.00067 U	0.000306 U	0.000517 U
PCB 24	µg/Kg WW	0.00199	0.00148 JK	0.00196	0.000834 J	0.0017 K	0.00154 JK
PCB 25	µg/Kg WW	0.0149	0.0111	0.0126	0.00804	0.0153	0.0122
PCB 26	µg/Kg WW	0.0452 C	0.0298 C	0.0362 C	0.0216 C	0.0386 C	0.0354 C
PCB 27	µg/Kg WW	0.00698	0.00873	0.00993	0.0058	0.013	0.00983
PCB 3	µg/Kg WW	0.00205	0.00191 K	0.00201	0.00221	0.00106 K	0.00207 K
PCB 31	µg/Kg WW	0.254	0.186	0.211	0.138	0.199	0.215
PCB 32	µg/Kg WW	0.0271	0.0148 Q	0.0175	0.00888	0.00991	0.0161
PCB 34	µg/Kg WW	0.00129 JK	0.00148 J	0.0021	0.00104 J	0.00279	0.0023
PCB 35	µg/Kg WW	0.00183 JK	0.0012 J	0.000811 U	0.00165 J	0.00351	0.0018 JK

Table B-66
Results of PCB Congeners for Mountain Whitefish Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, FSCA 4, FSCA 5, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	MW1W15 Primary Sample	LW2W55 Primary Sample	LW3W25 Primary Sample	LW4W25 Primary Sample	LW5W45 Primary Sample	LW6W13 Primary Sample
PCB 36	µg/Kg WW	0.0011 U	0.000819 U	0.000734 U	0.000691 U	0.0024	0.000832 U
PCB 37	µg/Kg WW	0.0337	0.0385	0.0513	0.0329	0.0512	0.0525
PCB 38	µg/Kg WW	0.00122 U	0.000836 U	0.000748 U	0.000705 U	0.000703 J	0.00133 J
PCB 39	µg/Kg WW	0.00391 K	0.00215 K	0.00308	0.00204	0.00264	0.0043
PCB 4	µg/Kg WW	0.0116 Q	0.00929 Q	0.0113 Q	0.00864 Q	0.00993 Q	0.0109 Q
PCB 40	µg/Kg WW	0.0991 C	0.101 C	0.135 C	0.0665 C	0.167 C	0.148 C
PCB 41	µg/Kg WW	0.0275	0.0298	0.0344	0.017	0.0357	0.0288
PCB 42	µg/Kg WW	0.0864	0.0987	0.128	0.069	0.184	0.13
PCB 43	µg/Kg WW	0.0127 K	0.0202	0.0219	0.0119	0.0368	0.0238
PCB 44	µg/Kg WW	0.33 Q	0.506 C	0.56 C	0.331 C	0.847 C	0.735 C
PCB 45	µg/Kg WW	0.0318 C	0.0404 C	0.0476 C	0.0253 C	0.0477 Q	0.0485 C
PCB 46	µg/Kg WW	0.0139 KQ	0.0159	0.0169	0.0101	0.0189 Q	0.0167
PCB 48	µg/Kg WW	0.0664 Q	0.0676	0.0752	0.0417	0.108	0.077
PCB 49	µg/Kg WW	0.379 C	0.35 C	0.409 C	0.236 C	0.623 C	0.511 C
PCB 5	µg/Kg WW	0.000971 U	0.00131 U	0.00088 U	0.00123 U	0.000598 U	0.001 U
PCB 50	µg/Kg WW	0.0405 C	0.0496 C	0.0549 C	0.032 C	0.0642 Q	0.0613 C
PCB 52	µg/Kg WW	0.859	0.794	0.791	0.506	1.24	1.14
PCB 54	µg/Kg WW	0.000836 J	0.000581 U	0.000461 U	0.000536 U	0.00104 U	0.00118 U
PCB 55	µg/Kg WW	0.0167	0.0101	0.00969	0.00544	0.0121	0.0128
PCB 56	µg/Kg WW	0.128	0.155	0.162	0.108	0.266	0.177
PCB 57	µg/Kg WW	0.00475 K	0.00262	0.00288	0.0017 U	0.00455	0.00435 K
PCB 58	µg/Kg WW	0.00626 K	0.00368	0.00484 K	0.00318	0.00575 K	0.00639 K
PCB 59	µg/Kg WW	0.0479 C	0.0463 C	0.0548 C	0.0313 C	0.0842 C	0.0747 C
PCB 6	µg/Kg WW	0.00576	0.00541 K	0.00628 KQ	0.00532 KQ	0.00217	0.0049
PCB 60	µg/Kg WW	0.222	0.0961	0.0997	0.0677	0.167	0.158
PCB 61	µg/Kg WW	1.63 C	0.913 C	0.906 C	0.654 C	1.54 C	1.44 C
PCB 63	µg/Kg WW	0.0455	0.0269	0.0289	0.018	0.0548	0.0503
PCB 64	µg/Kg WW	0.275	0.234	0.287	0.154	0.426	0.36
PCB 66	µg/Kg WW	1.08 Q	0.503	0.591	0.361	1.03	0.984
PCB 67	µg/Kg WW	0.0217	0.0112	0.0125	0.0099	0.0223	0.019
PCB 68	µg/Kg WW	0.0197	0.0082	0.00723	0.00608	0.014	0.015
PCB 7	µg/Kg WW	0.000904 U	0.00123 U	0.00181 JK	0.00115 U	0.000545 U	0.000933 U
PCB 72	µg/Kg WW	0.0242	0.0108 K	0.0104	0.00772	0.02	0.0195
PCB 73	µg/Kg WW	0.00515 K	0.00478 K	0.00437 K	0.00291	0.00445 K	0.00666
PCB 77	µg/Kg WW	0.0575	0.0323	0.0336	0.0256	0.058	0.0579
PCB 78	µg/Kg WW	0.00314 U	0.00143 U	0.00134 U	0.00172 U	0.000777 U	0.00245 U
PCB 79	µg/Kg WW	0.0842	0.0341	0.0314	0.029	0.0387	0.0661

Table B-66
Results of PCB Congeners for Mountain Whitefish Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, FSCA 4, FSCA 5, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	MW1W15 Primary Sample	LW2W55 Primary Sample	LW3W25 Primary Sample	LW4W25 Primary Sample	LW5W45 Primary Sample	LW6W13 Primary Sample
PCB 8	µg/Kg WW	0.00851 QB	0.00857 QB	0.00952 KQE	0.00769 KQE	0.00379	0.00912 QB
PCB 80	µg/Kg WW	0.00254 U	0.00125 U	0.00117 U	0.00151 U	0.000685 U	0.00198 U
PCB 81	µg/Kg WW	0.00457	0.00129 U	0.00119 U	0.00147 U	0.00474 K	0.00194 U
PCB 82	µg/Kg WW	0.146	0.0802	0.109	0.0752	0.141	0.139
PCB 83	µg/Kg WW	0.421	0.248	0.159	0.272	0.129	0.433
PCB 84	µg/Kg WW	0.31	0.244	0.238	0.161	0.333	0.369
PCB 85	µg/Kg WW	1.26 C	0.497 C	0.456 C	0.423 C	0.249 C	0.767 C
PCB 86	µg/Kg WW	1.93 Q	0.892 C	0.848 C	0.675 C	1.31 C	1.58 C
PCB 88	µg/Kg WW	0.646 C	0.163 C	0.172 C	0.113 C	0.261 C	0.568 C
PCB 89	µg/Kg WW	0.0062	0.00968	0.0122	0.00581 K	0.0146	0.0154 K
PCB 9	µg/Kg WW	0.00281 K	0.00265 K	0.00404 K	0.00313 K	0.000597 U	0.00451 K
PCB 90	µg/Kg WW	3.05 C	1.38 C	1.35 C	1.06 C	2 C	2.58 C
PCB 92	µg/Kg WW	0.686	0.356	0.314	0.263	0.466	0.609
PCB 93	µg/Kg WW	0.027 C	0.0118 K	0.0169 K	0.0107 K	0.0221 K	0.0199 K
PCB 94	µg/Kg WW	0.00588 K	0.00539 K	0.00549	0.00312 K	0.00822	0.0076
PCB 95	µg/Kg WW	1.23	0.989	0.881	0.655	1.25	1.48
PCB 96	µg/Kg WW	0.00496	0.00479 K	0.00497	0.00369 K	0.00768	0.00653
PCB 98	µg/Kg WW	0.0452 C	0.034 C	0.0344 C	0.0217 C	0.056 C	0.0552 C
PCB 99	µg/Kg WW	3.12	0.601	0.687	0.453	0.951	1.19

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-67

Results of Dioxins/Furans Analysis and Conventionals for Mountain Whitefish Whole Body Composites from FSCA 1

Upper Columbia River RI/FS

Analyte	Units	MW1W15 Primary Sample	MW1W25 Primary Sample	MW1W35 Primary Sample	MW1W45 Primary Sample	MW1W45 Field Duplicate	MW1W45 Field Triplicate	MW1W55 Primary Sample
Dioxins/Furans								
2,3,7,8-TCDD	µg/Kg WW	0.000191	0.000304 U	0.00021 U	0.000219 U	0.000186 U	0.000229 U	0.000435 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000573 EMPC	0.000257 EMPC	0.000274	0.000297 EMPC	0.000356 EMPC	0.000255 EMPC	0.000538 U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000343 U	0.000309 U	0.000233 U	0.000243 U	0.000322 U	0.000274 U	0.000571 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000315	0.000225	0.000244	0.000238 U	0.000299	0.000275 U	0.000543
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000351 U	0.000228	0.000232 U	0.000247 U	0.000323 U	0.000282 U	0.000574 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.00029	0.00028	0.000963	0.00044	0.000785	0.000479	0.00292
OCDD	µg/Kg WW	0.00104	0.000945	0.00445	0.00201	0.00347	0.0019	0.00654
2,3,7,8-TCDF	µg/Kg WW	0.00428	0.00332	0.006	0.00339	0.00357	0.00348	0.00258
1,2,3,7,8-PeCDF	µg/Kg WW	0.000181	0.000174 EMPC	0.000155	0.000162 EMPC	0.000144 U	0.000155 EMPC	0.000625 U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000265	0.000289	0.000246	0.000247	0.000308	0.000289	0.000628 U
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.00014 U	0.000169 U	0.000152 U	0.000139 U	0.000197 U	0.000147 U	0.000515 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000138 U	0.000163 U	0.000154 U	0.000138 U	0.000199 U	0.000145 U	0.000496 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000207 U	0.000257 U	0.000231 U	0.00021 U	0.0003 U	0.000227 U	0.000744 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000143 U	0.000168 U	0.000152 U	0.000135 U	0.000205 U	0.000143 U	0.0004
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000172 U	0.00016 U	0.00036	0.000169 U	0.000203	0.000121	0.00088
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000255 U	0.00025 U	0.000202 U	0.000251 U	0.00025 U	0.000211 U	0.000731 U
OCDF	µg/Kg WW	0.000598 U	0.000456 U	0.00172	0.000567 U	0.000418 U	0.000368 U	0.000861 U
TCDD	µg/Kg WW	0.000191	0.000313	0.00021 U	0.000361	0.00032	0.000246	0.000435 U
TCDF	µg/Kg WW	0.0054	0.004	0.00746	0.00459	0.00498	0.00449	0.00311
PeCDD	µg/Kg WW	0.000576	0.000428	0.000274	0.000163 U	0.000242 U	0.000198 U	0.000702
PeCDF	µg/Kg WW	0.000773	0.000827	0.000401	0.000436	0.000976	0.000772	0.000625 U
HxCDD	µg/Kg WW	0.000315	0.000453	0.000244	0.000238 U	0.000299	0.000274 U	0.000543
HxCDF	µg/Kg WW	0.000135	0.000163 U	0.00025	0.000112	0.000197 U	0.000143 U	0.000934
HpCDD	µg/Kg WW	0.000782	0.00466	0.00309	0.00062	0.00215	0.00326	0.0065
HpCDF	µg/Kg WW	0.000172 U	0.00016 U	0.00161	0.000169 U	0.000203	0.000121	0.00088
Conventionals								
Lipids	%	7.6	8.3	8.9	9.2	6.6	7.7	10.2
Moisture	%	65.5	63.4	64.8	65.3	64.9	65.4	64.8

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

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Table B-68
Results of TAL Metals, Mercury, and Arsenic Speciation for Individual Largescale Sucker Gut/contents and Gutless Whole Body and Whole Body Composites from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	LS1G[a]10040 Primary Sample	LS1W10040[b] Primary Sample	LS1G10041 Primary Sample	LS1W10041 Primary Sample	LS1G10051 Primary Sample	LS1W10051 Primary Sample	LS1G10056 Primary Sample	LS1W10056 Primary Sample	LS1G10089 Primary Sample	LS1W10089 Primary Sample	LS1G50769 Primary Sample	LS1W50769 Primary Sample	LS1G50770 Primary Sample	LS1W50770 Primary Sample	LS1G5077 Primary Sample
TAL Metals																
Aluminum	mg/Kg WW	2862.5	0 J	1869.48	0 J	744.12	0 J	1410.5	0 J	6486	0 J	213.024	0 U	449.8	0	246.264
Antimony	mg/Kg WW	1.9007	0 U	1.053	0 U	1.5444	0 U	1.281	0 U	2.1808	0 U	0.19824	0 U	0.17646	0 U	0.12247
Arsenic	mg/Kg WW	2.37702	0	1.6848	0	1.10916	0	1.4875	0	4.982	0	0.6048	0	0.7266	0	0.80764
Barium	mg/Kg WW	241.824	0	118.908	0	44.928	0	67.2	0	606.3	0	14.9856	0 J	16.9194	0 J	9.3673
Beryllium	mg/Kg WW	0.13282	0 U	0.081	0 U	0.03861	0 U	0.0665	0 U	0.2773	0 U	0.01008	0 U	0.0263	0 U	0.01258
Cadmium	mg/Kg WW	1.603	0	2.1384	0	2.26395	0	1.624	0	2.538	0	1.38432	0	1.6781	0	1.0261
Calcium	mg/Kg WW	7740.2	0	6350.4	0	8985.6	0	5355	0	21103	0	17841.6	0 J	8926.8	0 J	18767.7
Chromium	mg/Kg WW	54.044 J	0 J	99.144 J	0 J	53.703 J	0 J	37.8 J	0 J	101.52 J	0 J	3.18864 J	0	8.5462 J	0	3.4755
Cobalt	mg/Kg WW	8.7478	0	4.9896	0	1.9305	0	2.506	0	18.894	0	0.4368	0	0.4498	0	0.3641
Copper	mg/Kg WW	306.86	0 J	163.62	0 J	70.551	0 J	82.6	0 J	784.9	0 J	24.7296 U	0	14.2206	0	13.9351
Iron	mg/Kg WW	25006.8	0	14061.6	0	4984.2	0	7770	0	66740	0	833.28	0 J	1211	0 J	728.2
Lead	mg/Kg WW	34.6706	0 J	21.7404	0 J	11.583	0 J	14.385	0 J	116.56	0 J	2.37552	0	4.9478	0	2.05551
Magnesium	mg/Kg WW	1199.96	0	884.52	0	498.42	0	854	0	2016.3	0	362.88	0	536.3	0	417.06
Manganese	mg/Kg WW	503.8	0	284.148	0	100.386	0	166.25	0	1245.5	0	26.1072	0 J	28.3374	0 J	21.7467
Nickel	mg/Kg WW	19.6482	0	64.152	0	32.994	0	20.16	0	38.963	0	1.80432	0	4.7056	0	1.96283
Potassium	mg/Kg WW	2725.1	0	2527.2	0	2804.49	0	2789.5	0	2914	0	2120.16	0	2338.96	0	1916.49
Selenium	mg/Kg WW	1.0992	0	0.80676	0	1.04598	0	0.84	0	1.4993	0	1.17936	0	1.4532	0	1.20484
Silver	mg/Kg WW	0.5954	0 U	0.6804	0 U	0.29133	0 U	0.1715	0 U	1.645	0 U	0.08064	0 U	0.07958	0 U	0.07613
Sodium	mg/Kg WW	1309.88	0	1500.12	0	1449.63	0	1585.5	0	1856.5	0	1609.44	0	1415.14	0	1555.7
Thallium	mg/Kg WW	0.10992	0 U	0.081	0 U	0.08424	0 U	0.084	0 U	0.1128	0 U	0.08064	0 U	0.07958	0 U	0.07613
Uranium	mg/Kg WW	0.65952	0	0.3888	0	0.20147	0	0.30625	0	1.4382	0	0.1008	0	0.11037	0	0.14101
Vanadium	mg/Kg WW	6.9158	0 U	5.2812	0 U	2.79747	0 U	4.515	0 U	11.468	0 U	0.7728	0 U	1.46704	0 U	1.06582
Zinc	mg/Kg WW	1951.08	0 J	1036.8	0 J	331.344	0 J	462	0 J	5170	0 J	58.128	0	59.512	0	39.389
Mercury																
Mercury	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic Species																
Arsenic ($As^+3 + AS^+5$)	µg/Kg WW	-	-	187.272	11.234 UJ	118.287	10.824 UJ	-	-	-	-	-	-	-	-	-
ASB + Cation	µg/Kg WW	-	-	13.284 UJ	16.714 JL	14.391 UJ	7.656 JL	-	-	-	-	-	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	26.244 J	13.7 JL	17.901 J	10.824 UJ	-	-	-	-	-	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	13.284 U	11.234 UJ	14.391 U	10.824 UJ	-	-	-	-	-	-	-	-	-
Unknown	µg/Kg WW	-	-	27.54 J	11.234 JL	15.444 J	10.824 UJ	-	-	-	-	-	-	-	-	-
Conventionals																
Lipids	%	-	6.9	-	5.6	-	2.9	-	5.3	-	5.9	11	4.5	-	4.8	11
Moisture	%	54.2	71	67.6	72.6	65	73.6	65	72.7	53	72.7	66.4	73.9	65.4	74.5	66.9

[a] G indicates a gut/contents sample from an individual largescale sucker.

[b] W followed by a 4 digit numeric code indicates a whole body sample with the gut/contents removed fornm an individual large scale sucker.

[c] W followed by a 2 digit numeric code indicates a whole body composite.

- not analyzed

U - The analyte was not detected at or above the reported value.

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Table B-68
Results of TAL Metals, Mercury, and Arsenic Speciation for Individual Largescale Sucker Gut/contents and Gutless Whole Body and Whole Body Composites from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	71	LS1W50771 Primary Sample	LS1G50775 Primary Sample	LS1W50775 Primary Sample	LS1G50778 Primary Sample	LS1W50778 Primary Sample	LS1G60778 Field Duplicate	LS1W60778 Field Duplicate	LS1W25[c] Primary Sample	LS1W35 Primary Sample	LS1W45 Primary Sample
TAL Metals												
Aluminum	mg/Kg WW		0	424.44	0	294.468	0	298.931	0 U	0 J	0 J	0 J
Antimony	mg/Kg WW		0 U	1.11874	0 U	0.12402	0 U	0.1268	0 U	0	0	0 U
Arsenic	mg/Kg WW		0	1.01656	0	0.83634 U	0	0.8242 U	0	0	0	0
Barium	mg/Kg WW		0 J	24.9424	0 J	17.4582	0 J	18.6396	0 J	0	0	0 J
Beryllium	mg/Kg WW		0 U	0.01913	0 U	0.01495	0 U	0.01553	0 U	0 U	0 U	0 U
Cadmium	mg/Kg WW		0	2.0436	0	1.34514	0	1.31872	0	0	0	0
Calcium	mg/Kg WW		0 J	27772	0 J	13769.4	0 J	14391.8	0 J	0	0	0 J
Chromium	mg/Kg WW	J	0	4.6374 J	0	3.4026 J	0	3.2651 J	0	0 J	0 J	0
Cobalt	mg/Kg WW		0	0.5764	0	0.3498	0	0.317	0	0	0	0
Copper	mg/Kg WW	U	0	25.8594 U	0	7.4094 U	0	7.3544 U	0	0 J	0 J	0
Iron	mg/Kg WW		0 J	1391.22	0 J	655.08	0 J	675.21	0 J	0	0	0
Lead	mg/Kg WW		0	4.7946	0	2.2419	0	2.09537	0	0 J	0 J	0 J
Magnesium	mg/Kg WW		0	594.74	0	422.94	0	421.61	0	0	0	0
Manganese	mg/Kg WW		0 J	43.492	0 J	16.5996	0 J	16.8644	0 J	0	0	0 J
Nickel	mg/Kg WW		0	2.2663	0	1.7967	0	1.81324	0	0	0	0
Potassium	mg/Kg WW		0	2457.56	0	2117.88	0	2060.5	0	0	0	0
Selenium	mg/Kg WW		0	1.048	0	1.4946	0	1.4582	0	0	0	0
Silver	mg/Kg WW		0 U	0.131	0 U	0.0795	0 U	0.07925	0 U	0 U	0 U	0 U
Sodium	mg/Kg WW		0	1747.54	0	1669.5	0	1629.38	0	0	0	0
Thallium	mg/Kg WW		0 U	0.0655	0 U	0.0795	0 U	0.07925	0 U	0 U	0 U	0 U
Uranium	mg/Kg WW		0	0.16087	0	0.11225	0	0.11761	0	0	0	0
Vanadium	mg/Kg WW		0 U	1.44886	0	1.12254	0 U	1.16339	0	0	0	0
Zinc	mg/Kg WW		0	74.408	0	31.2276	0	32.017	0	0 J	0 J	0
Mercury												
Mercury	µg/Kg WW		-	-	-	-	-	-	-	77.1	92.8	194
Arsenic Species												
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW		-	-	-	215.922	10.824 U	241.237	10.742 U	-	-	12.079 J
ASB + Cation	µg/Kg WW		-	-	-	21.942 J	39.072 J	12.997 UJ	37.466 J	-	-	16.191 J
Dimethylarsonic acid (DMA)	µg/Kg WW		-	-	-	22.896 J	7.128 J	23.775 J	7.598 J	-	-	8.738 J
Monomethylarsonic acid (MMA)	µg/Kg WW		-	-	-	29.892 J	10.824 U	29.164 J	10.742 U	-	-	10.537 U
Unknown	µg/Kg WW		-	-	-	89.04 J	13.2 J	120.46 J	13.362 J	-	-	11.308 J
Conventionals												
Lipids	%		5.3	-	0.3 U	9.4	4.2	-	4.5	5.8	2.7	4
Moisture	%		71.8	73.8	80.8	68.2	73.6	68.3	73.8	72.2	71.3	74.3

[a] G indicates a gut/contents sample from an individual largescale sucker.

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Table B-69
Results of TAL Metals, Mercury, and Arsenic Speciation for Largescale Sucker Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	LS2W15 Primary Sample	LS2W25 Primary Sample	LS2W25 Field Duplicate	LS2W25 Field Triplicate	LS2W35 Primary Sample	LS2W45 Primary Sample
TAL Metals							
Aluminum	mg/Kg WW	12.19 J	20.988 J	24.258 J	25.6041 J	19.0608 J	41.85 J
Antimony	mg/Kg WW	0.10335 U	0.10296 U	0.0988 U	0.10179 U	0.11088 U	0.10602 U
Arsenic	mg/Kg WW	0.159	0.16896	0.1326	0.15921	0.14256	0.19809
Barium	mg/Kg WW	1.9663	2.31792	3.146	3.0537	2.50008	3.4875
Beryllium	mg/Kg WW	0.0053 U	0.00502 U	0.00494 U	0.00522 U	0.00554 U	0.0053 U
Cadmium	mg/Kg WW	0.2915	0.4752	0.468	0.4176	0.3696	0.3348
Calcium	mg/Kg WW	9805	8896.8	12454	12449.7	11352	10323
Chromium	mg/Kg WW	0.6731 J	1.40976 J	1.5912 J	1.6704 J	1.1088 J	1.02672 J
Cobalt	mg/Kg WW	0.03975	0.0528	0.0572	0.05742	0.04488	0.06417
Copper	mg/Kg WW	0.91425 J	1.3992 J	1.3468 J	1.37025 J	1.20912 J	1.5066 J
Iron	mg/Kg WW	43.99	69.696	65	72.819	56.232	91.791
Lead	mg/Kg WW	3.5775 J	3.0888 J	4.238 J	4.8285 J	4.2768 J	3.7386 J
Magnesium	mg/Kg WW	336.55	322.08	377	368.01	356.4	337.59
Manganese	mg/Kg WW	6.6515	5.8872	8.372	8.2998	6.8904	7.4772
Nickel	mg/Kg WW	0.3445	0.68376	0.9256	0.89784	0.6336	0.5301
Potassium	mg/Kg WW	3206.5	3141.6	3224	3105.9	3247.2	3236.4
Selenium	mg/Kg WW	0.583	0.70224	0.52	0.6003	0.5808	0.6417
Silver	mg/Kg WW	0.06625 U	0.06336 U	0.0624 U	0.06264 U	0.06864 U	0.06696 U
Sodium	mg/Kg WW	1054.7	1304.16	1406.6	1372.86	1375.44	1316.88
Thallium	mg/Kg WW	0.06625 U	0.06336 U	0.0624 U	0.06264 U	0.06864 U	0.06696 U
Uranium	mg/Kg WW	0.01794	0.0151	0.01999	0.01882	0.01418	0.01629
Vanadium	mg/Kg WW	0.10335 U	0.12672	0.1248	0.13833	0.12144	0.18414
Zinc	mg/Kg WW	23.1875 J	26.2152 J	27.04 J	29.232 J	27.192 J	24.5799 J
Mercury							
Mercury	µg/Kg WW	222	195	217	217	166	169
Arsenic Species							
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	10.66 UJ	-	10.824 UJ	-
ASB + Cation	µg/Kg WW	-	-	15.34 JL	-	8.448 JL	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	7.8 JL	-	9.768 JL	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	10.66 UJ	-	10.824 UJ	-
Unknown	µg/Kg WW	-	-	14.3 JL	-	22.968 JL	-
Conventionals							
Lipids	%	3.5	3.3	2.8	2.4	3.6	5.3
Moisture	%	73.5	73.6	74	73.9	73.6	72.1

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
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Table B-70
Results of TAL Metals, Mercury, and Arsenic Speciation for Individual Largescale Sucker Gut/contents and Gutless Whole Body and Whole Body Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	LS3G40486 Primary Sample	LS3W40486 Primary Sample	LS3G4050 4 Primary Sample	LS3W40504 Primary Sample	LS3G40520 Primary Sample	LS3W40520 Primary Sample	LS3G40914 Primary Sample	LS3W40914 Primary Sample	LS3G40915 Primary Sample	LS3W40915 Primary Sample	LS3W15 Primary Sample	LS3W25 Primary Sample	LS3W35 Primary Sample
TAL Metals														
Aluminum	mg/Kg WW	609	4.267 J	346.02	3.615 J	183.309	15.34 J	323.778	5.786 J	65.326	4.539 J	51.023 J	47.613 J	12.8453 J
Antimony	mg/Kg WW	0.116	0.09538 U	0.0876	0.08917 U	0.11739	0.1014 U	0.19656 UJ	0.1052 U	0.1468	0.10146 U	0.09842 U	0.09953 U	0.09399 U
Arsenic	mg/Kg WW	0.667	0.19327	0.3942	0.21208	0.6321 U	0.2132	0.49686	0.11835	0.26057	0.14151	0.16317	0.19368	0.16388
Barium	mg/Kg WW	10.092	4.0913	14.7387	2.18828	5.4782	1.4898 J	4.23696	0.96521 J	1.31019	2.2962 J	2.54856	3.0935	1.60988
Beryllium	mg/Kg WW	0.0232	0.00477 U	0.01336	0.00458 U	0.00752	0.0052 U	0.01201	0.00526 U	0.00734	0.00507 U	0.00492 U	0.00484 U	0.00458 U
Cadmium	mg/Kg WW	1.0759	0.2008	1.21764	0.2651	0.89096	0.1144	0.20748	0.02893	0.4404	0.10413	0.2849	0.2959	0.3133
Calcium	mg/Kg WW	3074	10968.7	8322	10604	10926.3	12428 J	407.316	9520.6 J	513.8	10626.6 J	10593.1	12750.6	9808.7
Chromium	mg/Kg WW	45.53 J	0.502 J	4.7085	0.4338 J	3.4615 J	0.364	23.5872	0.4997	1.9084 J	0.3738	1.036 J	0.86349 J	0.64588 J
Cobalt	mg/Kg WW	0.8613	0.0502	0.2409	0.02651	0.17157	0.0286	0.38766	0.01631	0.06239	0.03471	0.06475	0.06725	0.03374
Copper	mg/Kg WW	12.673 U	0.502 J	7.5117 U	0.6507 J	6.923 U	0.494	5.9514	0.3945	5.6885 U	0.4539	0.94535 J	0.91191 J	0.723 J
Iron	mg/Kg WW	1081.7	11.295	676.71	25.546	304.01	11.18	616.98	9.731	146.433	15.6462	89.096	93.074	29.402
Lead	mg/Kg WW	0.7946	0.71284 J	1.94034	4.338 J	1.36353	2.0046 J	0.6552	0.11835 J	0.28626	1.74351 J	3.3411 J	3.0397 J	2.01717 J
Magnesium	mg/Kg WW	504.6	333.83	348.21	361.5	295.281	384.8	262.08	389.24	145.699	373.8	370.37	398.12	337.4
Manganese	mg/Kg WW	46.69	4.5431	22.338	5.8081	18.963	6.76 J	13.377	1.98039 J	3.09381	5.9007 J	7.5628	8.2852	4.3139
Nickel	mg/Kg WW	30.16	0.3765	2.6499	0.3615	2.06185	0.338	17.472 J	0.3419	0.6973	0.3204	0.5698	0.538	0.3856
Potassium	mg/Kg WW	2665.1	3388.5	2628	3735.5	2221.38	3458	1577.94	3550.5	2286.41	3497.7	3418.8	3066.6	3181.2
Selenium	mg/Kg WW	1.0614	0.5773	0.94389	0.76879	0.82775	0.494	0.819	0.4208	0.93585	0.5607	0.72779	0.67788	0.73023
Silver	mg/Kg WW	0.0725	0.06024 U	0.05475	0.05543 U	0.07525	0.0624 U	0.12558 U	0.06575 U	0.09175	0.06141 U	0.06216 U	0.06187 U	0.05784 U
Sodium	mg/Kg WW	1374.6	1229.9	1752	1368.88	1387.61	1084.2	960.96	836.34	1247.8	1038.63	1362.34	1347.69	1412.26
Thallium	mg/Kg WW	0.0725	0.06024 U	0.05475	0.05543 U	0.07525	0.0624 U	0.12558 U	0.06575 U	0.09175	0.06141 U	0.06216 U	0.06187 U	0.05784 U
Uranium	mg/Kg WW	0.05771	0.0191	0.12308	0.01911	0.04997	0.02392	0.02353	0.00279	0.00973	0.02248	0.01751	0.02547	0.0162
Vanadium	mg/Kg WW	2.059	0.12048	1.09719	0.11809	0.5117	0.1014 U	1.2012	0.1052 U	0.24956	0.10146 U	0.21238	0.21251	0.13496
Zinc	mg/Kg WW	27.753	21.7868 J	25.842	24.0759 J	25.886	23.218	15.6702	13.2552	17.249	23.9499	21.4452 J	21.1972 J	17.9063 J
Mercury														
Mercury	µg/Kg WW		-		-		-		-		-	277	232	277
Arsenic Species														
Arsenic (As^{+}3 + AS^{+}5)	µg/Kg WW	-	-	-	-	-	-	-	-	15.047 J	10.947 U	-	-	-
ASB + Cation	µg/Kg WW	-	-	-	-	-	-	-	-	11.377 J	2.136 J	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	-	-	-	-	16.882 J	4.806 J	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	-	-	-	-	15.047 U	10.947 U	-	-	-
Unknown	µg/Kg WW	-	-	-	-	-	-	-	-	13.212 J	10.68 J	-	-	-
Conventionals														
Lipids	%	-	4.3	-	1.8	-	4.3	-	5.4	-	5.1	5.7	11	4.3
Moisture	%	71	74.9	78.1	75.9	69.9	74	45.4	73.7	63.3	73.3	74.1	73.1	75.9

[a] G indicates a gut/contents sample from an individual largescale sucker.
[b] W followed by a 4 digit numeric code indicates a whole body sample with the gut/contents removed fornm an individual large scale sucker.
[c] W followed by a 2 digit numeric code indicates a whole body composite.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-71
Results of TAL Metals, Mercury, and Arsenic Speciation for Largescale Sucker Composites from FSCA 4
Upper Columbia River RI/FS

Analyte	Units	LS4W15 Primary Sample	LS4W25 Primary Sample	LS4W35 Primary Sample	LS4W45 Primary Sample	LS4W55 Primary Sample
TAL Metals						
Aluminum	mg/Kg WW	45.933 J	78.59 J	86.4 J	86.147 J	88.888 J
Antimony	mg/Kg WW	0.09538 U	0.10569 U	0.1152 U	0.10526 U	0.10569 U
Arsenic	mg/Kg WW	0.1757	0.19241	0.18144	0.21606	0.19512
Barium	mg/Kg WW	4.0411 J	4.336 J	2.6352 J	3.3517 J	4.1463 J
Beryllium	mg/Kg WW	0.00477 U	0.00542 U	0.00576 U	0.00526 U	0.00515 U
Cadmium	mg/Kg WW	0.2761	0.2981	0.3744	0.26592	0.3252
Calcium	mg/Kg WW	15662.4 J	12980.9 J	8006.4 J	8199.2 J	11951.1 J
Chromium	mg/Kg WW	0.71033	1.19511	1.27584	1.57613	2.10838
Cobalt	mg/Kg WW	0.06275	0.0813	0.0864	0.11357	0.1084
Copper	mg/Kg WW	0.70782	0.83197	0.864	0.831	0.81571
Iron	mg/Kg WW	67.268	93.224	121.824	129.636	130.622
Lead	mg/Kg WW	2.10338 J	1.4363 J	1.14336 J	1.08861	1.53115 J
Magnesium	mg/Kg WW	394.07	382.11	345.6	343.48	398.37
Manganese	mg/Kg WW	8.9105 J	9.2682 J	6.5664 J	7.3405 J	9.0514 J
Nickel	mg/Kg WW	0.5773	0.542	0.4896	0.5817	0.89159
Potassium	mg/Kg WW	2911.6	3035.2	3312	3213.2	3197.8
Selenium	mg/Kg WW	0.4518	0.5691	0.4608	0.554	0.6233
Silver	mg/Kg WW	0.06024	0.06775 U	0.072 U	0.06648 U	0.06504 U
Sodium	mg/Kg WW	1285.12 U	1268.28	1169.28	1152.32	1295.38
Thallium	mg/Kg WW	0.06024	0.06775 U	0.072 U	0.06648 U	0.06504 U
Uranium	mg/Kg WW	0.01807 U	0.02057	0.01469	0.01424	0.01954
Vanadium	mg/Kg WW	0.16817	0.20325	0.28512	0.277	0.2981
Zinc	mg/Kg WW	24.2466	22.3304	20.4768	23.1572	21.0567
Mercury						
Mercury	µg/Kg WW	300	258	248	216	262
Arsenic Species						
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	-	-
ASB + Cation	µg/Kg WW	-	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	-
Unknown	µg/Kg WW	-	-	-	-	-
Conventionals						
Lipids	%	4.1	5.1	7.5	6.4	5.2
Moisture	%	74.9	72.9	71.2	72.3	72.9

[a] G indicates a gut/contents sample from an individual largescale sucker.
[b] W followed by a 4 digit numeric code indicates a whole body sample with the gut/contents removed fornm an individual large scale sucker.
[c] W followed by a 2 digit numeric code indicates a whole body composite.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-72
Results of TAL Metals, Mercury, and Arsenic Speciation for Sucker Composites from FSCA 5
Upper Columbia River RI/FS

Analyte	Units	LS5W15 Primary Sample	LS5W25 Primary Sample	LS5W35 Primary Sample	LS5W45 Primary Sample	LS5W55 Primary Sample
TAL Metals						
Aluminum	mg/Kg WW	21.5623 J	78.84 J	23.3016 J	13.288 J	8.525 J
Antimony	mg/Kg WW	0.09509 U	0.11096 U	0.11096 U	0.11778 U	0.11 U
Arsenic	mg/Kg WW	0.16962	0.22776	0.19564	0.18724	0.132
Barium	mg/Kg WW	3.3153 J	4.1172 J	3.7084 J	2.31936 J	3.245 J
Beryllium	mg/Kg WW	0.00488 U	0.00555 U	0.00555 U	0.00574 U	0.0055 U
Cadmium	mg/Kg WW	0.2827	0.292	0.292	0.27482	0.26125
Calcium	mg/Kg WW	11667.8 J	13636.4 J	10862.4 J	9301.6 J	14052.5 J
Chromium	mg/Kg WW	1.05113	1.44832	0.94608	0.5134	0.4675
Cobalt	mg/Kg WW	0.05397	0.09928	0.06132	0.03624	0.0495
Copper	mg/Kg WW	0.77357	0.81176	0.6716	0.604	0.71225
Iron	mg/Kg WW	37.522	120.012	45.844	24.6432	19.2775
Lead	mg/Kg WW	0.7196 J	0.73584 J	0.72416 J	0.453 J	0.6325 J
Magnesium	mg/Kg WW	339.24	397.12	327.04	289.316	368.5
Manganese	mg/Kg WW	6.2708 J	9.2564 J	7.6796 J	4.3186 J	6.05 J
Nickel	mg/Kg WW	0.5397	0.73	0.4964	0.29898	0.4125
Potassium	mg/Kg WW	2878.4	2887.88	2879.12	2808.6	2673
Selenium	mg/Kg WW	0.4369	0.4964	0.4672	0.4832	0.3575
Silver	mg/Kg WW	0.05911 U	0.07008 U	0.07008 U	0.07248 U	0.06875 U
Sodium	mg/Kg WW	1338.97	1290.64	1243.92	1211.02	1430
Thallium	mg/Kg WW	0.05911 U	0.07008 U	0.07008 U	0.07248 U	0.06875 U
Uranium	mg/Kg WW	0.01563	0.01875	0.01428	0.01471	0.00921
Vanadium	mg/Kg WW	0.11565	0.25112	0.11096 U	0.11778 U	0.11 U
Zinc	mg/Kg WW	18.3498	22.2504	20.7612	17.4858	17.8475
Mercury						
Mercury	µg/Kg WW	238	225	212	203	258
Arsenic Species						
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	10.537 UJ	-	-	-	-
ASB + Cation	µg/Kg WW	13.107 J	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	11.565 J	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	10.537 UJ	-	-	-	-
Unknown	µg/Kg WW	35.98 J	-	-	-	-
Conventionals						
Lipids	%	4.6	7.7	8.1	10.5	6.7
Moisture	%	74.3	70.8	70.8	69.8	72.5

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-73
Results of TAL Metals, Mercury, and Arsenic Speciation for Individual Largescale Sucker Gut/contents and Gutless Whole Body and Whole Body Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	LS6G50727 Primary Sample	LS6W50727 Primary Sample	LS6G50732 Primary Sample	LS6W50732 Primary Sample	LS6G50734 Primary Sample	LS6W50734 Primary Sample	LS6G60734 Field Duplicate	LS6W60734 Field Duplicate	LS6G50744 Primary Sample	LS6W50744 Primary Sample	LS6G50747 Primary Sample	LS6W50747 Primary Sample	LS6W15 Primary Sample	LS6W25 Primary Sample	LS6W35 Primary Sample	LS6W35 Field Duplicate
TAL Metals																	
Aluminum	mg/Kg WW	56.115	4.8 U	29.3514	3.71 U	1253.16	13.6404	1102.1	13.8996	117.072	3.8624 U	149.941	3.9712 U	40.32 J	87.954 J	46.341 J	53.133
Antimony	mg/Kg WW	0.10179	0.1248 U	0.11766	0.1007 U	0.2124 UJ	0.11988 U	0.214 UJ	0.12636 U	0.10569	0.10336 U	0.12046	0.10608 U	0.11232 U	0.10686 U	0.1084 U	0.09879 U
Arsenic	mg/Kg WW	0.4698	0.2144	0.24804	0.19875	1.60893	0.081	1.6585	0.21384	0.3794	0.13872	0.3487	0.1496	0.17856	0.21646	0.21409	0.12282
Barium	mg/Kg WW	2.8188	1.9776 J	0.4452	1.68275 J	17.3106	2.55312 J	16.3175	2.48832 J	3.5501	3.264 J	3.6455	2.63296 J	2.76192 J	3.699 J	4.336 J	3.8448 J
Beryllium	mg/Kg WW	0.00496	0.00608 U	0.00604	0.00504 U	0.04567	0.00616 U	0.04601	0.00648 U	0.0065	0.00517 U	0.00602	0.00517 U	0.00547 U	0.00521 U	0.00542 U	0.00481 U
Cadmium	mg/Kg WW	1.9836	0.3008	0.96672	0.14575	0.6903	0.23976	0.6955	0.4212	0.78048	0.16592	1.01757	0.1496	0.288	0.3014	0.2981	0.15219
Calcium	mg/Kg WW	2563.02	7840 J	167.268	11660 J	2208.96	7938 J	2295.15	7516.8 J	1704.59	12566.4 J	735.44	10308.8 J	6825.6 J	9891.4 J	14146.2 J	9104.7 J
Chromium	mg/Kg WW	1.25541	0.8128	2.00022	0.76055	22.302	0.5508	19.0995	2.34576	6.7479	0.4624	5.5792	0.952	1.83456	1.81662	1.71814	0.5073
Cobalt	mg/Kg WW	0.10179	0.0352	0.0636	0.02306	0.7965	0.04536	0.8025	0.09396	0.14634	0.04624	0.1585	0.02666	0.06048	0.07946	0.07588	0.03204
Copper	mg/Kg WW	3.8628 U	0.608	7.3776 U	0.371	4.17897	0.5508	4.2051	1.33164	2.6558	0.544	5.8962	0.3536	1.1808	1.03572	0.95392	0.4272
Iron	mg/Kg WW	95.526	10.88 J	102.078	10.07 J	2086.83	28.2204 J	1979.5	28.4148 J	258.534	11.424 J	351.87	11.696 J	85.824	150.974	86.449	92.916 J
Lead	mg/Kg WW	0.13572	0.352	0.06996	0.2915	1.062	0.4536	1.0165	0.5832	0.16531	0.5168	0.19654	0.272	0.432 J	0.548 J	0.6504 J	1.37505
Magnesium	mg/Kg WW	173.304	289.28	129.426	307.4	908.01	293.22	866.7	289.008	173.982	318.24	213.975	340	305.28	364.42	390.24	341.76
Manganese	mg/Kg WW	10.6488	2.3744 J	1.72356	2.6182 J	47.5776	6.156 J	46.224	8.91 J	11.653	4.5968 J	8.8443	2.448 J	4.3776 J	6.4664 J	8.2384 J	4.6725 J
Nickel	mg/Kg WW	0.4698	0.2112	0.6996	0.2491	11.2041 J	0.4212	9.3625 J	0.83268	3.8482	0.2992	3.05588	0.2176	0.6048	0.5754	0.76151	0.3204
Potassium	mg/Kg WW	2056.68	2921.6	2318.22	3206.5	1784.16	3074.76	1728.05	2964.6	1861.77	2711.84	2149.26	3400	3110.4	3178.4	2737.1	2883.6
Selenium	mg/Kg WW	0.93177	0.608	0.94764	0.477	0.9027	0.3888	0.963	0.486	0.8672	0.544	1.17607	0.2992	0.4896	0.5206	0.542	0.5073
Silver	mg/Kg WW	0.06264	0.0768 U	0.07314	0.0636 U	0.13275 U	0.07452 U	0.13375 U	0.07776 U	0.06504	0.06528 U	0.07608	0.06528 U	0.06912 U	0.06576 U	0.06775 U	0.06141 U
Sodium	mg/Kg WW	1652.13	1072	1682.22	1179.25	945.18	1014.12	941.6	955.8	1674.78	1487.84	1451.86	1292	1177.92	1301.5	1368.55	1310.97
Thallium	mg/Kg WW	0.06264	0.0768 U	0.07314	0.0636 U	0.13275 U	0.07452 U	0.13375 U	0.07776 U	0.06504	0.06528 U	0.07608	0.06528 U	0.06912 U	0.06576 U	0.06775 U	0.06141 U
Uranium	mg/Kg WW	0.01028	0.0113	0.00588	0.00684	0.0977	0.01445	0.09469	0.01584	0.0164	0.0102	0.01934	0.00664	0.01296	0.01759	0.01913	0.01068
Vanadium	mg/Kg WW	0.14877	0.1248 U	0.13038	0.1007 U	3.06387	0.11988 U	2.84085	0.22032	0.3523	0.10336 U	0.4438	0.10608 U	0.16128	0.3288	0.18157	0.09879 U
Zinc	mg/Kg WW	15.4512	17.888	16.8222	18.8415	20.5497	17.2044	21.293	17.334	12.6015	18.0064	17.0229	18.1968	19.3248	19.454	17.6692	17.4885
Mercury																	
Mercury	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-	211	250	232	239
Arsenic Species																	
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	13.038 U	10.865 UJ	-	-	-	-	-	-	-	-	-	-	-	-
ASB + Cation	µg/Kg WW	-	-	3.498 J	3.71 J	-	-	-	-	-	-	-	-	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	15.264 J	7.95 J	-	-	-	-	-	-	-	-	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	13.038 U	10.865 UJ	-	-	-	-	-	-	-	-	-	-	-	-
Unknown	µg/Kg WW	-	-	25.44 J	24.645 J	-	-	-	-	-	-	-	-	-	-	-	-
Conventionals																	
Lipids	%	-	12	-	6.2	-	13	-	13	-	6.9	-	5.9	8.3	6.4	6.9	6.3
Moisture	%	73.9	68	68.2	73.5	46.9	67.6	46.5	67.6	72.9	72.8	68.3	72.8	71.2	72.6	72.9	73.3

[a] G indicates a gut/contents sample from an individual largescale sucker.
[b] W followed by a 4 digit numeric code indicates a whole body sample with the gut/contents removed fornm an individual large scale sucker.
[c] W followed by a 2 digit numeric code indicates a whole body composite.
- not analyzed

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-73
Results of TAL Metals, Mercury, and Arsenic Speciation for Individual Largescale Sucker Gut/contents and Gutless Whole Body and Whole Body Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	LS6W35 Field Triplicate	LS6W45 Primary Sample
TAL Metals			
Aluminum	mg/Kg WW	51.57	46.86 J
Antimony	mg/Kg WW	0.1053 U	0.11076 U
Arsenic	mg/Kg WW	0.2052	0.21016
Barium	mg/Kg WW	3.348 J	3.4932 J
Beryllium	mg/Kg WW	0.00513 U	0.00568 U
Cadmium	mg/Kg WW	0.324	0.26128
Calcium	mg/Kg WW	8775 J	12694.8 J
Chromium	mg/Kg WW	1.7442	1.66992
Cobalt	mg/Kg WW	0.0648	0.06248
Copper	mg/Kg WW	0.9774	0.96276
Iron	mg/Kg WW	92.61 J	89.744
Lead	mg/Kg WW	0.405	0.9514 J
Magnesium	mg/Kg WW	321.3	369.2
Manganese	mg/Kg WW	6.048 J	8.1508 J
Nickel	mg/Kg WW	0.621	0.5964
Potassium	mg/Kg WW	2781	2734.92
Selenium	mg/Kg WW	0.567	0.6248
Silver	mg/Kg WW	0.0648 U	0.071 U
Sodium	mg/Kg WW	1247.4	1286.52
Thallium	mg/Kg WW	0.0648 U	0.071 U
Uranium	mg/Kg WW	0.01069	0.01678
Vanadium	mg/Kg WW	0.1809	0.20448
Zinc	mg/Kg WW	16.551	18.9996
Mercury			
Mercury	µg/Kg WW	231	212
Arsenic Species			
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-
ASB + Cation	µg/Kg WW	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-
Unknown	µg/Kg WW	-	-
Conventionals			
Lipids	%	6.6	8.3
Moisture	%	73	71.6

[a] G indicates a gut/contents sample from an individual largescale sucker.
[b] W followed by a 4 digit numeric code indicates a whole body sample with the gut/contents removed fornm an individual large scale sucker.
[c] W followed by a 2 digit numeric code indicates a whole body composite.
- not analyzed

U - The analyte was not detected at or above the reported value.

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JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-74
Results of PCB Aroclors and Conventionals for Sucker Whole Body Composites from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	LS1W25 Primary Sample	LS1W35 Primary Sample	LS1W45 Primary Sample
PCB Aroclor				
PCB-1016	µg/Kg WW	11 U	11 U	10 U
PCB-1221	µg/Kg WW	11 U	11 U	10 U
PCB-1232	µg/Kg WW	21 U	21 U	21 U
PCB-1242	µg/Kg WW	11 U	11 U	10 U
PCB-1248	µg/Kg WW	11 U	11 U	10 U
PCB-1254	µg/Kg WW	-	-	-
PCB-1254/1260	µg/Kg WW	55 J	89 J	58 J
PCB-1260	µg/Kg WW	-	-	-
PCB-1262	µg/Kg WW	11 U	11 U	10 U
PCB-1268	µg/Kg WW	11 U	11 U	10 U
Conventionals				
Lipids	%	5.8	2.7	4
Moisture	%	72.2	71.3	74.3

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-75
Results of PCB Aroclors and Conventionals for Sucker Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	LS2W15 Primary Sample	LS2W25 Primary Sample	LS2W25 Field Duplicate	LS2W25 Field Triplicate	LS2W35 Primary Sample	LS2W45 Primary Sample
PCB Aroclor							
PCB-1016	µg/Kg WW	11 U	10 U	10 U	11 U	49 U	11 U
PCB-1221	µg/Kg WW	11 U	10 U	10 U	11 U	49 U	11 U
PCB-1232	µg/Kg WW	21 U	20 U	21 U	22 U	98 U	22 U
PCB-1242	µg/Kg WW	11 U	10 U	10 U	11 U	49 U	11 U
PCB-1248	µg/Kg WW	11 U	10 U	10 U	11 U	49 U	11 U
PCB-1254	µg/Kg WW	13	29	23	20	-	27
PCB-1254/1260	µg/Kg WW	-	-	-	-	419 J	-
PCB-1260	µg/Kg WW	27	67	59	42	-	47
PCB-1262	µg/Kg WW	11 U	10 U	10 U	11 U	49 U	11 U
PCB-1268	µg/Kg WW	11 U	10 U	10 U	11 U	49 U	11 U
Conventionals							
Lipids	%	3.5	3.3	2.8	2.4	3.6	5.3
Moisture	%	73.5	73.6	74	73.9	73.6	72.1

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-76
Results of PCB Aroclors and Conventionals for Sucker Whole Body Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	LS3W15 Primary Sample	LS3W25 Primary Sample	LS3W35 Primary Sample	LS3W55 Primary Sample
PCB Aroclor					
PCB-1016	µg/Kg WW	11 U	11 U	10 U	10 U
PCB-1221	µg/Kg WW	11 U	11 U	10 U	10 U
PCB-1232	µg/Kg WW	22 U	22 U	21 U	21 U
PCB-1242	µg/Kg WW	11 U	11 U	10 U	10 U
PCB-1248	µg/Kg WW	11 U	11 U	10 U	10 U
PCB-1254	µg/Kg WW	10	10	-	-
PCB-1254/1260	µg/Kg WW	-	-	61 J	68 J
PCB-1260	µg/Kg WW	21	21	-	-
PCB-1262	µg/Kg WW	11 U	11 U	10 U	10 U
PCB-1268	µg/Kg WW	11 U	11 U	10 U	10 U
Conventionals					
Lipids	%	5.7	11	4.3	3.1
Moisture	%	74.1	73.1	75.9	77

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-77
Results of PCB Aroclors and Conventionals for Sucker Whole Body Composites from FSCA 4
Upper Columbia River RI/FS

Analyte	Units	LS4W15 Primary Sample	LS4W25 Primary Sample	LS4W35 Primary Sample	LS4W45 Primary Sample	LS4W55 Primary Sample
PCB Aroclor						
PCB-1016	µg/Kg WW	21 U	10 U	21 U	11 U	22 U
PCB-1221	µg/Kg WW	21 U	10 U	21 U	11 U	22 U
PCB-1232	µg/Kg WW	42 U	21 U	42 U	21 U	43 U
PCB-1242	µg/Kg WW	21 U	10 U	21 U	11 U	22 U
PCB-1248	µg/Kg WW	21 U	10 U	21 U	11 U	22 U
PCB-1254	µg/Kg WW	-	21	-	-	-
PCB-1254/1260	µg/Kg WW	126 J	-	142 J	76 J	154 J
PCB-1260	µg/Kg WW	-	52	-	-	-
PCB-1262	µg/Kg WW	21 U	10 U	21 U	11 U	22 U
PCB-1268	µg/Kg WW	21 U	10 U	21 U	11 U	22 U
Conventionals						
Lipids	%	4.1	5.1	7.5	6.4	5.2
Moisture	%	74.9	72.9	71.2	72.3	72.9

[a] The W signifies that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-78
Results of PCB Aroclors and Conventionals for Sucker Whole Body Composites from FSCA 5
Upper Columbia River RI/FS

Analyte	Units	LS5W15 Primary Sample	LS5W25 Primary Sample	LS5W35 Primary Sample	LS5W45 Primary Sample	LS5W55 Primary Sample
PCB Aroclor						
PCB-1016	µg/Kg WW	11 U	21 U	22 U	21 U	10 U
PCB-1221	µg/Kg WW	11 U	21 U	22 U	21 U	10 U
PCB-1232	µg/Kg WW	22 U	42 U	44 U	41 U	21 U
PCB-1242	µg/Kg WW	11 U	21 U	22 U	21 U	10 U
PCB-1248	µg/Kg WW	11 U	21 U	22 U	21 U	10 U
PCB-1254	µg/Kg WW	-	-	-	-	-
PCB-1254/1260	µg/Kg WW	102 J	123 J	154 J	164 J	93 J
PCB-1260	µg/Kg WW	-	-	-	-	-
PCB-1262	µg/Kg WW	11 U	21 U	22 U	21 U	10 U
PCB-1268	µg/Kg WW	11 U	21 U	22 U	21 U	10 U
Conventionals						
Lipids	%	4.6	7.7	8.1	10.5	6.7
Moisture	%	74.3	70.8	70.8	69.8	72.5

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-79
Results of PCB Aroclors and Conventionals for Sucker Whole Body Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	LS6W15 Primary Sample	LS6W25 Primary Sample	LS6W35 Primary Sample	LS6W35 Field Duplicate	LS6W35 Field Triplicate	LS6W45 Primary Sample
PCB Aroclor							
PCB-1016	µg/Kg WW	10 U	11 U	11 U	11 U	10 U	11 U
PCB-1221	µg/Kg WW	10 U	11 U	11 U	11 U	10 U	11 U
PCB-1232	µg/Kg WW	21 U	21 U	21 U	21 U	21 U	21 U
PCB-1242	µg/Kg WW	10 U	11 U	11 U	11 U	10 U	11 U
PCB-1248	µg/Kg WW	10 U	11 U	11 U	11 U	10 U	11 U
PCB-1254	µg/Kg WW	47 J	68 J	-	-	-	-
PCB-1254/1260	µg/Kg WW	-	-	87 J	71 J	80 J	87 J
PCB-1260	µg/Kg WW	56 J	78 J	-	-	-	-
PCB-1262	µg/Kg WW	10 U	11 U	11 U	11 U	10 U	11 U
PCB-1268	µg/Kg WW	10 U	11 U	11 U	11 U	10 U	11 U
Conventionals							
Lipids	%	8.3	6.4	6.9	6.3	6.6	8.3
Moisture	%	71.2	72.6	72.9	73.3	73	71.6

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-80
Results of PCB Congeners for Sucker Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, FSCA 4, FSCA 5 and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	LS1W35 Primary Sample		LS2W45 Primary Sample		LS3W25 Primary Sample		LS4W55 Primary Sample		LS5W25 Primary Sample		LS6W25 Primary Sample	
PCB Congener													
PCB 1	µg/Kg WW	0.00286	Q	0.000996	KQ	0.000685	JKQ	0.00049	UQ	0.000269	UQ	0.000476	JKQ
PCB 10	µg/Kg WW	0.00187	U	0.000584	U	0.000478	U	0.000639	U	0.00102	U	0.00101	U
PCB 103	µg/Kg WW	0.0285		0.0326		0.0191		0.0195		0.0357		0.0623	
PCB 104	µg/Kg WW	0.000778	U	0.000437	U	0.000905	U	0.000656	U	0.000476	U	0.000768	U
PCB 105	µg/Kg WW	2.04	Q	1.83		1.09	K	1.42		2.09		2.76	
PCB 106	µg/Kg WW	0.00652	U	0.0042	U	0.00353	U	0.00351	U	0.195		0.0042	U
PCB 107	µg/Kg WW	0.202	C	0.1	C	0.102	C	0.153	C	0.108	C	0.13	C
PCB 109	µg/Kg WW	0.515		0.47		0.344		0.356		0.551		0.712	
PCB 11	µg/Kg WW	0.044	QB	0.0551		0.0608		0.0533		0.0324	B	0.027	B
PCB 110	µg/Kg WW	3.31	Q	0.00113	U	0.141	C	2.97	C	4.64	E	7.23	E
PCB 111	µg/Kg WW	0.00623	U	0.00739		0.00584	K	0.00596	K	0.00537		0.0114	K
PCB 112	µg/Kg WW	0.00628	U	0.308		0.242		0.449		0.35		0.639	
PCB 114	µg/Kg WW	0.144		0.128		0.0806		0.11		0.146		0.211	
PCB 118	µg/Kg WW	5.83		5.73	E	4	E	5.04	E	5.6	E	7.65	E
PCB 12	µg/Kg WW	0.000809	U	0.00117	JK	0.00166	JK	0.000196	U	0.000509	U	0.000255	U
PCB 120	µg/Kg WW	0.0184		0.0242	K	0.0149	K	0.0217	K	0.0353		0.0389	K
PCB 121	µg/Kg WW	0.00667	U	0.00238		0.00206	U	0.00134	U	0.0028	K	0.00136	U
PCB 122	µg/Kg WW	0.00726	U	0.00406	U	0.0295	K	0.00361	U	0.00403	U	0.00406	U
PCB 123	µg/Kg WW	0.0545	K	0.0868	K	0.0844		0.111		0.175		0.216	
PCB 126	µg/Kg WW	0.0117	U	0.0526	Q	0.013	K	0.0508		0.0582		0.076	
PCB 127	µg/Kg WW	0.0066	U	0.0039	U	0.00328	U	0.00327	U	0.00387	U	0.0039	U
PCB 128	µg/Kg WW	0.738	Q	1.14	C	1.04	C	1.72	C	1.47	C	1.73	C
PCB 129	µg/Kg WW	10.3	E	12.5	E	10.8	E	17.8	E	12.8	E	15.1	E
PCB 130	µg/Kg WW	0.831		0.829		0.674		0.874		0.809		1.03	
PCB 131	µg/Kg WW	0.0583		0.0569	K	0.0547		0.077		0.0742		0.0794	
PCB 132	µg/Kg WW	1.87		1.89		1.49		2.13		2.04		2.6	
PCB 133	µg/Kg WW	0.169	Q	0.208		0.178		0.281		0.235		0.281	
PCB 134	µg/Kg WW	0.151		0.185		0.145		0.647		0.239	K	0.287	
PCB 135	µg/Kg WW	1.76	C	2.26	C	1.74	C	2.78	C	2.5	C	3.3	C
PCB 136	µg/Kg WW	0.403		0.439		0.346		0.481		0.509		0.732	
PCB 137	µg/Kg WW	0.726		0.584		0.489		0.755		0.526		0.707	K
PCB 139	µg/Kg WW	0.183	C	0.193	C	0.165	C	0.199	C	0.17	C	0.246	C
PCB 14	µg/Kg WW	0.000871	U	0.000246	U	0.000227	U	0.000208	U	0.000545	U	0.000273	U
PCB 141	µg/Kg WW	0.977		1.36		1.04		2.13		1.71		1.74	

Table B-80
Results of PCB Congeners for Sucker Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, FSCA 4, FSCA 5 and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	LS1W35 Primary Sample		LS2W45 Primary Sample		LS3W25 Primary Sample		LS4W55 Primary Sample		LS5W25 Primary Sample		LS6W25 Primary Sample	
PCB 142	µg/Kg WW	0.0111	U	0.00822	U	0.00675	U	0.0156	U	0.00833	U	0.0112	U
PCB 143	µg/Kg WW	0.0115	U	0.0214	K	0.0271	K	0.0149	U	0.0419		0.0483	
PCB 144	µg/Kg WW	0.0754		0.279		0.118		0.156		0.304		0.184	
PCB 145	µg/Kg WW	0.00234	U	0.00114	U	0.00153	U	0.00116	U	0.000987	U	0.00144	U
PCB 146	µg/Kg WW	1.37	Q	2.02		1.78		2.94		2.31		2.79	
PCB 147	µg/Kg WW	5.2	C	5.72	E	5.37	E	7.93	E	6.71	E	8.77	E
PCB 148	µg/Kg WW	0.0031	U	0.00151	U	0.00778	K	0.0146		0.0153		0.0205	
PCB 15	µg/Kg WW	0.0107	QB	0.00923		0.00983		0.00679		0.00534		0.00446	
PCB 150	µg/Kg WW	0.00229	U	0.0068	K	0.00549		0.00869		0.00919		0.0147	
PCB 152	µg/Kg WW	0.0024	K	0.00481		0.00254	K	0.00345		0.00401		0.00475	K
PCB 153	µg/Kg WW	9.98	E	13.1	QE	12.9	E	20.6	E	14.6	E	17.8	E
PCB 154	µg/Kg WW	0.0768		0.0792		0.05	K	0.0995	K	0.0922		0.143	
PCB 155	µg/Kg WW	0.00189	U	0.00379		0.00229	K	0.00253		0.00283		0.00478	
PCB 156	µg/Kg WW	1.2	C	1.15	C	0.796	C	1.03	C	0.8	C	0.965	C
PCB 158	µg/Kg WW	0.0073	U	0.947		0.918		1.32		0.958		1.18	
PCB 159	µg/Kg WW	0.065		0.0631		0.065		0.0612		0.0048	U	0.0617	
PCB 16	µg/Kg WW	0.0301	QB	0.051		0.0404		0.0147		0.0177		0.0128	
PCB 160	µg/Kg WW	0.00858	U	0.00585	U	0.00464	U	0.0107	U	0.00593	U	0.00796	U
PCB 161	µg/Kg WW	0.00812	U	0.00593	U	0.00469	U	0.0108	U	0.00601	U	0.00807	U
PCB 162	µg/Kg WW	0.00584	U	0.134		0.0349		0.0117	U	0.123		0.128	
PCB 164	µg/Kg WW	0.405		0.502		0.295		0.603		0.545		0.573	K
PCB 165	µg/Kg WW	0.00809	U	0.00572	U	0.0045	U	0.0104	U	0.0058	U	0.00779	U
PCB 167	µg/Kg WW	0.423		0.522		0.374		0.479		0.424		0.471	
PCB 169	µg/Kg WW	0.00433	U	0.0276	K	0.0269	K	0.0375	K	0.0379	K	0.0779	K
PCB 17	µg/Kg WW	0.0375	B	0.0637		0.0515		0.0188		0.025		0.0223	
PCB 170	µg/Kg WW	2.88		3.94	QE	3.2		4.1	QE	2.85	Q	3.31	Q
PCB 171	µg/Kg WW	0.827	C	1.27	C	0.934	C	1.31	C	1.01	C	1.24	C
PCB 172	µg/Kg WW	0.682		0.964		0.838		1.3		0.822		0.995	
PCB 174	µg/Kg WW	1.34		1.96		1.56		2.4		1.86		2.11	
PCB 175	µg/Kg WW	0.0198		0.105		0.141		0.184		0.144		0.206	
PCB 176	µg/Kg WW	0.00299	U	0.236		0.227		0.37		0.319		0.395	
PCB 177	µg/Kg WW	1.53		2.21		1.82		2.59		2.03		2.45	
PCB 178	µg/Kg WW	0.264	Q	0.663	Q	0.633		1.04		0.805		0.997	
PCB 179	µg/Kg WW	0.305	Q	0.735		0.624		0.999		0.908		1.06	
PCB 18	µg/Kg WW	0.0704	B	0.113	C	0.0907	C	0.0332	C	0.0429	C	0.0292	C
PCB 180	µg/Kg WW	8.49	E	12.9	E	10.5	E	16.1	E	8.41	E	10.3	E

Table B-80
Results of PCB Congeners for Sucker Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, FSCA 4, FSCA 5 and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	LS1W35 Primary Sample	LS2W45 Primary Sample	LS3W25 Primary Sample	LS4W55 Primary Sample	LS5W25 Primary Sample	LS6W25 Primary Sample
PCB 181	µg/Kg WW	0.00699 U	0.00421 U	0.00473 U	0.0845	0.00253 U	0.00343 U
PCB 182	µg/Kg WW	0.00354 U	0.397	0.447	1.23	0.629	0.481
PCB 183	µg/Kg WW	3.04 C	3.89 C	3.66 C	5.52 E	3.38 C	4.15 E
PCB 184	µg/Kg WW	0.00263 U	0.0016 U	0.004	0.00995	0.00632	0.00888
PCB 186	µg/Kg WW	0.00285 U	0.00172 U	0.00162 U	0.00143 U	0.00161 U	0.00374 U
PCB 187	µg/Kg WW	2.7 Q	4.46 QE	5.08 E	6.98 E	5.12 E	5.95 E
PCB 188	µg/Kg WW	0.00315 U	0.00506	0.00468	0.00579	0.00919	0.0109 K
PCB 189	µg/Kg WW	0.0926	0.112	0.102	0.124	0.0673	0.0784
PCB 19	µg/Kg WW	0.00756 Q	0.00738 Q	0.00574 Q	0.00252 Q	0.00413 KQ	0.00278 Q
PCB 190	µg/Kg WW	0.522	0.544 Q	0.502 Q	0.465 Q	0.36 Q	0.343 Q
PCB 191	µg/Kg WW	0.115	0.154	0.149	0.239	0.112	0.13
PCB 192	µg/Kg WW	0.00597 U	0.0036 U	0.0041 U	0.00444 U	0.00216 U	0.00293 U
PCB 194	µg/Kg WW	1.57 Q	1.85 Q	1.77	2.14 Q	0.916 Q	1.28
PCB 195	µg/Kg WW	0.531	0.853	0.828	0.967 Q	0.485	0.625
PCB 196	µg/Kg WW	1.14	1.58	1.44	1.6	0.961	1.26
PCB 197	µg/Kg WW	0.191 C	0.326 C	0.265 C	0.409 C	0.248 C	0.304 C
PCB 198	µg/Kg WW	2.04 C	2.94 Q	2.81 C	2.91 Q	1.91 Q	2.53 C
PCB 2	µg/Kg WW	0.00348 K	0.00183 K	0.0017 KQ	0.00175 K	0.00112 K	0.00105 K
PCB 20	µg/Kg WW	0.18 Q	0.365 C	0.305 C	0.152 C	0.314 C	0.382 C
PCB 201	µg/Kg WW	0.209	0.4	0.298	0.465	0.293	0.36
PCB 202	µg/Kg WW	0.303	0.508	0.428	0.633	0.405	0.518
PCB 203	µg/Kg WW	1.39	2.26	2.01	2.12	1.27	1.62
PCB 204	µg/Kg WW	0.00199 U	0.00187 U	0.000838 U	0.00124 U	0.000978 U	0.00113 U
PCB 205	µg/Kg WW	0.0632	0.096 Q	0.092	0.111 Q	0.0496 Q	0.0601
PCB 206	µg/Kg WW	0.828	1.17 Q	1.08	1.15 Q	0.538	0.67
PCB 207	µg/Kg WW	0.0985	0.146	0.14	0.163 Q	0.0949	0.114
PCB 208	µg/Kg WW	0.211	0.329	0.326	0.383 Q	0.197	0.245
PCB 209	µg/Kg WW	0.0863	0.122 Q	0.162	0.162	0.0971 Q	0.13 Q
PCB 21	µg/Kg WW	0.0459 KQE	0.128 C	0.113 C	0.0409 C	0.0469 C	0.0544 C
PCB 22	µg/Kg WW	0.0199 QB	0.0564 Q	0.0652 Q	0.0286	0.0316	0.0309
PCB 23	µg/Kg WW	0.000745 U	0.000541 JK	0.000404 U	0.000508 U	0.000533 U	0.000459 U
PCB 24	µg/Kg WW	0.00153 JK	0.00226	0.00256	0.000882 JK	0.00106 K	0.00111 K
PCB 25	µg/Kg WW	0.00719 Q	0.0144	0.0134	0.00566	0.00701	0.00879
PCB 26	µg/Kg WW	0.0219 Q	0.0419 C	0.0376 C	0.0189 C	0.0248 C	0.0269 C
PCB 27	µg/Kg WW	0.00571	0.00933	0.00766	0.00324	0.00514	0.00406
PCB 3	µg/Kg WW	0.00162 JK	0.00168 K	0.00141 K	0.00141 K	0.000964 J	0.00112

Table B-80
Results of PCB Congeners for Sucker Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, FSCA 4, FSCA 5 and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	LS1W35 Primary Sample		LS2W45 Primary Sample		LS3W25 Primary Sample		LS4W55 Primary Sample		LS5W25 Primary Sample		LS6W25 Primary Sample	
PCB 31	µg/Kg WW	0.124	QB	0.188		0.178		0.068		0.0839		0.106	
PCB 32	µg/Kg WW	0.0199	B	0.0392		0.0291	Q	0.00806		0.00936		0.0109	
PCB 34	µg/Kg WW	0.00082	U	0.0012		0.00113		0.000684	J	0.00128		0.00161	
PCB 35	µg/Kg WW	0.00119	U	0.000526	U	0.000667	U	0.00054	U	0.000386	U	0.000411	U
PCB 36	µg/Kg WW	0.00108	U	0.000489	U	0.000608	U	0.000492	U	0.000358	U	0.000382	U
PCB 37	µg/Kg WW	0.0219	B	0.0194		0.0206		0.011		0.0181		0.0195	
PCB 38	µg/Kg WW	0.00108	U	0.000515	U	0.000616	U	0.000498	U	0.000378	U	0.000403	U
PCB 39	µg/Kg WW	0.00236		0.00203		0.00316		0.00159	K	0.00332		0.00417	
PCB 4	µg/Kg WW	0.0138	QB	0.00609	Q	0.00509	Q	0.00254	Q	0.00284	Q	0.00195	Q
PCB 40	µg/Kg WW	0.104	C	0.202	C	0.179	C	0.0882	C	0.334	C	0.606	C
PCB 41	µg/Kg WW	0.026		0.0392		0.034		0.0184		0.0593	K	0.0867	K
PCB 42	µg/Kg WW	0.101		0.175		0.156		0.0947		0.346		0.538	
PCB 43	µg/Kg WW	0.0126	K	0.0377		0.029		0.0205	K	0.0484		0.0463	
PCB 44	µg/Kg WW	0.49	Q	0.832	C	0.732	C	0.508	C	1.44	C	2.21	C
PCB 45	µg/Kg WW	0.0214	Q	0.0552	C	0.0448	C	0.0199	Q	0.0552	C	0.0787	C
PCB 46	µg/Kg WW	0.00923	KQ	0.0159	K	0.014		0.00697	Q	0.0159		0.0193	
PCB 48	µg/Kg WW	0.0666		0.125		0.108		0.0594		0.195		0.27	
PCB 49	µg/Kg WW	0.517	C	0.787	C	0.579	C	0.378	C	1.17	C	1.99	C
PCB 5	µg/Kg WW	0.00292	K	0.000248	U	0.000224	U	0.000205	U	0.000548	U	0.000275	U
PCB 50	µg/Kg WW	0.0325	Q	0.0562	C	0.0392	C	0.0249	Q	0.0516	C	0.0708	Q
PCB 52	µg/Kg WW	1.17		1.13		0.814		0.49		1.36		1.11	
PCB 54	µg/Kg WW	0.000564	JQ	0.00041	JKQ	0.000469	U	0.000207	UQ	0.000314	U	0.000447	JK
PCB 55	µg/Kg WW	0.00353	U	0.0413		0.0303		0.0594		0.0922		0.127	
PCB 56	µg/Kg WW	0.125		0.143		0.132		0.0928		0.352		0.383	
PCB 57	µg/Kg WW	0.00351	U	0.0068	K	0.00518	K	0.00582	K	0.00878		0.0135	K
PCB 58	µg/Kg WW	0.00321	U	0.00761	K	0.00738		0.00835	K	0.012		0.0194	K
PCB 59	µg/Kg WW	0.0304	C	0.0882	C	0.0669	C	0.051	C	0.144	C	0.219	C
PCB 6	µg/Kg WW	0.00642	QB	0.00703	Q	0.00514	KQ	0.00158	Q	0.00113		0.00153	KQ
PCB 60	µg/Kg WW	0.12	Q	0.221	Q	0.266		0.174		0.515		0.806	
PCB 61	µg/Kg WW	1.46	C	1.42	C	1.29	C	0.958	C	2.46	C	3.72	C
PCB 63	µg/Kg WW	0.0384		0.0721		0.0614		0.0424		0.161		0.265	
PCB 64	µg/Kg WW	0.266		0.483		0.369		0.249		0.867		1.38	
PCB 66	µg/Kg WW	0.751		1.18		1.14		0.862		2.63		4.18	E
PCB 67	µg/Kg WW	0.00678	K	0.00597		0.0063	K	0.00133	U	0.00752		0.0102	K
PCB 68	µg/Kg WW	0.0148		0.0171		0.0132		0.0148		0.0293		0.0445	
PCB 7	µg/Kg WW	0.00144	JK	0.00166	K	0.00125	K	0.000667	JK	0.000503	U	0.000671	JK

Table B-80
Results of PCB Congeners for Sucker Whole Body Composites from FSCA 1, FSCA 2, FSCA 3, FSCA 4, FSCA 5 and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	LS1W35 Primary Sample	LS2W45 Primary Sample	LS3W25 Primary Sample	LS4W55 Primary Sample	LS5W25 Primary Sample	LS6W25 Primary Sample
PCB 72	µg/Kg WW	0.0177	0.022	0.0164	0.0192	0.04	0.055
PCB 73	µg/Kg WW	0.00113 U	0.0203	0.0175	0.0185	0.028	0.025
PCB 77	µg/Kg WW	0.0253	0.0342	0.0243	0.0199 K	0.0591	0.0662
PCB 78	µg/Kg WW	0.00343 U	0.00202 U	0.00171 U	0.00146 U	0.00274 U	0.00263 U
PCB 79	µg/Kg WW	0.124 Q	0.0242 Q	0.0701	0.068	0.1	0.15
PCB 8	µg/Kg WW	0.00844 KQE	0.0168 Q	0.018 Q	0.00683 Q	0.00491 Q	0.00381 Q
PCB 80	µg/Kg WW	0.003 U	0.00174 U	0.0014 U	0.00119 U	0.00236 U	0.00227 U
PCB 81	µg/Kg WW	0.00426 U	0.00265 U	0.0018 U	0.00161 U	0.00293 U	0.00316 U
PCB 82	µg/Kg WW	0.207	0.188	0.213	0.198	0.446	0.57
PCB 83	µg/Kg WW	0.0108 U	0.918	0.359	0.607	0.611	1.09
PCB 84	µg/Kg WW	0.543	0.413	0.333	0.281	0.548	0.846
PCB 85	µg/Kg WW	1.61 C	1.32 Q	1.03 C	1.25 C	1.59 C	2.1 C
PCB 86	µg/Kg WW	3.36 Q	3.02 C	2.34 C	2.51 C	3.82 C	5.58 E
PCB 88	µg/Kg WW	0.484 C	0.457 C	0.331 C	0.302 C	0.631 C	1.06 C
PCB 89	µg/Kg WW	0.0101 U	0.0153	0.0136	0.0117	0.0366	0.0612
PCB 9	µg/Kg WW	0.00281 KB	0.00342 K	0.00273 K	0.00133 K	0.000546 U	0.000274 U
PCB 90	µg/Kg WW	5.75 C	5.32 E	4.04 E	4.42 E	6.19 E	8.34 E
PCB 92	µg/Kg WW	0.957	0.819 Q	0.599	0.671	1.08	1.32
PCB 93	µg/Kg WW	0.00863 U	0.0637 C	0.0515 C	0.0866 C	0.0752 C	0.101 C
PCB 94	µg/Kg WW	0.00946 U	0.01	0.0078	0.00675 K	0.0121	0.0211
PCB 95	µg/Kg WW	2.07 Q	1.79	1.32	1.17	1.92	2.91
PCB 96	µg/Kg WW	0.0085	0.00694	0.00594	0.00414	0.0111	0.0185
PCB 98	µg/Kg WW	0.0833 Q	0.0777 C	0.0515 C	0.0525 C	0.118 C	0.202 C
PCB 99	µg/Kg WW	3.36	2.01	1.83	1.89	3.19	4.29 E

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-81
Results of Dioxins/Furans Analysis and Conventionals for Sucker Whole Body Composites from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	LS1W25 Primary Sample		LS1W35 Primary Sample		LS1W45 Primary Sample	
Dioxins/Furans							
2,3,7,8-TCDD	µg/Kg WW	0.000522	U	0.000516	U	0.000469	U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000295	U	0.000375	U	0.000365	U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.00049	U	0.000433	U	0.000388	U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000458	U	0.000435	U	0.000379	U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000498	U	0.000457	U	0.000403	U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000483	U	0.000694	U	0.000567	U
OCDD	µg/Kg WW	0.00145	U	0.00166	U	0.00138	U
2,3,7,8-TCDF	µg/Kg WW	0.000916		0.00153		0.00122	
1,2,3,7,8-PeCDF	µg/Kg WW	0.000176	EMI	0.000188		0.000184	U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000168	U	0.000282		0.000187	U
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000254	U	0.000253	U	0.000251	U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000233	U	0.000223	U	0.000244	U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000372	U	0.000381	U	0.000383	U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000246	U	0.000242	U	0.000253	U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000353	U	0.000319	U	0.000325	U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000534	U	0.000499	U	0.000511	U
OCDF	µg/Kg WW	0.00109	U	0.00109	U	0.00122	U
TCDD	µg/Kg WW	0.000522	U	0.000516	U	0.000469	U
TCDF	µg/Kg WW	0.000916		0.00153		0.00122	
PeCDD	µg/Kg WW	0.000295	U	0.000375	U	0.000365	U
PeCDF	µg/Kg WW	0.000168	U	0.000673		0.000184	U
HxCDD	µg/Kg WW	0.000458	U	0.000433	U	0.000379	U
HxCDF	µg/Kg WW	0.000233	U	0.000223	U	0.000244	U
HpCDD	µg/Kg WW	0.000483	U	0.000694	U	0.000567	U
HpCDF	µg/Kg WW	0.000353	U	0.000319	U	0.000325	U
Conventionals							
Lipids	%	5.8		2.7		4	
Moisture	%	72.2		71.3		74.3	

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an

Table B-82
Results of Dioxins/Furans Analysis and Conventionals for Sucker Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	LS2W15 Primary Sample		LS2W25 Primary Sample		LS2W25 Field Duplicate		LS2W25 Field Triplicate		LS2W35 Primary Sample		LS2W45 Primary Sample	
Dioxins/Furans													
2,3,7,8-TCDD	µg/Kg WW	0.000422	U	0.000624	U	0.000466	U	0.000452	U	0.000576	U	0.000554	U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000295	U	0.000408	EMI	0.000331	U	0.000402	U	0.000436	EMI	0.000297	U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000433	U	0.000343	U	0.000605	U	0.000378	U	0.000345	U	0.000353	U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000424	U	0.000321	U	0.000578	U	0.000362	U	0.000329	U	0.000328	U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000451	U	0.000348	U	0.000622	U	0.000389	U	0.000354	U	0.000357	U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000548	U	0.000525	U	0.000812	U	0.000621	U	0.000543		0.00076	U
OCDD	µg/Kg WW	0.00197		0.00149	U	0.00225		0.0015		0.00144		0.00202	
2,3,7,8-TCDF	µg/Kg WW	0.0016		0.00654		0.00607		0.00655		0.0115		0.00233	
1,2,3,7,8-PeCDF	µg/Kg WW	0.000136		0.000187		0.0006		0.000506		0.000478		0.000539	
2,3,4,7,8-PeCDF	µg/Kg WW	0.00024	EI	0.000232	EMI	0.000341		0.000357		0.000441		0.000413	
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000228	U	0.00017	U	0.000332	U	0.000206	U	0.000159	U	0.000213	U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000209	U	0.000154	U	0.000314	U	0.000192	U	0.000143	U	0.000198	U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000315	U	0.000248	U	0.000479	U	0.000299	U	0.000221	U	0.000302	U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000224	U	0.000167	U	0.000319	U	0.000192	U	0.000156	U	0.000195	U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000334	U	0.000281	U	0.000409	U	0.000281	U	0.000282	U	0.000399	U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.00048	U	0.000424	U	0.000642	U	0.000442	U	0.00044	U	0.000602	U
OCDF	µg/Kg WW	0.000957	U	0.000742	U	0.00136	U	0.000915	U	0.000828	U	0.000842	U
TCDD	µg/Kg WW	0.000422	U	0.000624	U	0.000466	U	0.000452	U	0.000576	U	0.000554	U
TCDF	µg/Kg WW	0.0016		0.00654		0.00607		0.00655		0.0115		0.00233	
PeCDD	µg/Kg WW	0.000295	U	0.000262	U	0.000548		0.000402	U	0.000638		0.000297	U
PeCDF	µg/Kg WW	0.000136		0.000325		0.00128		0.00122		0.00127		0.0012	
HxCDD	µg/Kg WW	0.000424	U	0.000321	U	0.000578	U	0.000362	U	0.000329	U	0.000328	U
HxCDF	µg/Kg WW	0.000209	U	0.000154	U	0.000314	U	0.000192	U	0.000143	U	0.000195	U
HpCDD	µg/Kg WW	0.000548	U	0.000439		0.000812	U	0.000621	U	0.000543		0.00076	U
HpCDF	µg/Kg WW	0.000334	U	0.000281	U	0.000409	U	0.000281	U	0.000282	U	0.000399	U
Conventionals													
Lipids	%	3.5		3.3		2.8		2.4		3.6		5.3	
Moisture	%	73.5		73.6		74		73.9		73.6		72.1	

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-83
Results of Dioxins/Furans Analysis and Conventionals for Sucker Whole Body Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	LS3W15 Primary Sample		LS3W25 Primary Sample		LS3W35 Primary Sample		LS3W55 Primary Sample	
Dioxins/Furans									
2,3,7,8-TCDD	µg/Kg WW	0.000558	U	0.00051	U	0.000568	U	0.000568	U
1,2,3,7,8-PeCDD	µg/Kg WW	0.00147		0.000606	EMPC	0.00022	U	0.000382	U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.00102	U	0.000499	U	0.000449	U	0.000439	U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.00109	U	0.000454	U	0.000431	U	0.000408	U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.00111	U	0.0005	U	0.000463	U	0.000445	U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000854	U	0.000736	U	0.000675	U	0.000745	U
OCDD	µg/Kg WW	0.00251	U	0.00151		0.00105	EMPC	0.00209	U
2,3,7,8-TCDF	µg/Kg WW	0.0019		0.00312		0.00157		0.00193	
1,2,3,7,8-PeCDF	µg/Kg WW	0.000851		0.000533		0.000146	U	0.000192	U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000479		0.000346		0.000261		0.000198	EMPC
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000545	U	0.0003	U	0.000289	U	0.000252	U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000536	U	0.000279	U	0.000274	U	0.000233	U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000861	U	0.000454	U	0.000431	U	0.000369	U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000582	U	0.000321	U	0.000267	U	0.000248	U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.00103	U	0.000377	U	0.000305	U	0.00032	U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.00071	U	0.00057	U	0.000509	U	0.000503	U
OCDF	µg/Kg WW	0.00211	U	0.00108	U	0.00089	U	0.0016	U
TCDD	µg/Kg WW	0.00109	U	0.00051	U	0.000568	U	0.000568	U
TCDF	µg/Kg WW	0.00309		0.00312		0.00157		0.00193	
PeCDD	µg/Kg WW	0.00147		0.000499	U	0.00022	U	0.000382	U
PeCDF	µg/Kg WW	0.00133		0.0012		0.000261		0.000175	U
HxCDD	µg/Kg WW	0.00102	U	0.000454	U	0.000431	U	0.000408	U
HxCDF	µg/Kg WW	0.000536	U	0.000279	U	0.000267	U	0.000233	U
HpCDD	µg/Kg WW	0.00195	U	0.000758		0.000675	U	0.000745	U
HpCDF	µg/Kg WW	0.00071	U	0.000377	U	0.000305	U	0.00032	U
Conventionals									
Lipids	%	5.7		11		4.3		3.1	
Moisture	%	74.1		73.1		75.9		77	

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
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JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-84
Results of Dioxins/Furans Analysis and Conventionals for Sucker Whole Body Composites from FSCA 4
Upper Columbia River RI/FS

Analyte	Units	LS4W15 Primary Sample	LS4W25 Primary Sample	LS4W35 Primary Sample	LS4W45 Primary Sample	LS4W55 Primary Sample
Dioxins/Furans						
2,3,7,8-TCDD	µg/Kg WW	0.000577 U	0.000725 U	0.000164 EMPC	0.000224	0.000241 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000483 U	0.000274 U	0.00019	0.000275	0.000203 EMPC
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000493 U	0.000556 U	0.000212 U	0.000181 U	0.000258 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000469 U	0.000534 U	0.000212 U	0.000174 U	0.000262 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000506 U	0.000573 U	0.000223 U	0.000187 U	0.000274 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000864 U	0.000755 U	0.000367	0.000381	0.000325
OCDD	µg/Kg WW	0.00187 U	0.00114	0.00136	0.00143	0.00134
2,3,7,8-TCDF	µg/Kg WW	0.00257	0.00373	0.00428	0.00392	0.00335
1,2,3,7,8-PeCDF	µg/Kg WW	0.000223 U	0.000288 U	0.000166 EMPC	0.0001 U	0.000175 U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000161 EMPC	0.000252 EMPC	0.00024	0.000174	0.00017
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000232 U	0.000273 U	0.000114 U	9.88E-05 U	0.000137 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.00022 U	0.000258 U	0.000116 U	9.13E-05 U	0.000128 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000331 U	0.000411 U	0.000146 U	0.00013 U	0.000186 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000225 U	0.000264 U	0.000116 U	0.000106 U	0.000134 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.00044 U	0.000335 U	0.000158 U	0.00015	0.000248 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000697 U	0.000541 U	0.000226 U	0.000268 U	0.000349 U
OCDF	µg/Kg WW	0.00106 U	0.00114 U	0.000322 U	0.000398 U	0.000666 U
TCDD	µg/Kg WW	0.000577 U	0.000725 U	0.000187 U	0.000224	0.000241 U
TCDF	µg/Kg WW	0.00257	0.00373	0.00428	0.00392	0.00335
PeCDD	µg/Kg WW	0.000483 U	0.000274 U	0.00019	0.000275	0.000253 U
PeCDF	µg/Kg WW	0.00022 U	0.000255 U	0.00024	0.000174	0.00017
HxCDD	µg/Kg WW	0.000469 U	0.000534 U	0.000212 U	0.000174 U	0.000258 U
HxCDF	µg/Kg WW	0.00022 U	0.000258 U	0.000114 U	9.13E-05 U	0.000128 U
HpCDD	µg/Kg WW	0.000864 U	0.000755 U	0.000367	0.000381	0.000325
HpCDF	µg/Kg WW	0.00044 U	0.000335 U	0.000158 U	0.00015	0.000248 U
Conventionals						
Lipids	%	4.1	5.1	7.5	6.4	5.2
Moisture	%	74.9	72.9	71.2	72.3	72.9

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-85
Results of Dioxins/Furans Analysis and Conventionals for Sucker Whole Body Composites from FSCA 5
Upper Columbia River RI/FS

Analyte	Units	LS5W15 Primary Sample	LS5W25 Primary Sample	LS5W35 Primary Sample	LS5W45 Primary Sample	LS5W55 Primary Sample
Dioxins/Furans						
2,3,7,8-TCDD	µg/Kg WW	0.000184 U	0.000206 U	0.000217 U	0.000229 U	0.000211 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000156 EMPC	0.000171	0.000147 U	0.000193 U	0.000341
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000261 U	0.000188 U	0.000247 U	0.000307 U	0.00027 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000261 U	0.000181 U	0.000258 U	0.000296 U	0.000264 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000275 U	0.000194 U	0.000266 U	0.000317 U	0.000281 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000259 U	0.000248	0.00038	0.000347	0.000203
OCDD	µg/Kg WW	0.000879	0.00131	0.00193	0.00152	0.00123
2,3,7,8-TCDF	µg/Kg WW	0.00383	0.00372	0.00345	0.00544	0.00354
1,2,3,7,8-PeCDF	µg/Kg WW	0.000109	8.95E-05 U	0.000111	0.000367	0.000108 U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000174 EMPC	0.00021 EMPC	0.000196	0.000265	0.000193
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000159 U	0.00013 U	0.000136 U	0.000141 U	0.000173 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000154 U	0.00012 U	0.000124 U	0.000144 U	0.000168 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000202 U	0.000159 U	0.00017 U	0.000196 U	0.000226 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000159 U	0.000133 U	0.000137 U	0.000158 U	0.000187 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.00016 U	0.000142 U	0.00019 U	0.000149 U	0.00017 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.00022 U	0.000202 U	0.000271 U	0.000213 U	0.000239 U
OCDF	µg/Kg WW	0.000456 U	0.000436 U	0.000396	0.000475 U	0.000494 U
TCDD	µg/Kg WW	0.000184 U	0.000206 U	0.000217 U	0.000143	0.000211 U
TCDF	µg/Kg WW	0.00383	0.00381	0.00345	0.00634	0.00354
PeCDD	µg/Kg WW	0.000118 U	0.000171	0.000147 U	0.000307	0.000341
PeCDF	µg/Kg WW	0.000109	8.27E-05 U	0.000307	0.000731	0.000193
HxCDD	µg/Kg WW	0.000261 U	0.000317	0.000247 U	0.00135	0.000264 U
HxCDF	µg/Kg WW	0.000154 U	0.00012 U	0.000124 U	0.000141 U	0.000168 U
HpCDD	µg/Kg WW	0.000259 U	0.00429	0.00038	0.00635	0.00207
HpCDF	µg/Kg WW	0.00016 U	0.000142 U	0.00019 U	0.000149 U	0.00017 U
Conventionals						
Lipids	%	4.6	7.7	8.1	10.5	6.7
Moisture	%	74.3	70.8	70.8	69.8	72.5

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-86

Results of Dioxins/Furans Analysis and Conventionals for Sucker Whole Body Composites from FSCA 6

Upper Columbia River RI/FS

Analyte	Units	LS6W15 Primary Sample	LS6W25 Primary Sample	LS6W35 Primary Sample	LS6W35 Field Duplicate	LS6W35 Field Triplicate	LS6W45 Primary Sample
Dioxins/Furans							
2,3,7,8-TCDD	µg/Kg WW	0.000212 U	0.000222 U	0.000305 U	0.000304 U	0.0003 U	0.000311 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000868 EMI	0.00023 EMI	0.000335 EMI	0.000247 U	0.000246 U	0.000528
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000305 U	0.000281 U	0.000421 U	0.000389 U	0.00045 U	0.000354 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000302 U	0.000275 U	0.000425 U	0.000357 U	0.000464 U	0.00035 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.00032 U	0.000293 U	0.000445 U	0.000393 U	0.000482 U	0.000371 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000415 U	0.000254	0.000436 U	0.000394 U	0.000398 U	0.000458 U
OCDD	µg/Kg WW	0.00202	0.00159	0.00154	0.00294	0.00172	0.00127
2,3,7,8-TCDF	µg/Kg WW	0.00652	0.00563	0.00386	0.00365	0.00362	0.0047
1,2,3,7,8-PeCDF	µg/Kg WW	0.000195	0.000217	0.000159 U	0.000122 U	0.000142 U	0.000164 U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000244	0.000237	0.000161 U	0.000181 EMI	0.000166	0.00022
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000199 U	0.000165 U	0.000265 U	0.000234 U	0.000223 U	0.000202 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000184 U	0.000164 U	0.00027 U	0.000227 U	0.000221 U	0.000184 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000235 U	0.000224 U	0.000336 U	0.000305 U	0.000287 U	0.000243 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000186 U	0.000176 U	0.000279 U	0.000231 U	0.000236 U	0.000202 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000218 U	0.000176 U	0.000228 U	0.000245 U	0.000218 U	0.000258 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.00032 U	0.000256 U	0.000334 U	0.000346 U	0.000306 U	0.000383 U
OCDF	µg/Kg WW	0.000859 U	0.000577 U	0.000605 U	0.000503 U	0.000614 U	0.000471 U
TCDD	µg/Kg WW	0.000212 U	0.000471	0.000305 U	0.000304 U	0.0003 U	0.000311 U
TCDF	µg/Kg WW	0.00672	0.00563	0.00386	0.00365	0.00362	0.0047
PeCDD	µg/Kg WW	0.000294 U	0.0002 U	0.000256 U	0.000247 U	0.000246 U	0.000528
PeCDF	µg/Kg WW	0.000439	0.000454	0.000159 U	0.000122 U	0.000166	0.00022
HxCDD	µg/Kg WW	0.000302 U	0.000275 U	0.000421 U	0.000357 U	0.00045 U	0.00035 U
HxCDF	µg/Kg WW	0.000184 U	0.000164 U	0.000265 U	0.000227 U	0.000221 U	0.000184 U
HpCDD	µg/Kg WW	0.000601	0.00139	0.000436 U	0.000438	0.000398 U	0.000586
HpCDF	µg/Kg WW	0.000218 U	0.000176 U	0.000228 U	0.000245 U	0.000218 U	0.000258 U
Conventionals							
Lipids	%	8.3	6.4	6.9	6.3	6.6	8.3
Moisture	%	71.2	72.6	72.9	73.3	73	71.6

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-87
Results of TAL Metals, Mercury, and Arsenic Speciation for Burbot Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	BB2W13 Primary Sample	BB2W23 Primary Sample	BB2W33 Primary Sample
TAL Metals				
Aluminum	mg/Kg WW	4.945	5.472	3.689
Antimony	mg/Kg WW	0.08385 U	0.08892 U	0.08463 U
Arsenic	mg/Kg WW	0.78045	0.66804	0.72695
Barium	mg/Kg WW	5.375	3.9444	5.5552
Beryllium	mg/Kg WW	0.0043 U	0.00456 U	0.00434 U
Cadmium	mg/Kg WW	0.0301	0.02508	0.02018
Calcium	mg/Kg WW	8385 J	7706.4 J	9244.2 J
Chromium	mg/Kg WW	0.387	0.5016	0.4123
Cobalt	mg/Kg WW	0.04085	0.02736	0.02821
Copper	mg/Kg WW	1.19325	1.0944	1.03726
Iron	mg/Kg WW	22.145	18.3084	17.2732
Lead	mg/Kg WW	0.0731	0.06384	0.0651
Magnesium	mg/Kg WW	350.45 J	346.56 J	358.05 J
Manganese	mg/Kg WW	2.0769	2.18196	2.04848
Nickel	mg/Kg WW	0.301	0.3192	0.3038
Potassium	mg/Kg WW	3139	3123.6	2994.6
Selenium	mg/Kg WW	0.57835	0.70452	0.76601
Silver	mg/Kg WW	0.0516 U	0.05472 U	0.05208 U
Sodium	mg/Kg WW	1356.65	1331.52	1536.36
Thallium	mg/Kg WW	0.0516 U	0.05472 U	0.05208 U
Uranium	mg/Kg WW	0.0046	0.00447	0.00312
Vanadium	mg/Kg WW	0.08385 U	0.10716	0.12803
Zinc	mg/Kg WW	11.8465	12.2892	12.1737
Mercury				
Mercury	µg/Kg WW	181	112	121
Arsenic Species				
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-
ASB + Cation	µg/Kg WW	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-
Unknown	µg/Kg WW	-	-	-
Conventionals				
Lipids	%	1.3	2.4	2.2
Moisture	%	78.5	77.2	78.3

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-88
Results of TAL Metals, Mercury, and Arsenic Speciation for Burbot Whole Body Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	BB3W15 Primary Sample	BB3W25 Primary Sample	BB3W35 Primary Sample	BB3W35 Field Duplicate	BB3W35 Field Triplicate	BB3W45 Primary Sample	BB3W55 Primary Sample
TAL Metals								
Aluminum	mg/Kg WW	4.664	8.112	12.272	14.144	14.137	3.774	4.746
Antimony	mg/Kg WW	0.08268 U	0.0832 U	0.07904 U	0.07904 U	0.08018 U	0.08658 U	0.0904 U
Arsenic	mg/Kg WW	0.62328	0.67808	0.66768	0.66768	0.60346	0.71706	0.5198
Barium	mg/Kg WW	5.2576	6.1152	4.7424	6.5104	6.7309	5.1948	3.1866
Beryllium	mg/Kg WW	0.00403 U	0.00416 U	0.00395 U	0.00395 U	0.00401 U	0.00422 U	0.00452 U
Cadmium	mg/Kg WW	0.0212	0.04784	0.0416	0.03952	0.03587	0.02442	0.03164
Calcium	mg/Kg WW	9116 J	7987.2 J	6552 J	9131.2 J	10149.1 J	7836.6 J	4904.2 J
Chromium	mg/Kg WW	0.2968	0.3744	0.3744	0.4368	0.4431	0.333	0.339
Cobalt	mg/Kg WW	0.02756	0.0416	0.0416	0.04576	0.04431	0.0333	0.02938
Copper	mg/Kg WW	0.89888	1.44352	1.456	1.4664	1.38627	0.97902	1.32662
Iron	mg/Kg WW	17.914	34.112	35.984	37.648	37.98	21.8892	21.3796
Lead	mg/Kg WW	0.06572	0.12688	0.14768	0.17056	0.19201	0.08658	0.07006
Magnesium	mg/Kg WW	349.8 J	334.88 J	320.32 J	349.44 J	373.47 J	352.98 J	293.8 J
Manganese	mg/Kg WW	1.908	2.1008	2.392	2.9536	3.4182	1.89366	1.33566
Nickel	mg/Kg WW	0.318	0.312	0.2496	0.3536	0.3798	0.2442	0.18306
Potassium	mg/Kg WW	2904.4	2953.6	3078.4	2891.2	2869.6	3174.6	3164
Selenium	mg/Kg WW	0.59148	0.58448	0.81744	0.84864	0.81868	0.70818	0.56726
Silver	mg/Kg WW	0.05088 U	0.052 U	0.04992 U	0.04992 U	0.05064 U	0.05328 U	0.0565 U
Sodium	mg/Kg WW	1361.04	1360.32	1551.68	1572.48	1540.3	1420.8	1215.88
Thallium	mg/Kg WW	0.05088 U	0.052 U	0.04992 U	0.04992 U	0.05064 U	0.05328 U	0.0565 U
Uranium	mg/Kg WW	0.0042	0.00532	0.01028	0.01107	0.01255	0.00444	0.00301
Vanadium	mg/Kg WW	0.0848	0.11232	0.16224	0.17056	0.18779	0.09324	0.0904 U
Zinc	mg/Kg WW	11.66	12.9168	13.2288	13.4576	13.926	12.6984	11.2322
Mercury								
Mercury	µg/Kg WW	142	204	183	180	169	123	164
Arsenic Species								
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	8.528 UJ	8.528 UJ	-	-	-
ASB + Cation	µg/Kg WW	-	-	14.976 J	14.56 J	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	480.48 U	486.72	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	8.528 UJ	8.528 UJ	-	-	-
Unknown	µg/Kg WW	-	-	8.528 UJ	8.528 UJ	-	-	-
Conventionals								
Lipids	%	6.3	1.3	1.3	1.2	1.1	2.3	2.5
Moisture	%	78.8	79.2	79.2	79.2	78.9	77.8	77.4

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-89
Results of TAL Metals, Mercury, and Arsenic Speciation for Burbot Whole Body Composites from FSCA 4
Upper Columbia River RI/FS

Analyte	Units	BB4W15 Primary Sample	BB4W25 Primary Sample	BB4W35 Primary Sample	BB4W45 Primary Sample
TAL Metals					
Aluminum	mg/Kg WW	5.46	5.025	4.85	6.18
Antimony	mg/Kg WW	0.0819 U	0.07638 U	0.07372 U	0.08034 U
Arsenic	mg/Kg WW	0.8778	0.63918	0.75854	0.94142
Barium	mg/Kg WW	6.594	5.9295	4.947	6.2006
Beryllium	mg/Kg WW	0.00399 U	0.00382 U	0.00369 U	0.00391 U
Cadmium	mg/Kg WW	0.0315	0.04623	0.04268	0.04326
Calcium	mg/Kg WW	9702 J	7256.1 J	6693 J	8178.2 J
Chromium	mg/Kg WW	0.441	0.2613	0.3104	0.2884
Cobalt	mg/Kg WW	0.0378	0.03819	0.03686	0.03502
Copper	mg/Kg WW	1.1823	1.39695	1.00104	0.97232
Iron	mg/Kg WW	20.538	23.919	22.698	23.278
Lead	mg/Kg WW	0.0819	0.08442	0.10282	0.10918
Magnesium	mg/Kg WW	365.4 J	321.6 J	310.4 J	333.72 J
Manganese	mg/Kg WW	3.234	2.3517	2.1146	2.5338
Nickel	mg/Kg WW	0.378	0.2613	0.2522	0.2884
Potassium	mg/Kg WW	2961	3055.2	2987.6	3172.4
Selenium	mg/Kg WW	0.5943	0.55476	0.62856	0.5768
Silver	mg/Kg WW	0.0504 U	0.04824 U	0.04656 U	0.04944 U
Sodium	mg/Kg WW	1335.6	1328.61	1301.74	1470.84
Thallium	mg/Kg WW	0.0504 U	0.04824 U	0.04656 U	0.04944 U
Uranium	mg/Kg WW	0.00544	0.00382	0.00388	0.00478
Vanadium	mg/Kg WW	0.0987	0.07638 U	0.07954	0.08034 U
Zinc	mg/Kg WW	12.81	12.9042	11.3102	12.1334
Mercury					
Mercury	µg/Kg WW	167	230	177	184
Arsenic Species					
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	7.954 UJ	-
ASB + Cation	µg/Kg WW	-	-	12.222 J	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	583.94	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	7.954 UJ	-
Unknown	µg/Kg WW	-	-	52.768 J	-
Conventionals					
Lipids	%	1.1	0.6	0.9	1.3
Moisture	%	79	79.9	80.6	79.4

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-90
Results of TAL Metals, Mercury, and Arsenic Speciation for Burbot Whole Body Composites from FSCA 5
Upper Columbia River RI/FS

Analyte	Units	BB5W15 Primary Sample	BB5W25 Primary Sample	BB5W35 Primary Sample	BB5W45 Primary Sample	BB5W55 Primary Sample
TAL Metals						
Aluminum	mg/Kg WW	5.304	19.76	7.448	8.5224	11.109
Antimony	mg/Kg WW	0.07752 U	0.07904 U	0.07644 U	0.08268 U	0.084 U
Arsenic	mg/Kg WW	0.7956	0.676	0.95648	0.85012	0.8694
Barium	mg/Kg WW	5.0592	5.928	8.0948	5.6392	8.463
Beryllium	mg/Kg WW	0.00388 U	0.00395 U	0.00372 U	0.00424 U	0.0042 U
Cadmium	mg/Kg WW	0.08772	0.02288	0.04704	0.0424	0.0399
Calcium	mg/Kg WW	7078.8 J	10337.6 J	10309.6 J	8352.8	11571
Chromium	mg/Kg WW	0.2856	1.48512	0.2744	0.4028	0.336
Cobalt	mg/Kg WW	0.03468	0.03744	0.0392	0.0318	0.0357
Copper	mg/Kg WW	1.275	0.8008	1.17208	0.9646	0.8547
Iron	mg/Kg WW	29.988	35.568	28.224	26.288	29.19
Lead	mg/Kg WW	0.0918	0.05616	0.12152	0.06148	0.1092
Magnesium	mg/Kg WW	340.68 J	364 J	362.6 J	320.12	369.6
Manganese	mg/Kg WW	2.142	2.8288	2.9792	1.8444	2.793
Nickel	mg/Kg WW	0.2652	0.416	0.3724	0.2756	0.357
Potassium	mg/Kg WW	3162	2704	2724.4	2883.2	2814
Selenium	mg/Kg WW	0.51816	0.416	0.4312	0.5088	0.5208
Silver	mg/Kg WW	0.04896 U	0.04992 U	0.04704 U	0.053 U	0.0525 U
Sodium	mg/Kg WW	1636.08	1395.68	1560.16	1460.68	1507.8
Thallium	mg/Kg WW	0.04896 U	0.04992 U	0.04704 U	0.053 U	0.0525 U
Uranium	mg/Kg WW	0.00522	0.00445	0.00633	0.00426	0.00508
Vanadium	mg/Kg WW	0.08568	0.07904 U	0.10192	0.10388	0.1029
Zinc	mg/Kg WW	13.5864	11.2112	12.9948	12.5928 J	12.873 J
Mercury						
Mercury	µg/Kg WW	239	134	177	180	216
Arsenic Species						
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	-	-
ASB + Cation	µg/Kg WW	-	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	-
Unknown	µg/Kg WW	-	-	-	-	-
Conventionals						
Lipids	%	0.8	1.4	0.9	1.9	1.4
Moisture	%	79.6	79.2	80.4	78.8	79

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-91

Results of TAL Metals, Mercury, and Arsenic Speciation for Burbot Whole Body Composites from FSCA 6

Upper Columbia River RI/FS

Analyte	Units	BB6W15 Primary Sample	BB6W25 Primary Sample	BB6W35 Primary Sample	BB6W45 Primary Sample	BB6W55 Primary Sample
TAL Metals						
Aluminum	mg/Kg WW	11.3365	6.0346	8.585	8.5698	6.7524
Antimony	mg/Kg WW	0.07995 U	0.08229 U	0.0808 U	0.08901 U	0.08364 U
Arsenic	mg/Kg WW	0.70725	0.94317	0.73124	0.95841	0.86292
Barium	mg/Kg WW	6.15	7.3006	6.262	5.796	7.0584
Beryllium	mg/Kg WW	0.00389 U	0.00401 U	0.00404 U	0.00435 U	0.00408 U
Cadmium	mg/Kg WW	0.0369	0.03798	0.06464	0.04347	0.05304
Calcium	mg/Kg WW	10065.5	10423.4	7777	7389.9	8833.2
Chromium	mg/Kg WW	0.451	0.3376	0.2626	0.4761	0.2652
Cobalt	mg/Kg WW	0.0287	0.02954	0.0404	0.03519	0.03264
Copper	mg/Kg WW	0.95325	0.93895	1.51298	1.02258	1.0812
Iron	mg/Kg WW	25.625	23.843	28.078	31.464	25.704
Lead	mg/Kg WW	0.0779	0.08862	0.0909	0.0828	0.08364
Magnesium	mg/Kg WW	332.1	354.48	305.02	300.15	324.36
Manganese	mg/Kg WW	2.3575	2.7641	1.86446	2.484	2.5704
Nickel	mg/Kg WW	0.3485	0.3165	0.2626	0.2484	0.306
Potassium	mg/Kg WW	2644.5	2595.3	2868.4	2856.6	2713.2
Selenium	mg/Kg WW	0.41	0.4853	0.4242	0.4554	0.3876
Silver	mg/Kg WW	0.05125 U	0.05275 U	0.0505 U	0.05175 U	0.051 U
Sodium	mg/Kg WW	1303.8	1455.9	1492.78	1486.26	1372.92
Thallium	mg/Kg WW	0.0492 U	0.05064 U	0.0505 U	0.05589 U	0.051 U
Uranium	mg/Kg WW	0.00506	0.00701	0.00452	0.00373	0.00508
Vanadium	mg/Kg WW	0.07995 U	0.09706	0.0909	0.08901 U	0.08364 U
Zinc	mg/Kg WW	11.4595 J	12.2802 J	12.8674 J	11.5713 J	13.6068 J
Mercury						
Mercury	µg/Kg WW	210	154	226	180	242
Arsenic Species						
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	8.487 UJ	-
ASB + Cation	µg/Kg WW	-	-	-	9.315 J	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	780.39	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	8.487 UJ	-
Unknown	µg/Kg WW	-	-	-	39.744 J	-
Conventionals						
Lipids	%	1.6	2	1.3	1.6	1
Moisture	%	79.5	78.9	79.8	79.3	79.6

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-92
Results of PCB Aroclors and Conventionals for Burbot Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	BB2W13 Primary Sample	BB2W23 Primary Sample	BB2W33 Primary Sample
PCB Aroclor				
PCB-1016	µg/Kg WW	11 U	11 U	11 U
PCB-1221	µg/Kg WW	11 U	11 U	11 U
PCB-1232	µg/Kg WW	22 U	22 U	22 U
PCB-1242	µg/Kg WW	11 U	11 U	11 U
PCB-1248	µg/Kg WW	11 U	11 U	11 U
PCB-1254	µg/Kg WW	-	-	-
PCB-1254/1260	µg/Kg WW	20 J	43 J	27 J
PCB-1260	µg/Kg WW	-	-	-
PCB-1262	µg/Kg WW	11 U	11 U	11 U
PCB-1268	µg/Kg WW	11 U	11 U	11 U
Conventionals				
Lipids	%	1.3	2.4	2.2
Moisture	%	78.5	77.2	78.3

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-93
Results of PCB Aroclors and Conventionals for Burbot Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	BB3W15 Primary Sample	BB3W25 Primary Sample	BB3W35 Primary Sample	BB3W35 Field Duplicate	BB3W35 Field Triplicate	BB3W45 Primary Sample	BB3W55 Primary Sample
PCB Aroclor								
PCB-1016	µg/Kg WW	11 U	11 U	11 U	11 U	11 U	11 U	11 U
PCB-1221	µg/Kg WW	11 U	11 U	11 U	11 U	11 U	11 U	11 U
PCB-1232	µg/Kg WW	22 U	22 U	22 U	22 U	22 U	22 U	22 U
PCB-1242	µg/Kg WW	11 U	11 U	11 U	11 U	11 U	11 U	11 U
PCB-1248	µg/Kg WW	11 U	11 U	11 U	11 U	11 U	11 U	11 U
PCB-1254	µg/Kg WW	-	-	11 U	-	-	-	-
PCB-1254/1260	µg/Kg WW	18 J	32 J	31 J	38 J	37 J	21 J	28 J
PCB-1260	µg/Kg WW	-	-	-	-	-	-	-
PCB-1262	µg/Kg WW	11 U	11 U	11 U	11 U	11 U	11 U	11 U
PCB-1268	µg/Kg WW	11 U	11 U	11 U	11 U	11 U	11 U	11 U
Conventionals								
Lipids	%	6.3	1.3	1.3	1.2	1.1	2.3	2.5
Moisture	%	78.8	79.2	79.2	79.2	78.9	77.8	77.4

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-94
Results of PCB Aroclors and Conventionals for Burbot Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	BB4W15 Primary Sample	BB4W25 Primary Sample	BB4W35 Primary Sample	BB4W45 Primary Sample
PCB Aroclor					
PCB-1016	µg/Kg WW	11 U	11 U	11 U	11 U
PCB-1221	µg/Kg WW	11 U	11 U	11 U	11 U
PCB-1232	µg/Kg WW	22 U	22 U	22 U	22 U
PCB-1242	µg/Kg WW	11 U	11 U	11 U	11 U
PCB-1248	µg/Kg WW	11 U	11 U	11 U	11 U
PCB-1254	µg/Kg WW	-	-	16	-
PCB-1254/1260	µg/Kg WW	28 J	21 J	-	11 J
PCB-1260	µg/Kg WW	-	-	17	-
PCB-1262	µg/Kg WW	11 U	11 U	11 U	11 U
PCB-1268	µg/Kg WW	11 U	11 U	11 U	11 U
Conventionals					
Lipids	%	1.1	0.6	0.9	1.3
Moisture	%	79	79.9	80.6	79.4

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-95

Results of PCB Aroclors and Conventionals for Burbot Whole Body Composites from FSCA 2

Upper Columbia River RI/FS

Analyte	Units	BB5W15 Primary Sample	BB5W25 Primary Sample	BB5W35 Primary Sample	BB5W45 Primary Sample	BB5W55 Primary Sample
PCB Aroclor						
PCB-1016	µg/Kg WW	11 U	11 U	11 U	11 U	11 U
PCB-1221	µg/Kg WW	11 U	11 U	11 U	11 U	11 U
PCB-1232	µg/Kg WW	22 U	22 U	22 U	22 U	22 U
PCB-1242	µg/Kg WW	11 U	11 U	11 U	11 U	11 U
PCB-1248	µg/Kg WW	11 U	11 U	11 U	11 U	11 U
PCB-1254	µg/Kg WW	-	-	-	-	-
PCB-1254/1260	µg/Kg WW	20 J	26 J	20 J	58 J	28 J
PCB-1260	µg/Kg WW	-	-	-	-	-
PCB-1262	µg/Kg WW	11 U	11 U	11 U	11 U	11 U
PCB-1268	µg/Kg WW	11 U	11 U	11 U	11 U	11 U
Conventionals						
Lipids	%	0.8	1.4	0.9	1.9	1.4
Moisture	%	79.6	79.2	80.4	78.8	79

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-96
Results of PCB Aroclors and Conventionals for Burbot Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	BB6W15 Primary Sample	BB6W25 Primary Sample	BB6W35 Primary Sample	BB6W45 Primary Sample	BB6W55 Primary Sample
PCB Aroclor						
PCB-1016	µg/Kg WW	11 U	11 U	11 U	11 U	11 U
PCB-1221	µg/Kg WW	11 U	11 U	11 U	11 U	11 U
PCB-1232	µg/Kg WW	22 U	22 U	22 U	21 U	21 U
PCB-1242	µg/Kg WW	11 U	11 U	11 U	11 U	11 U
PCB-1248	µg/Kg WW	11 U	11 U	11 U	11 U	11 U
PCB-1254	µg/Kg WW	-	-	-	-	-
PCB-1254/1260	µg/Kg WW	20 J	19 J	21 J	27 J	27 J
PCB-1260	µg/Kg WW	-	-	-	-	-
PCB-1262	µg/Kg WW	11 U	11 U	11 U	11 U	11 U
PCB-1268	µg/Kg WW	11 U	11 U	11 U	11 U	11 U
Conventionals						
Lipids	%	1.6	2	1.3	1.6	1
Moisture	%	79.5	78.9	79.8	79.3	79.6

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-97
Results of PCB Congeners for Burbot Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	BB2W33 Primary Sample	BB3W35 Primary Sample	BB4W25 Primary Sample	BB5W55 Primary Sample	BB6W55 Primary Sample
PCB Congener						
PCB 1	µg/Kg WW	0.00073 JQ	0.000505 JKQ	0.000621 JQ	0.000626 JQ	0.000617 JQ
PCB 10	µg/Kg WW	0.000712 U	0.000423 U	0.000775 U	0.0003 U	0.000666 U
PCB 103	µg/Kg WW	0.0188	0.0124	0.00661	0.0138	0.0137
PCB 104	µg/Kg WW	0.000238 U	0.000374 U	0.000393 U	0.000369 U	0.000381 U
PCB 105	µg/Kg WW	0.00105 U	0.931	0.431	0.626	0.684
PCB 106	µg/Kg WW	0.000934 U	0.0017 U	0.00122 U	0.00135 U	0.0017 U
PCB 107	µg/Kg WW	0.000935 U	0.0145 C	0.00636 C	0.0162 C	0.012 C
PCB 109	µg/Kg WW	0.000768 U	0.118	0.0614	0.112	0.133
PCB 11	µg/Kg WW	0.0248	0.0184	0.0169	0.0248	0.0477
PCB 110	µg/Kg WW	0.731 C	0.292 C	0.135 C	0.463 C	0.384 C
PCB 111	µg/Kg WW	0.00376	0.00144 K	0.00209 K	0.00125 K	0.00458
PCB 112	µg/Kg WW	0.0857	0.114	0.0438	0.0413	0.0599
PCB 114	µg/Kg WW	0.00107 U	0.0531 K	0.0313	0.0386	0.0528
PCB 118	µg/Kg WW	0.000968 U	2.38	1.15	1.47	1.7
PCB 12	µg/Kg WW	0.000621 J	0.000465 JK	0.000247 U	0.000636 JK	0.000288 U
PCB 120	µg/Kg WW	0.0194	0.0114 K	0.00951	0.0114	0.0171
PCB 121	µg/Kg WW	0.00148 K	0.00133 K	0.000907 JK	0.00137	0.00127 K
PCB 122	µg/Kg WW	0.000991 U	0.0018 U	0.00129 U	0.00131 U	0.00165 U
PCB 123	µg/Kg WW	0.00103 U	0.0353	0.0192	0.0307	0.0306
PCB 126	µg/Kg WW	0.00138 U	0.0242	0.00527	0.0175	0.00848 K
PCB 127	µg/Kg WW	0.000915 U	0.00166 U	0.00328	0.00338	0.00416
PCB 128	µg/Kg WW	0.522 C	0.646 C	0.364 C	0.466 C	0.546 C
PCB 129	µg/Kg WW	3.78 C	3.98 E	2.24 C	3.21 C	3.68 E
PCB 130	µg/Kg WW	0.0159	0.00929 U	0.00168 U	0.0329	0.0186
PCB 131	µg/Kg WW	0.00538	0.00922 U	0.00218	0.0071	0.00444
PCB 132	µg/Kg WW	0.0363	0.00903 U	0.0058	0.0399	0.0151
PCB 133	µg/Kg WW	0.0859	0.0735	0.0457	0.0624	0.0803
PCB 134	µg/Kg WW	0.0213	0.0101 U	0.00325 K	0.0187	0.00703
PCB 135	µg/Kg WW	0.575 C	0.302 C	0.178 C	0.377 C	0.349 C
PCB 136	µg/Kg WW	0.0323	0.00776	0.00498 K	0.0222	0.0112
PCB 137	µg/Kg WW	0.183	0.174	0.0985	0.123	0.16
PCB 139	µg/Kg WW	0.0756 C	0.0834 C	0.0474 C	0.0666 C	0.0746 C
PCB 14	µg/Kg WW	0.000443 U	0.000166 U	0.000261 U	0.000185 U	0.000307 U
PCB 141	µg/Kg WW	0.295	0.54	0.145	0.508	0.251

Table B-97
Results of PCB Congeners for Burbot Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	BB2W33 Primary Sample		BB3W35 Primary Sample		BB4W25 Primary Sample		BB5W55 Primary Sample		BB6W55 Primary Sample	
PCB 142	µg/Kg WW	0.00263	U	0.00951	U	0.00172	U	0.0063	U	0.00123	U
PCB 143	µg/Kg WW	0.00269		0.0088	U	0.00159	U	0.00635	U	0.00124	U
PCB 144	µg/Kg WW	0.0666		0.0379		0.018		0.0489		0.042	
PCB 145	µg/Kg WW	0.000653	U	0.000932	U	0.000713	U	0.00108	U	0.000709	U
PCB 146	µg/Kg WW	0.48		0.262		0.153		0.282		0.311	
PCB 147	µg/Kg WW	0.283	C	0.0553	C	0.0396	C	0.225	C	0.118	C
PCB 148	µg/Kg WW	0.00752	K	0.00613		0.00358	K	0.00621		0.00687	
PCB 15	µg/Kg WW	0.005		0.00348		0.00262		0.00489		0.00627	
PCB 150	µg/Kg WW	0.000635	U	0.000906	U	0.000694	U	0.00103	U	0.000679	U
PCB 152	µg/Kg WW	0.000777	JK	0.000996	U	0.000762	U	0.0011	U	0.000725	U
PCB 153	µg/Kg WW	4.2	E	3.91	E	2.37	C	3.13	C	4.08	E
PCB 154	µg/Kg WW	0.0733		0.0786		0.0451		0.077		0.0837	
PCB 155	µg/Kg WW	0.0033	K	0.00244		0.00229		0.00329		0.00371	
PCB 156	µg/Kg WW	0.361	C	0.446	C	0.245	C	0.265	C	0.305	C
PCB 158	µg/Kg WW	0.273		0.333		0.187		0.244		0.314	
PCB 159	µg/Kg WW	0.00287	U	0.00288	U	0.00141	U	0.00339	U	0.00186	U
PCB 16	µg/Kg WW	0.00425		0.00271		0.00189	K	0.00278		0.00242	
PCB 160	µg/Kg WW	0.00202	U	0.0073	U	0.00132	U	0.00438	U	0.000854	U
PCB 161	µg/Kg WW	0.00195	U	0.0168		0.00128	U	0.00459	U	0.000893	U
PCB 162	µg/Kg WW	0.0156		0.0127	K	0.00821	K	0.0118		0.0143	
PCB 164	µg/Kg WW	0.0629		0.0343	K	0.0139		0.0435		0.0281	
PCB 165	µg/Kg WW	0.00193	U	0.00699	U	0.00127	U	0.00439	U	0.000855	U
PCB 167	µg/Kg WW	0.077		0.0759		0.0262		0.0405		0.0374	
PCB 169	µg/Kg WW	0.00846		0.00406	U	0.00559		0.00493	U	0.00713	K
PCB 17	µg/Kg WW	0.00773		0.00386		0.00254		0.00523		0.00388	
PCB 170	µg/Kg WW	0.702	Q	0.776		0.49		0.538		0.634	
PCB 171	µg/Kg WW	0.26	C	0.279	C	0.181	C	0.215	C	0.278	C
PCB 172	µg/Kg WW	0.122		0.107		0.0653		0.0866		0.115	
PCB 174	µg/Kg WW	0.0316	K	0.113		0.00747	K	0.0898		0.0179	
PCB 175	µg/Kg WW	0.0174		0.00822		0.00487		0.0113		0.0115	
PCB 176	µg/Kg WW	0.00597		0.000676	J	0.000494	U	0.005		0.00268	
PCB 177	µg/Kg WW	0.00947		0.00445	U	0.00162	U	0.0152		0.00199	U
PCB 178	µg/Kg WW	0.221		0.178		0.104		0.165		0.202	
PCB 179	µg/Kg WW	0.048		0.0129		0.00813		0.0381		0.02	
PCB 18	µg/Kg WW	0.02	C	0.0108	C	0.00629	C	0.0119	C	0.00977	C
PCB 180	µg/Kg WW	2.4	C	2.02	C	1.24	C	1.42	C	1.66	C

Table B-97
Results of PCB Congeners for Burbot Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	BB2W33 Primary Sample	BB3W35 Primary Sample	BB4W25 Primary Sample	BB5W55 Primary Sample	BB6W55 Primary Sample
PCB 181	µg/Kg WW	0.00126 U	0.00371 U	0.00135 U	0.00182 U	0.00167 U
PCB 182	µg/Kg WW	0.0101	0.0215	0.00546	0.0453	0.0106
PCB 183	µg/Kg WW	0.783 C	0.61 C	0.439 C	0.538 C	0.637 C
PCB 184	µg/Kg WW	0.00514	0.00414	0.00359	0.00562 K	0.0056 K
PCB 186	µg/Kg WW	0.000563 U	0.00056 U	0.000479 U	0.00142 U	0.000379 U
PCB 187	µg/Kg WW	0.563	0.121	0.0705	0.194	0.163
PCB 188	µg/Kg WW	0.00296	0.00201	0.00143	0.00221	0.00219
PCB 189	µg/Kg WW	0.0236	0.019 Q	0.0136	0.00949	0.0158
PCB 19	µg/Kg WW	0.00113 K	0.000518 JK	0.000454 JK	0.000717 J	0.000515 J
PCB 190	µg/Kg WW	0.165 Q	0.173 K	0.128	0.105	0.156
PCB 191	µg/Kg WW	0.028	0.0188 K	0.0185	0.0315 K	0.0252
PCB 192	µg/Kg WW	0.00109 U	0.0032 U	0.00117 U	0.00156 U	0.00143 U
PCB 194	µg/Kg WW	0.263 Q	0.203 Q	0.169 Q	0.123 Q	0.177 Q
PCB 195	µg/Kg WW	0.197	0.177	0.131	0.105	0.137
PCB 196	µg/Kg WW	0.425	0.0555	0.201	0.0507	0.254
PCB 197	µg/Kg WW	0.0299 C	0.0286 C	0.0171 C	0.0236 C	0.0261 C
PCB 198	µg/Kg WW	0.518 Q	0.182 C	0.131 C	0.155 C	0.183 C
PCB 2	µg/Kg WW	0.000956 JK	0.000644 J	0.000784 J	0.00109 K	0.00187 K
PCB 20	µg/Kg WW	0.118 C	0.0708 C	0.0387 C	0.0945 C	0.0685 C
PCB 201	µg/Kg WW	0.0484	0.0162	0.00983	0.0201	0.0186
PCB 202	µg/Kg WW	0.145	0.11	0.0786	0.0799	0.109
PCB 203	µg/Kg WW	0.492	0.129	0.304	0.0722	0.341
PCB 204	µg/Kg WW	0.000355 U	0.000858 U	0.000549 U	0.00124 U	0.00149 U
PCB 205	µg/Kg WW	0.0203 Q	0.0181 Q	0.0112 Q	0.011 Q	0.013 Q
PCB 206	µg/Kg WW	0.432	0.19 Q	0.15 Q	0.137	0.16
PCB 207	µg/Kg WW	0.0734 Q	0.0385 Q	0.0273 Q	0.0296	0.0293
PCB 208	µg/Kg WW	0.0977 Q	0.0276 Q	0.0249 Q	0.0213 Q	0.0279 Q
PCB 209	µg/Kg WW	0.0697 Q	0.0478	0.0316	0.0397	0.0436
PCB 21	µg/Kg WW	0.00765 K	0.00531 C	0.00445 C	0.00614 C	0.00757 C
PCB 22	µg/Kg WW	0.0153	0.00907	0.00641	0.0106	0.00931
PCB 23	µg/Kg WW	0.000181 U	0.000168 U	0.000215 U	0.000115 U	0.000274 U
PCB 24	µg/Kg WW	0.00048 J	0.00027 JK	0.000205 U	0.000319 JK	0.000328 J
PCB 25	µg/Kg WW	0.00364	0.00153	0.00135 K	0.0025	0.00208
PCB 26	µg/Kg WW	0.0107 C	0.00627 C	0.00382 C	0.00915 C	0.0063 C
PCB 27	µg/Kg WW	0.00108 K	0.000428 JK	0.000248 J	0.000574 JK	0.000394 JK
PCB 3	µg/Kg WW	0.00096 JK	0.000662 J	0.000669 J	0.000883 J	0.00137 K

Table B-97
Results of PCB Congeners for Burbot Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	BB2W33 Primary Sample	BB3W35 Primary Sample	BB4W25 Primary Sample	BB5W55 Primary Sample	BB6W55 Primary Sample
PCB 31	µg/Kg WW	0.0713	0.044	0.0272	0.0582	0.0433
PCB 32	µg/Kg WW	0.0021	0.00143	0.000918	0.00128	0.00143
PCB 34	µg/Kg WW	0.000692 J	0.000224 J	0.000221 U	0.000338 J	0.000292 U
PCB 35	µg/Kg WW	0.000216 U	0.000223 U	0.000249 U	0.000299 U	0.000483 JK
PCB 36	µg/Kg WW	0.000202 U	0.000209 U	0.000233 U	0.000273 U	0.000214 U
PCB 37	µg/Kg WW	0.00589	0.00306	0.00209	0.00517 K	0.00632
PCB 38	µg/Kg WW	0.000208 U	0.000215 U	0.000241 U	0.000297 U	0.000233 U
PCB 39	µg/Kg WW	0.000975 J	0.000401 JK	0.000213 U	0.000748 J	0.000666 JK
PCB 4	µg/Kg WW	0.00171	0.00133	0.00109 K	0.00113	0.000802 U
PCB 40	µg/Kg WW	0.0128 C	0.00291 C	0.00175 J	0.00686 C	0.00571 K
PCB 41	µg/Kg WW	0.00263	0.00113	0.000841 JK	0.000427 U	0.000616 U
PCB 42	µg/Kg WW	0.059	0.016	0.00875	0.0473	0.03
PCB 43	µg/Kg WW	0.0144	0.00733	0.00332 K	0.0104	0.0061
PCB 44	µg/Kg WW	0.335 C	0.217 C	0.0882 C	0.3 C	0.221 C
PCB 45	µg/Kg WW	0.013 K	0.00242 C	0.00136 J	0.00691 C	0.00391 K
PCB 46	µg/Kg WW	0.0017	0.000421 U	0.000335 U	0.000671 J	0.000548 U
PCB 48	µg/Kg WW	0.0291	0.0104	0.00589	0.0211	0.014
PCB 49	µg/Kg WW	0.259 C	0.15 C	0.0612 C	0.222 C	0.156 C
PCB 5	µg/Kg WW	0.000442 U	0.000166 U	0.000261 U	0.000183 U	0.000304 U
PCB 50	µg/Kg WW	0.0174 C	0.00289 C	0.00222 C	0.00928 C	0.00652 C
PCB 52	µg/Kg WW	0.48	0.337	0.135	0.407	0.293
PCB 54	µg/Kg WW	0.000167 U	0.000167 U	0.000142 U	0.000163 U	0.000211 U
PCB 55	µg/Kg WW	0.0185	0.0211	0.00714	0.0158	0.0142
PCB 56	µg/Kg WW	0.0339	0.00778	0.00653 K	0.0217	0.0159
PCB 57	µg/Kg WW	0.00154	0.000868 JK	0.000617 JK	0.000619 U	0.000694 U
PCB 58	µg/Kg WW	0.00241 K	0.000893 JK	0.000527 JK	0.00185 K	0.000625 U
PCB 59	µg/Kg WW	0.0367 C	0.021 C	0.00927 C	0.0302 C	0.0244 C
PCB 6	µg/Kg WW	0.000889 J	0.000897 JK	0.000258 U	0.000756 J	0.000995
PCB 60	µg/Kg WW	0.093	0.107	0.0404	0.104	0.0865
PCB 61	µg/Kg WW	0.751 C	0.683 C	0.289 C	0.74 C	0.589 C
PCB 63	µg/Kg WW	0.0282	0.0164	0.00824	0.0263	0.023
PCB 64	µg/Kg WW	0.122	0.036	0.0192	0.0893	0.0636
PCB 66	µg/Kg WW	0.54	0.561	0.204	0.633	0.51
PCB 67	µg/Kg WW	0.00295	0.000899 J	0.000445 U	0.00271	0.00202
PCB 68	µg/Kg WW	0.00914	0.00722	0.0038	0.00873	0.00789
PCB 7	µg/Kg WW	0.00042 U	0.000158 U	0.000248 U	0.000169 U	0.00028 U

Table B-97
Results of PCB Congeners for Burbot Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	BB2W33 Primary Sample		BB3W35 Primary Sample		BB4W25 Primary Sample		BB5W55 Primary Sample		BB6W55 Primary Sample	
PCB 72	µg/Kg WW	0.0116		0.0083		0.00475		0.0111		0.00858	K
PCB 73	µg/Kg WW	0.00736		0.00634		0.00343		0.00591	K	0.00514	
PCB 77	µg/Kg WW	0.0102		0.00257		0.00224		0.00637		0.0045	K
PCB 78	µg/Kg WW	0.000333	U	0.000818	U	0.000486	U	0.000621	U	0.000697	U
PCB 79	µg/Kg WW	0.0227		0.0126		0.00618		0.0144		0.0148	
PCB 8	µg/Kg WW	0.00546		0.00438		0.00413		0.00444		0.00586	
PCB 80	µg/Kg WW	0.00029	U	0.000712	U	0.000423	U	0.000501	U	0.000562	U
PCB 81	µg/Kg WW	0.000365	U	0.000879	U	0.000517	U	0.000569	U	0.000634	U
PCB 82	µg/Kg WW	0.0326		0.0101	K	0.00394	K	0.0178		0.0143	
PCB 83	µg/Kg WW	0.053		0.162		0.125		0.0401		0.0825	
PCB 84	µg/Kg WW	0.0211		0.00364		0.00279		0.014		0.0074	
PCB 85	µg/Kg WW	0.397	C	0.495	C	0.217	C	0.42	C	0.425	C
PCB 86	µg/Kg WW	0.647	C	0.434	C	0.201	C	0.493	C	0.447	C
PCB 88	µg/Kg WW	0.0541	C	0.011	C	0.00633	C	0.0361	C	0.0221	C
PCB 89	µg/Kg WW	0.000914	JK	0.00095	U	0.000808	U	0.00096	U	0.00104	U
PCB 9	µg/Kg WW	0.000602	JK	0.00017	U	0.000268	U	0.00045	JK	0.000938	K
PCB 90	µg/Kg WW	1.41	C	1.16	C	0.484	C	1.05	C	1.05	C
PCB 92	µg/Kg WW	0.358		0.309		0.145		0.285		0.289	
PCB 93	µg/Kg WW	0.017	C	0.0129	C	0.00573	C	0.0171	C	0.0128	C
PCB 94	µg/Kg WW	0.00242	K	0.000923	U	0.000784	U	0.00167		0.00148	
PCB 95	µg/Kg WW	0.158		0.027		0.0184		0.104		0.0577	
PCB 96	µg/Kg WW	0.000427	U	0.000736	U	0.000676	U	0.000769	U	0.000693	U
PCB 98	µg/Kg WW	0.00919	C	0.00142	J	0.00083	U	0.00538	C	0.00252	K
PCB 99	µg/Kg WW	1.01		1.18		0.5		1.05		1.03	

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-98
Results of Dioxins/Furans Analysis and Conventionals for Burbot Whole Body Composites from FSCA 2
Upper Columbia River RI/FS

Analyte	Units	BB2W13 Primary Sample		BB2W23 Primary Sample		BB2W33 Primary Sample	
Dioxins/Furans							
2,3,7,8-TCDD	µg/Kg WW	0.000126	U	0.000129	EMPC	0.000122	EMPC
1,2,3,7,8-PeCDD	µg/Kg WW	0.000404	EMPC	0.000296	EMPC	0.000457	EMPC
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000103	U	7.16E-05	U	9.53E-05	U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000312		0.00029		0.00036	
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000104	U	8.24E-05		0.00012	
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000519		0.000467		0.000599	
OCDD	µg/Kg WW	0.00129		0.000935		0.00147	
2,3,7,8-TCDF	µg/Kg WW	0.00397		0.00511		0.00548	
1,2,3,7,8-PeCDF	µg/Kg WW	0.000193		0.000222		0.00024	
2,3,4,7,8-PeCDF	µg/Kg WW	0.000232		0.000284		0.000255	
1,2,3,4,7,8-HxCDF	µg/Kg WW	9.55E-05	EMPC	9.41E-05		0.000101	
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000103	EMPC	9.61E-05		9.93E-05	
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000078		5.29E-05		0.000074	U
2,3,4,6,7,8-HxCDF	µg/Kg WW	7.99E-05		7.25E-05		8.24E-05	
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	9.55E-05		9.61E-05		0.000125	
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000111	U	5.67E-05	U	4.26E-05	U
OCDF	µg/Kg WW	0.00018	U	5.49E-05		7.87E-05	
TCDD	µg/Kg WW	0.000126	U	6.68E-05	U	6.02E-05	U
TCDF	µg/Kg WW	0.00417		0.00535		0.00573	
PeCDD	µg/Kg WW	6.14E-05	U	0.000048	U	6.69E-05	U
PeCDF	µg/Kg WW	0.000712		0.000973		0.000901	
HxCDD	µg/Kg WW	0.000312		0.000373		0.000479	
HxCDF	µg/Kg WW	0.000351		0.000478		0.000483	
HpCDD	µg/Kg WW	0.000519		0.000467		0.000689	
HpCDF	µg/Kg WW	9.55E-05		9.61E-05		0.000125	
Conventionals							
Lipids	%	1.3		2.4		2.2	
Moisture	%	78.5		77.2		78.3	

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-99
Results of Dioxins/Furans Analysis and Conventionals for Burbot Whole Body Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	BB3W15 Primary Sample	BB3W25 Primary Sample	BB3W35 Primary Sample	BB3W35 Field Duplicate	BB3W35 Field Triplicate	BB3W45 Primary Sample	BB3W55 Primary Sample
Dioxins/Furans								
2,3,7,8-TCDD	µg/Kg WW	0.000298 U	0.000217 U	0.000189 U	0.000237 U	0.000218 U	0.000193 U	0.00022 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000257 EMPC	0.000125 EMPC	0.000161 EMPC	0.000148 U	0.000123 U	0.000144 EMPC	0.000135 EMPC
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000254 U	0.000255 U	0.000234 U	0.000242 U	0.000286 U	0.000182 U	0.000215 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000341 EMPC	0.000331	0.000237	0.000247	0.000319	0.000378	0.000341
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.00027 U	0.00025 U	0.000243 U	0.000252 U	0.000294 U	0.000187 U	0.000223 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000442	0.00054	0.000443	0.000545	0.000448	0.000457	0.000522
OCDD	µg/Kg WW	0.00121	0.00108	0.00115	0.00118	0.00133	0.00111	0.00123
2,3,7,8-TCDF	µg/Kg WW	0.00271	0.00365	0.00279	0.00309	0.00321	0.00403	0.00367
1,2,3,7,8-PeCDF	µg/Kg WW	0.000174	0.000194 EMPC	0.000211	0.000224 EMPC	0.000202	0.000254	0.000253
2,3,4,7,8-PeCDF	µg/Kg WW	0.000216	0.000192	0.000246	0.00022 EMPC	0.00024	0.00025	0.000261
1,2,3,4,7,8-HxCDF	µg/Kg WW	9.56E-05	0.000124 U	0.00014	0.000143	0.000152 U	0.000114	0.000113
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000101	0.000125	0.000112	0.000135	0.000147 U	0.000101	0.000101
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000201 U	0.000173 U	0.000217 U	0.000195 U	0.000223 U	0.00012 U	0.000183 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000129 U	0.00009	0.000114	0.000135 U	0.000146 U	8.16E-05	0.000123 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000143 U	0.000141	0.00014 EMPC	0.000154	0.000131 U	0.000137 U	0.000152 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000206 U	0.000181 U	0.000246 U	0.000193 U	0.000202 U	0.000219 U	0.000223 U
OCDF	µg/Kg WW	0.000416 U	0.000488 U	0.000525 U	0.000559 U	0.00032 U	0.000349 U	0.000393 U
TCDD	µg/Kg WW	0.000298 U	0.000217 U	0.000189 U	0.000237 U	0.000218 U	0.000193 U	0.00022 U
TCDF	µg/Kg WW	0.00271	0.00365	0.00279	0.00309	0.00321	0.00403	0.00367
PeCDD	µg/Kg WW	0.000112 U	0.000116 U	0.000112 U	0.000148 U	0.000123 U	0.000113 U	0.000119 U
PeCDF	µg/Kg WW	0.000508	0.000323	0.000543	0.000145	0.000442	0.000651	0.000659
HxCDD	µg/Kg WW	0.000254 U	0.000331	0.000237	0.000247	0.000319	0.000378	0.000341
HxCDF	µg/Kg WW	0.000337	0.000413	0.000506	0.000459	0.000146 U	0.000514	0.000392
HpCDD	µg/Kg WW	0.000442	0.00054	0.000443	0.000545	0.000448	0.000457	0.000522
HpCDF	µg/Kg WW	0.000143 U	0.000141	0.000148 U	0.000154	0.000131 U	0.000137 U	0.000152 U
Conventionals								
Lipids	%	6.3	1.3	1.3	1.2	1.1	2.3	2.5
Moisture	%	78.8	79.2	79.2	79.2	78.9	77.8	77.4

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-100
Results of Dioxins/Furans Analysis and Conventionals for Burbot Whole Body Composites from FSCA 4
Upper Columbia River RI/FS

Analyte	Units	BB4W15 Primary Sample		BB4W25 Primary Sample		BB4W35 Primary Sample		BB4W45 Primary Sample	
Dioxins/Furans									
2,3,7,8-TCDD	µg/Kg WW	0.000105	U	0.000195	U	0.00017	U	0.000198	U
1,2,3,7,8-PeCDD	µg/Kg WW	0.00016	EMPC	0.000127	U	0.000135	U	0.000204	EMPC
1,2,3,4,7,8-HxCDD	µg/Kg WW	7.63E-05	U	0.000254	U	0.000141	U	0.000178	U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000429		0.0004		0.000335		0.000276	
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000115	EMPC	0.000261	U	0.000144	U	0.000179	U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000662		0.00062		0.0005		0.00047	
OCDD	µg/Kg WW	0.00126		0.00185		0.00135		0.00114	
2,3,7,8-TCDF	µg/Kg WW	0.00571		0.00412		0.00478		0.00314	
1,2,3,7,8-PeCDF	µg/Kg WW	0.000261		0.000233		0.000218		0.000179	
2,3,4,7,8-PeCDF	µg/Kg WW	0.000248		0.000221		0.000175		0.000204	
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000105		0.000105		0.000103		0.000105	
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000107		0.000107		0.000111		7.58E-05	
1,2,3,7,8,9-HxCDF	µg/Kg WW	4.77E-05		0.000209	U	0.000118	U	6.22E-05	
2,3,4,6,7,8-HxCDF	µg/Kg WW	8.78E-05		0.000145	U	0.000079		0.000101	
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000126		0.000172	U	0.00012		0.000136	
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	7.95E-05	U	0.00027	U	0.000119	U	0.000202	U
OCDF	µg/Kg WW	0.000119	U	0.000352	U	0.000297	U	0.000283	U
TCDD	µg/Kg WW	0.000105	U	0.000195	U	0.00017	U	0.000198	U
TCDF	µg/Kg WW	0.00571		0.00412		0.00478		0.00314	
PeCDD	µg/Kg WW	0.000041	U	0.000127	U	0.000135	U	9.88E-05	U
PeCDF	µg/Kg WW	0.000645		0.000454		0.000557		0.00048	
HxCDD	µg/Kg WW	0.000429		0.0004		0.000335		0.000276	
HxCDF	µg/Kg WW	0.000611		0.000459		0.000497		0.000509	
HpCDD	µg/Kg WW	0.000662		0.00062		0.0005		0.00047	
HpCDF	µg/Kg WW	0.000126		0.000172	U	0.00012		0.000136	
Conventionals									
Lipids	%	1.1		0.6		0.9		1.3	
Moisture	%	79		79.9		80.6		79.4	

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-101

Results of Dioxins/Furans Analysis and Conventionals for Burbot Whole Body Composites from FSCA 5

Upper Columbia River RI/FS

Analyte	Units	BB5W15 Primary Sample	BB5W25 Primary Sample	BB5W35 Primary Sample	BB5W45 Primary Sample	BB5W55 Primary Sample
Dioxins/Furans						
2,3,7,8-TCDD	µg/Kg WW	0.000201 U	0.000199 U	0.000193 U	0.00016 U	0.000168 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000231 EMPC	0.000153 U	0.000116 U	0.000334 EMPC	0.000371 EMPC
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000171 U	0.000227 U	0.000146 U	0.000181 U	0.000181 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000146	0.000339	0.000241	0.00025	0.000279
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000184 U	0.000157	9.82E-05	0.000188 U	0.000192 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000256	0.000559	0.000364	0.000469	0.00042
OCDD	µg/Kg WW	0.000934	0.00138	0.000785	0.00103	0.00112
2,3,7,8-TCDF	µg/Kg WW	0.00159	0.0039	0.00219	0.00389	0.00341
1,2,3,7,8-PeCDF	µg/Kg WW	0.000191	0.000283	0.000191	0.000215	0.000223
2,3,4,7,8-PeCDF	µg/Kg WW	0.000156	0.000224	0.000156	0.000221	0.000201
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000102	0.00013	0.000123	9.96E-05	9.18E-05
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000121	0.00011	0.000108	9.96E-05	9.93E-05
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000151 U	0.000181 U	9.24E-05 EMPC	0.000196 U	0.000195 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000111 U	8.27E-05	7.12E-05	8.59E-05	7.87E-05
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	8.28E-05	0.000157 U	9.24E-05	0.000125	8.25E-05
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000172 U	0.000236 U	0.000208 U	0.000221 U	0.000172 U
OCDF	µg/Kg WW	0.000247 U	0.000393 U	0.000382 U	0.000376 U	0.000375 U
TCDD	µg/Kg WW	0.000201 U	0.000199 U	0.000193 U	0.00016 U	0.000168 U
TCDF	µg/Kg WW	0.00159	0.0039	0.00219	0.00354	0.00341
PeCDD	µg/Kg WW	8.57E-05 U	0.000153 U	0.000116 U	0.000118 U	0.000116 U
PeCDF	µg/Kg WW	0.000346	0.000693	0.000433	0.000436	0.000521
HxCDD	µg/Kg WW	0.000146	0.000496	0.000339	0.00025	0.000279
HxCDF	µg/Kg WW	0.000223	0.000524	0.000397	0.000424	0.00027
HpCDD	µg/Kg WW	0.000256	0.000559	0.000364	0.000469	0.000527
HpCDF	µg/Kg WW	8.28E-05	0.000157 U	9.24E-05	0.000125	8.25E-05
Conventionals						
Lipids	%	0.8	1.4	0.9	1.9	1.4
Moisture	%	79.6	79.2	80.4	78.8	79

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

Table B-102
Results of Dioxins/Furans Analysis and Conventionals for Burbot Whole Body Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	BB6W15 Primary Sample	BB6W25 Primary Sample	BB6W35 Primary Sample	BB6W45 Primary Sample	BB6W55 Primary Sample
Dioxins/Furans						
2,3,7,8-TCDD	µg/Kg WW	0.000182 U	0.000208 U	0.00017 U	0.000206 U	0.000271 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000351 EMPC	0.000268 EMPC	0.000328 EMPC	0.000409 EMPC	0.000115 U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000161 U	0.000184 U	0.000158 U	0.00023 U	0.000195 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000316	0.000287	0.000251	0.000407	0.00042
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000157	0.00019 U	0.000163 U	0.000127	0.000198 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000702	0.000421	0.000451	0.000549	0.000597
OCDD	µg/Kg WW	0.00136	0.00101	0.00087	0.00132	0.00141
2,3,7,8-TCDF	µg/Kg WW	0.00493	0.00396	0.00326	0.00467	0.00392
1,2,3,7,8-PeCDF	µg/Kg WW	0.000314	0.000252	0.000219	0.000249	0.000236 EMPC
2,3,4,7,8-PeCDF	µg/Kg WW	0.000252	0.000247	0.000173	0.000265	0.000184
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000155	0.00013	0.000107	0.00014	0.000135
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000149	0.000109	9.71E-05	0.000123	0.000122
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000151	0.00013	0.000102 U	0.000205 U	0.000199 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000186	7.96E-05	8.19E-05	0.000103	0.000131 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000196	0.000153	0.000126 U	0.000154	0.000118 EMPC
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000221 U	0.000161 U	0.000195 U	0.000241 U	0.000231 U
OCDF	µg/Kg WW	0.000266	0.000258 U	0.000256 U	0.000474 U	0.000516 U
TCDD	µg/Kg WW	0.000182 U	0.000208 U	0.00017 U	0.000206 U	0.000271 U
TCDF	µg/Kg WW	0.00493	0.00396	0.00326	0.00467	0.00392
PeCDD	µg/Kg WW	0.000137 U	9.97E-05 U	0.000117 U	0.000173	0.000115 U
PeCDF	µg/Kg WW	0.000991	0.000499	0.000537	0.000695	0.000289
HxCDD	µg/Kg WW	0.000473	0.000287	0.000251	0.000534	0.00042
HxCDF	µg/Kg WW	0.000828	0.000449	0.00044	0.000576	0.000257
HpCDD	µg/Kg WW	0.000702	0.000421	0.000451	0.000549	0.000597
HpCDF	µg/Kg WW	0.000196	0.000153	0.000126 U	0.000154	0.000146 U
Conventionals						
Lipids	%	1.6	2	1.3	1.6	1
Moisture	%	79.5	78.9	79.8	79.3	79.6

[a] The W indicates that the sample consisted of whole bodies.
- not analyzed
U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

APPENDIX C

Estimated Whole Body Concentrations from Walleye and Rainbow Trout

APPENDIX C

Estimated Whole Body Concentrations from Walleye and Rainbow Trout

This appendix contains the following tables:

TABLE C-1
Results of TAL Metals, Mercury, and Arsenic Speciation for Walleye Estimated Whole Body Composites from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	WE1EW[a]15 Primary Sample		WE1EW25 Primary Sample		WE1EW35 Primary Sample		WE1EW45 Primary Sample		WE1EW55 Primary Sample	
TAL Metals											
Aluminum	mg/Kg WW	5.69		126.14		3.12		3.17		2.22	U
Antimony	mg/Kg WW	0.096		0.104		0.104		0.106		0.074	U
Arsenic	mg/Kg WW	0.143	U	0.114	U	0.097	U	0.073	U	0.048	
Barium	mg/Kg WW	0.771		0.905		0.818		0.732		0.833	
Beryllium	mg/Kg WW	0.005		0.005		0.005		0.005		0.004	U
Cadmium	mg/Kg WW	0.049		0.026		0.021		0.026		0.021	
Calcium	mg/Kg WW	7037		11561		11222		10079		10997	
Chromium	mg/Kg WW	0.485		0.558		0.556		0.552		0.344	
Cobalt	mg/Kg WW	0.025		0.021		0.020		0.020		0.019	
Copper	mg/Kg WW	0.425		0.336		0.339		0.323		0.267	
Iron	mg/Kg WW	22.03		10.92		9.56		10.02		10.43	
Lead	mg/Kg WW	0.025		0.030		0.029		0.038		0.038	
Magnesium	mg/Kg WW	336.1		372.4		367.5		349.7		283.8	
Manganese	mg/Kg WW	2.38		1.47		1.28		0.95		1.04	
Nickel	mg/Kg WW	0.240		0.455		0.473		0.374		0.373	
Potassium	mg/Kg WW	3528	U	3296	U	3293	U	3349	U	2058	
Selenium	mg/Kg WW	0.542		0.419		0.390		0.416		0.321	
Silver	mg/Kg WW	0.060	U	0.039	U	0.039	U	0.040	U	0.028	U
Sodium	mg/Kg WW	1041.5		968.0		916.8		892.4		839.8	
Thallium	mg/Kg WW	0.060		0.065	U	0.065	U	0.066	U	0.046	U
Uranium	mg/Kg WW	0.002		0.001		0.001		0.001		0.001	
Vanadium	mg/Kg WW	0.117		0.104		0.104		0.106		0.074	U
Zinc	mg/Kg WW	28.31		13.35		12.60		13.01		10.86	
Mercury											
Mercury	µg/Kg WW	133.07		156.47		125.36		184.28		192.34	
Arsenic Species											
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	8.70		-		-		-		-	
ASB + Cation	µg/Kg WW	20.34		-		-		-		-	
Dimethylarsonic acid (DMA)	µg/Kg WW	7.21		-		-		-		-	
Monomethylarsonic acid (MMA)	µg/Kg WW	8.70	U	-		-		-		-	
Unknown	µg/Kg WW	8.70	U	-		-		-		-	

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-2
Results of TAL Metals, Mercury, and Arsenic Speciation for Walleye Estimated Whole Body Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	WE3EW15 Primary Sample	WE3EW25 Primary Sample	WE3EW35 Primary Sample	WE3EW45 Primary Sample	WE3EW55 Primary Sample
TAL Metals						
Aluminum	mg/Kg WW	3.17	2.94	4.11	4.51	3.83
Antimony	mg/Kg WW	0.106	0.098	0.101	0.104	0.105
Arsenic	mg/Kg WW	0.116 U	0.137 U	0.144 U	0.186 U	0.152 U
Barium	mg/Kg WW	0.778	0.812	0.744	0.861	0.914
Beryllium	mg/Kg WW	0.005	0.005	0.005	0.005	0.005
Cadmium	mg/Kg WW	0.019	0.018	0.026	0.035	0.023
Calcium	mg/Kg WW	10094	11490	8926	10114	11812
Chromium	mg/Kg WW	0.533	0.379	0.467	0.800	0.550
Cobalt	mg/Kg WW	0.020	0.021	0.022	0.029	0.025
Copper	mg/Kg WW	0.318	0.262	0.353	0.416	0.375
Iron	mg/Kg WW	9.17	7.10	10.83	12.07	10.05
Lead	mg/Kg WW	0.032	0.045	0.038	0.053	0.053
Magnesium	mg/Kg WW	351.8	371.5	342.0	344.2	363.5
Manganese	mg/Kg WW	0.99	1.16	1.01	1.30	1.18
Nickel	mg/Kg WW	0.382	0.352	0.312	0.423	0.446
Potassium	mg/Kg WW	3317 U	3355 U	3536 U	3290 U	3268 U
Selenium	mg/Kg WW	0.431	0.407	0.507	0.655	0.586
Silver	mg/Kg WW	0.040 U	0.037 U	0.038 U	0.039 U	0.039 U
Sodium	mg/Kg WW	982.4	902.5	944.0	890.2	962.5
Thallium	mg/Kg WW	0.066 U	0.061 U	0.063 U	0.065 U	0.066 U
Uranium	mg/Kg WW	0.001	0.001	0.001	0.001	0.001
Vanadium	mg/Kg WW	0.106	0.098	0.101	0.104	0.105
Zinc	mg/Kg WW	11.10	11.03	12.19	11.44	12.65
Mercury						
Mercury	µg/Kg WW	182.67	143.11	201.26	166.91	168.56
Arsenic Species						
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	-	29.05
ASB + Cation	µg/Kg WW	-	-	-	-	11.64
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	9.55
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	8.71 U
Unknown	µg/Kg WW	-	-	-	-	10.62

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-3
Results of TAL Metals, Mercury, and Arsenic Speciation for Walleye Estimated Whole Body Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE6EW15 Primary Sample	WE6EW25 Primary Sample	WE6EW35 Primary Sample	WE6EW45 Primary Sample	WE6EW55 Primary Sample
TAL Metals						
Aluminum	mg/Kg WW	3.04	5.54	4.28	4.51	3.59
Antimony	mg/Kg WW	0.101	0.108	0.104	0.105	0.103
Arsenic	mg/Kg WW	0.160 U	0.163 U	0.161 U	0.123 U	0.126 U
Barium	mg/Kg WW	0.802	0.834	0.826	1.025	0.845
Beryllium	mg/Kg WW	0.005	0.005	0.005	0.005	0.005
Cadmium	mg/Kg WW	0.021	0.021	0.025	0.025	0.024
Calcium	mg/Kg WW	11153	10467	10587	12832	11845
Chromium	mg/Kg WW	0.842	0.547	0.678	0.473	0.422
Cobalt	mg/Kg WW	0.022	0.021	0.022	0.024	0.022
Copper	mg/Kg WW	0.346	0.359	0.385	0.397	0.356
Iron	mg/Kg WW	11.66	10.15	9.84	10.01	8.40
Lead	mg/Kg WW	0.051	0.024	0.036	0.020	0.016
Magnesium	mg/Kg WW	360.4	341.6	349.2	375.3	360.1
Manganese	mg/Kg WW	1.19	1.33	1.46	1.66	1.17
Nickel	mg/Kg WW	0.358	0.375	0.475	0.466	0.432
Potassium	mg/Kg WW	3370 U	3248 U	3343 U	3210 U	3202 U
Selenium	mg/Kg WW	0.499	0.495	0.517	0.402	0.329
Silver	mg/Kg WW	0.038	0.041	0.039	0.039	0.039
Sodium	mg/Kg WW	967.3	945.2	983.4	1031.4	932.1
Thallium	mg/Kg WW	0.067 U	0.078 U	0.072 U	0.069 U	0.067 U
Uranium	mg/Kg WW	0.001	0.001	0.001	0.001	0.001
Vanadium	mg/Kg WW	0.101	0.108	0.104	0.105	0.103
Zinc	mg/Kg WW	12.35	12.69	12.08	12.29	11.42
Mercury						
Mercury	µg/Kg WW	189.2	292.0	238.3	279.6	199.9
Arsenic Species						
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	9.12 U	-
ASB + Cation	µg/Kg WW	-	-	-	9.12 U	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	11.32	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	9.12 U	-
Unknown	µg/Kg WW	-	-	-	15.27	-

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-4
Results of PCB Aroclors and Conventionals for Walleye Estimated Whole Body Composites from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	WE1EW15 Primary Sample	WE1EW25 Primary Sample	WE1EW35 Primary Sample	WE1EW45 Primary Sample	WE1EW55 Primary Sample
PCB Aroclor						
PCB-1016	µg/Kg WW	2 U	1 U	1 U	1 U	1 U
PCB-1221	µg/Kg WW	2 U	1 U	1 U	1 U	1 U
PCB-1232	µg/Kg WW	4 U	3 U	3 U	3 U	3 U
PCB-1242	µg/Kg WW	2 U	1 U	1 U	1 U	1 U
PCB-1248	µg/Kg WW	2 U	1 U	1 U	1 U	1 U
PCB-1254	µg/Kg WW	2 U	1 U	1 U	1 U	1 U
PCB-1254/1260	µg/Kg WW	-	-	-	-	-
PCB-1260	µg/Kg WW	33	23	17	26	18
PCB-1262	µg/Kg WW	-	-	-	-	-
PCB-1268	µg/Kg WW	-	-	-	-	-
Conventionals						
Lipids	%	NC	NC	NC	NC	NC
Moisture	%	NC	NC	NC	NC	NC

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-5
Results of PCB Aroclors and Conventionals for Walleye Estimated Whole Body Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	WE3EW15 Primary Sample	WE3EW25 Primary Sample	WE3EW35 Primary Sample	WE3EW45 Primary Sample	WE3EW55 Primary Sample
PCB Aroclor						
PCB-1016	µg/Kg WW	13 U	14 U	14 U	8 U	14 U
PCB-1221	µg/Kg WW	13 U	14 U	14 U	13 U	14 U
PCB-1232	µg/Kg WW	18 U	27 U	26 U	27 U	27 U
PCB-1242	µg/Kg WW	13 U	14 U	14 U	13 U	14 U
PCB-1248	µg/Kg WW	13 U	14 U	14 U	13 U	14 U
PCB-1254	µg/Kg WW	-	-	-	-	-
PCB-1254/1260	µg/Kg WW	14	9	6	11	12
PCB-1260	µg/Kg WW	-	-	-	-	-
PCB-1262	µg/Kg WW	13 U	14 U	14 U	13 U	14 U
PCB-1268	µg/Kg WW	13 U	14 U	14 U	13 U	14 U
Conventionals						
Lipids	%	NC	NC	NC	NC	NC
Moisture	%	NC	NC	NC	NC	NC

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-6
Results of PCB Aroclors and Conventionals for Walleye Estimated Whole Body Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE6EW15 Primary Sample	WE6EW25 Primary Sample	WE6EW35 Primary Sample	WE6EW45 Primary Sample	WE6EW55 Primary Sample
PCB Aroclor						
PCB-1016	µg/Kg WW	14 U	14 U	14 U	14 U	14 U
PCB-1221	µg/Kg WW	14 U	14 U	14 U	14 U	14 U
PCB-1232	µg/Kg WW	28 U	28 U	28 U	28 U	28 U
PCB-1242	µg/Kg WW	14 U	14 U	14 U	14 U	14 U
PCB-1248	µg/Kg WW	14 U	14 U	14 U	14 U	14 U
PCB-1254	µg/Kg WW	-	-	-	-	-
PCB-1254/1260	µg/Kg WW	20	55	28	35	28
PCB-1260	µg/Kg WW	-	-	-	-	-
PCB-1262	µg/Kg WW	14 U	14 U	14 U	14 U	14 U
PCB-1268	µg/Kg WW	14 U	14 U	14 U	14 U	14 U
Conventionals						
Lipids	%	NC	NC	NC	NC	NC
Moisture	%	NC	NC	NC	NC	NC

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-7
Results of PCB Congeners for Walleye Estimated Whole Body Composites from FSCA 1, FSCA 3, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE1EW45 Primary Sample	WE3EW25 Primary Sample	WE6EW35 Primary Sample
PCB Congener				
PCB 1	µg/Kg WW	0.0020	0.0012	0.0012
PCB 2	µg/Kg WW	0.0058 U	0.0020 U	0.0022
PCB 3	µg/Kg WW	0.0029 U	0.0014 U	0.0017
PCB 4	µg/Kg WW	0.0128 U	0.0040	0.0039
PCB 5	µg/Kg WW	0.0090 U	0.0005 U	0.0008 U
PCB 6	µg/Kg WW	0.0080	0.0027	0.0024
PCB 7	µg/Kg WW	0.0077 U	0.0006	0.0009
PCB 8	µg/Kg WW	0.0082	0.0130	0.0132
PCB 9	µg/Kg WW	0.0091	0.0019	0.0021 U
PCB 10	µg/Kg WW	0.0094 U	0.0005 U	0.0007 U
PCB 11	µg/Kg WW	0.1361	0.0588	0.0477
PCB 12	µg/Kg WW	0.0077	0.0009	0.0010
PCB 14	µg/Kg WW	0.0081 U	0.0005 U	0.0008 U
PCB 15	µg/Kg WW	0.1916 U	0.0080	0.0082
PCB 16	µg/Kg WW	0.0369 U	0.0105	0.0093
PCB 17	µg/Kg WW	0.0601	0.0135	0.0113
PCB 18	µg/Kg WW	0.1058	0.0247	0.0220
PCB 19	µg/Kg WW	0.0090	0.0023	0.0022
PCB 20	µg/Kg WW	0.6207	0.1375	0.0871
PCB 21	µg/Kg WW	0.0891	0.0227	0.0158
PCB 22	µg/Kg WW	0.0168	0.0046	0.0032
PCB 23	µg/Kg WW	0.0078 U	0.0003 U	0.0003 U
PCB 24	µg/Kg WW	0.0078	0.0008	0.0006
PCB 25	µg/Kg WW	0.1067	0.0286	0.0186
PCB 26	µg/Kg WW	0.0700	0.0156	0.0099
PCB 27	µg/Kg WW	0.0103	0.0026	0.0021
PCB 31	µg/Kg WW	0.3859	0.0912	0.0577
PCB 32	µg/Kg WW	0.0357	0.0062	0.0041
PCB 34	µg/Kg WW	0.0090 U	0.0008	0.0007
PCB 35	µg/Kg WW	0.0053 U	0.0005 U	0.0008
PCB 36	µg/Kg WW	0.0048 U	0.0004 U	0.0006 U
PCB 37	µg/Kg WW	0.0095	0.0109	0.0095
PCB 38	µg/Kg WW	0.0048 U	0.0004 U	0.0006 U
PCB 39	µg/Kg WW	0.0046	0.0010	0.0007
PCB 40	µg/Kg WW	0.0069	0.0666	0.0305
PCB 41	µg/Kg WW	0.0059	0.0166	0.0077
PCB 42	µg/Kg WW	0.0069	0.0951	0.0423
PCB 43	µg/Kg WW	0.0041	0.0060	0.0050 U

TABLE C-7
Results of PCB Congeners for Walleye Estimated Whole Body Composites from FSCA 1, FSCA 3, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE1EW45 Primary Sample	WE3EW25 Primary Sample	WE6EW35 Primary Sample
PCB 44	µg/Kg WW	0.0248	0.4013	0.2390
PCB 45	µg/Kg WW	0.0492	0.0181	0.0108
PCB 46	µg/Kg WW	0.0078	0.0020 U	0.0018
PCB 48	µg/Kg WW	0.1081	0.0216	0.0143
PCB 49	µg/Kg WW	0.8448	0.3348	0.1878
PCB 50	µg/Kg WW	0.0370	0.0149	0.0082
PCB 52	µg/Kg WW	1.7687	0.5806	0.3857
PCB 54	µg/Kg WW	0.0016 U	0.0003 U	0.0004 U
PCB 55	µg/Kg WW	0.1399	0.0122	0.0060
PCB 56	µg/Kg WW	0.1063	0.0625	0.0345
PCB 57	µg/Kg WW	0.0219 U	0.0034 U	0.0016
PCB 58	µg/Kg WW	0.0223 U	0.0043 U	0.0021
PCB 59	µg/Kg WW	0.0740	0.0377	0.0232
PCB 60	µg/Kg WW	0.3329	0.1180	0.0799
PCB 61	µg/Kg WW	2.7094	0.9670	0.6179
PCB 63	µg/Kg WW	0.0976	0.0392	0.0279
PCB 64	µg/Kg WW	0.4529	0.2000	0.1219
PCB 66	µg/Kg WW	1.4962	0.7705	0.4625
PCB 67	µg/Kg WW	0.0181 U	0.0048	0.0033
PCB 68	µg/Kg WW	0.0273	0.0101	0.0084
PCB 72	µg/Kg WW	0.0448	0.0144	0.0117
PCB 73	µg/Kg WW	0.0403	0.0027	0.0019
PCB 77	µg/Kg WW	0.0430	0.0210	0.0109
PCB 78	µg/Kg WW	0.0230 U	0.0021 U	0.0009 U
PCB 79	µg/Kg WW	0.1539	0.0496	0.0345
PCB 80	µg/Kg WW	0.0199 U	0.0018 U	0.0008 U
PCB 81	µg/Kg WW	0.0277 U	0.0028	0.0008 U
PCB 82	µg/Kg WW	0.4194	0.1626	0.0832
PCB 83	µg/Kg WW	0.6324	0.1318	0.1290
PCB 84	µg/Kg WW	0.4224	0.1402	0.0843
PCB 85	µg/Kg WW	2.1817	0.4242	0.4153
PCB 86	µg/Kg WW	4.7945	1.1442	0.8584
PCB 88	µg/Kg WW	0.0082	0.0048	0.0032 U
PCB 89	µg/Kg WW	0.0371	0.0132	0.0051
PCB 90	µg/Kg WW	8.8158	1.9624	1.6305
PCB 92	µg/Kg WW	1.9117	0.4243	0.4078
PCB 93	µg/Kg WW	0.1035	0.7232	0.5430
PCB 94	µg/Kg WW	0.0068	0.0159	0.0151
PCB 95	µg/Kg WW	2.6697	0.0023	0.0014 U

TABLE C-7
Results of PCB Congeners for Walleye Estimated Whole Body Composites from FSCA 1, FSCA 3, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE1EW45 Primary Sample	WE3EW25 Primary Sample	WE6EW35 Primary Sample
PCB 96	µg/Kg WW	0.0066	0.0030	0.0024
PCB 98	µg/Kg WW	0.4887	0.3915	0.2224
PCB 99	µg/Kg WW	6.1478	1.0535	1.0214
PCB 103	µg/Kg WW	0.0484	0.0148	0.0136
PCB 104	µg/Kg WW	0.0030 U	0.0005 U	0.0007 U
PCB 105	µg/Kg WW	4.1123	0.5916	0.6094
PCB 106	µg/Kg WW	0.0167 U	0.0018 U	0.0042
PCB 107	µg/Kg WW	0.2717	0.0522	0.0393
PCB 109	µg/Kg WW	1.1085	0.1932	0.2060
PCB 110	µg/Kg WW	7.8830	3.4238	2.7610
PCB 111	µg/Kg WW	0.0050	0.0037	0.0040
PCB 112	µg/Kg WW	0.6207	0.1915	0.1134
PCB 114	µg/Kg WW	0.2586	0.0404	0.0474
PCB 118	µg/Kg WW	11.9131	1.6558	1.7738
PCB 120	µg/Kg WW	0.1118	0.0175	0.0225
PCB 121	µg/Kg WW	0.0073	0.0013	0.0016
PCB 122	µg/Kg WW	0.0203 U	0.0020 U	0.0027 U
PCB 123	µg/Kg WW	0.2415	0.0281	0.0217
PCB 126	µg/Kg WW	0.0634	0.0220	0.0250
PCB 127	µg/Kg WW	0.0249	0.0065	0.0074
PCB 128	µg/Kg WW	3.5990	0.5175	0.6697
PCB 129	µg/Kg WW	34.3096	3.5625	4.5306
PCB 130	µg/Kg WW	1.5218	0.2100	0.2296
PCB 131	µg/Kg WW	0.0993	0.0155	0.0106
PCB 132	µg/Kg WW	2.6453	0.4840	0.3575
PCB 133	µg/Kg WW	0.6188	0.0708	0.0951
PCB 134	µg/Kg WW	0.3653	0.0569	0.0541
PCB 135	µg/Kg WW	4.7727	0.7667	0.8371
PCB 136	µg/Kg WW	0.8538	0.1580	0.1584
PCB 137	µg/Kg WW	1.7193	0.1918	0.2214
PCB 139	µg/Kg WW	0.5021	0.0565	0.0710
PCB 141	µg/Kg WW	2.8820	0.3519	0.3865
PCB 142	µg/Kg WW	7.7163	0.0045 U	0.0053 U
PCB 143	µg/Kg WW	0.0504 U	0.0043 U	0.0052 U
PCB 144	µg/Kg WW	0.0434	0.0981	0.0881
PCB 145	µg/Kg WW	0.0069 U	0.0015 U	0.0012 U
PCB 146	µg/Kg WW	5.2432	0.5654	0.7034
PCB 147	µg/Kg WW	0.6306	1.3314	0.9142
PCB 148	µg/Kg WW	0.0338	0.0052	0.0071

TABLE C-7
Results of PCB Congeners for Walleye Estimated Whole Body Composites from FSCA 1, FSCA 3, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE1EW45 Primary Sample	WE3EW25 Primary Sample	WE6EW35 Primary Sample
PCB 150	µg/Kg WW	0.0122	0.0025	0.0020 U
PCB 152	µg/Kg WW	0.0072	0.0015 U	0.0013 U
PCB 153	µg/Kg WW	36.1427	3.5574	4.2446
PCB 154	µg/Kg WW	0.3371	0.0461	0.0664
PCB 155	µg/Kg WW	0.0239	0.0031	0.0051
PCB 156	µg/Kg WW	2.8312	0.2236	0.3183
PCB 158	µg/Kg WW	2.0782	0.2647	0.3287
PCB 159	µg/Kg WW	0.0972	0.0033 U	0.0118
PCB 160	µg/Kg WW	0.0350 U	0.0034 U	0.0040 U
PCB 161	µg/Kg WW	0.0356 U	0.0034 U	0.0040 U
PCB 162	µg/Kg WW	0.2221	0.0274	0.0307
PCB 164	µg/Kg WW	1.0203	0.1092	0.1271
PCB 165	µg/Kg WW	0.0370 U	0.0032 U	0.0038 U
PCB 167	µg/Kg WW	0.7385	0.0868	0.0975
PCB 169	µg/Kg WW	0.0362	0.0029	0.0053
PCB 170	µg/Kg WW	6.8550	0.6471	0.8758
PCB 171	µg/Kg WW	2.1765	0.2241	0.3153
PCB 172	µg/Kg WW	1.4588	0.1545	0.2060
PCB 174	µg/Kg WW	2.2619	0.3480	0.2665
PCB 175	µg/Kg WW	0.1802	0.0332	0.0379
PCB 176	µg/Kg WW	0.2004	0.0467	0.0404
PCB 177	µg/Kg WW	2.7980	0.3494	0.3878
PCB 178	µg/Kg WW	1.3049	0.2300	0.3174
PCB 179	µg/Kg WW	1.2011	0.2354	0.2654
PCB 180	µg/Kg WW	19.6875	1.6834	2.2434
PCB 181	µg/Kg WW	6.5283	0.0047 U	0.0052 U
PCB 182	µg/Kg WW	0.0720	0.0075	0.0100 U
PCB 183	µg/Kg WW	0.0518	0.6727	0.8995
PCB 184	µg/Kg WW	0.0369	0.0045	0.0066
PCB 186	µg/Kg WW	0.0088 U	0.0010 U	0.0021 U
PCB 187	µg/Kg WW	7.1424	1.1843	1.4593
PCB 188	µg/Kg WW	0.0127	0.0030	0.0036
PCB 189	µg/Kg WW	0.1876	0.0134	0.0176
PCB 190	µg/Kg WW	1.4684	0.1406	0.1833
PCB 191	µg/Kg WW	0.3233	0.0236	0.0329
PCB 192	µg/Kg WW	0.0288 U	0.0040 U	0.0045 U
PCB 194	µg/Kg WW	2.7377	0.1795	0.2219
PCB 195	µg/Kg WW	1.1598	0.1156	0.1615
PCB 196	µg/Kg WW	2.0417	0.2310	0.2827

TABLE C-7
Results of PCB Congeners for Walleye Estimated Whole Body Composites from FSCA 1, FSCA 3, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE1EW45 Primary Sample	WE3EW25 Primary Sample	WE6EW35 Primary Sample
PCB 197	µg/Kg WW	0.2829	0.0372	0.0429
PCB 198	µg/Kg WW	3.6497	0.4611	0.4314
PCB 201	µg/Kg WW	0.4348	0.0548	0.0724
PCB 202	µg/Kg WW	0.9203	0.1090	0.1555
PCB 203	µg/Kg WW	3.4065	0.2695	0.3347
PCB 204	µg/Kg WW	0.0049 U	0.0013 U	0.0014 U
PCB 205	µg/Kg WW	0.1554	0.0100	0.0155
PCB 206	µg/Kg WW	1.6547	0.1134	0.1445
PCB 207	µg/Kg WW	0.1990	0.0208	0.0295
PCB 208	µg/Kg WW	0.4236	0.0401	0.0581
PCB 209	µg/Kg WW	0.1539	0.0202	0.0336

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported
and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-8

Results of Dioxins/Furans Analysis and Conventionals for Walleye Estimated Whole Body Composites from FSCA 1

Upper Columbia River RI/FS

Analyte	Units	WE1EW15 Primary Sample	WE1EW25 Primary Sample	WE1EW35 Primary Sample	WE1EW45 Primary Sample	WE1EW55 Primary Sample
Dioxins/Furans						
2,3,7,8-TCDD	µg/Kg WW	0.000136 U	0.000132 U	0.000115 U	0.000105 U	0.000109 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000241 U	0.000351 U	0.000312 U	0.000376 U	0.000311 U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000283 U	0.000231 U	0.000206 U	0.000207 U	0.000269 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000273	0.000239 U	0.000203 U	0.000184 U	0.000261 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000294 U	0.000243 U	0.00021 U	0.000216 U	0.000273 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000252 U	0.000226	0.000209	0.000229	0.000181
OCDD	µg/Kg WW	0.000872	0.001241	0.001242	0.001527	0.000896
2,3,7,8-TCDF	µg/Kg WW	0.001147	0.001307	0.000919	0.001009	0.000671
1,2,3,7,8-PeCDF	µg/Kg WW	0.000121 U	0.000105 U	0.000109 U	9.56E-05 U	9.24E-05 U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000124 U	0.000143 U	0.000128 U	0.00014 U	0.000124 U
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000124 U	0.000115 U	9.6E-05 U	8.57E-05	0.000117 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000123 U	9.79E-05 U	9.27E-05 U	8.4E-05 U	0.000104 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000185 U	0.000145 U	0.000128 U	0.000142 U	0.000151 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000131 U	0.000108 U	9.73E-05 U	7.16E-05 U	0.000116 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000138 U	0.000103 U	0.000154	0.000109 U	0.000107 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000215 U	0.000151 U	0.000165 U	0.000163 U	0.000159 U
OCDF	µg/Kg WW	0.000364 U	0.000266 U	0.000348 U	0.000329 U	0.000344 U
TCDD	µg/Kg WW	0.000118 U	0.000108 U	0.000115 U	0.000105 U	0.000101 U
TCDF	µg/Kg WW	0.001147	0.001307	0.000919	0.001009	0.000671
PeCDD	µg/Kg WW	0.000237 U	0.000268 U	0.000126 U	8.96E-05 U	0.000498 U
PeCDF	µg/Kg WW	0.000244 U	0.000213 U	0.000112 U	0.000113 U	0.000119 U
HxCDD	µg/Kg WW	0.000259	0.000231 U	0.000198 U	0.000206 U	0.000257 U
HxCDF	µg/Kg WW	0.000123 U	9.79E-05 U	0.000106 U	8.16E-05	0.000104 U
HpCDD	µg/Kg WW	0.000251 U	0.000226	0.000209	0.000229	0.000181
HpCDF	µg/Kg WW	0.000138 U	0.000103 U	0.000154	0.000109 U	0.000107 U
TEQ WHO-98	µg/Kg WW	0.0001	0.000116	7.78E-05	8.97E-05	5.91E-05
Conventionals						
Lipids	%	NC	NC	NC	NC	NC
Moisture	%	NC	NC	NC	NC	NC

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-9

Results of Dioxins/Furans Analysis and Conventionals for Walleye Estimated Whole Body Composites from FSCA 3

Upper Columbia River RI/FS

Analyte	Units	WE3EW15 Primary Sample		WE3EW25 Primary Sample		WE3EW35 Primary Sample		WE3EW45 Primary Sample		WE3EW55 Primary Sample	
Dioxins/Furans											
2,3,7,8-TCDD	µg/Kg WW	0.000131	U	0.000127	U	0.000111	U	8.6E-05	U	0.000139	U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000127	U	0.000196	U	0.000653	U	0.000162	U	0.000196	U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000199	U	0.00023	U	0.000228		0.000172	U	0.000173	U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000195	U	0.000212	U	0.000217		0.000173	U	0.000243	
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000203	U	0.000228	U	0.000211	U	0.000178	U	0.000177	U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000681		0.000247		0.000212		0.000352		0.000218	
OCDD	µg/Kg WW	0.004292		0.001663		0.001141		0.002659		0.001184	
2,3,7,8-TCDF	µg/Kg WW	0.001381		0.001116		0.001128		0.001372		0.001098	
1,2,3,7,8-PeCDF	µg/Kg WW	0.000141	U	0.000128	U	0.000121	U	0.000104	U	0.000109	U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000164	U	0.000152	U	0.00014	U	0.000147	U	0.000131	U
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000108	U	0.000138	U	0.000122	U	9.85E-05	U	9.03E-05	U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000105	U	0.00013	U	0.000115	U	9.65E-05	U	8.75E-05	U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000157	U	0.000161	U	0.000151	U	0.000143	U	0.00013	U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000107	U	0.000137	U	0.000122	U	0.000101	U	9.45E-05	U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000135		9.56E-05	U	9.58E-05	U	0.000128		7.65E-05	U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000133	U	0.000137	U	0.000145	U	0.000143	U	0.000115	U
OCDF	µg/Kg WW	0.000813		0.000253		0.000413	U	0.000357		0.000274	U
TCDD	µg/Kg WW	8.44E-05	U	0.000101	U	0.000111	U	9.51E-05	U	0.000105	U
TCDF	µg/Kg WW	0.001381		0.001353		0.001128		0.001167		0.001098	
PeCDD	µg/Kg WW	0.000127	U	0.000112	U	0.000441	U	0.000113	U	0.00013	U
PeCDF	µg/Kg WW	0.000306	U	0.000224	U	0.000207	U	0.000185	U	0.000232	
HxCDD	µg/Kg WW	0.000196	U	0.000212	U	0.000216		0.00017	U	0.000243	
HxCDF	µg/Kg WW	0.000105	U	0.000129	U	0.000115	U	9.65E-05	U	8.75E-05	U
HpCDD	µg/Kg WW	0.00087		0.000247		0.000212		0.000179	U	0.000214	
HpCDF	µg/Kg WW	0.000353		9.56E-05	U	9.58E-05	U	9.5E-05	U	7.65E-05	U
TEQ WHO-98	µg/Kg WW	0.000146		0.000121		0.000145		2.33E-05		0.000113	
Conventionals											
Lipids	%	NC		NC		NC		NC		NC	
Moisture	%	NC		NC		NC		NC		NC	

[a] The W indicates that the sample consisted of whole bodies.

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UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-10
Results of Dioxins/Furans Analysis and Conventionals for Walleye Estimated Whole Body Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	WE6EW15 Primary Sample		WE6EW25 Primary Sample		WE6EW35 Primary Sample		WE6EW45 Primary Sample		WE6EW55 Primary Sample	
Dioxins/Furans											
2,3,7,8-TCDD	µg/Kg WW	0.000139	U	0.000124	U	0.000188	U	0.000155	U	0.000101	U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000148	U	0.000233	U	0.000261	U	0.000262		0.000296	U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000146	U	0.000168	U	0.000191	U	0.000173	U	0.000151	U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000151	U	0.000172	U	0.000276	U	0.000228		0.000176	
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000153	U	0.000175	U	0.0002	U	0.00018	U	0.000157	U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.00027		0.000283		0.000216		0.00029		0.000236	
OCDD	µg/Kg WW	0.001892	U	0.002182	U	0.001346	U	0.001326	U	0.00179	U
2,3,7,8-TCDF	µg/Kg WW	0.001388		0.002794		0.002372		0.002057		0.00149	
1,2,3,7,8-PeCDF	µg/Kg WW	0.000142	U	0.000155	U	0.000149	U	0.000148	U	0.000136	U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000151	U	0.000219	U	0.000161	U	0.00019	U	0.000153	U
1,2,3,4,7,8-HxCDF	µg/Kg WW	8.39E-05		9.04E-05	U	0.000111	U	0.000116	U	7.82E-05	
1,2,3,6,7,8-HxCDF	µg/Kg WW	8.76E-05		8.67E-05	U	0.000106	U	0.000114	U	7.92E-05	
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000104	U	0.000109	U	0.000143	U	0.000141	U	0.000112	U
2,3,4,6,7,8-HxCDF	µg/Kg WW	8.43E-05	U	0.000106	U	0.000113	U	0.000118	U	8.1E-05	
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	9.05E-05	U	9.82E-05	U	9.19E-05	U	9.23E-05	U	8.23E-05	U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000115	U	0.000133	U	0.000116	U	0.000119	U	8.64E-05	U
OCDF	µg/Kg WW	0.000271	U	0.000345	U	0.000205	U	0.000267	U	0.000181	U
TCDD	µg/Kg WW	0.000139	U	0.000124	U	0.00017	U	0.000125	U	0.000101	U
TCDF	µg/Kg WW	0.001625		0.003535		0.002813		0.002555		0.001986	
PeCDD	µg/Kg WW	0.000171		0.000139		9.08E-05	U	0.000262		0.000136	
PeCDF	µg/Kg WW	8.29E-05	U	0.000319	U	0.000271	U	0.00027	U	0.000247	U
HxCDD	µg/Kg WW	0.000146	U	0.000166	U	0.000191	U	0.000228		0.000176	
HxCDF	µg/Kg WW	0.000123		8.67E-05	U	0.000106	U	0.000114	U	0.000143	
HpCDD	µg/Kg WW	0.000342		0.000203		0.000216		0.000346		0.000296	
HpCDF	µg/Kg WW	0.000145	U	0.000102	U	0.000116	U	9.23E-05	U	0.000134	
TEQ WHO-98	µg/Kg WW	0.000169		0.000355		0.000275		0.00049		0.000217	
Conventionals											
Lipids	%	NC		NC		NC		NC		NC	
Moisture	%	NC		NC		NC		NC		NC	

[a] The W indicates that the sample consisted of whole bodies.

- not analyzed
NC = not calculated

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TABLE C-11
Results of TAL Metals, Mercury, and Arsenic Speciation for Wild Rainbow Trout Estimated Whole Body Composites from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	RW1EW15 Primary Sample		RW1EW25 Primary Sample		RW1EW35 Primary Sample		RW1EW45 Primary Sample		RW1EW55 Primary Sample	
TAL Metals											
Aluminum	mg/Kg WW	4.66		6.64		4.38		4.41		5.54	
Antimony	mg/Kg WW	0.124		0.116		0.115		0.118		0.120	
Arsenic	mg/Kg WW	0.154	U	0.140	U	0.124	U	0.126	U	0.154	U
Barium	mg/Kg WW	0.733		0.973		0.746		0.590		0.705	
Beryllium	mg/Kg WW	0.006		0.006		0.006		0.006		0.006	
Cadmium	mg/Kg WW	0.023		0.054		0.022		0.020		0.022	
Calcium	mg/Kg WW	5315		6195		6452		4625		4642	
Chromium	mg/Kg WW	0.806		0.812		0.774		0.729		0.979	
Cobalt	mg/Kg WW	0.026		0.031		0.024		0.018		0.023	
Copper	mg/Kg WW	1.16		1.94		1.11		1.07		1.28	
Iron	mg/Kg WW	20.1		29.1		24.6		20.7		30.3	
Lead	mg/Kg WW	0.117		0.159		0.114		0.107		0.134	
Magnesium	mg/Kg WW	303		296		325		287		274	
Manganese	mg/Kg WW	1.35		1.41		1.31		0.97		1.15	
Nickel	mg/Kg WW	0.206		0.276		0.256		0.173		0.197	
Potassium	mg/Kg WW	3411	U	3325	U	3445	U	3382	U	3319	U
Selenium	mg/Kg WW	0.815		0.758		0.745		0.692		0.747	
Silver	mg/Kg WW	0.078	U	0.073	U	0.073	U	0.073	U	0.075	U
Sodium	mg/Kg WW	807		920		831		840		791	
Thallium	mg/Kg WW	0.078	U	0.073		0.073	U	0.073	U	0.075	U
Uranium	mg/Kg WW	0.003		0.004		0.003		0.002		0.003	
Vanadium	mg/Kg WW	0.124		0.119		0.115		0.118		0.120	
Zinc	mg/Kg WW	23.8		30.0		26.0		24.3		24.3	
Mercury											
Mercury	µg/Kg WW	56.9		85.5		67.3		72.8		74.2	
Arsenic Species											
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-		-		-		-		12.2	U
ASB + Cation	µg/Kg WW	-		-		-		-		8.52	
Dimethylarsonic acid (DMA)	µg/Kg WW	-		-		-		-		9.53	
Monomethylarsonic acid (MMA)	µg/Kg WW	-		-		-		-		12.2	U
Unknown	µg/Kg WW	-		-		-		-		12.2	U

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal

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JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expec
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-12
Results of TAL Metals, Mercury, and Arsenic Speciation for Wild Rainbow Trout
Estimated Whole Body Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	RW3EW15 Primary Sample		RW3EW25 Primary Sample	
TAL Metals					
Aluminum	mg/Kg WW	8.76		6.54	
Antimony	mg/Kg WW	0.1023		0.1059	
Arsenic	mg/Kg WW	0.1569	U	0.1476	U
Barium	mg/Kg WW	0.5665		0.4716	
Beryllium	mg/Kg WW	0.0051		0.0053	
Cadmium	mg/Kg WW	0.0526		0.0451	
Calcium	mg/Kg WW	4617		5536	
Chromium	mg/Kg WW	0.6750		0.6204	
Cobalt	mg/Kg WW	0.0193		0.0175	
Copper	mg/Kg WW	1.29		1.04	
Iron	mg/Kg WW	25.3		19.5	
Lead	mg/Kg WW	0.0321		0.0341	
Magnesium	mg/Kg WW	303		308	
Manganese	mg/Kg WW	1.27		1.11	
Nickel	mg/Kg WW	0.1939		0.2062	
Potassium	mg/Kg WW	3733	U	3572	U
Selenium	mg/Kg WW	0.7101		0.6754	
Silver	mg/Kg WW	0.0629	U	0.0666	U
Sodium	mg/Kg WW	877		921	
Thallium	mg/Kg WW	0.0629		0.0666	
Uranium	mg/Kg WW	0.0023		0.0020	
Vanadium	mg/Kg WW	0.1169		0.1090	
Zinc	mg/Kg WW	22.4		22.9	
Mercury					
Mercury	µg/Kg WW	55.8		69.6	
Arsenic Species					
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-		14.5	
ASB + Cation	µg/Kg WW	-		9.73	U
Dimethylarsonic acid (DMA)	µg/Kg WW	-		9.89	
Monomethylarsonic acid (MMA)	µg/Kg WW	-		9.73	U
Unknown	µg/Kg WW	-		24.5	

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet an

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JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-13

Results of TAL Metals, Mercury, and Arsenic Speciation for Wild Rainbow Trout Estimated Whole Body Composites from FSCA 6

Upper Columbia River RI/FS

Analyte	Units	RW6EW14 Primary Sample
TAL Metals		
Aluminum	mg/Kg WW	5664.58
Antimony	mg/Kg WW	96.055 U
Arsenic	mg/Kg WW	142.373
Barium	mg/Kg WW	764.303
Beryllium	mg/Kg WW	4.732 U
Cadmium	mg/Kg WW	48.286
Calcium	mg/Kg WW	6973042
Chromium	mg/Kg WW	484.389
Cobalt	mg/Kg WW	24.836
Copper	mg/Kg WW	423.738
Iron	mg/Kg WW	21868.6
Lead	mg/Kg WW	24.716
Magnesium	mg/Kg WW	335543 J
Manganese	mg/Kg WW	2356.72
Nickel	mg/Kg WW	238.411
Potassium	mg/Kg WW	3537633
Selenium	mg/Kg WW	539.982
Silver	mg/Kg WW	59.791 U
Sodium	mg/Kg WW	1036387
Thallium	mg/Kg WW	59.791 U
Uranium	mg/Kg WW	1.919
Vanadium	mg/Kg WW	116.852
Zinc	mg/Kg WW	28105.6
Mercury		
Mercury	µg/Kg WW	97.7
Arsenic Species		
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-
ASB + Cation	µg/Kg WW	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-
Unknown	µg/Kg WW	-

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and of

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JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is exp be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-14

Results of PCB Aroclors and Conventionals for Wild Rainbow Trout Estimated Whole Body Composites from FSCA 1

Upper Columbia River RI/FS

Analyte	Units	RW1EW15 Primary Sample	RW1EW25 Primary Sample	RW1EW35 Primary Sample	RW1EW45 Primary Sample	RW1EW55 Primary Sample
PCB Aroclor						
PCB-1016	µg/Kg WW	13 U	14 U	14 U	14 U	14 U
PCB-1221	µg/Kg WW	13 U	14 U	14 U	14 U	14 U
PCB-1232	µg/Kg WW	27 U	27 U	28 U	28 U	28 U
PCB-1242	µg/Kg WW	13 U	14 U	14 U	14 U	14 U
PCB-1248	µg/Kg WW	13 U	14 U	14 U	14 U	14 U
PCB-1254	µg/Kg WW	-	-	-	-	-
PCB-1254/1260	µg/Kg WW	59	35	22	23	28
PCB-1260	µg/Kg WW	-	-	-	-	-
PCB-1262	µg/Kg WW	13 U	14 U	14 U	14 U	14 U
PCB-1268	µg/Kg WW	13 U	14 U	14 U	14 U	14 U
Conventionals						
Lipids	%	NC	NC	NC	NC	NC
Moisture	%	NC	NC	NC	NC	NC

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fille

- not analyzed

NC = not calculated

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JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual va

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual val

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-15
Results of PCB Aroclors and Conventionals for Wild Rainbow Trout Estimated Whole Body Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	RW3EW15 Primary Sample	RW3EW25 Primary Sample
PCB Aroclor			
PCB-1016	µg/Kg WW	11 U	11 U
PCB-1221	µg/Kg WW	11 U	11 U
PCB-1232	µg/Kg WW	22 U	22 U
PCB-1242	µg/Kg WW	11 U	11 U
PCB-1248	µg/Kg WW	11 U	11 U
PCB-1254	µg/Kg WW	-	-
PCB-1254/1260	µg/Kg WW	12	12
PCB-1260	µg/Kg WW	-	-
PCB-1262	µg/Kg WW	11 U	11 U
PCB-1268	µg/Kg WW	11 U	11 U
Conventionals			
Lipids	%	NC	NC
Moisture	%	NC	NC

TABLE C-16

Results of PCB Aroclors and Conventionals for Wild Rainbow Trout
Estimated Whole Body Composites from FSCA 6

Upper Columbia River RI/FS

Analyte	Units	RW6EW14 Primary Sample	
PCB Aroclor			
PCB-1016	µg/Kg WW	9	U
PCB-1221	µg/Kg WW	11	U
PCB-1232	µg/Kg WW	22	U
PCB-1242	µg/Kg WW	11	U
PCB-1248	µg/Kg WW	11	U
PCB-1254	µg/Kg WW	-	
PCB-1254/1260	µg/Kg WW	10	J
PCB-1260	µg/Kg WW	-	
PCB-1262	µg/Kg WW	11	U
PCB-1268	µg/Kg WW	11	U
Conventionals			
Lipids	%	NC	
Moisture	%	NC	

TABLE C-17
Results of PCB Congeners for Wild Rainbow Trout Estimated Whole Body Composites from FSCA 1, FSCA 3, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RW1EW25 Primary Sample	RW3EW15 Primary Sample
PCB Congener			
PCB 1	µg/Kg WW	0.0019	0.0009
PCB 2	µg/Kg WW	0.0033 U	0.0020 U
PCB 3	µg/Kg WW	0.0019	0.0014 U
PCB 4	µg/Kg WW	0.0076	0.0023
PCB 5	µg/Kg WW	0.0012 U	0.0011
PCB 6	µg/Kg WW	0.0034	0.0012 U
PCB 7	µg/Kg WW	0.0011 U	0.0005
PCB 8	µg/Kg WW	0.0062	0.0045
PCB 9	µg/Kg WW	0.0019	0.0008
PCB 10	µg/Kg WW	0.0014 U	0.0008 U
PCB 11	µg/Kg WW	0.0639 U	0.0570
PCB 12	µg/Kg WW	0.0011 U	0.0004 U
PCB 14	µg/Kg WW	0.0012 U	0.0004 U
PCB 15	µg/Kg WW	0.0101	0.0077
PCB 16	µg/Kg WW	0.0117	0.0050
PCB 17	µg/Kg WW	0.0245	0.0077
PCB 18	µg/Kg WW	0.0537	0.0154
PCB 19	µg/Kg WW	0.0036	0.0012
PCB 20	µg/Kg WW	0.1675	0.0575
PCB 21	µg/Kg WW	0.0138	0.0115
PCB 22	µg/Kg WW	0.0078	0.0027
PCB 23	µg/Kg WW	0.0006 U	0.0003 U
PCB 24	µg/Kg WW	0.0008	0.0004
PCB 25	µg/Kg WW	0.0217	0.0125
PCB 26	µg/Kg WW	0.0276	0.0071
PCB 27	µg/Kg WW	0.0028	0.0012
PCB 31	µg/Kg WW	0.1444	0.0424
PCB 32	µg/Kg WW	0.0148	0.0036
PCB 34	µg/Kg WW	0.0006 U	0.0003 U
PCB 35	µg/Kg WW	0.0011	0.0006
PCB 36	µg/Kg WW	0.0009 U	0.0003 U
PCB 37	µg/Kg WW	0.0219	0.0099
PCB 38	µg/Kg WW	0.0009 U	0.0003 U
PCB 39	µg/Kg WW	0.0020	0.0004
PCB 40	µg/Kg WW	0.0563	0.0132
PCB 41	µg/Kg WW	0.0089	0.0017
PCB 42	µg/Kg WW	0.0411	0.0101
PCB 43	µg/Kg WW	0.0077	0.0026
PCB 44	µg/Kg WW	0.2642	0.0761
PCB 45	µg/Kg WW	0.0206	0.0052
PCB 46	µg/Kg WW	0.0047	0.0011
PCB 48	µg/Kg WW	0.0549	0.0119
PCB 49	µg/Kg WW	0.2495	0.0579
PCB 50	µg/Kg WW	0.0248	0.0047
PCB 52	µg/Kg WW	0.6381	0.1298
PCB 54	µg/Kg WW	0.0005	0.0001 U

TABLE C-17
Results of PCB Congeners for Wild Rainbow Trout Estimated Whole Body Composites from FSCA 1, FSCA 3, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RW1EW25 Primary Sample	RW3EW15 Primary Sample
PCB 55	µg/Kg WW	0.0118	0.0044
PCB 56	µg/Kg WW	0.0274	0.0096
PCB 57	µg/Kg WW	0.0029 U	0.0008
PCB 58	µg/Kg WW	0.0039	0.0013
PCB 59	µg/Kg WW	0.0274	0.0073
PCB 60	µg/Kg WW	0.0916	0.0230
PCB 61	µg/Kg WW	1.0127	0.2036
PCB 63	µg/Kg WW	0.0294	0.0054
PCB 64	µg/Kg WW	0.1677	0.0367
PCB 66	µg/Kg WW	0.4410	0.1071
PCB 67	µg/Kg WW	0.0107	0.0022
PCB 68	µg/Kg WW	0.0130	0.0021
PCB 72	µg/Kg WW	0.0172	0.0026
PCB 73	µg/Kg WW	0.0044	0.0023
PCB 77	µg/Kg WW	0.0283	0.0082
PCB 78	µg/Kg WW	0.0015 U	0.0005 U
PCB 79	µg/Kg WW	0.0325	0.0067
PCB 80	µg/Kg WW	0.0013 U	0.0004 U
PCB 81	µg/Kg WW	0.0026	0.0006 U
PCB 82	µg/Kg WW	0.0240	0.0076
PCB 83	µg/Kg WW	0.1007	0.0135
PCB 84	µg/Kg WW	0.1062	0.0227
PCB 85	µg/Kg WW	0.5575	0.0858
PCB 86	µg/Kg WW	1.0271	0.1839
PCB 88	µg/Kg WW	0.0035	0.0015
PCB 89	µg/Kg WW	0.0264	0.0056
PCB 90	µg/Kg WW	2.3290	0.4197
PCB 92	µg/Kg WW	0.5476	0.0772
PCB 93	µg/Kg WW	0.8834	0.1423
PCB 94	µg/Kg WW	0.0181	0.0044
PCB 95	µg/Kg WW	0.0031 U	0.0011 U
PCB 96	µg/Kg WW	0.0023	0.0005 U
PCB 98	µg/Kg WW	0.1729	0.0278
PCB 99	µg/Kg WW	1.4409	0.2123
PCB 103	µg/Kg WW	0.0188	0.0027
PCB 104	µg/Kg WW	0.0011 U	0.0003 U
PCB 105	µg/Kg WW	0.8583	0.1498
PCB 106	µg/Kg WW	0.0358	0.0012 U
PCB 107	µg/Kg WW	0.0998	0.0163
PCB 109	µg/Kg WW	0.2750	0.0381
PCB 110	µg/Kg WW	1.8814	0.3439
PCB 111	µg/Kg WW	0.0046 U	0.0008 U
PCB 112	µg/Kg WW	0.0866	0.0148
PCB 114	µg/Kg WW	0.0521	0.0092
PCB 118	µg/Kg WW	2.4138	0.4260
PCB 120	µg/Kg WW	0.0287	0.0042
PCB 121	µg/Kg WW	0.0016 U	0.0008 U
PCB 122	µg/Kg WW	0.0031 U	0.0013 U

TABLE C-17
Results of PCB Congeners for Wild Rainbow Trout Estimated Whole Body Composites from FSCA 1, FSCA 3, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RW1EW25 Primary Sample	RW3EW15 Primary Sample
PCB 123	µg/Kg WW	0.0367	0.0067
PCB 126	µg/Kg WW	0.0222	0.0026
PCB 127	µg/Kg WW	0.0028	0.0012 U
PCB 128	µg/Kg WW	0.2450	0.1210
PCB 129	µg/Kg WW	3.5640	0.9706
PCB 130	µg/Kg WW	0.3070	0.0525
PCB 131	µg/Kg WW	0.0091	0.0023 U
PCB 132	µg/Kg WW	0.4326	0.0910
PCB 133	µg/Kg WW	0.0913	0.0171
PCB 134	µg/Kg WW	0.0603	0.0158
PCB 135	µg/Kg WW	0.9444	0.1979
PCB 136	µg/Kg WW	0.1208	0.0288
PCB 137	µg/Kg WW	0.3117	0.0415
PCB 139	µg/Kg WW	0.0804	0.0123
PCB 141	µg/Kg WW	0.4584	0.1105
PCB 142	µg/Kg WW	0.0058 U	0.0018 U
PCB 143	µg/Kg WW	0.0088	0.0018
PCB 144	µg/Kg WW	0.0774	0.0244
PCB 145	µg/Kg WW	0.0033 U	0.0007 U
PCB 146	µg/Kg WW	0.7843	0.1462
PCB 147	µg/Kg WW	1.8183	0.3897
PCB 148	µg/Kg WW	0.0061	0.0012
PCB 150	µg/Kg WW	0.0032 U	0.0007 U
PCB 152	µg/Kg WW	0.0033 U	0.0008 U
PCB 153	µg/Kg WW	3.3589	0.9934
PCB 154	µg/Kg WW	0.0599	0.0093
PCB 155	µg/Kg WW	0.0061	0.0009
PCB 156	µg/Kg WW	0.4456	0.0699
PCB 158	µg/Kg WW	0.1377	0.0678
PCB 159	µg/Kg WW	0.0173	0.0022
PCB 160	µg/Kg WW	0.0044 U	0.0014 U
PCB 161	µg/Kg WW	0.0042 U	0.0013 U
PCB 162	µg/Kg WW	0.0457	0.0085
PCB 164	µg/Kg WW	0.1547	0.0402
PCB 165	µg/Kg WW	0.0041 U	0.0013 U
PCB 167	µg/Kg WW	0.1632	0.0309
PCB 169	µg/Kg WW	0.0075	0.0014
PCB 170	µg/Kg WW	0.8683	0.1950
PCB 171	µg/Kg WW	0.2730	0.0590
PCB 172	µg/Kg WW	0.1691	0.0418
PCB 174	µg/Kg WW	0.4006	0.1204
PCB 175	µg/Kg WW	0.0193	0.0089 U
PCB 176	µg/Kg WW	0.0101	0.0098
PCB 177	µg/Kg WW	0.5441	0.1405
PCB 178	µg/Kg WW	0.0969	0.0633
PCB 179	µg/Kg WW	0.0937	0.0483
PCB 180	µg/Kg WW	2.3923	0.5292
PCB 181	µg/Kg WW	0.0049	0.0012 U

TABLE C-17
Results of PCB Congeners for Wild Rainbow Trout Estimated Whole Body Composites from FSCA 1, FSCA 3, and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RW1EW25 Primary Sample	RW3EW15 Primary Sample
PCB 182	µg/Kg WW	0.1201	0.0059
PCB 183	µg/Kg WW	0.8668	0.1867
PCB 184	µg/Kg WW	0.0047	0.0008
PCB 186	µg/Kg WW	0.0043 U	0.0005 U
PCB 187	µg/Kg WW	0.4140	0.3902
PCB 188	µg/Kg WW	0.0044 U	0.0008
PCB 189	µg/Kg WW	0.0303	0.0055
PCB 190	µg/Kg WW	0.1706	0.0368
PCB 191	µg/Kg WW	0.0366	0.0125
PCB 192	µg/Kg WW	0.0037 U	0.0010 U
PCB 194	µg/Kg WW	0.3753	0.0696
PCB 195	µg/Kg WW	0.1630	0.0335
PCB 196	µg/Kg WW	0.3418	0.0607
PCB 197	µg/Kg WW	0.0309	0.0087
PCB 198	µg/Kg WW	0.5054	0.1456
PCB 201	µg/Kg WW	0.0708	0.0162
PCB 202	µg/Kg WW	0.1011	0.0327
PCB 203	µg/Kg WW	0.4443	0.0750
PCB 204	µg/Kg WW	0.0016 U	0.0008 U
PCB 205	µg/Kg WW	0.0168	0.0043
PCB 206	µg/Kg WW	0.1873	0.0497
PCB 207	µg/Kg WW	0.0196	0.0070
PCB 208	µg/Kg WW	0.0444	0.0177
PCB 209	µg/Kg WW	0.0145	0.0118

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-18

Results of Dioxins/Furans Analysis and Conventionals for Wild Rainbow Trout Estimated Whole Body Composites from FSCA 1

Upper Columbia River RI/FS

Analyte	Units	RW1EW15 Primary Sample	RW1EW25 Primary Sample	RW1EW35 Primary Sample	RW1EW45 Primary Sample	RW1EW55 Primary Sample	RW1EW55 Field Duplicate
Dioxins/Furans							
2,3,7,8-TCDD	µg/Kg WW	0.000177 U	0.000196 U	0.000204 U	0.000252 U	0.000206 U	0.000194
1,2,3,7,8-PeCDD	µg/Kg WW	0.000257	0.000457	0.000396	0.000405	0.00059 U	0.000409 U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.00022 U	0.000214 U	0.000236 U	0.000281 U	0.000266 U	0.000234 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000216	0.000246	0.000268	0.000264 U	0.000267	0.000271
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000225	0.000212 U	0.000236 U	0.000279 U	0.000269 U	0.000234 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000242	0.000261	0.000232	0.000365	0.00031	0.000277
OCDD	µg/Kg WW	0.001216 U	0.00103	0.000968	0.001273	0.001035	0.000787
2,3,7,8-TCDF	µg/Kg WW	0.003389	0.001013	0.001017	0.000931	0.00113	0.001174
1,2,3,7,8-PeCDF	µg/Kg WW	0.000136	0.000129	0.000143	0.000152	0.000188	0.000164
2,3,4,7,8-PeCDF	µg/Kg WW	0.000203 U	0.000202	0.000179	0.00021	0.000241 U	0.00022 U
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000129 U	0.000123 U	0.000143 U	0.00015 U	0.000143 U	0.000108 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000123 U	0.000118 U	0.000134 U	0.00015 U	0.00014 U	0.000105 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000203 U	0.000183 U	0.00022 U	0.000237 U	0.000181 U	0.000151 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000132 U	0.000122 U	0.000143 U	0.000158 U	0.000143 U	0.000104 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	9.82E-05	0.000149 U	0.000121 U	0.000131 U	0.00022	0.000147 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000208 U	0.000219 U	0.000182 U	0.000199 U	0.000293 U	0.000215 U
OCDF	µg/Kg WW	0.000456 U	0.000525 U	0.000408 U	0.000365 U	0.000398 U	0.000312 U
TCDD	µg/Kg WW	0.000183 U	0.000196 U	0.000204 U	0.000252 U	0.000206 U	0.000194
TCDF	µg/Kg WW	0.00365	0.001326	0.001319	0.001401	0.0015	0.001755
PeCDD	µg/Kg WW	0.000369	0.000254	0.000113 U	0.000125 U	0.000515 U	0.000409 U
PeCDF	µg/Kg WW	0.000325	0.000338	0.000414	0.000436	0.000602	0.000522
HxCDD	µg/Kg WW	0.000328	0.000246	0.000268	0.000264 U	0.000267	0.000414
HxCDF	µg/Kg WW	0.000126	0.00011	0.000134 U	0.00012	0.000313 U	0.000201 U
HpCDD	µg/Kg WW	0.000981	0.000361	0.000347	0.001116	0.001004	0.001229
HpCDF	µg/Kg WW	9.82E-05	0.000149 U	0.000121 U	0.000131 U	0.00022	0.000147 U
TEQ WHO-98	µg/Kg WW	0.000629	0.000125	0.000126	0.000104	0.000134	0.000251
Conventionals							
Lipids	%	NC	NC	NC	NC	NC	NC
Moisture	%	NC	NC	NC	NC	NC	NC

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed

NC = not calculated

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

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JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-19

Results of Dioxins/Furans Analysis and Conventionals for Wild Rainbow Trout Estimated Whole Body Composites from FSCA 3

Upper Columbia River RI/FS

Analyte	Units	RW3EW15 Primary Sample		RW3EW25 Primary Sample	
Dioxins/Furans					
2,3,7,8-TCDD	µg/Kg WW	0.0004	U	0.000397	U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000231	U	0.000678	U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000435	U	0.000391	U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000441		0.000342	
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000451	U	0.000412	U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000511		0.000527	
OCDD	µg/Kg WW	0.000799		0.001181	U
2,3,7,8-TCDF	µg/Kg WW	0.001033		0.001172	
1,2,3,7,8-PeCDF	µg/Kg WW	0.00015	U	0.000169	U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000157	U	0.000198	U
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000227	U	0.000241	U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000209	U	0.000231	U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000295	U	0.00031	U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000226	U	0.000233	U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000345	U	0.000259	U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000503	U	0.000366	U
OCDF	µg/Kg WW	0.000745	U	0.000677	U
TCDD	µg/Kg WW	0.0004	U	0.000397	U
TCDF	µg/Kg WW	0.001033		0.001172	
PeCDD	µg/Kg WW	0.000181	U	0.000315	U
PeCDF	µg/Kg WW	0.000157	U	0.000198	U
HxCDD	µg/Kg WW	0.000441		0.000342	
HxCDF	µg/Kg WW	0.000209	U	0.000231	U
HpCDD	µg/Kg WW	0.000511		0.000527	
HpCDF	µg/Kg WW	0.000345	U	0.000259	U
TEQ WHO-98	µg/Kg WW	0.00013		0.000138	
Conventionals					
Lipids	%	NC		NC	
Moisture	%	NC		NC	

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-20

Results of Dioxins/Furans Analysis and Conventionals for Wild Rainbow Trout Estimated Whole Body Composites from FSCA 6

Upper Columbia River RI/FS

Analyte	Units	RW6EW14 Primary Sample	
Dioxins/Furans			
2,3,7,8-TCDD	µg/Kg WW	0.000202	U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000422	U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000204	U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000190	U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000198	
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000228	J
OCDD	µg/Kg WW	0.000652	J
2,3,7,8-TCDF	µg/Kg WW	0.000966	
1,2,3,7,8-PeCDF	µg/Kg WW	0.000186	U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000169	U
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000124	U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000129	U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000168	U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000123	U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000107	U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000155	U
OCDF	µg/Kg WW	0.000301	U
TCDD	µg/Kg WW	0.000202	U
TCDF	µg/Kg WW	0.00097	
PeCDD	µg/Kg WW	0.000137	U
PeCDF	µg/Kg WW	0.000285	U
HxCDD	µg/Kg WW	0.000182	
HxCDF	µg/Kg WW	0.000229	U
HpCDD	µg/Kg WW	0.000274	J
HpCDF	µg/Kg WW	0.00015	U
TEQ WHO-98	µg/Kg WW	0.000103	
Conventionals			
Lipids	%	NC	
Moisture	%	NC	

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed
NC = not calculated

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JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-21
Results of TAL Metals, Mercury, and Arsenic Speciation for Hatchery Rainbow Trout Estimated Whole Body Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	RH3EW15 Primary Sample	RH3EW25 Primary Sample	RH3EW35 Primary Sample
TAL Metals				
Aluminum	mg/Kg WW	29.2	12.5	33.9
Antimony	mg/Kg WW	0.105	0.103	0.104
Arsenic	mg/Kg WW	0.104 U	0.094 U	0.107 U
Barium	mg/Kg WW	1.58	0.62	1.57
Beryllium	mg/Kg WW	0.005	0.005	0.005
Cadmium	mg/Kg WW	0.068	0.063	0.060
Calcium	mg/Kg WW	7516	4801	6771
Chromium	mg/Kg WW	0.773	0.424	0.718
Cobalt	mg/Kg WW	0.034	0.021	0.034
Copper	mg/Kg WW	2.51	1.57	2.57
Iron	mg/Kg WW	43.2	21.4	45.2
Lead	mg/Kg WW	0.211	0.065	0.210
Magnesium	mg/Kg WW	355	305	332
Manganese	mg/Kg WW	2.44	1.37	2.91
Nickel	mg/Kg WW	0.367	0.222	0.388
Potassium	mg/Kg WW	3827 U	3622 U	3691 U
Selenium	mg/Kg WW	0.555	0.463	0.498
Silver	mg/Kg WW	0.066 U	0.064 U	0.065 U
Sodium	mg/Kg WW	898	763	879
Thallium	mg/Kg WW	0.066	0.064 U	0.065
Uranium	mg/Kg WW	0.008	0.003	0.009
Vanadium	mg/Kg WW	0.131	0.103	0.133
Zinc	mg/Kg WW	24.5	20.4	23.3
Mercury				
Mercury	µg/Kg WW	54.1	60.9	53.3
Arsenic Species				
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-
ASB + Cation	µg/Kg WW	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-
Unknown	µg/Kg WW	-	-	-

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

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JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-22

Results of TAL Metals, Mercury, and Arsenic Speciation for Hatchery Rainbow Trout Estimated Whole Body Composites from FSCA 6

Upper Columbia River RI/FS

Analyte	Units	RH6EW15 Primary Sample	RH6EW15 Field Duplicate	RH6EW25 Primary Sample	RH6EW35 Primary Sample	RH6EW45 Primary Sample
TAL Metals						
Aluminum	mg/Kg WW	6.19	6.79	5.53	5.61	5.48
Antimony	mg/Kg WW	0.107	0.107	0.108	0.106	0.108
Arsenic	mg/Kg WW	0.116 U	0.096 U	0.093 U	0.083 U	0.102 U
Barium	mg/Kg WW	0.462	0.480	0.564	0.408	0.421
Beryllium	mg/Kg WW	0.005	0.005	0.005	0.005	0.005
Cadmium	mg/Kg WW	0.052	0.061	0.054	0.039	0.042
Calcium	mg/Kg WW	4494	4508	6484	4414	5512
Chromium	mg/Kg WW	0.377	0.363	0.348	0.353	0.310
Cobalt	mg/Kg WW	0.021	0.021	0.022	0.018	0.025
Copper	mg/Kg WW	0.412	0.423	0.355	0.417	0.421
Iron	mg/Kg WW	14.6	19.4	17.6	17.1	14.7
Lead	mg/Kg WW	0.014	0.020	0.020	0.013	0.016
Magnesium	mg/Kg WW	287	293	316	290	306
Manganese	mg/Kg WW	1.23	1.22	1.51	1.09	1.44
Nickel	mg/Kg WW	0.163	0.182	0.234	0.159	0.185
Potassium	mg/Kg WW	3498 U	3555 U	3401 U	3572 U	3452 U
Selenium	mg/Kg WW	0.322	0.284	0.281	0.306	0.266
Silver	mg/Kg WW	0.067 U	0.067 U	0.067 U	0.066 U	0.067 U
Sodium	mg/Kg WW	857	1040	1044	934 U	876 U
Thallium	mg/Kg WW	0.067 U	0.067 U	0.067 U	0.066 U	0.067 U
Uranium	mg/Kg WW	0.002	0.002	0.002	0.001	0.001
Vanadium	mg/Kg WW	0.107	0.107	0.108	0.106	0.108
Zinc	mg/Kg WW	21.7	25.1	26.1	25.5	24.8
Mercury						
Mercury	µg/Kg WW	68.3	84.5	102.9	85.7	68.5
Arsenic Species						
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	-	-
ASB + Cation	µg/Kg WW	-	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	-
Unknown	µg/Kg WW	-	-	-	-	-

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed

NC = not calculated

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-23
Results of PCB Aroclors and Conventionals for Hatchery Rainbow Trout Estimated Whole Body Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	RH3EW15 Primary Sample		RH3EW25 Primary Sample		RH3EW35 Primary Sample	
PCB Aroclor							
PCB-1016	µg/Kg WW	11	U	10	U	10	U
PCB-1221	µg/Kg WW	11	U	10	U	10	U
PCB-1232	µg/Kg WW	22	U	21	U	21	U
PCB-1242	µg/Kg WW	11	U	10	U	10	U
PCB-1248	µg/Kg WW	11	U	10	U	10	U
PCB-1254	µg/Kg WW	-		-		-	
PCB-1254/1260	µg/Kg WW	11		7		8	
PCB-1260	µg/Kg WW	-		-		-	
PCB-1262	µg/Kg WW	11	U	10	U	10	U
PCB-1268	µg/Kg WW	11	U	10	U	10	U
Conventionals							
Lipids	%	NC		NC		NC	
Moisture	%	NC		NC		NC	

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-24

Results of PCB Aroclors and Conventionals for Hatchery Rainbow Trout Estimated Whole Body Composites from FSCA 6

Upper Columbia River RI/FS

Analyte	Units	RH6EW15 Primary Sample	RH6EW15 Field Duplicate	RH6EW25 Primary Sample	RH6EW35 Primary Sample	RH6EW45 Primary Sample
PCB Aroclor						
PCB-1016	µg/Kg WW	10 U	11 U	11 U	11 U	11 U
PCB-1221	µg/Kg WW	10 U	11 U	11 U	11 U	11 U
PCB-1232	µg/Kg WW	21 U	21 U	21 U	22 U	21 U
PCB-1242	µg/Kg WW	10 U	11 U	11 U	11 U	11 U
PCB-1248	µg/Kg WW	10 U	11 U	11 U	11 U	11 U
PCB-1254	µg/Kg WW	4	5	6	7	5
PCB-1254/1260	µg/Kg WW	-	-	-	-	-
PCB-1260	µg/Kg WW	4	5	7	8	6
PCB-1262	µg/Kg WW	10 U	11 U	11 U	11 U	11 U
PCB-1268	µg/Kg WW	10 U	11 U	11 U	11 U	11 U
Conventionals						
Lipids	%	NC	NC	NC	NC	NC
Moisture	%	NC	NC	NC	NC	NC

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-25
Results of PCB Congeners for Hatchery Rainbow Trout Estimated Whole Body Composites from FSCA 3 and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RH3EW35 Primary Sample		RH6EW35 Primary Sample	
PCB Congener					
PCB 1	µg/Kg WW	0.0015		0.0009	
PCB 2	µg/Kg WW	0.0022	U	0.0033	U
PCB 3	µg/Kg WW	0.0013	U	0.0014	U
PCB 4	µg/Kg WW	0.0040		0.0014	U
PCB 5	µg/Kg WW	0.0007	U	0.0010	U
PCB 6	µg/Kg WW	0.0023		0.0010	U
PCB 7	µg/Kg WW	0.0010		0.0009	U
PCB 8	µg/Kg WW	0.0038		0.0055	
PCB 9	µg/Kg WW	0.0014		0.0013	U
PCB 10	µg/Kg WW	0.0008	U	0.0011	U
PCB 11	µg/Kg WW	0.0335		0.0562	U
PCB 12	µg/Kg WW	0.0012		0.0009	U
PCB 14	µg/Kg WW	0.0007	U	0.0010	U
PCB 15	µg/Kg WW	0.0106		0.0060	U
PCB 16	µg/Kg WW	0.0068		0.0072	
PCB 17	µg/Kg WW	0.0095		0.0124	
PCB 18	µg/Kg WW	0.0197		0.0257	
PCB 19	µg/Kg WW	0.0015		0.0015	
PCB 20	µg/Kg WW	0.1182		0.1081	
PCB 21	µg/Kg WW	0.0137		0.0044	
PCB 22	µg/Kg WW	0.0047		0.0133	
PCB 23	µg/Kg WW	0.0006	U	0.0005	U
PCB 24	µg/Kg WW	0.0006		0.0006	
PCB 25	µg/Kg WW	0.0127		0.0161	
PCB 26	µg/Kg WW	0.0103		0.0131	
PCB 27	µg/Kg WW	0.0015		0.0020	
PCB 31	µg/Kg WW	0.0758		0.0788	
PCB 32	µg/Kg WW	0.0050		0.0049	
PCB 34	µg/Kg WW	0.0006	U	0.0005	U
PCB 35	µg/Kg WW	0.0007	U	0.0005	U
PCB 36	µg/Kg WW	0.0006	U	0.0004	U
PCB 37	µg/Kg WW	0.0103		0.0094	
PCB 38	µg/Kg WW	0.0006	U	0.0004	U
PCB 39	µg/Kg WW	0.0008		0.0018	
PCB 40	µg/Kg WW	0.0177		0.0555	
PCB 41	µg/Kg WW	0.0029	U	0.0069	
PCB 42	µg/Kg WW	0.0125		0.0331	

TABLE C-25
Results of PCB Congeners for Hatchery Rainbow Trout Estimated Whole Body Composites from FSCA 3 and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RH3EW35 Primary Sample	RH6EW35 Primary Sample
PCB 43	µg/Kg WW	0.0025	0.0091 U
PCB 44	µg/Kg WW	0.0995	0.2660
PCB 45	µg/Kg WW	0.0060	0.0163
PCB 46	µg/Kg WW	0.0012	0.0017
PCB 48	µg/Kg WW	0.0150	0.0422
PCB 49	µg/Kg WW	0.0814	0.1972
PCB 50	µg/Kg WW	0.0060	0.0145
PCB 52	µg/Kg WW	0.1792	0.3978
PCB 54	µg/Kg WW	0.0004 U	0.0004 U
PCB 55	µg/Kg WW	0.0035	0.0092
PCB 56	µg/Kg WW	0.0118	0.0220
PCB 57	µg/Kg WW	0.0021 U	0.0022
PCB 58	µg/Kg WW	0.0012	0.0029
PCB 59	µg/Kg WW	0.0101	0.0262
PCB 60	µg/Kg WW	0.0312	0.0629
PCB 61	µg/Kg WW	0.2402	0.5549
PCB 63	µg/Kg WW	0.0094	0.0185
PCB 64	µg/Kg WW	0.0505	0.1448
PCB 66	µg/Kg WW	0.1546	0.3655
PCB 67	µg/Kg WW	0.0031 U	0.0066
PCB 68	µg/Kg WW	0.0037	0.0054
PCB 72	µg/Kg WW	0.0045	0.0069
PCB 73	µg/Kg WW	0.0017	0.0048
PCB 77	µg/Kg WW	0.0082	0.0205
PCB 78	µg/Kg WW	0.0028	0.0009 U
PCB 79	µg/Kg WW	0.0124	0.0194
PCB 80	µg/Kg WW	0.0011 U	0.0007 U
PCB 81	µg/Kg WW	0.0012 U	0.0015
PCB 82	µg/Kg WW	0.0082	0.0180
PCB 83	µg/Kg WW	0.0683	0.0731
PCB 84	µg/Kg WW	0.0159	0.0583
PCB 85	µg/Kg WW	0.1423	0.2652
PCB 86	µg/Kg WW	0.2891	0.5380
PCB 88	µg/Kg WW	0.0022 U	0.0061 U
PCB 89	µg/Kg WW	0.0074	0.0248
PCB 90	µg/Kg WW	0.6907	1.0577
PCB 92	µg/Kg WW	0.1299	0.2138
PCB 93	µg/Kg WW	0.0046	0.0104
PCB 94	µg/Kg WW	0.0018 U	0.0017 U

TABLE C-25
Results of PCB Congeners for Hatchery Rainbow Trout Estimated Whole Body Composites from FSCA 3 and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RH3EW35 Primary Sample	RH6EW35 Primary Sample
PCB 95	µg/Kg WW	0.2404	0.5047
PCB 96	µg/Kg WW	0.0013 U	0.0014 U
PCB 98	µg/Kg WW	0.0488	0.0913
PCB 99	µg/Kg WW	0.2983	0.4789
PCB 103	µg/Kg WW	0.0051	0.0029
PCB 104	µg/Kg WW	0.0007 U	0.0008 U
PCB 105	µg/Kg WW	0.2508	0.2681
PCB 106	µg/Kg WW	0.0015 U	0.0118
PCB 107	µg/Kg WW	0.0261	0.0251
PCB 109	µg/Kg WW	0.0677	0.0802
PCB 110	µg/Kg WW	0.9870	1.0346
PCB 111	µg/Kg WW	0.0019	0.0020
PCB 112	µg/Kg WW	0.0587	0.0513
PCB 114	µg/Kg WW	0.0156	0.0161
PCB 118	µg/Kg WW	0.7416	0.7337
PCB 120	µg/Kg WW	0.0079	0.0075
PCB 121	µg/Kg WW	0.0013 U	0.0012 U
PCB 122	µg/Kg WW	0.0017 U	0.0020 U
PCB 123	µg/Kg WW	0.0107	0.0134
PCB 126	µg/Kg WW	0.0091	0.0050
PCB 127	µg/Kg WW	0.0015 U	0.0018 U
PCB 128	µg/Kg WW	0.2202	0.2168
PCB 129	µg/Kg WW	1.7941	1.5948
PCB 130	µg/Kg WW	0.0809	0.0856
PCB 131	µg/Kg WW	0.0029 U	0.0047
PCB 132	µg/Kg WW	0.1181	0.2261
PCB 133	µg/Kg WW	0.0280	0.0295
PCB 134	µg/Kg WW	0.0233	0.0393
PCB 135	µg/Kg WW	0.3368	0.4085
PCB 136	µg/Kg WW	0.0378	0.0654
PCB 137	µg/Kg WW	0.0736	0.0846
PCB 139	µg/Kg WW	0.0205	0.0274
PCB 141	µg/Kg WW	0.1631	0.1745
PCB 142	µg/Kg WW	0.5684	0.9142
PCB 143	µg/Kg WW	0.0030 U	0.0044 U
PCB 144	µg/Kg WW	0.0029 U	0.0046
PCB 145	µg/Kg WW	0.0015 U	0.0016 U
PCB 146	µg/Kg WW	0.2533	0.2575
PCB 147	µg/Kg WW	0.0387	0.0502

TABLE C-25
Results of PCB Congeners for Hatchery Rainbow Trout Estimated Whole Body Composites from FSCA 3 and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RH3EW35 Primary Sample	RH6EW35 Primary Sample
PCB 148	µg/Kg WW	0.0022	0.0031
PCB 150	µg/Kg WW	0.0014	0.0020
PCB 152	µg/Kg WW	0.0015 U	0.0015 U
PCB 153	µg/Kg WW	1.8404	1.7110
PCB 154	µg/Kg WW	0.0177	0.0217
PCB 155	µg/Kg WW	0.0020 U	0.0025 U
PCB 156	µg/Kg WW	0.1289	0.0718
PCB 158	µg/Kg WW	0.1268	0.1076
PCB 159	µg/Kg WW	0.0038 U	0.0029 U
PCB 160	µg/Kg WW	0.0022 U	0.0031 U
PCB 161	µg/Kg WW	0.0022 U	0.0032 U
PCB 162	µg/Kg WW	0.0150	0.0120
PCB 164	µg/Kg WW	0.0606	0.0642
PCB 165	µg/Kg WW	0.0022 U	0.0030 U
PCB 167	µg/Kg WW	0.0531	0.0352
PCB 169	µg/Kg WW	0.0038	0.0015
PCB 170	µg/Kg WW	0.3991	0.2171
PCB 171	µg/Kg WW	0.1143	0.0841
PCB 172	µg/Kg WW	0.0567	0.0577
PCB 174	µg/Kg WW	0.1765	0.1970
PCB 175	µg/Kg WW	0.0145	0.0146
PCB 176	µg/Kg WW	0.0159	0.0185
PCB 177	µg/Kg WW	0.2075	0.1750
PCB 178	µg/Kg WW	0.1004	0.0948
PCB 179	µg/Kg WW	0.0825	0.0970
PCB 180	µg/Kg WW	0.9806	0.5923
PCB 181	µg/Kg WW	0.3331	0.2786
PCB 182	µg/Kg WW	0.0035 U	0.0024 U
PCB 183	µg/Kg WW	0.0037 U	0.0039
PCB 184	µg/Kg WW	0.0019 U	0.0027
PCB 186	µg/Kg WW	0.0020 U	0.0021 U
PCB 187	µg/Kg WW	0.6249	0.5273
PCB 188	µg/Kg WW	0.0019 U	0.0018 U
PCB 189	µg/Kg WW	0.0102	0.0041
PCB 190	µg/Kg WW	0.0879	0.0345
PCB 191	µg/Kg WW	0.0163	0.0075 U
PCB 192	µg/Kg WW	0.0029 U	0.0021 U
PCB 194	µg/Kg WW	0.1189	0.0658
PCB 195	µg/Kg WW	0.0856	0.0324

TABLE C-25
Results of PCB Congeners for Hatchery Rainbow Trout Estimated Whole Body Composites from FSCA 3 and FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RH3EW35 Primary Sample		RH6EW35 Primary Sample	
PCB 196	µg/Kg WW	0.1207		0.0719	
PCB 197	µg/Kg WW	0.0154		0.0117	
PCB 198	µg/Kg WW	0.2763		0.1596	
PCB 201	µg/Kg WW	0.0303		0.0220	
PCB 202	µg/Kg WW	0.0572		0.0401	
PCB 203	µg/Kg WW	0.1747		0.0837	
PCB 204	µg/Kg WW	0.0014	U	0.0009	U
PCB 205	µg/Kg WW	0.0074		0.0027	
PCB 206	µg/Kg WW	0.0904		0.0367	
PCB 207	µg/Kg WW	0.0141		0.0066	
PCB 208	µg/Kg WW	0.0331		0.0157	
PCB 209	µg/Kg WW	0.0206		0.0117	

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
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JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-26
Results of Dioxins/Furans Analysis and Conventionals for Hatchery Rainbow Trout Estimated Whole Body Composites from FSCA 3
Upper Columbia River RI/FS

Analyte	Units	RH3EW15 Primary Sample		RH3EW25 Primary Sample		RH3EW35 Primary Sample	
Dioxins/Furans							
2,3,7,8-TCDD	µg/Kg WW	0.000394	U	0.000555	U	0.000322	U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000443	U	0.000446	U	0.000434	U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000631	U	0.000872	U	0.000588	U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000643	U	0.000879	U	0.000601	U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000656	U	0.000901	U	0.000612	U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000785	U	0.000857	U	0.000993	U
OCDD	µg/Kg WW	0.00202	U	0.002167	U	0.002134	U
2,3,7,8-TCDF	µg/Kg WW	0.001159	U	0.000975		0.001714	
1,2,3,7,8-PeCDF	µg/Kg WW	0.000281	U	0.000294	U	0.00023	U
2,3,4,7,8-PeCDF	µg/Kg WW	0.000282	U	0.000287	U	0.000241	U
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000335	U	0.000404	U	0.000277	U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.000331	U	0.000388	U	0.000277	U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000469	U	0.000566	U	0.00039	U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000381	U	0.000448	U	0.000338	U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000441	U	0.000451	U	0.000512	U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000617	U	0.000661	U	0.000732	U
OCDF	µg/Kg WW	0.001181	U	0.001219	U	0.001351	U
TCDD	µg/Kg WW	0.000636	U	0.00054	U	0.000683	U
TCDF	µg/Kg WW	0.0002	U	0.000975		0.000656	
PeCDD	µg/Kg WW	0.000443	U	0.000446	U	0.000434	U
PeCDF	µg/Kg WW	0.000275	U	0.000287	U	0.000229	U
HxCDD	µg/Kg WW	0.000625	U	0.000868	U	0.000586	U
HxCDF	µg/Kg WW	0.000331	U	0.000388	U	0.000271	U
HpCDD	µg/Kg WW	0.000785	U	0.000857	U	0.000993	U
HpCDF	µg/Kg WW	0.000441	U	0.000451	U	0.000512	U
TEQ WHO-98	µg/Kg WW	0		9.79E-05		5.42E-05	
Conventionals							
Lipids	%	NC		NC		NC	
Moisture	%	NC		NC		NC	

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE C-27
Results of Dioxins/Furans Analysis and Conventionals for Hatchery Rainbow Trout Estimated Whole Body Composites from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	RH6EW15 Primary Sample	RH6EW15 Field Duplicate	RH6EW25 Primary Sample	RH6EW35 Primary Sample	RH6EW45 Primary Sample
Dioxins/Furans						
2,3,7,8-TCDD	µg/Kg WW	0.000353 U	0.00082 U	0.000339 U	0.000428 U	0.000411 U
1,2,3,7,8-PeCDD	µg/Kg WW	0.000435 U	0.00108 U	0.000584 U	0.000645 U	0.000643 U
1,2,3,4,7,8-HxCDD	µg/Kg WW	0.000716 U	0.000842 U	0.000644 U	0.000798 U	0.000966 U
1,2,3,6,7,8-HxCDD	µg/Kg WW	0.000744 U	0.000908 U	0.000644 U	0.000836 U	0.000961 U
1,2,3,7,8,9-HxCDD	µg/Kg WW	0.000752 U	0.000901 U	0.000662 U	0.000841 U	0.000991 U
1,2,3,4,6,7,8-HpCDD	µg/Kg WW	0.000848 U	0.000979 U	0.001115 U	0.00118 U	0.000901 U
OCDD	µg/Kg WW	0.000958 U	0.00182 U	0.001351	0.001225 U	0.002598
2,3,7,8-TCDF	µg/Kg WW	0.001391	0.0017	0.00136	0.001818	0.000971
1,2,3,7,8-PeCDF	µg/Kg WW	0.000417 U	0.000572 U	0.000303 U	0.000366 U	0.000365 U
2,3,4,7,8-PeCDF	µg/Kg WW	0.00047 U	0.000629 U	0.00035 U	0.000381 U	0.000376 U
1,2,3,4,7,8-HxCDF	µg/Kg WW	0.000435 U	0.00051 U	0.0004 U	0.000475 U	0.000573 U
1,2,3,6,7,8-HxCDF	µg/Kg WW	0.00044 U	0.000523 U	0.0004 U	0.000482 U	0.000555 U
1,2,3,7,8,9-HxCDF	µg/Kg WW	0.000569 U	0.000666 U	0.000514 U	0.000642 U	0.00073 U
2,3,4,6,7,8-HxCDF	µg/Kg WW	0.000444 U	0.00052 U	0.000408 U	0.000506 U	0.000593 U
1,2,3,4,6,7,8-HpCDF	µg/Kg WW	0.000477 U	0.00055 U	0.000559 U	0.000657 U	0.000633 U
1,2,3,4,7,8,9-HpCDF	µg/Kg WW	0.000682 U	0.000783 U	0.000789 U	0.000919 U	0.000866 U
OCDF	µg/Kg WW	0.000636 U	0.001265 U	0.00064 U	0.000917 U	0.000956 U
TCDD	µg/Kg WW	0.000844 U	0.001 U	0.000807 U	0.000941 U	0.00089 U
TCDF	µg/Kg WW	0.001391	0.001204	0.00136	0.001818	0.000876
PeCDD	µg/Kg WW	0.000627 U	0.00108 U	0.000584 U	0.000645 U	0.000643 U
PeCDF	µg/Kg WW	0.000401 U	0.000572 U	0.000303 U	0.000366 U	0.000365 U
HxCDD	µg/Kg WW	0.000716 U	0.000842 U	0.00064 U	0.000798 U	0.000961 U
HxCDF	µg/Kg WW	0.000428 U	0.000505 U	0.000395 U	0.000475 U	0.000547 U
HpCDD	µg/Kg WW	0.000848 U	0.001421 U	0.001115 U	0.00118 U	0.001246 U
HpCDF	µg/Kg WW	0.000477 U	0.00055 U	0.000559 U	0.000657 U	0.000633 U
TEQ WHO-98	µg/Kg WW	0.000139	0.00011	0.000136	0.000182	7.75E-05
Conventionals						
Lipids	%	NC	NC	NC	NC	NC
Moisture	%	NC	NC	NC	NC	NC

[a] WE indicates an estimated whole body concentration. The value was derived as a weighted average of the composite fillet and offal concentrations.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.
J - The identification of the analyte is acceptable; the reported value is an estimate.
JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

APPENDIX D

Estimated Whole Body Concentrations from Largescale Suckers

APPENDIX D

Estimated Whole Body Concentrations from Largescale Suckers

This appendix contains the following tables:

D-1 Estimated Whole Body Results of TAL Metals, Mercury, and Arsenic Speciation for Individual Largescale Sucker Samples from FSCA 1

D-2 Estimated Whole Body Results of TAL Metals, Mercury, and Arsenic Speciation for Individual Largescale Sucker Samples from FSCA 3

D-3 Estimated Whole Body Results of TAL Metals, Mercury, and Arsenic Speciation for Individual Largescale Sucker Samples from FSCA 6

TABLE D-1
Estimated Whole Body Results of TAL Metals, Mercury, and Arsenic Speciation for Individual Largescale Sucker Samples from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	LS1G[a]1004 0 Primary Sample	LS1W10040[b] Primary Sample	LS1EW[c]10040 Primary Sample	Associated with Gut/ Contents	LS1G10041 Primary Sample	LS1W10041 Primary Sample	LS1EW10041 Primary Sample	Associated with Gut/ Contents	LS1G10051 Primary Sample	LS1W10051 Primary Sample	LS1EW10051 Primary Sample	Associated with Gut/ Contents	LS1G10056 Primary Sample	LS1W10056 Primary Sample	LS1EW10056 Primary Sample	Associated with Gut/ Contents	LS1G10089 Primary Sample
TAL Metals																		
Aluminum	mg/Kg WW	2862.5	20.271 J	231.978	91.9%	1869.48	7.124 J	150.082	95.6%	744.12	112.728 J	137.782	21.4%	1410.5	6.825 J	94.482	93.2%	6486
Antimony	mg/Kg WW	1.9007	0.1131 U	0.246	57.5%	1.053	0.10686 U	0.179	45.0%	1.5444	0.1056 U	0.163	37.7%	1.281	0.10647 U	0.180	44.5%	2.1808
Arsenic	mg/Kg WW	2.37702	0.1479	0.314	56.4%	1.6848	0.20002	0.314	41.2%	1.10916	0.12408	0.163	27.0%	1.4875	0.18291	0.264	35.1%	4.982
Barium	mg/Kg WW	241.824	2.639	20.455	88.1%	118.908	1.7399	10.734	85.0%	44.928	3.1944	4.850	36.8%	67.2	3.0303	7.038	59.6%	606.3
Beryllium	mg/Kg WW	0.13282	0.0058 U	0.015	64.8%	0.081	0.00548 U	0.011	55.1%	0.03861	0.00528 U	0.007	23.2%	0.0665	0.00519 U	0.009	46.0%	0.2773
Cadmium	mg/Kg WW	1.603	0.2726	0.372	32.1%	2.1384	0.411	0.544	30.2%	2.26395	0.3432	0.419	21.4%	1.624	0.4095	0.485	20.9%	2.538
Calcium	mg/Kg WW	7740.2	9657	9514.225	6.1%	6350.4	8905	8708.904	5.6%	8985.6	13992	13793.341	2.6%	5355	10592.4	10265.335	3.3%	21103
Chromium	mg/Kg WW	54.044 J	0.638 J	4.616	87.2%	99.144 J	0.6576 J	8.218	92.6%	53.703 J	0.7524 J	2.854	74.7%	37.8 J	0.6279 J	2.949	80.0%	101.52 J
Cobalt	mg/Kg WW	8.7478	0.0522	0.700	93.1%	4.9896	0.03562	0.416	92.1%	1.9305	0.05808	0.132	57.9%	2.506	0.04095	0.195	80.3%	18.894
Copper	mg/Kg WW	306.86	1.8821 J	24.599	92.9%	163.62	0.92064 J	13.410	93.7%	70.551	1.18008 J	3.933	71.2%	82.6	0.77259 J	5.883	87.7%	784.9
Iron	mg/Kg WW	25006.8	138.91	1991.224	93.5%	14061.6	29.592	1106.719	97.5%	4984.2	69.96	264.962	74.6%	7770	33.852	516.959	93.9%	66740
Lead	mg/Kg WW	34.6706	5.017 J	7.226	35.7%	21.7404	7.261 J	8.372	19.9%	11.583	13.4904 J	13.415	3.4%	14.385	6.3336 J	6.836	13.1%	116.56
Magnesium	mg/Kg WW	1199.96	356.7	419.511	21.3%	884.52	331.54	373.988	18.2%	498.42	411.84	415.276	4.8%	854	368.55	398.865	13.4%	2016.3
Manganese	mg/Kg WW	503.8	8.729	45.605	82.3%	284.148	12.056	32.942	66.2%	100.386	15.3912	18.764	21.2%	166.25	12.4488	22.053	47.1%	1245.5
Nickel	mg/Kg WW	19.6482	0.29	1.732	84.5%	64.152	0.3014	5.203	94.7%	32.994	0.4224	1.715	76.3%	20.16	0.3549	1.592	79.1%	38.963
Potassium	mg/Kg WW	2725.1	3480	3423.770	5.9%	2527.2	3205.8	3153.709	6.2%	2804.49	3352.8	3331.042	3.3%	2789.5	3439.8	3399.190	5.1%	2914
Selenium	mg/Kg WW	1.0992	0.551	0.592	13.8%	0.80676	0.5206	0.543	11.4%	1.04598	0.68112	0.696	6.0%	0.84	0.6552	0.667	7.9%	1.4993
Silver	mg/Kg WW	0.5954	0.0725 U	0.111	39.8%	0.6804	0.0685 U	0.115	45.2%	0.29133	0.066 U	0.075	15.4%	0.1715	0.06552 U	0.072	14.8%	1.645
Sodium	mg/Kg WW	1309.88	1020.8	1042.332	9.4%	1500.12	1120.66	1149.788	10.0%	1449.63	1393.92	1396.131	4.1%	1585.5	1321.32	1337.818	7.4%	1856.5
Thallium	mg/Kg WW	0.10992	0.0725 U	0.075	10.9%	0.081	0.0685 U	0.069	9.0%	0.08424	0.066 U	0.067	5.0%	0.084	0.06552 U	0.067	7.9%	0.1128
Uranium	mg/Kg WW	0.65952	0.01491	0.063	78.1%	0.3888	0.0274	0.055	54.1%	0.20147	0.02957	0.036	22.0%	0.30625	0.01813	0.036	52.9%	1.4382
Vanadium	mg/Kg WW	6.9158	0.1131 U	0.620	83.1%	5.2812	0.10686 U	0.504	80.4%	2.79747	0.1056 U	0.212	52.3%	4.515	0.10647 U	0.382	73.9%	11.468
Zinc	mg/Kg WW	1951.08	40.31 J	182.636	79.6%	1036.8	50.69 J	126.386	63.0%	331.344	54.648 J	65.628	20.0%	462	37.401 J	63.916	45.1%	5170
Mercury																		
Mercury	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic Species																		
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	-	187.272	11.234 UJI	24.74704912	58.1%	118.287	10.824 UJI	15.08824283	31.1%	-	-	-	-	-
ASB + Cation	µg/Kg WW	-	-	-	-	13.284 UJ	16.714 JL	16.45070595	6.2%	14.391 UJ	7.656 JL	7.923251756	7.2%	-	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	26.244 J	13.7 JL	14.66290396	13.7%	17.901 J	10.824 UJI	11.10482267	6.4%	-	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	13.284 U	11.234 UJI	11.39136233	9.0%	14.391 U	10.824 UJI	10.96554224	5.2%	-	-	-	-	-
Unknown	µg/Kg WW	-	-	-	-	27.54 J	11.234 JL	12.48568304	16.9%	15.444 J	10.824 UJI	11.00732637	5.6%	-	-	-	-	-
Conventionals																		
Lipids	%	-	6.9	NC	NC	-	5.6	NC	NC	-	2.9	NC	NC	-	5.3	NC	NC	-
Moisture	%	54.2	71	NC	NC	67.6	72.6	NC	NC	65	73.6	NC	NC	65	72.7	NC	NC	53

[a] G indicates a gut/contents sample from an individual largescale sucker.

[b] W followed by a 5-digit numeric code indicates a whole body sample with the gut/contents removed form an individual largescale sucker.

[c] EW indicates estimated whole body. The estimated whole body concentration for the individual largescale sucker was calculated as a weighted average of the gut/contents and the gutless whole body concentrations.

- not analyzed
NC = not calculated

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J - The identification of the analyte is acceptable; the reported value is an estimate.

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JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

TABLE D-1
Estimated Whole Body Results of TAL Metals, Mercury, and Arsenic Speciation for Individual Largescale Sucker Samples from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	LS1W10089 Primary Sample	LS1EW10089 Primary Sample	Associated with Gut/ Contents	LS1G50769 Primary Sample	LS1W50769 Primary Sample	LS1EW50769 Primary Sample	Associated with Gut/ Contents	LS1G50770 Primary Sample	LS1W50770 Primary Sample	LS1EW50770 Primary Sample	Associated with Gut/ Contents	LS1G50771 Primary Sample	LS1W50771 Primary Sample	LS1EW50771 Primary Sample	Associated with Gut/ Contents	LS1G50775 Primary Sample	LS1W50775 Primary Sample
TAL Metals																		
Aluminum	mg/Kg WW	8.19 J	400.597	98.1%	213.024	3.654 U	19.536	82.7%	449.8	5.1	38.659	87.8%	246.264	4.512	27.104	84.9%	424.44	5.184
Antimony	mg/Kg WW	0.11466 U	0.240	55.1%	0.19824	0.09657 U	0.104	14.4%	0.17646	0.09945 U	0.105	12.7%	0.12247	0.10998 U	0.111	10.3%	1.11874	0.07104 U
Arsenic	mg/Kg WW	0.14469	0.438	68.9%	0.6048	0.10179	0.140	32.8%	0.7266	0.1785	0.220	24.9%	0.80764	0.18048	0.239	31.6%	1.01656	0.09984
Barium	mg/Kg WW	2.21676	38.810	94.6%	14.9856	1.07793 J	2.133	53.3%	16.9194	2.31285 J	3.415	37.4%	9.3673	1.2408 J	2.000	43.8%	24.9424	1.7664 J
Beryllium	mg/Kg WW	0.00573 U	0.022	75.7%	0.01008	0.0047 U	0.005	15.0%	0.0263	0.0051 U	0.007	29.6%	0.01258	0.00564 U	0.006	18.7%	0.01913	0.00346 U
Cadmium	mg/Kg WW	0.3822	0.513	30.0%	1.38432	0.2871	0.370	28.4%	1.6781	0.255	0.362	34.9%	1.0261	0.2538	0.326	29.4%	2.0436	0.3456
Calcium	mg/Kg WW	8244.6	9023.525	14.2%	17841.6	7725.6 J	8492.952	15.9%	8926.8	8109 J	8170.714	8.2%	18767.7	10462.2 J	11238.357	15.6%	27772	9408 J
Chromium	mg/Kg WW	0.546 J	6.663	92.3%	3.18864 J	0.4698	0.676	35.8%	8.5462 J	0.67575	1.270	50.8%	3.4755 J	0.5922	0.862	37.7%	4.6374 J	0.3264
Cobalt	mg/Kg WW	0.03549	1.178	97.2%	0.4368	0.0261	0.057	57.9%	0.4498	0.03315	0.065	52.6%	0.3641	0.05358	0.083	41.2%	0.5764	0.04032
Copper	mg/Kg WW	1.00464 J	48.491	98.1%	24.7296 U	0.60813	2.438	76.9%	14.2206	0.5865	1.615	66.4%	13.9351 U	0.81216	2.039	63.9%	25.8594 U	0.73536
Iron	mg/Kg WW	61.698	4100.877	98.6%	833.28	13.7025 J	75.872	83.3%	1211	23.307 J	112.934	80.9%	728.2	21.8268 J	87.838	77.5%	1391.22	43.968 J
Lead	mg/Kg WW	7.7805 J	14.370	49.1%	2.37552	3.1842	3.123	5.8%	4.9478	6.7575	6.621	5.6%	2.05551	4.1172	3.925	4.9%	4.7946	7.8144
Magnesium	mg/Kg WW	327.6	429.897	28.4%	362.88	305.37	309.732	8.9%	536.3	318.75	335.167	12.1%	417.06	346.86	353.420	11.0%	594.74	318.72
Manganese	mg/Kg WW	10.4013	85.220	88.5%	26.1072	4.4892 J	6.129	32.3%	28.3374	10.863 J	12.182	17.6%	21.7467	5.3862 J	6.915	29.4%	43.492	9.8688 J
Nickel	mg/Kg WW	0.25389	2.599	90.8%	1.80432	0.24012	0.359	38.1%	4.7056	0.306	0.638	55.7%	1.96283	0.3384	0.490	37.4%	2.2663	0.288
Potassium	mg/Kg WW	3767.4	3715.703	4.8%	2120.16	3366.9	3272.328	4.9%	2338.96	3595.5	3500.677	5.0%	1916.49	2961	2863.390	6.3%	2457.56	3417.6
Selenium	mg/Kg WW	0.5187	0.578	15.7%	1.17936	0.4959	0.548	16.3%	1.4532	0.5865	0.652	16.8%	1.20484	0.6768	0.726	15.5%	1.048	0.4704
Silver	mg/Kg WW	0.07098 U	0.166	59.9%	0.08064	0.06003 U	0.062	9.9%	0.07958	0.06375 U	0.065	9.2%	0.07613	0.06768 U	0.068	10.4%	0.131	0.04416 U
Sodium	mg/Kg WW	1198.47	1238.332	9.1%	1609.44	986.58	1033.827	11.8%	1415.14	1060.8	1087.540	9.8%	1555.7	1221.06	1252.332	11.6%	1747.54	1278.72
Thallium	mg/Kg WW	0.07098 U	0.074	9.3%	0.08064	0.06003 U	0.062	9.9%	0.07958	0.06375 U	0.065	9.2%	0.07613	0.06768 U	0.068	10.4%	0.0655	0.04416 U
Uranium	mg/Kg WW	0.01111	0.098	89.3%	0.1008	0.00775	0.015	51.6%	0.11037	0.01048	0.018	46.2%	0.14101	0.01052	0.023	58.0%	0.16087	0.024
Vanadium	mg/Kg WW	0.11466 U	0.802	86.6%	0.7728	0.09657 U	0.148	39.6%	1.46704	0.09945 U	0.203	54.6%	1.06582	0.10998 U	0.199	50.0%	1.44886	0.10368
Zinc	mg/Kg WW	49.14 J	359.347	87.2%	58.128	22.9419	25.611	17.2%	59.512	39.78	41.269	10.9%	39.389	21.009	22.727	16.2%	74.408	28.992
Mercury																		
Mercury	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic Species																		
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ASB + Cation	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventionals																		
Lipids	%	5.9	NC	NC	11	4.5	NC	NC	-	4.8	NC	NC	11	5.3	NC	NC	-	0.3 U
Moisture	%	72.7	NC	NC	66.4	73.9	NC	NC	65.4	74.5	NC	NC	66.9	71.8	NC	NC	73.8	80.8

[a] G indicates a gut/contents sample from an individual largescale sucker.

[b] W followed by a 5-digit numeric code indicates a whole body sample with the gut/contents removed form an individual largescale sucker.

[c] EW indicates estimated whole body. The estimated whole body concentration for the individual largescale sucker was calculated as a weighted average of the gut/contents and the gutless whole body concentrations.

\- not analyzed
NC = not calculated

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TABLE D-1
Estimated Whole Body Results of TAL Metals, Mercury, and Arsenic Speciation for Individual Largescale Sucker Samples from FSCA 1
Upper Columbia River RI/FS

Analyte	Units	LS1EW50775 Primary Sample	Associated with Gut/ Contents	LS1G50778 Primary Sample	LS1W50778 Primary Sample	LS1EW50778 Primary Sample	Associated with Gut/ Contents	LS1G50778 Field Duplicate	LS1W50778 Field Duplicate	LS1EW50778 Field Duplicate	Associated with Gut/ Contents
TAL Metals											
Aluminum	mg/Kg WW	31.566	84.6%	294.468	3.96	32.355	89.0%	298.931	3.668 U	32.527	89.8%
Antimony	mg/Kg WW	0.137	51.4%	0.12402	0.10296 U	0.105	11.5%	0.1268	0.09956 U	0.102	12.1%
Arsenic	mg/Kg WW	0.158	40.6%	0.83634 U	0.19008	0.253	32.3%	0.8242 U	0.18864	0.251	32.1%
Barium	mg/Kg WW	3.225	48.7%	17.4582	2.09352 J	3.595	47.5%	18.6396	1.68466 J	3.342	54.5%
Beryllium	mg/Kg WW	0.004	27.1%	0.01495	0.00502 U	0.006	24.4%	0.01553	0.00498 U	0.006	25.3%
Cadmium	mg/Kg WW	0.452	28.4%	1.34514	0.23232	0.341	38.5%	1.31872	0.25152	0.356	36.2%
Calcium	mg/Kg WW	10563.567	16.5%	13769.4	11484 J	11707.378	11.5%	14391.8	8305.4 J	8900.294	15.8%
Chromium	mg/Kg WW	0.598	48.8%	3.4026 J	0.5808	0.857	38.8%	3.2651 J	0.63404	0.891	35.8%
Cobalt	mg/Kg WW	0.074	49.0%	0.3498	0.03696	0.068	50.6%	0.317	0.03668	0.064	48.4%
Copper	mg/Kg WW	2.316	70.3%	7.4094 U	0.6864	1.344	53.9%	7.3544 U	0.7074	1.357	53.0%
Iron	mg/Kg WW	128.745	68.0%	655.08	15.9192 J	78.392	81.7%	675.21	14.9078 J	79.447	83.1%
Lead	mg/Kg WW	7.624	4.0%	2.2419	3.9336	3.768	5.8%	2.09537	3.0392	2.947	6.9%
Magnesium	mg/Kg WW	336.089	11.1%	422.94	335.28	343.848	12.0%	421.61	306.54	317.787	13.0%
Manganese	mg/Kg WW	11.985	22.8%	16.5996	5.7288 J	6.791	23.9%	16.8644	4.454 J	5.667	29.1%
Nickel	mg/Kg WW	0.412	34.6%	1.7967	0.3432	0.485	36.2%	1.81324	0.3144	0.461	38.5%
Potassium	mg/Kg WW	3357.189	4.6%	2117.88	2851.2	2779.524	7.4%	2060.5	3013	2919.901	6.9%
Selenium	mg/Kg WW	0.507	13.0%	1.4946	0.68112	0.761	19.2%	1.4582	0.71788	0.790	18.0%
Silver	mg/Kg WW	0.050	16.6%	0.0795	0.06336 U	0.065	12.0%	0.07925	0.06026 U	0.062	12.5%
Sodium	mg/Kg WW	1308.221	8.4%	1669.5	1248.72	1289.848	12.7%	1629.38	1215.68	1256.116	12.7%
Thallium	mg/Kg WW	0.046	9.1%	0.0795	0.06336 U	0.065	12.0%	0.07925	0.06026 U	0.062	12.5%
Uranium	mg/Kg WW	0.033	31.0%	0.11225	0.01172	0.022	50.9%	0.11761	0.00943	0.020	57.5%
Vanadium	mg/Kg WW	0.188	48.4%	1.12254	0.10296 U	0.203	54.2%	1.16339	0.10218	0.206	55.2%
Zinc	mg/Kg WW	31.850	14.7%	31.2276	20.9616	21.965	13.9%	32.017	21.1958	22.253	14.1%
Mercury											
Mercury	µg/Kg WW	-	-	-	-	-	-	-	-	-	-
Arsenic Species											
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	215.922	10.824 U	30.87057629	68.4%	241.237	10.742 U	33.27091595	70.9%
ASB + Cation	µg/Kg WW	-	-	21.942 J	39.072 J	37.39768893	5.7%	12.997 UJ	37.466 J	35.07436441	3.6%
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	22.896 J	7.128 J	8.669187213	25.8%	23.775 J	7.598 J	9.179163467	25.3%
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	29.892 J	10.824 U	12.687734	23.0%	29.164 J	10.742 U	12.54259303	22.7%
Unknown	µg/Kg WW	-	-	89.04 J	13.2 J	20.61271171	42.2%	120.46 J	13.362 J	23.82991401	49.4%
Conventionals											
Lipids	%	NC	NC	9.4	4.2	NC	NC	-	4.5	NC	NC
Moisture	%	NC	NC	68.2	73.6	NC	NC	68.3	73.8	NC	NC

[a] G indicates a gut/contents sample from an individual largescale sucker.

[b] W followed by a 5-digit numeric code indicates a whole body sample with the gut/contents removed form an individual largescale sucker.

[c] EW indicates estimated whole body. The estimated whole body concentration for the individual largescale sucker was calculated as a weighted average of the gut/contents and the gutless whole body concentrations.

- not analyzed
NC = not calculated

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

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TABLE D-2

Estimated Whole Body Results of TAL Metals, Mercury, and Arsenic Speciation for Individual Largescale Sucker Samples from FSCA 3

Upper Columbia River RI/FS

Analyte	Units	LS3G40486 Primary Sample	LS3W40486 Primary Sample	LS3EW40486 Primary Sample	Associated with Gut/ Contents	LS3G40504 Primary Sample	LS3W40504 Primary Sample	LS3EW40504 Primary Sample	Associated with Gut/ Contents	LS3G40520 Primary Sample	LS3W40520 Primary Sample	LS3EW40520 Primary Sample	Associated with Gut/ Contents	LS3G40914 Primary Sample	LS3W40914 Primary Sample
TAL Metals															
Aluminum	mg/Kg WW	609	4.267 J	38.098	89.4%	346.02	3.615 J	23.091	85.2%	183.309	15.34 J	27.291	47.8%	323.778	5.786 J
Antimony	mg/Kg WW	0.116	0.09538 U	0.097	6.7%	0.0876	0.08917 U	0.089	5.6%	0.11739	0.1014 U	0.103	8.1%	0.19656	0.1052 U
Arsenic	mg/Kg WW	0.667	0.19327	0.220	17.0%	0.3942	0.21208	0.222	10.1%	0.6321 U	0.2132	0.243	18.5%	0.49686	0.11835
Barium	mg/Kg WW	10.092	4.0913	4.427	12.8%	14.7387	2.18828	2.902	28.9%	5.4782	1.4898 J	1.774	22.0%	4.23696	0.96521 J
Beryllium	mg/Kg WW	0.0232	0.00477 U	0.006	22.4%	0.01336	0.00458 U	0.005	15.0%	0.00752	0.0052 U	0.005	10.0%	0.01201	0.00526 U
Cadmium	mg/Kg WW	1.0759	0.2008	0.250	24.1%	1.21764	0.2651	0.319	21.7%	0.89096	0.1144	0.170	37.4%	0.20748	0.02893
Calcium	mg/Kg WW	3074	10968.7	10527.043	1.6%	8322	10604	10474.199	4.5%	10926.3	12428 J	12321.153	6.3%	407.316	9520.6 J
Chromium	mg/Kg WW	45.53 J	0.502 J	3.021	84.3%	4.7085	0.4338 J	0.677	39.6%	3.4615 J	0.364	0.584	42.1%	23.5872 J	0.4997
Cobalt	mg/Kg WW	0.8613	0.0502	0.090	47.3%	0.2409	0.02651	0.039	35.4%	0.17157	0.0286	0.039	31.5%	0.38766	0.01631
Copper	mg/Kg WW	12.673 U	0.502 J	1.183	59.9%	7.5117 U	0.6507 J	1.041	41.0%	6.923 U	0.494	0.951	51.8%	5.9514 U	0.3945
Iron	mg/Kg WW	1081.7	11.295	71.177	85.0%	676.71	25.546	62.585	61.5%	304.01	11.18	32.015	67.6%	616.98	9.731
Lead	mg/Kg WW	0.7946	0.71284 J	0.717	6.2%	1.94034	4.338 J	4.202	2.6%	1.36353	2.0046 J	1.959	5.0%	0.6552	0.11835 J
Magnesium	mg/Kg WW	504.6	333.83	343.383	8.2%	348.21	361.5	360.744	5.5%	295.281	384.8	378.431	5.6%	262.08	389.24
Manganese	mg/Kg WW	46.69	4.5431	6.901	37.8%	22.338	5.8081	6.748	18.8%	18.963	6.76 J	7.628	17.7%	13.377	1.98039 J
Nickel	mg/Kg WW	30.16	0.3765	2.043	82.6%	2.6499	0.3615	0.492	30.7%	2.06185	0.338	0.461	31.8%	17.472	0.3419
Potassium	mg/Kg WW	2665.1	3388.5	3348.030	4.5%	2628	3735.5	3672.505	4.1%	2221.38	3458	3370.014	4.7%	1577.94	3550.5
Selenium	mg/Kg WW	1.0614	0.5773	0.604	9.8%	0.94389	0.76879	0.779	6.9%	0.82775	0.494	0.518	11.4%	0.819	0.4208
Silver	mg/Kg WW	0.0725	0.06024 U	0.061	6.7%	0.05475	0.05543 U	0.055	5.6%	0.07525	0.0624 U	0.063	8.5%	0.12558	0.06575 U
Sodium	mg/Kg WW	1374.6	1229.9	1237.995	6.2%	1752	1368.88	1390.672	7.2%	1387.61	1084.2	1105.788	8.9%	960.96	836.34
Thallium	mg/Kg WW	0.0725	0.06024 U	0.061	6.7%	0.05475	0.05543 U	0.055	5.6%	0.07525	0.0624 U	0.063	8.5%	0.12558	0.06575 U
Uranium	mg/Kg WW	0.05771	0.0191	0.021	15.2%	0.12308	0.01911	0.025	28.0%	0.04997	0.02392	0.026	13.8%	0.02353	0.00279
Vanadium	mg/Kg WW	2.059	0.12048	0.229	50.3%	1.09719	0.11809	0.174	35.9%	0.5117	0.1014 U	0.131	27.9%	1.2012	0.1052 U
Zinc	mg/Kg WW	27.753	21.7868 J	22.121	7.0%	25.842	24.0759 J	24.176	6.1%	25.886	23.218	23.408	7.9%	15.6702	13.2552
Mercury															
Mercury	µg/Kg WW		-	-			-	-			-	-			-
Arsenic Species															
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ASB + Cation	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conventionals															
Lipids	%	-	4.3	NC	NC	-	1.8	NC	NC	-	4.3	NC	NC	-	5.4
Moisture	%	71	74.9	NC	NC	78.1	75.9	NC	NC	69.9	74	NC	NC	45.4	73.7

[a] G indicates a gut/contents sample from an individual largescale sucker.

[b] W followed by a 5-digit numeric code indicates a whole body sample with the gut/contents removed form an individual large scale sucker.

[c] EW indicates estimated whole body. The estimated whole body concentration for the individual largescale sucker was calculated as a weighted average of the gut/contents and the gutless whole body concentrations.

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TABLE D-2

Estimated Whole Body Results of TAL Metals, Mercury, and Arsenic Speciation for Individual Largescale Sucker Samples from FSCA 3

Upper Columbia River RI/FS

Analyte	Units	LS3EW40914 Primary Sample	Associated with Gut/ Contents	LS3G40915 Primary Sample	LS3W40915 Primary Sample	LS3EW40915 Primary Sample	% Associated with Gut/
TAL Metals							
Aluminum	mg/Kg WW	30.600	82.6%	65.326	4.539 J	8.324	48.9%
Antimony	mg/Kg WW	0.112	13.7%	0.1468	0.10146 U	0.104	8.8%
Arsenic	mg/Kg WW	0.148	26.2%	0.26057	0.14151	0.149	10.9%
Barium	mg/Kg WW	1.221	27.1%	1.31019	2.2962 J	2.235	3.7%
Beryllium	mg/Kg WW	0.006	16.2%	0.00734	0.00507 U	0.005	8.8%
Cadmium	mg/Kg WW	0.043	37.8%	0.4404	0.10413	0.125	21.9%
Calcium	mg/Kg WW	8809.448	0.4%	513.8	10626.6 J	9996.930	0.3%
Chromium	mg/Kg WW	2.301	80.0%	1.9084 J	0.3738	0.469	25.3%
Cobalt	mg/Kg WW	0.045	66.8%	0.06239	0.03471	0.036	10.7%
Copper	mg/Kg WW	0.828	56.1%	5.6885 U	0.4539	0.780	45.4%
Iron	mg/Kg WW	57.117	84.3%	146.433	15.6462	23.790	38.3%
Lead	mg/Kg WW	0.160	31.9%	0.28626	1.74351 J	1.653	1.1%
Magnesium	mg/Kg WW	379.317	5.4%	145.699	373.8	359.597	2.5%
Manganese	mg/Kg WW	2.870	36.4%	3.09381	5.9007 J	5.726	3.4%
Nickel	mg/Kg WW	1.679	81.2%	0.6973	0.3204	0.344	12.6%
Potassium	mg/Kg WW	3396.572	3.6%	2286.41	3497.7	3422.280	4.2%
Selenium	mg/Kg WW	0.452	14.1%	0.93585	0.5607	0.584	10.0%
Silver	mg/Kg WW	0.070	13.9%	0.09175	0.06141 U	0.063	9.0%
Sodium	mg/Kg WW	846.065	8.9%	1247.8	1038.63	1051.654	7.4%
Thallium	mg/Kg WW	0.070	13.9%	0.09175	0.06141 U	0.063	9.0%
Uranium	mg/Kg WW	0.004	41.7%	0.00973	0.02248	0.022	2.8%
Vanadium	mg/Kg WW	0.191	49.1%	0.24956	0.10146 U	0.111	14.0%
Zinc	mg/Kg WW	13.444	9.1%	17.249	23.9499	23.533	4.6%
Mercury							
Mercury	µg/Kg WW	-			-	-	
Arsenic Species							
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	15.047 J	10.947 U	11.2022849	8.4%
ASB + Cation	µg/Kg WW	-	-	11.377 J	2.136 J	2.711387255	26.1%
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	16.882 J	4.806 J	5.557907423	18.9%
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	15.047 U	10.947 U	11.2022849	8.4%
Unknown	µg/Kg WW	-	-	13.212 J	10.68 J	10.83765399	7.6%
Conventionals							
Lipids	%	NC	NC	-	5.1	NC	NC
Moisture	%	NC	NC	63.3	73.3	NC	NC

[a] G indicates a gut/contents sample from an individual largescale sucker.

[b] W followed by a 5-digit numeric code indicates a whole body sample with the gut/contents removed form an individual large scale sucker.

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TABLE D-3
Estimated Whole Body Results of TAL Metals, Mercury, and Arsenic Speciation for Individual Largescale Sucker Samples from FSCA 6
Upper Columbia River RI/FS

Analyte	Units	LS6G50727 Primary Sample	LS6W50727 Primary Sample	LS6EW50727 Primary Sample	Associated with Gut/ Contents	LS6G50732 Primary Sample	LS6W50732 Primary Sample	LS6EW50732 Primary Sample	Associated with Gut/ Contents	LS6G50734 Primary Sample	LS6W50734 Primary Sample	LS6EW50734 Primary Sample	Associated with Gut/ Contents	LS6G50744 Primary Sample	LS6W50744 Primary Sample	LS6EW50744 Primary Sample	Associated with Gut/ Contents	LS6G5074 Primary Sample
TAL Metals																		
Aluminum	mg/Kg WW	56.115	4.8 U	7.986	43.6%	29.3514	3.71 U	4.982	29.2%	1253.16	13.6404	112.553	88.8%	117.072	3.8624 U	13.288	73.4%	149.941
Antimony	mg/Kg WW	0.10179	0.1248 U	0.123	5.1%	0.11766	0.1007 U	0.102	5.7%	0.2124	0.11988 U	0.127	13.3%	0.10569	0.10336 U	0.104	8.5%	0.12046
Arsenic	mg/Kg WW	0.4698	0.2144	0.230	12.7%	0.24804	0.19875	0.201	6.1%	1.60893	0.081	0.203	63.3%	0.3794	0.13872	0.159	19.9%	0.3487
Barium	mg/Kg WW	2.8188	1.9776 J	2.030	8.6%	0.4452	1.68275 J	1.621	1.4%	17.3106	2.55312 J	3.731	37.0%	3.5501	3.264 J	3.288	9.0%	3.6455
Beryllium	mg/Kg WW	0.00496	0.00608 U	0.006	5.1%	0.00604	0.00504 U	0.005	5.9%	0.04567	0.00616 U	0.009	39.1%	0.0065	0.00517 U	0.005	10.2%	0.00602
Cadmium	mg/Kg WW	1.9836	0.3008	0.405	30.4%	0.96672	0.14575	0.186	25.7%	0.6903	0.23976	0.276	20.0%	0.78048	0.16592	0.217	29.9%	1.01757
Calcium	mg/Kg WW	2563.02	7840 J	7512.335	2.1%	167.268	11660 J	11089.918	0.1%	2208.96	7938 J	7480.826	2.4%	1704.59	12566.4 J	11662.028	1.2%	735.44
Chromium	mg/Kg WW	1.25541	0.8128	0.840	9.3%	2.00022	0.76055	0.822	12.1%	22.302	0.5508	2.287	77.8%	6.7479	0.4624	0.986	57.0%	5.5792
Cobalt	mg/Kg WW	0.10179	0.0352	0.039	16.1%	0.0636	0.02306	0.025	12.6%	0.7965	0.04536	0.105	60.4%	0.14634	0.04624	0.055	22.3%	0.1585
Copper	mg/Kg WW	3.8628 U	0.608	0.810	29.6%	7.3776 U	0.371	0.719	50.9%	4.17897	0.5508	0.840	39.7%	2.6558	0.544	0.720	30.7%	5.8962
Iron	mg/Kg WW	95.526	10.88 J	16.136	36.8%	102.078	10.07 J	14.634	34.6%	2086.83	28.2204 J	192.496	86.5%	258.534	11.424 J	31.999	67.3%	351.87
Lead	mg/Kg WW	0.13572	0.352	0.339	2.5%	0.06996	0.2915	0.281	1.2%	1.062	0.4536	0.502	16.9%	0.16531	0.5168	0.488	2.8%	0.19654
Magnesium	mg/Kg WW	173.304	289.28	282.079	3.8%	129.426	307.4	298.572	2.2%	908.01	293.22	342.280	21.2%	173.982	318.24	306.229	4.7%	213.975
Manganese	mg/Kg WW	10.6488	2.3744 J	2.888	22.9%	1.72356	2.6182 J	2.574	3.3%	47.5776	6.156 J	9.461	40.1%	11.653	4.5968 J	5.184	18.7%	8.8443
Nickel	mg/Kg WW	0.4698	0.2112	0.227	12.8%	0.6996	0.2491	0.271	12.8%	11.2041	0.4212	1.282	69.8%	3.8482	0.2992	0.595	53.9%	3.05588
Potassium	mg/Kg WW	2056.68	2921.6	2867.894	4.5%	2318.22	3206.5	3162.438	3.6%	1784.16	3074.76	2971.771	4.8%	1861.77	2711.84	2641.062	5.9%	2149.26
Selenium	mg/Kg WW	0.93177	0.608	0.628	9.2%	0.94764	0.477	0.500	9.4%	0.9027	0.3888	0.430	16.8%	0.8672	0.544	0.571	12.6%	1.17607
Silver	mg/Kg WW	0.06264	0.0768 U	0.076	5.1%	0.07314	0.0636 U	0.064	5.7%	0.13275	0.07452 U	0.079	13.4%	0.06504	0.06528 U	0.065	8.3%	0.07608
Sodium	mg/Kg WW	1652.13	1072	1108.022	9.3%	1682.22	1179.25	1204.199	6.9%	945.18	1014.12	1008.619	7.5%	1674.78	1487.84	1503.405	9.3%	1451.86
Thallium	mg/Kg WW	0.06264	0.0768 U	0.076	5.1%	0.07314	0.0636 U	0.064	5.7%	0.13275	0.07452 U	0.079	13.4%	0.06504	0.06528 U	0.065	8.3%	0.07608
Uranium	mg/Kg WW	0.01028	0.0113	0.011	5.7%	0.00588	0.00684	0.007	4.3%	0.0977	0.01445	0.021	37.0%	0.0164	0.0102	0.011	12.7%	0.01934
Vanadium	mg/Kg WW	0.14877	0.1248 U	0.126	7.3%	0.13038	0.1007 U	0.102	6.3%	3.06387	0.11988 U	0.355	68.9%	0.3523	0.10336 U	0.124	23.6%	0.4438
Zinc	mg/Kg WW	15.4512	17.888	17.737	5.4%	16.8222	18.8415	18.741	4.5%	20.5497	17.2044	17.471	9.4%	12.6015	18.0064	17.556	6.0%	17.0229
Mercury																		
Mercury	µg/Kg WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic Species																		
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	-	13.038 U	10.865 UJI	10.973	5.9%	-	-	-	-	-	-	-	-	-
ASB + Cation	µg/Kg WW	-	-	-	-	3.498 J	3.71 J	3.699	4.7%	-	-	-	-	-	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	15.264 J	7.95 J	8.313	9.1%	-	-	-	-	-	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	13.038 U	10.865 UJI	10.973	5.9%	-	-	-	-	-	-	-	-	-
Unknown	µg/Kg WW	-	-	-	-	25.44 J	24.645 J	24.684	5.1%	-	-	-	-	-	-	-	-	-
Conventionals																		
Lipids	%	-	12	NC	NC	-	6.2	NC	NC	-	13	NC	NC	-	6.9	NC	NC	-
Moisture	%	73.9	68	NC	NC	68.2	73.5	NC	NC	46.9	67.6	NC	NC	72.9	72.8	NC	NC	68.3

[a] G indicates a gut/contents sample from an individual largescale sucker.

[b] W followed by a 5-digit numeric code indicates a whole body sample with the gut/contents removed form an individual large scale sucker.

[c] EW indicates estimated whole body. The estimated whole body concentration for the individual largescale sucker was calculated as a weighted average of the gut/contents and the gutless whole body concentrations.

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TABLE D-3
Estimated Whole Body Results of TAL Metals, Mercury, and Arsenic Speciation for Individual Largescale Sucker Samples from FSCA 6
Upper Columbia River RI/FS

Analyte	47 Units	LS6W50747 Primary Sample	LS6EW50747 Primary Sample	Associated with Gut/ Contents	LS6G50734 Field Duplicate	LS6W50734 Field Duplicate	LS6EW50734 Field Duplicate	Associated with Gut/ Contents
TAL Metals								
Aluminum	mg/Kg WW	3.9712 U	11.051	65.8%	1102.1	13.8996	100.737	87.3%
Antimony	mg/Kg WW	0.10608 U	0.107	5.5%	0.214	0.12636 U	0.133	12.8%
Arsenic	mg/Kg WW	0.1496	0.159	10.6%	1.6585	0.21384	0.329	40.2%
Barium	mg/Kg WW	2.63296 J	2.682	6.6%	16.3175	2.48832 J	3.592	36.3%
Beryllium	mg/Kg WW	0.00517 U	0.005	5.6%	0.04601	0.00648 U	0.010	38.1%
Cadmium	mg/Kg WW	0.1496	0.192	25.7%	0.6955	0.4212	0.443	12.5%
Calcium	mg/Kg WW	10308.8 J	9844.473	0.4%	2295.15	7516.8 J	7100.115	2.6%
Chromium	mg/Kg WW	0.952	1.176	23.0%	19.0995	2.34576	3.683	41.4%
Cobalt	mg/Kg WW	0.02666	0.033	23.3%	0.8025	0.09396	0.151	42.6%
Copper	mg/Kg WW	0.3536	0.622	45.9%	4.2051	1.33164	1.561	21.5%
Iron	mg/Kg WW	11.696 J	28.195	60.5%	1979.5	28.4148 J	184.110	85.8%
Lead	mg/Kg WW	0.272	0.268	3.6%	1.0165	0.5832	0.618	13.1%
Magnesium	mg/Kg WW	340	333.888	3.1%	866.7	289.008	335.107	20.6%
Manganese	mg/Kg WW	2.448 J	2.758	15.6%	46.224	8.91 J	11.888	31.0%
Nickel	mg/Kg WW	0.2176	0.355	41.7%	9.3625	0.83268	1.513	49.4%
Potassium	mg/Kg WW	3400	3339.337	3.1%	1728.05	2964.6	2865.924	4.8%
Selenium	mg/Kg WW	0.2992	0.342	16.7%	0.963	0.486	0.524	14.7%
Silver	mg/Kg WW	0.06528 U	0.066	5.6%	0.13375	0.07776 U	0.082	13.0%
Sodium	mg/Kg WW	1292	1299.754	5.4%	941.6	955.8	954.667	7.9%
Thallium	mg/Kg WW	0.06528 U	0.066	5.6%	0.13375	0.07776 U	0.082	13.0%
Uranium	mg/Kg WW	0.00664	0.007	12.9%	0.09469	0.01584	0.022	34.1%
Vanadium	mg/Kg WW	0.10608 U	0.122	17.6%	2.84085	0.22032	0.429	52.8%
Zinc	mg/Kg WW	18.1968	18.140	4.6%	21.293	17.334	17.650	9.6%
Mercury								
Mercury	µg/Kg WW	-	-	-	-	-	-	-
Arsenic Species								
Arsenic ($As^{+}3$ + $AS^{+}5$)	µg/Kg WW	-	-	-	-	-	-	-
ASB + Cation	µg/Kg WW	-	-	-	-	-	-	-
Dimethylarsonic acid (DMA)	µg/Kg WW	-	-	-	-	-	-	-
Monomethylarsonic acid (MMA)	µg/Kg WW	-	-	-	-	-	-	-
Unknown	µg/Kg WW	-	-	-	-	-	-	-
Conventionals								
Lipids	%	5.9	NC	NC	-	13	NC	NC
Moisture	%	72.8	NC	NC	46.5	67.6	NC	NC

[a] G indicates a gut/contents sample from an individual largescale sucker.

[b] W followed by a 5-digit numeric code indicates a whole body sample with the gut/contents removed form an individual large scale sucker.

[c] EW indicates estimated whole body. The estimated whole body concentration for the individual largescale sucker was calculated as a weighted average of the gut/contents and the gutless whole body concentrations.

- not analyzed

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

APPENDIX E

Comparison of Preliminary Contaminant of Interest Concentrations by River Reach

APPENDIX E

Comparison of Preliminary Contaminant of Interest Concentrations by River Reach

This appendix contains the following figures:

FIGURE E-1
Mean Concentrations of Aluminum in Walleye by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals by Tissue Type
Upper Columbia River RI/FS

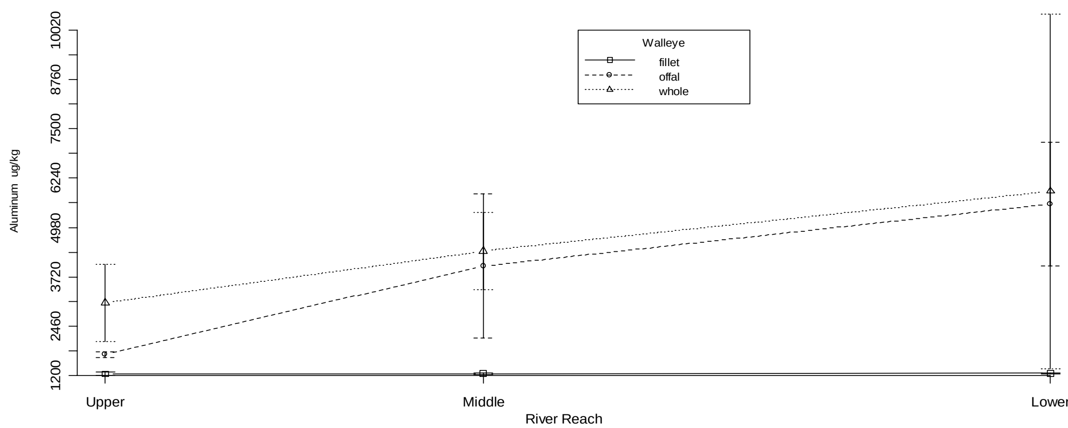


FIGURE E-2
Mean Concentrations of Arsenic in Walleye by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals by Tissue Type
Upper Columbia River RI/FS

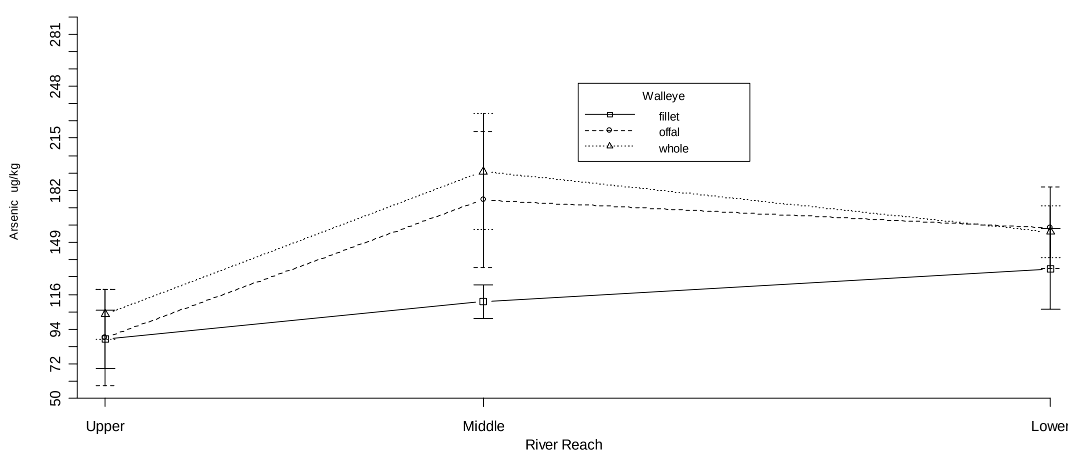


FIGURE E-3
Mean Concentrations of Barium in Walleye by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals by Tissue Type
Upper Columbia River RI/FS

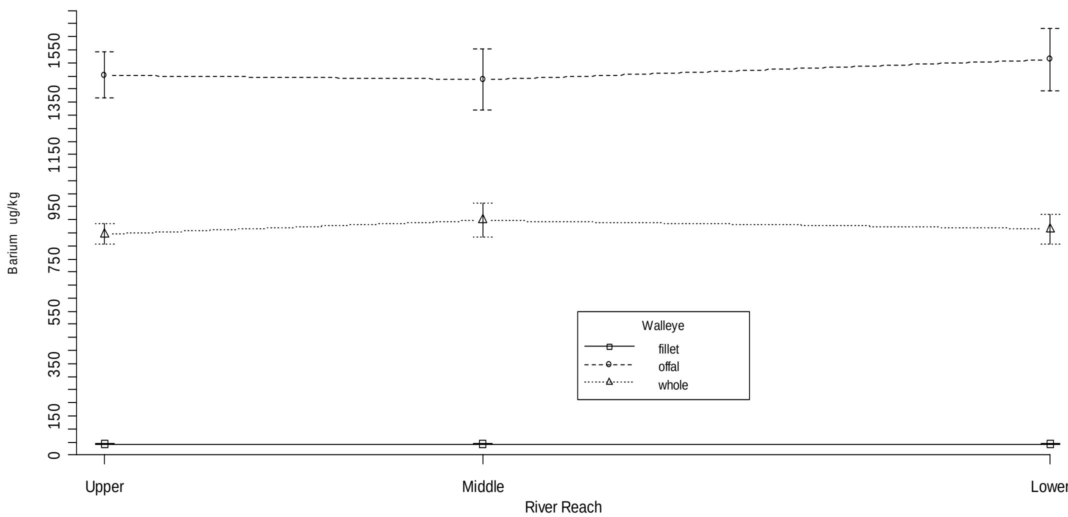


FIGURE E-4
Mean Concentrations of Cadmium in Walleye by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals by Tissue Type
Upper Columbia River RI/FS

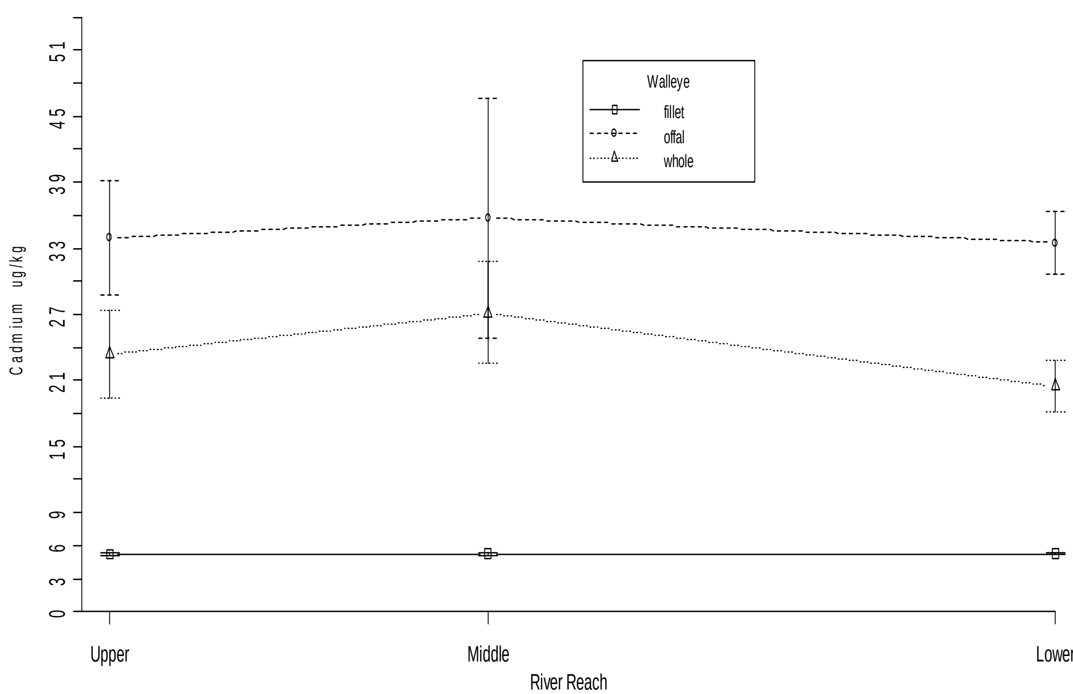


FIGURE E-5
Mean Concentrations of Chromium in Walleye by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals by Tissue Type
Upper Columbia River RI/FS

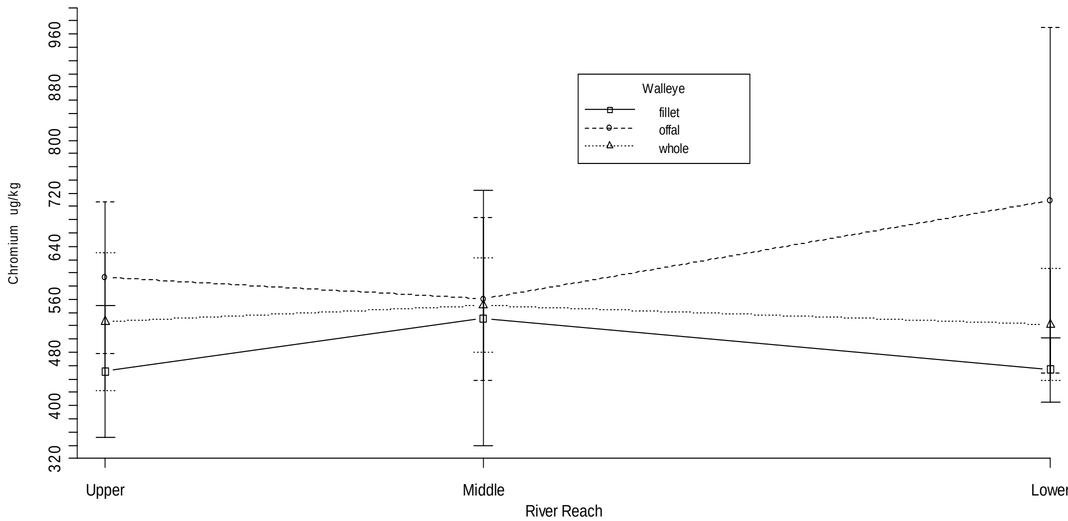


FIGURE E-6
Mean Concentrations of Copper in Walleye by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals by Tissue Type
Upper Columbia River RI/FS

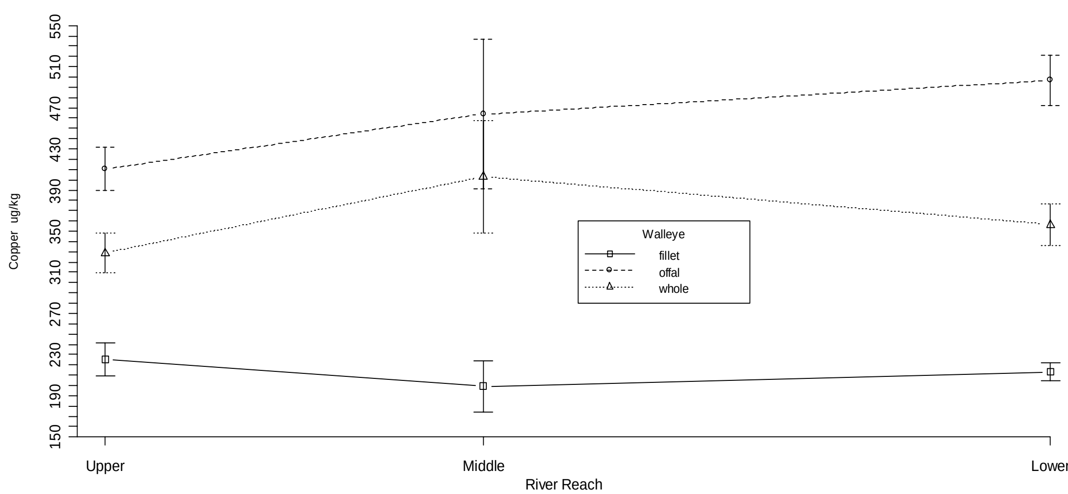


FIGURE E-7
Mean Concentrations of Iron in Walleye by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals by Tissue Type
Upper Columbia River RI/FS

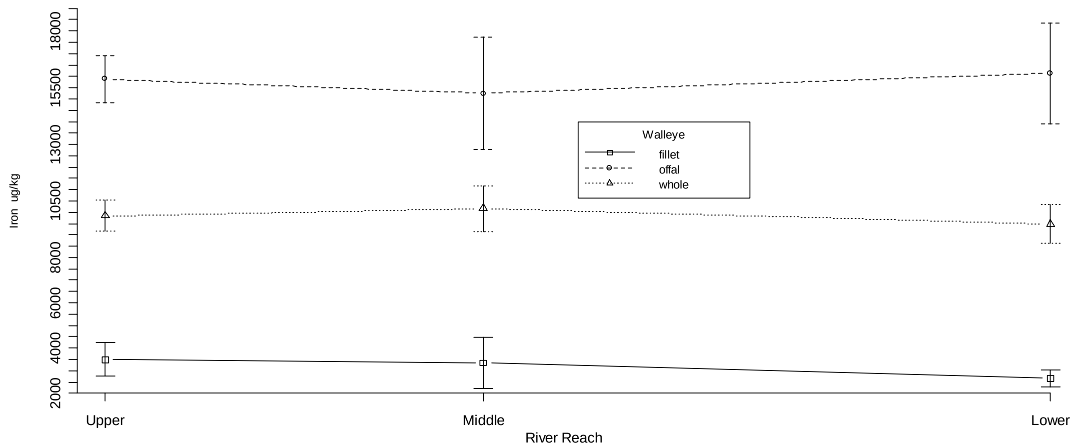


FIGURE E-8
Mean Concentrations of Lead in Walleye by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals by Tissue Type
Upper Columbia River RI/FS

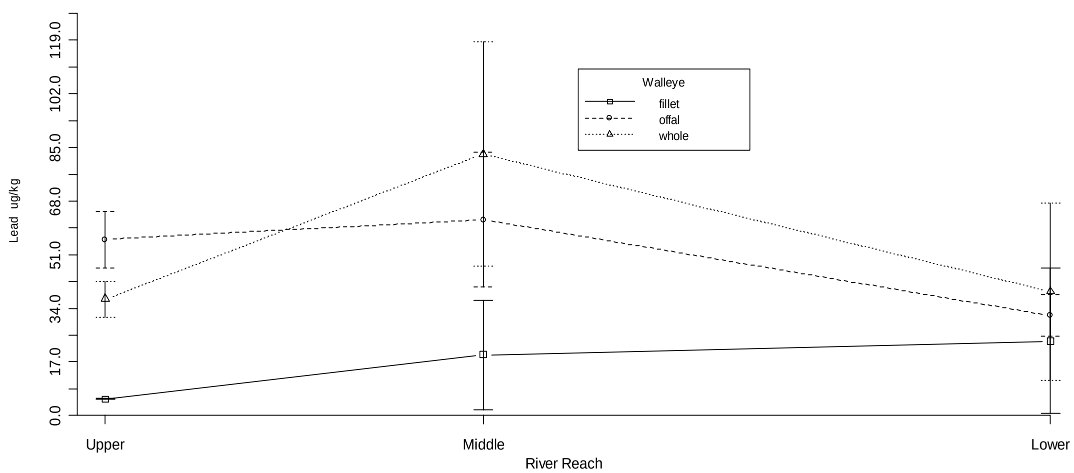


FIGURE E-9
Mean Concentrations of Nickel in Walleye by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals by Tissue Type
Upper Columbia River RI/FS

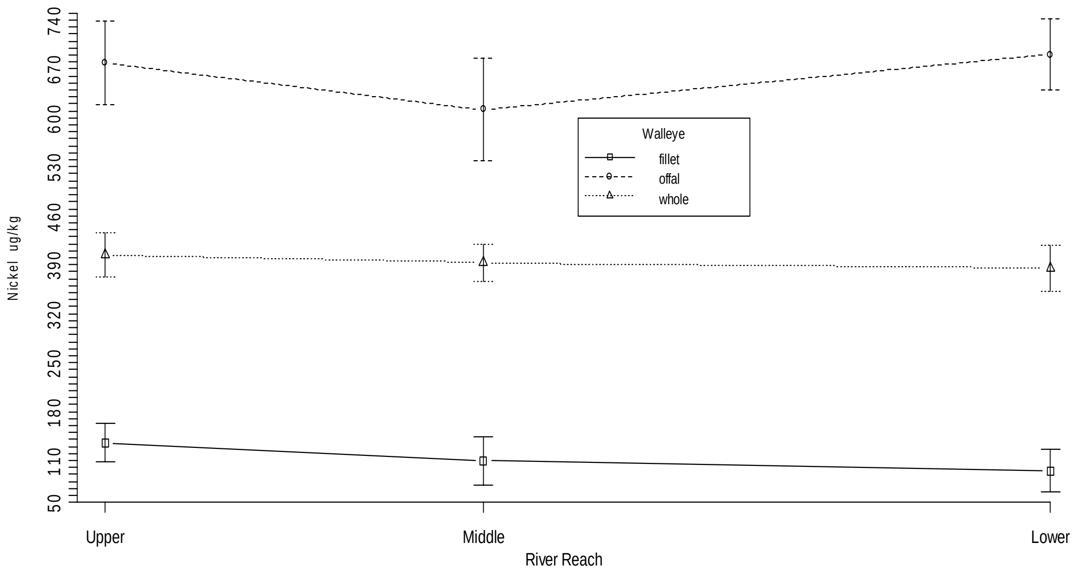


FIGURE E-10
Mean Concentrations of Selenium in Walleye by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals by Tissue Type
Upper Columbia River RI/FS

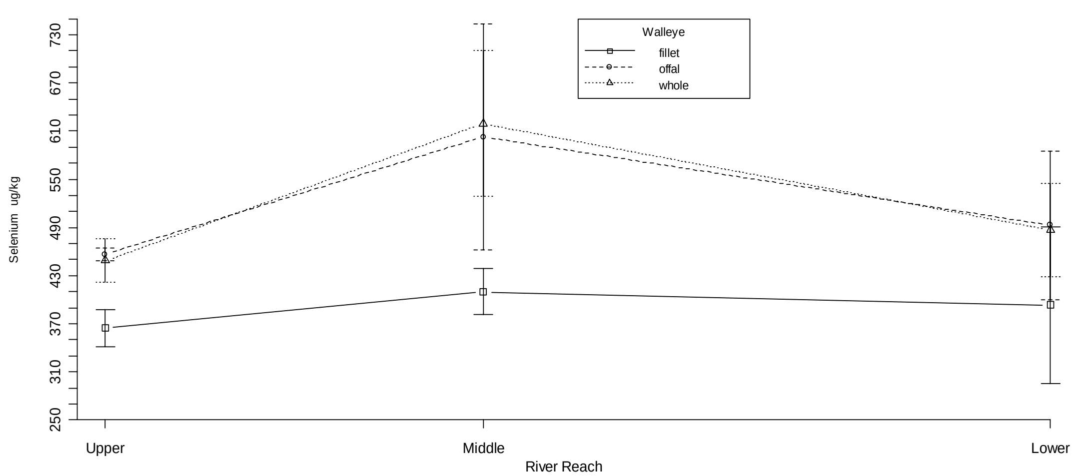


FIGURE E-11
Mean Concentrations of Uranium in Walleye by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals by Tissue Type
Upper Columbia River RI/FS

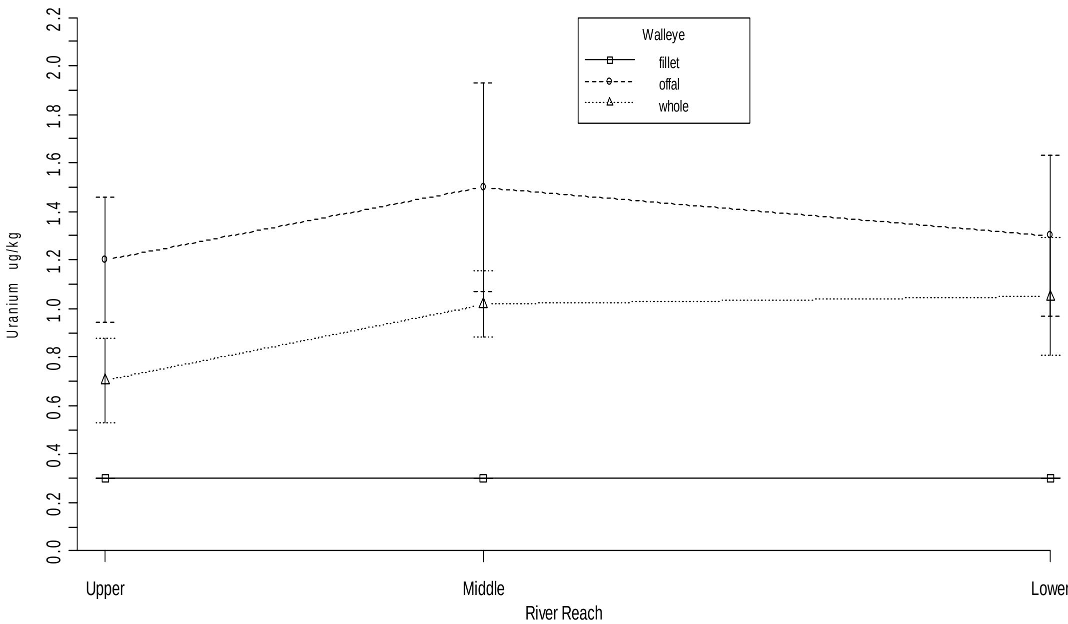


FIGURE E-12
Mean Concentrations of Zinc in Walleye by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals by Tissue Type
Upper Columbia River RI/FS

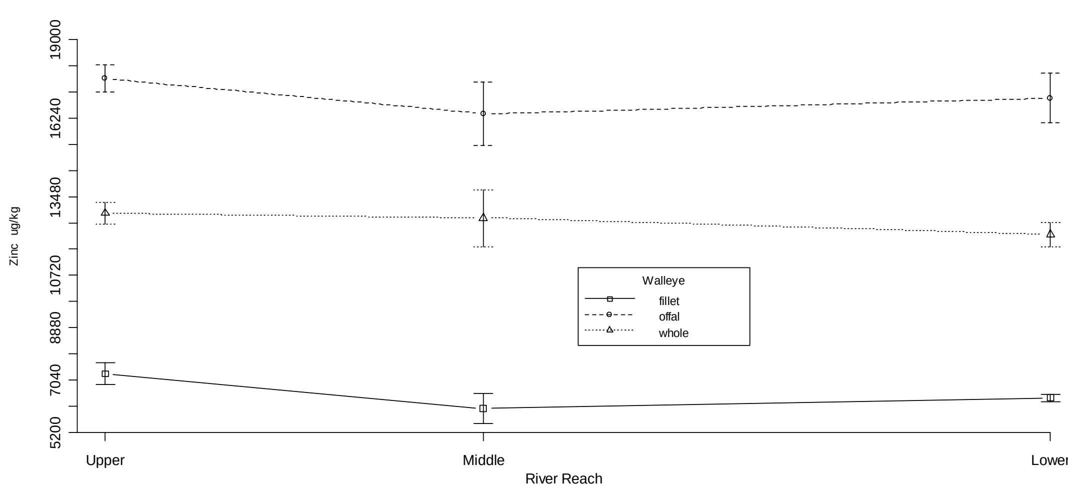


FIGURE E-13
Mean Concentrations of Mercury in Walleye by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals by Tissue Type
Upper Columbia River RI/FS

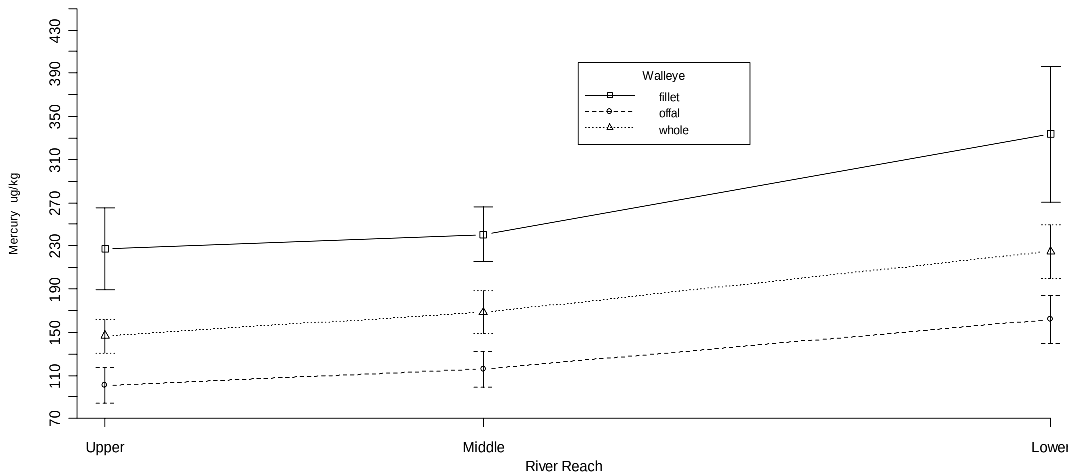


FIGURE E-14
Mean Concentrations of Total PCB in Walleye by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals by Tissue Type
Upper Columbia River RI/FS

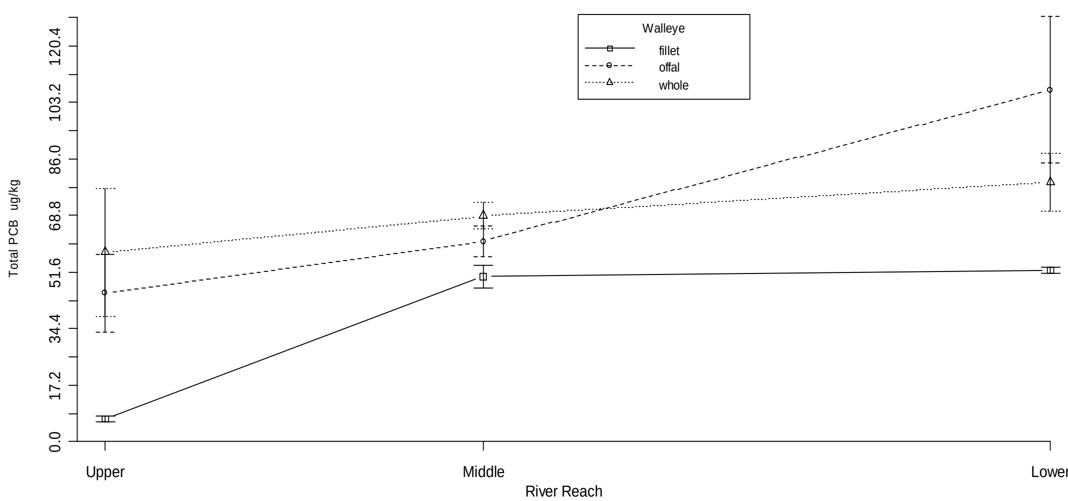


FIGURE E-15
Mean Concentrations of TCDF in Walleye by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals by Tissue Type
Upper Columbia River RI/FS

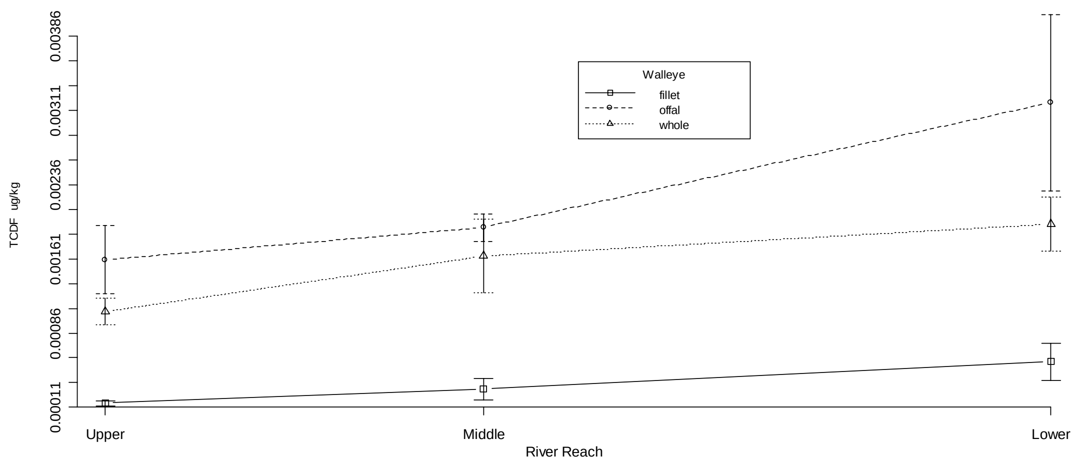


FIGURE E-16
Mean Concentrations of Aluminum in Whole Hatchery and Wild Rainbow Trout by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

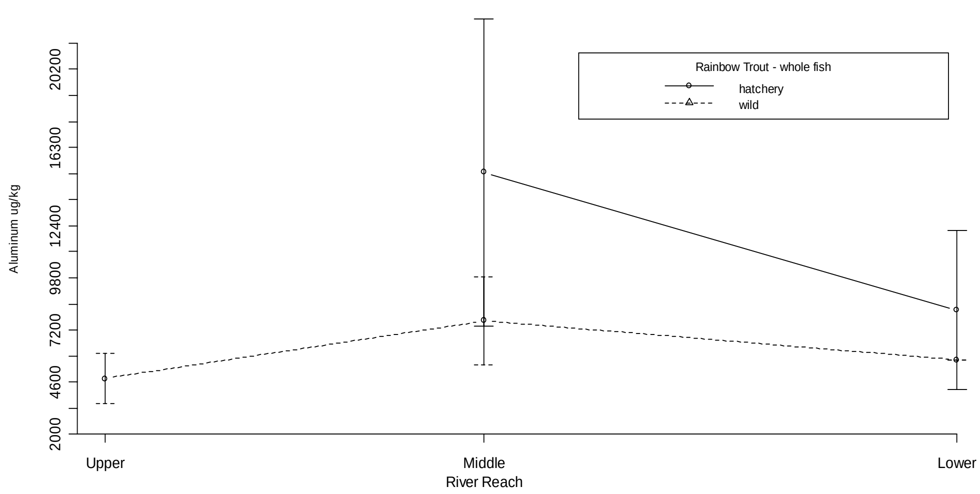


FIGURE E-17
Mean Concentrations of Arsenic in Whole Hatchery and Wild Rainbow Trout by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

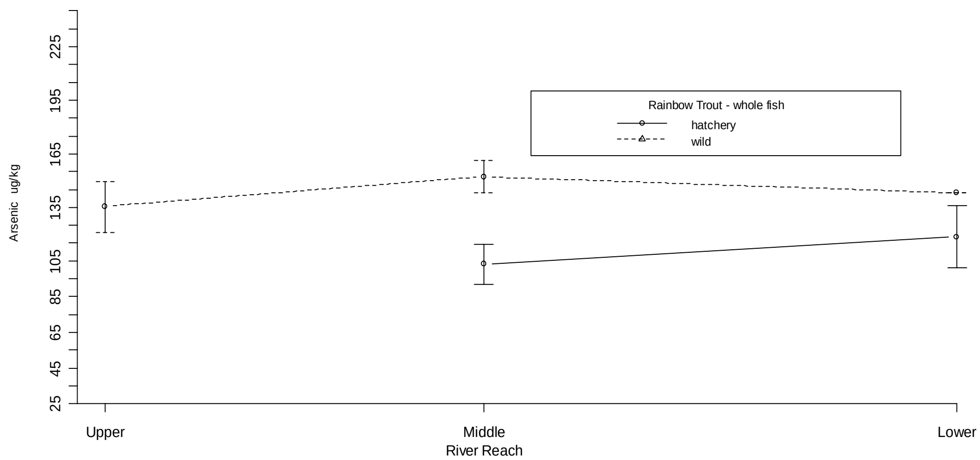


FIGURE E-18
Mean Concentrations of Barium in Whole Hatchery and Wild Rainbow Trout by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

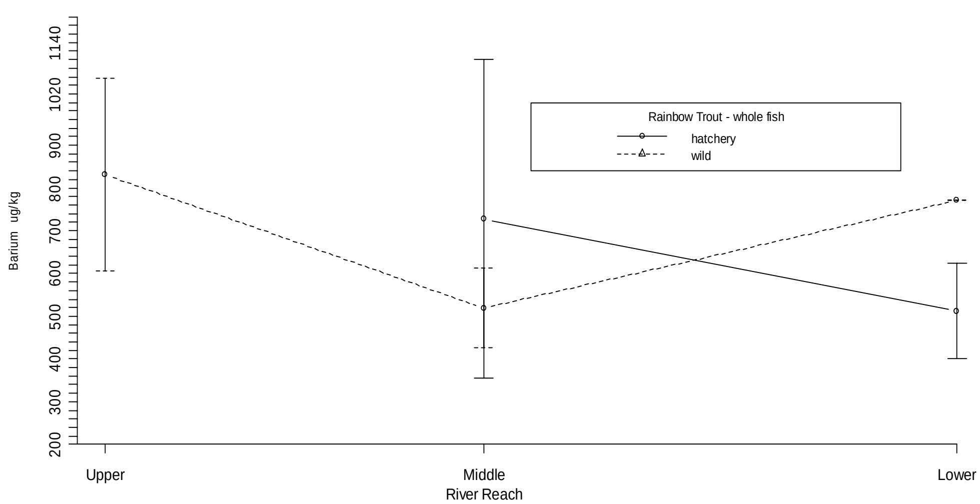


FIGURE E-19
Mean Concentrations of Cadmium in Whole Hatchery and Wild Rainbow Trout by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

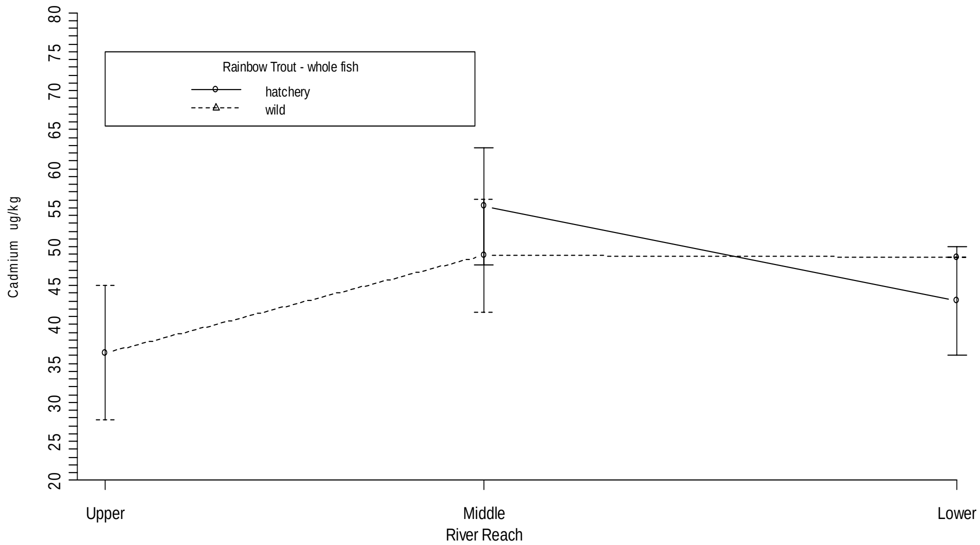


FIGURE E-20
Mean Concentrations of Chromium in Whole Hatchery and Wild Rainbow Trout by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

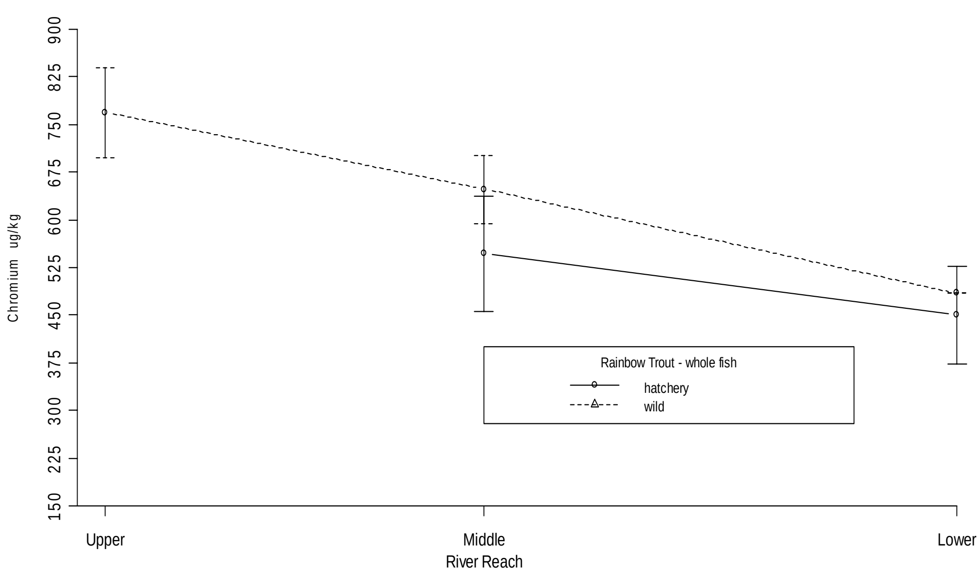


FIGURE E-21
Mean Concentrations of Copper in Whole Hatchery and Wild Rainbow Trout by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

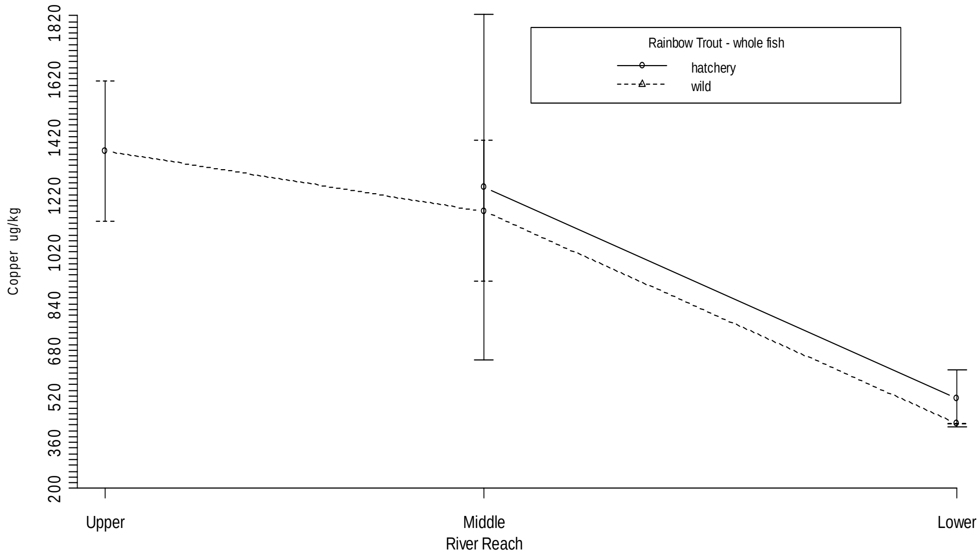


FIGURE E-22
Mean Concentrations of Iron in Whole Hatchery and Wild Rainbow Trout by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

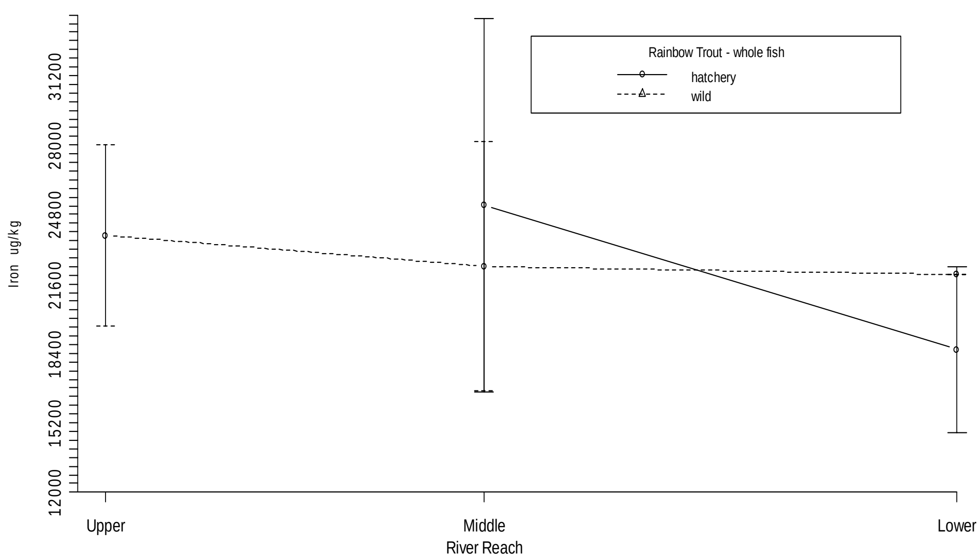


FIGURE E-23
Mean Concentrations of Lead in Whole Hatchery and Wild Rainbow Trout by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

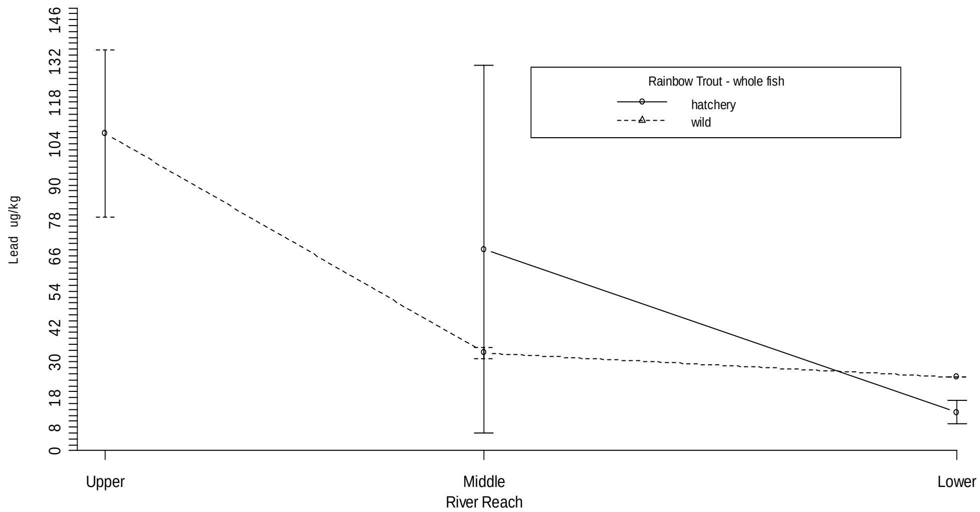


FIGURE E-24
Mean Concentrations of Nickel in Whole Hatchery and Wild Rainbow Trout by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

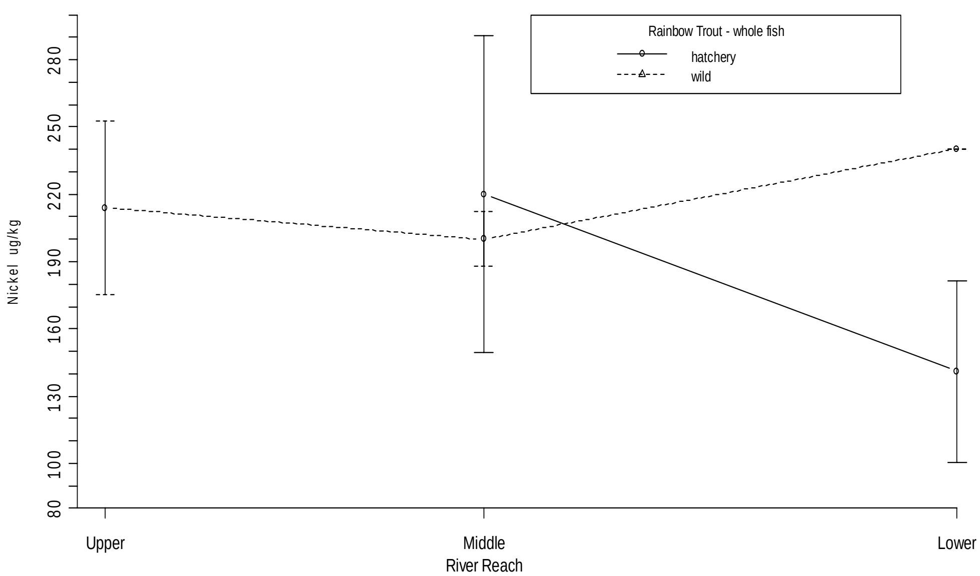


FIGURE E-25
Mean Concentrations of Selenium in Whole Hatchery and Wild Rainbow Trout by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

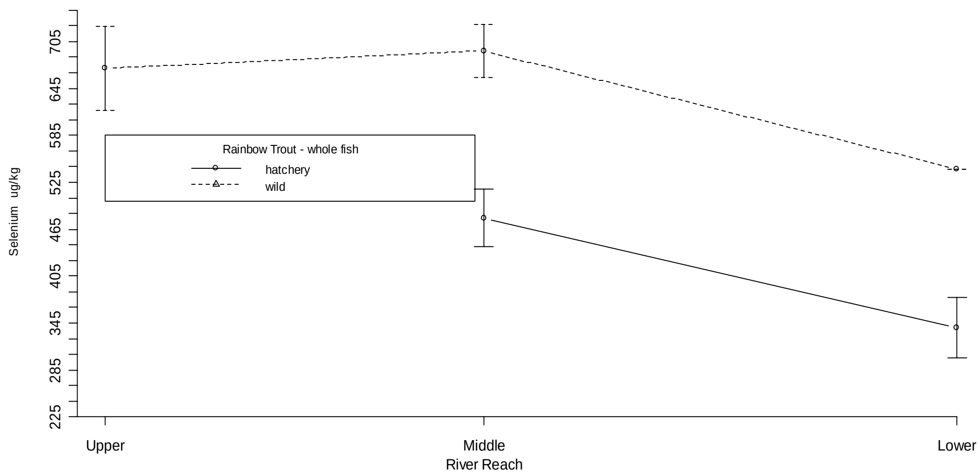


FIGURE E-26
Mean Concentrations of Uranium in Whole Hatchery and Wild Rainbow Trout by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

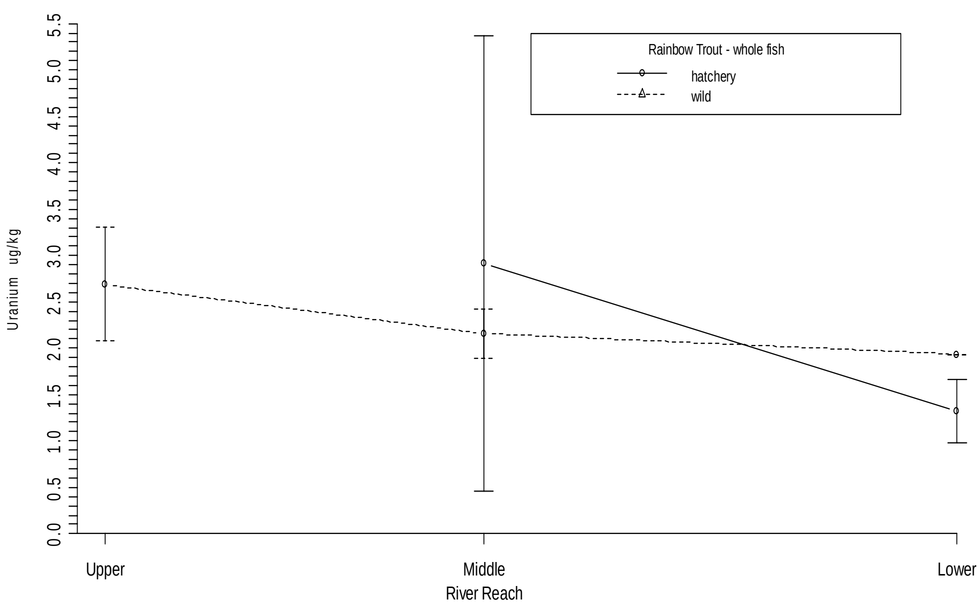


FIGURE E-27
Mean Concentrations of Zinc in Whole Hatchery and Wild Rainbow Trout by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

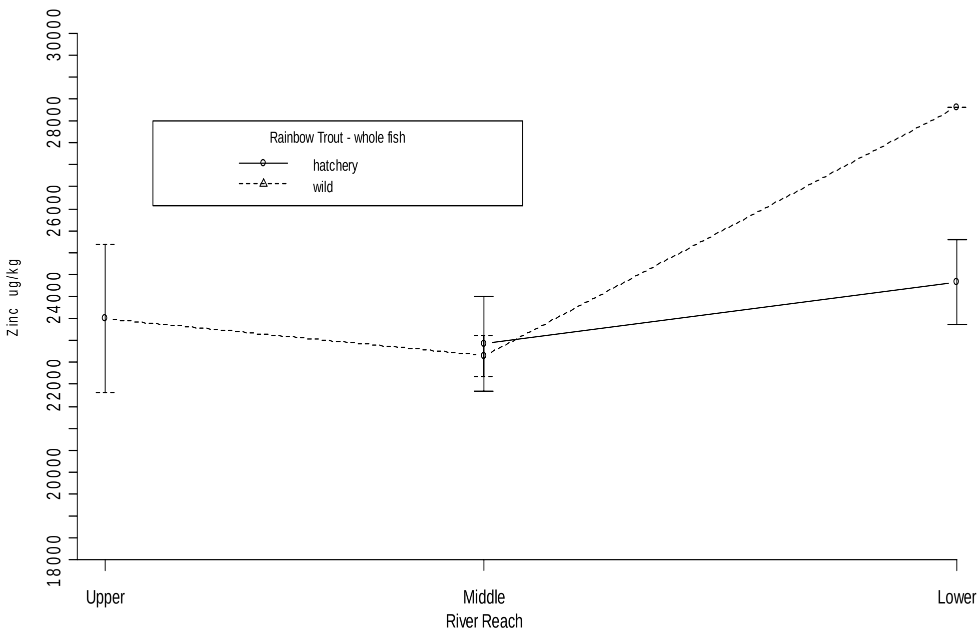


FIGURE E-28
Mean Concentrations of Mercury in Whole Hatchery and Wild Rainbow Trout by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

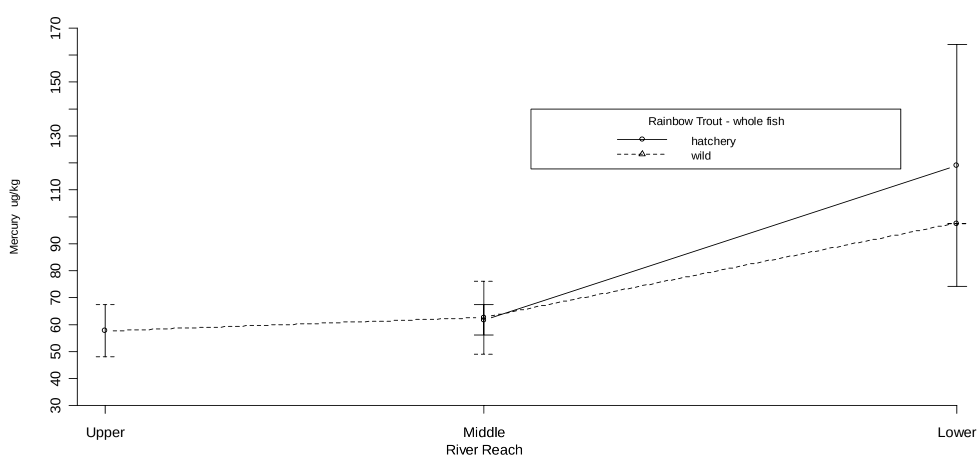


FIGURE E-29
Mean Concentrations of Total PCB in Whole Hatchery and Wild Rainbow Trout by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

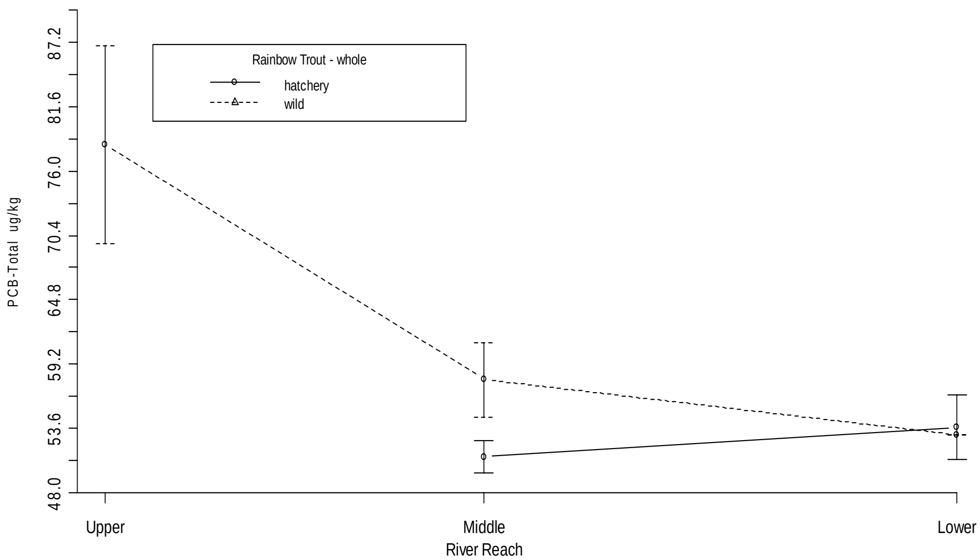


FIGURE E-30
Mean Concentrations of TCDF in Whole Hatchery and Wild Rainbow Trout by River Reach (Upper, Middle, and Lower) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

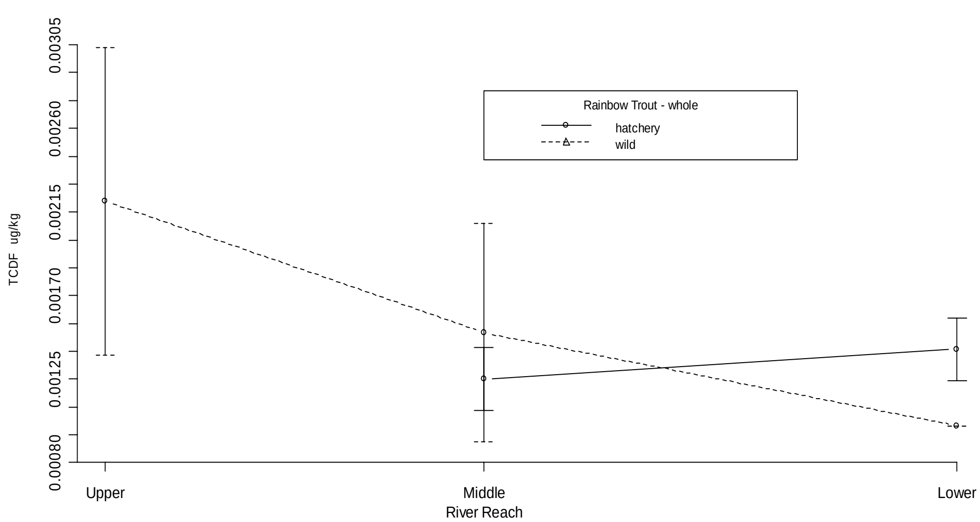


FIGURE E-31
Mean Concentration of Aluminum in Whole Lake Whitefish by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

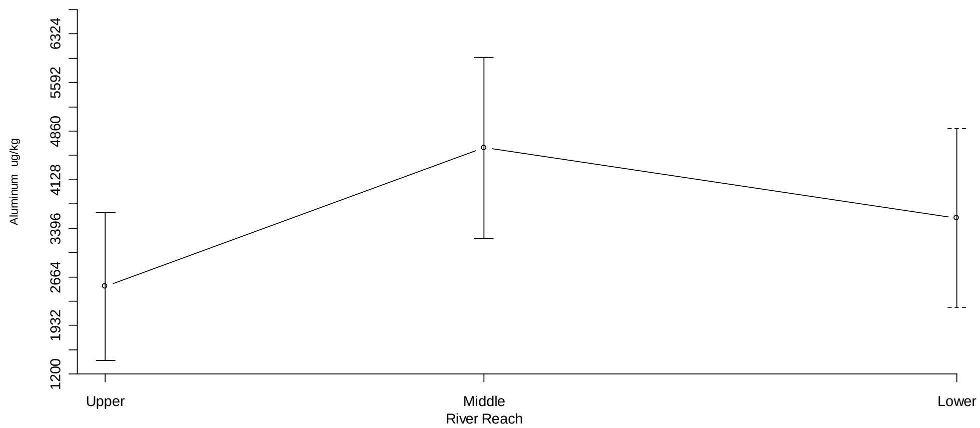


FIGURE E-32
Mean Concentration of Arsenic in Whole Lake Whitefish by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

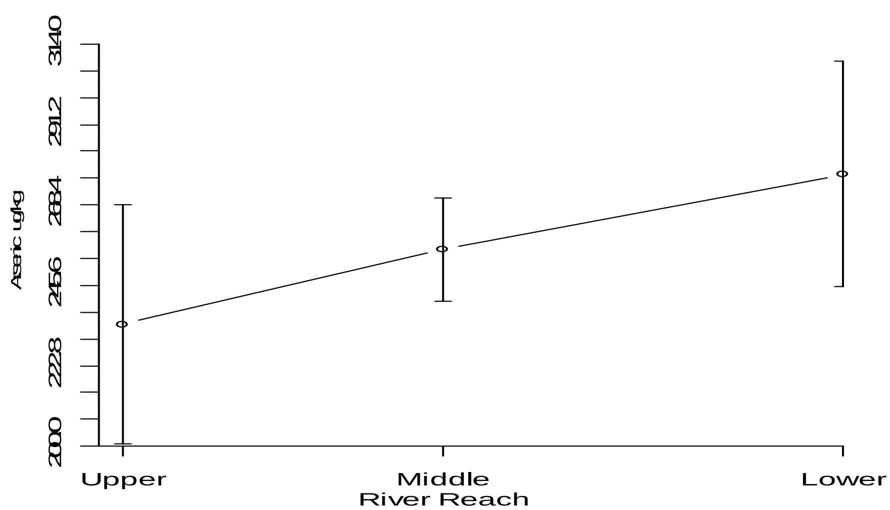


FIGURE E-33
Mean Concentration of Barium in Whole Lake Whitefish by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

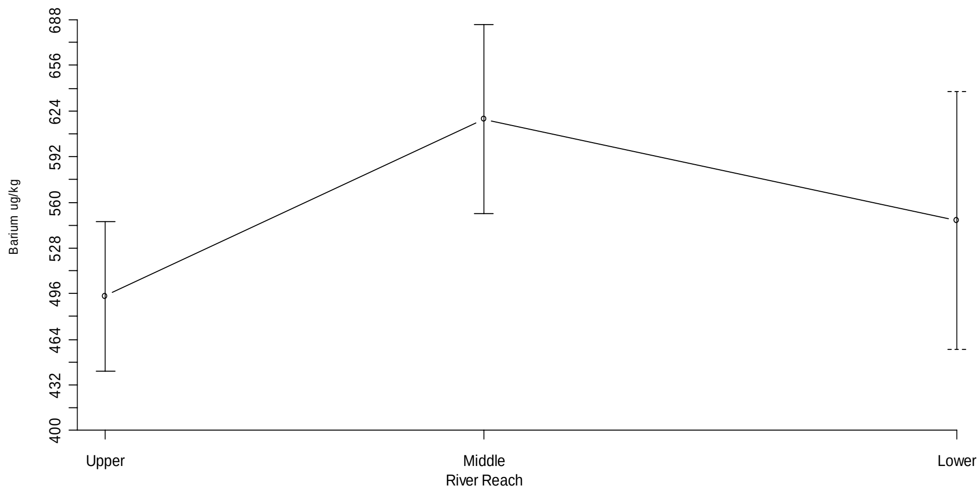


FIGURE E-34
Mean Concentration of Cadmium in Whole Lake Whitefish by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

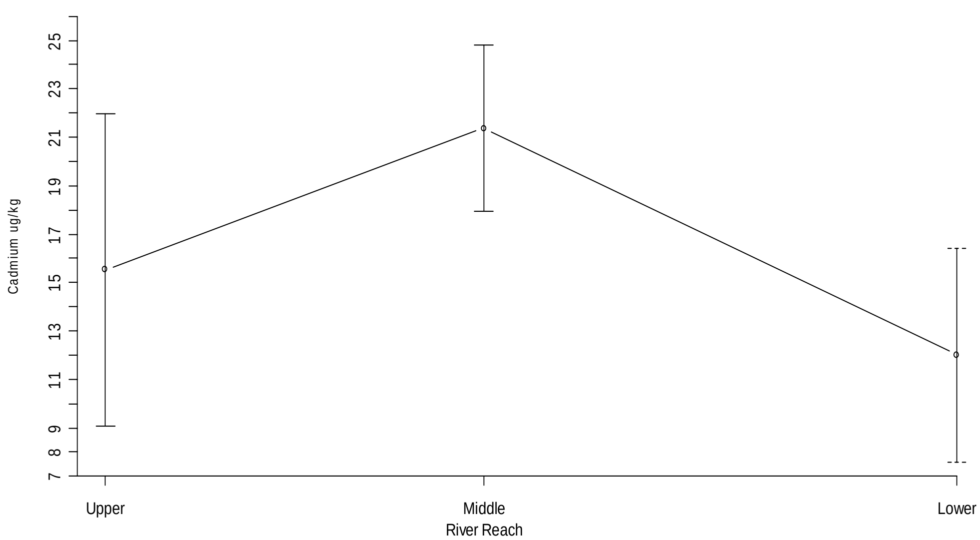


FIGURE E-35
Mean Concentration of Chromium in Whole Lake Whitefish by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

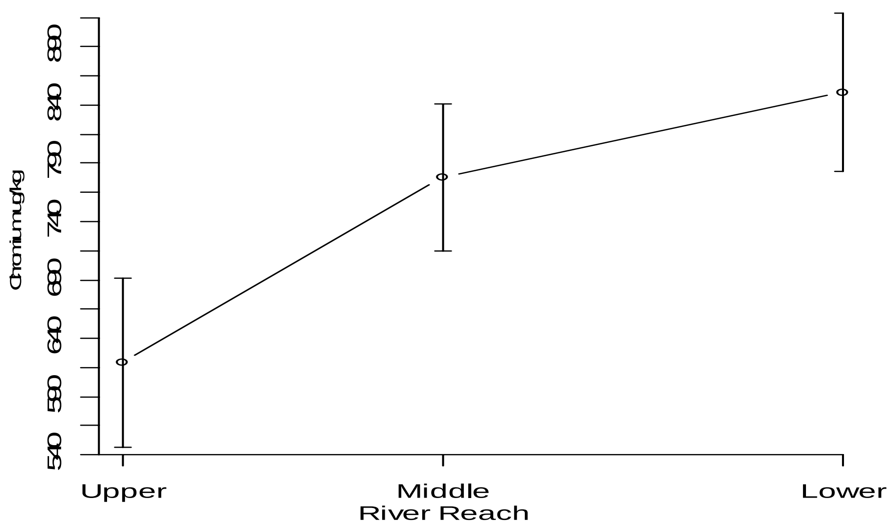


FIGURE E-36
Mean Concentration of Copper in Whole Lake Whitefish by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

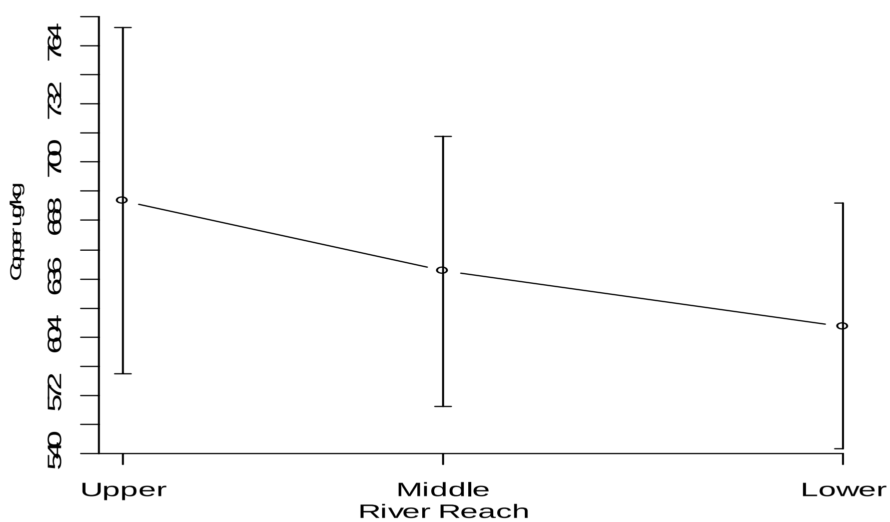


FIGURE E-37
Mean Concentration of Iron in Whole Lake Whitefish by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

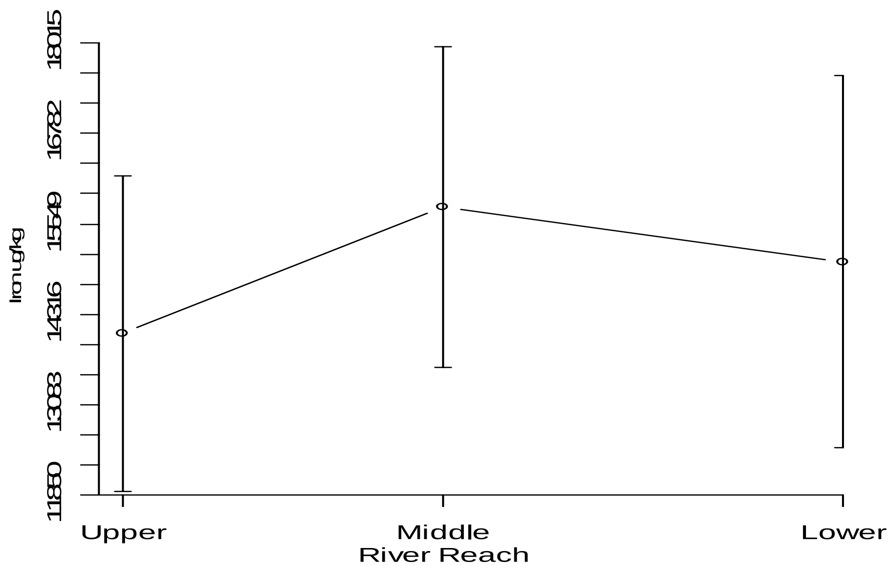


FIGURE E-38
Mean Concentration of Lead in Whole Lake Whitefish by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

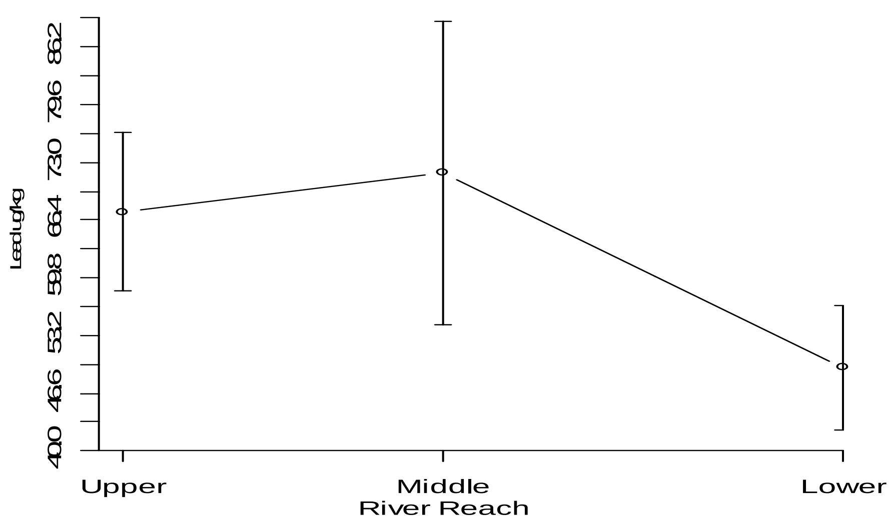


FIGURE E-39
Mean Concentration of Nickel in Whole Lake Whitefish by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

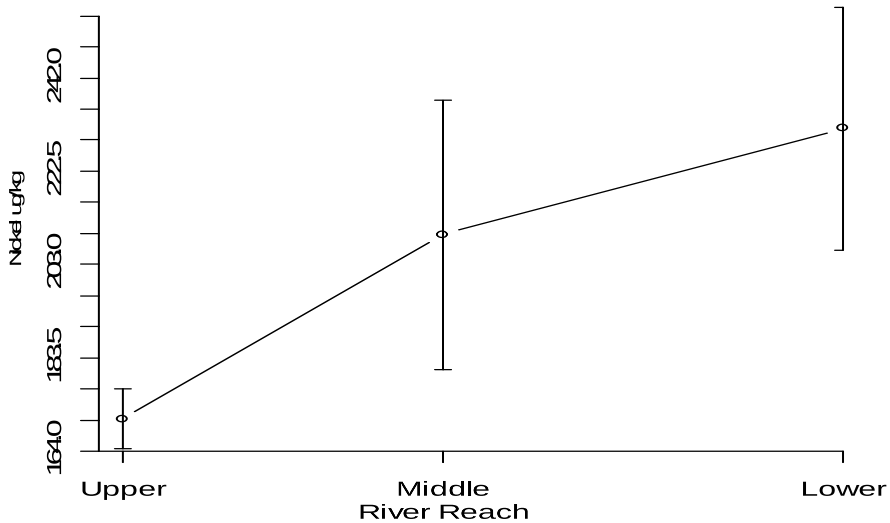


FIGURE E-40
Mean Concentration of Selenium in Whole Lake Whitefish by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

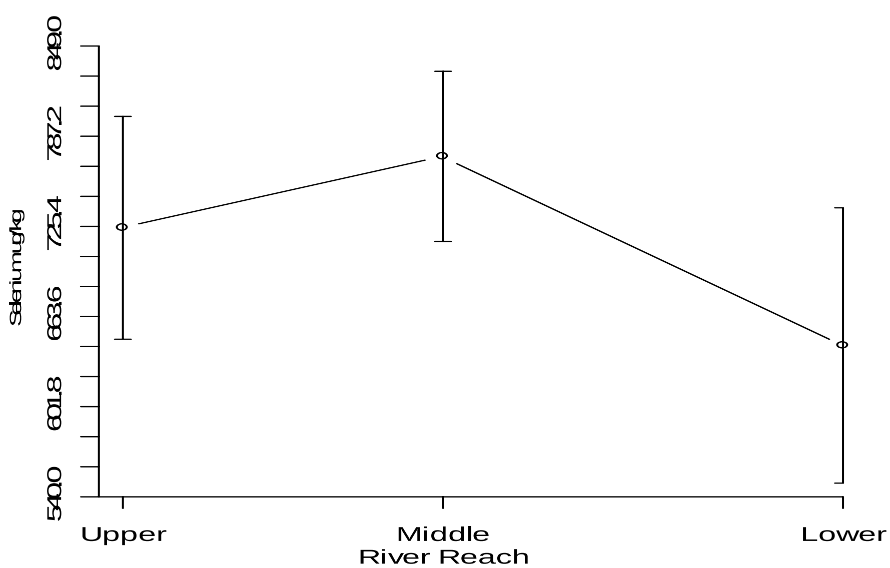


FIGURE E-41
Mean Concentration of Uranium in Whole Lake Whitefish by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

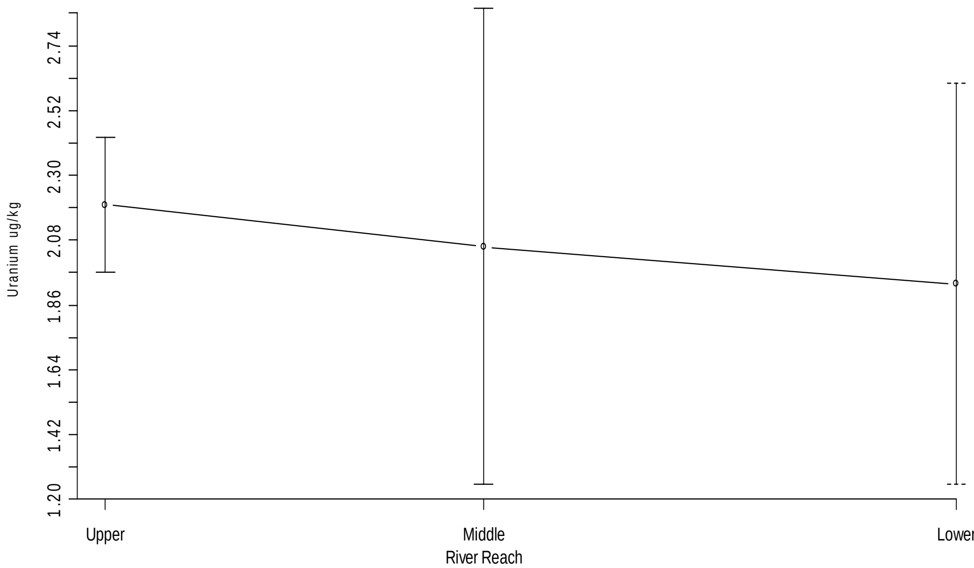


FIGURE E-42
Mean Concentration of Zinc in Whole Lake Whitefish by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

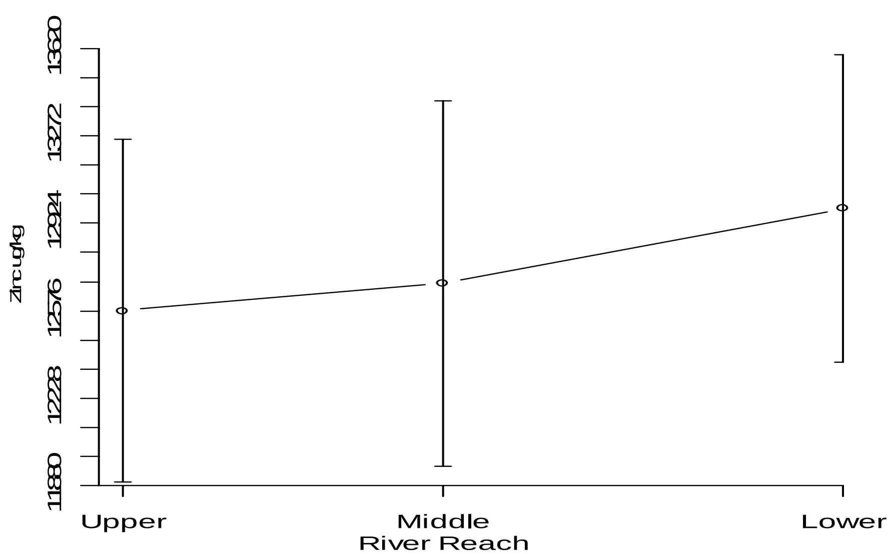


FIGURE E-43
Mean Concentration of Mercury in Whole Lake Whitefish by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

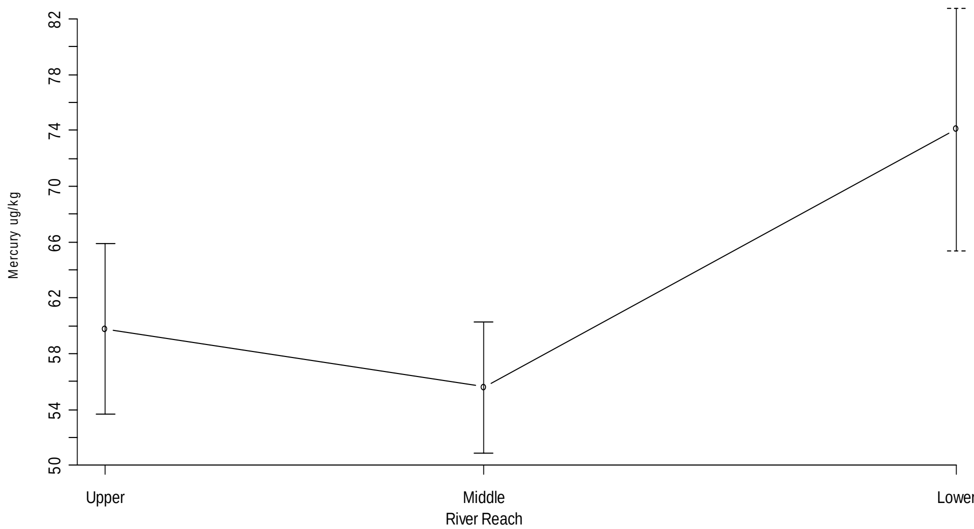


FIGURE E-44
Mean Concentration of Total PCB in Whole Lake Whitefish by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

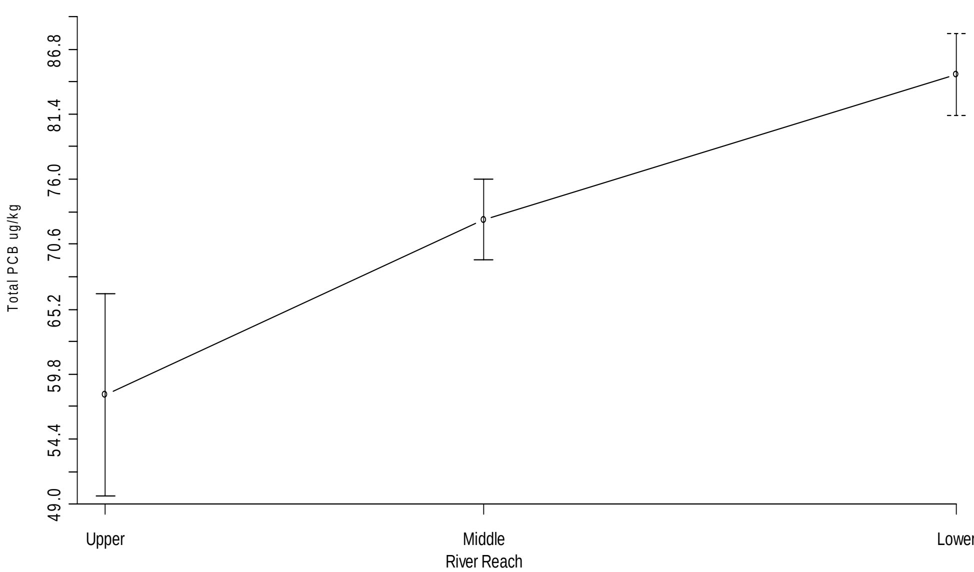


FIGURE E-45
Mean Concentration of TCDF in Whole Lake Whitefish by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

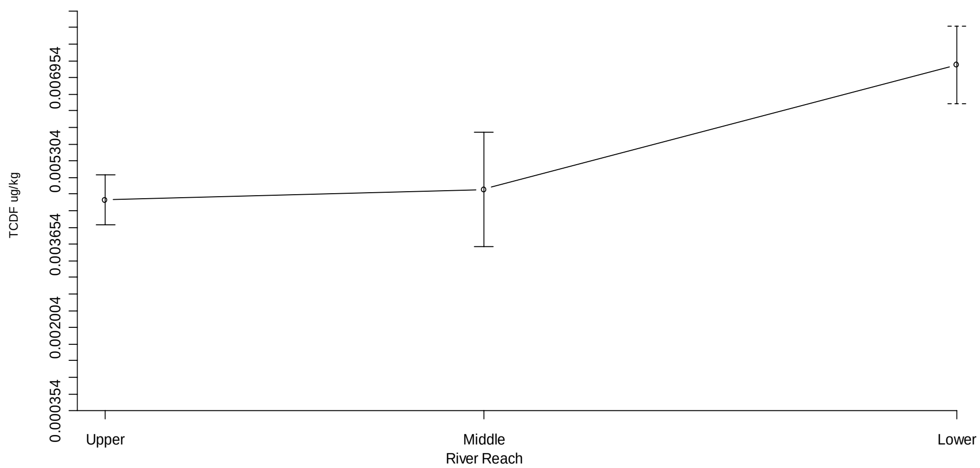


FIGURE E-46
Mean Concentration of Aluminum in Whole Sucker by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

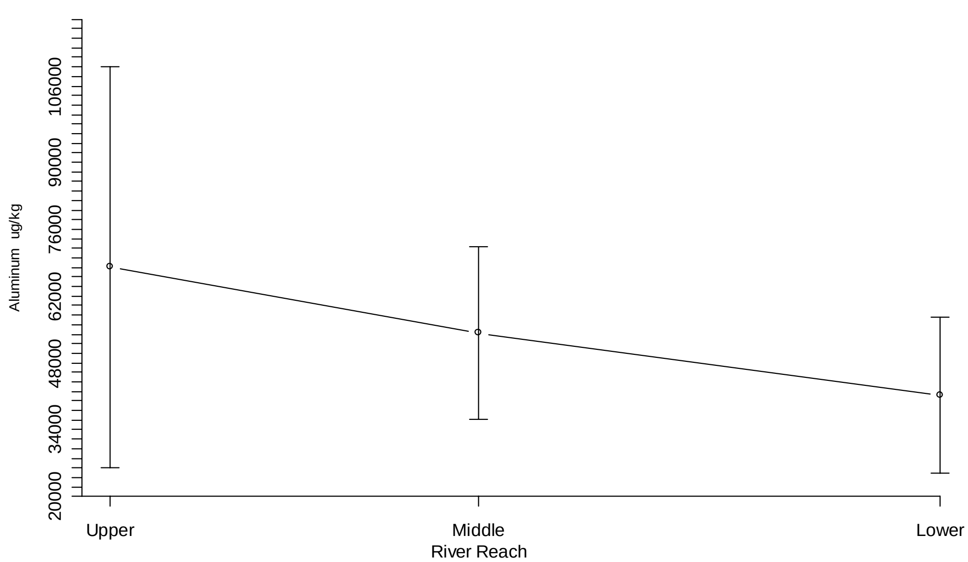


FIGURE E-47
Mean Concentration of Arsenic in Whole Sucker by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

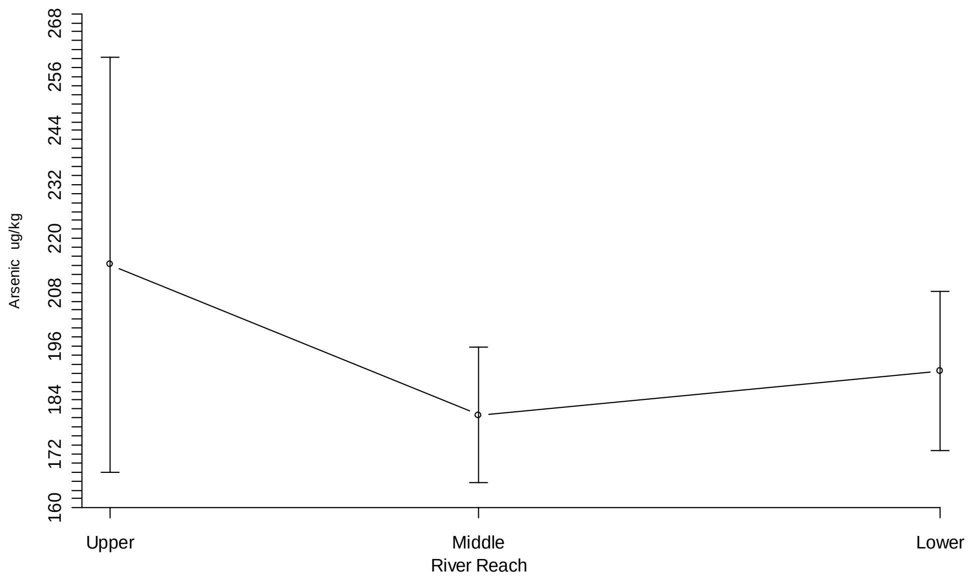


FIGURE E-48
Mean Concentration of Barium in Whole Sucker by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

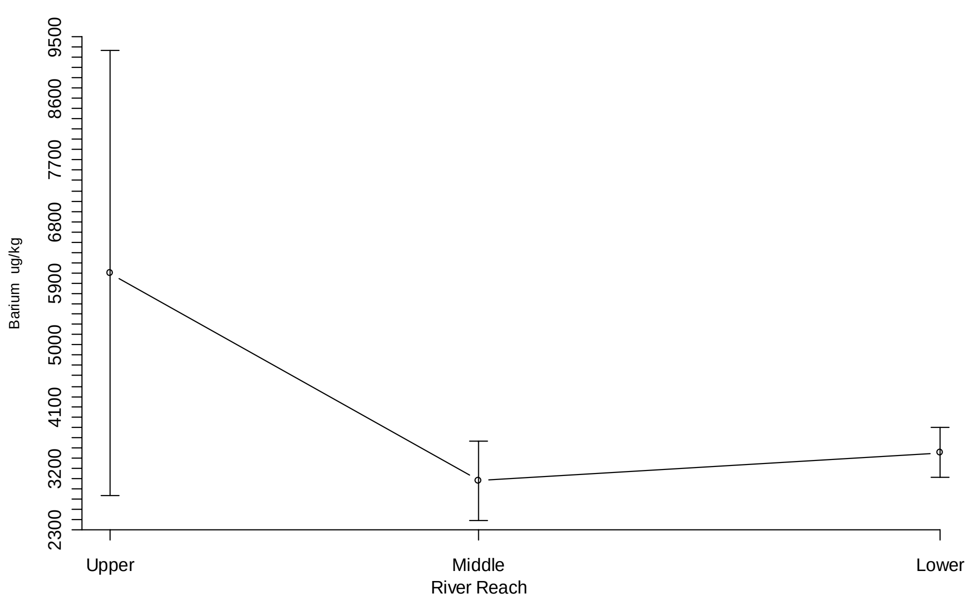


FIGURE E-49
Mean Concentration of Cadmium in Whole Sucker by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

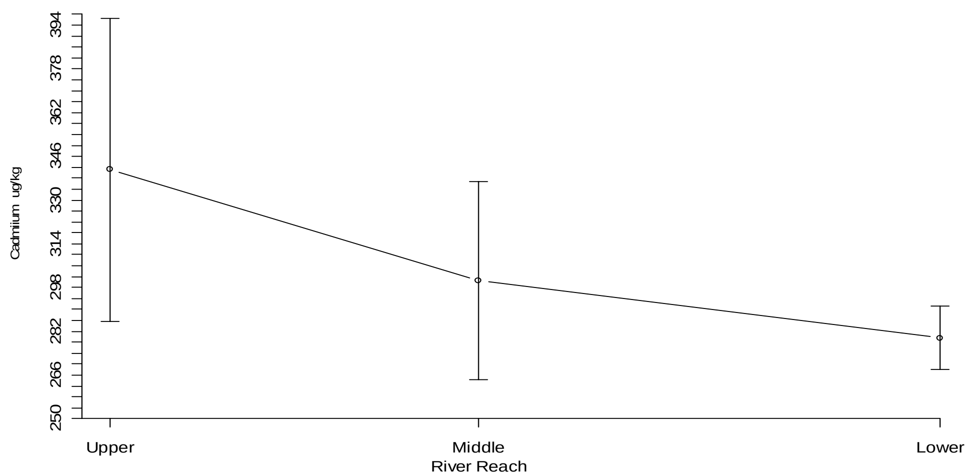


FIGURE E-50
Mean Concentration of Chromium in Whole Sucker by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

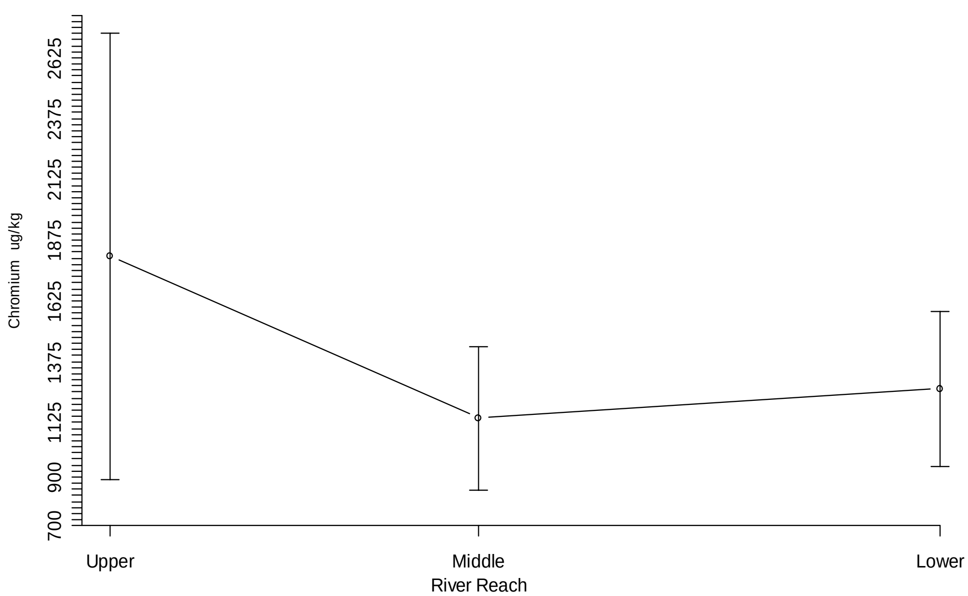


FIGURE E-51
Mean Concentration of Copper in Whole Sucker by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

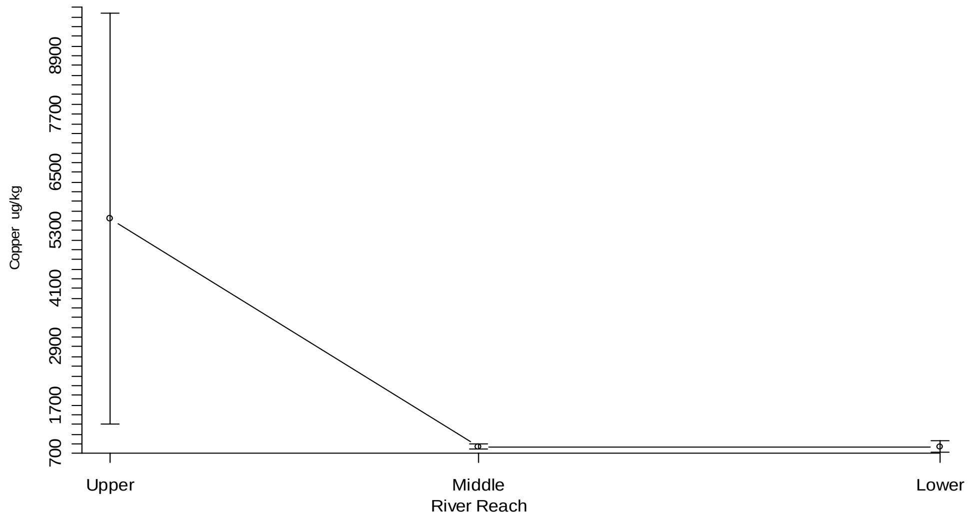


FIGURE E-52
Mean Concentration of Iron in Whole Sucker by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

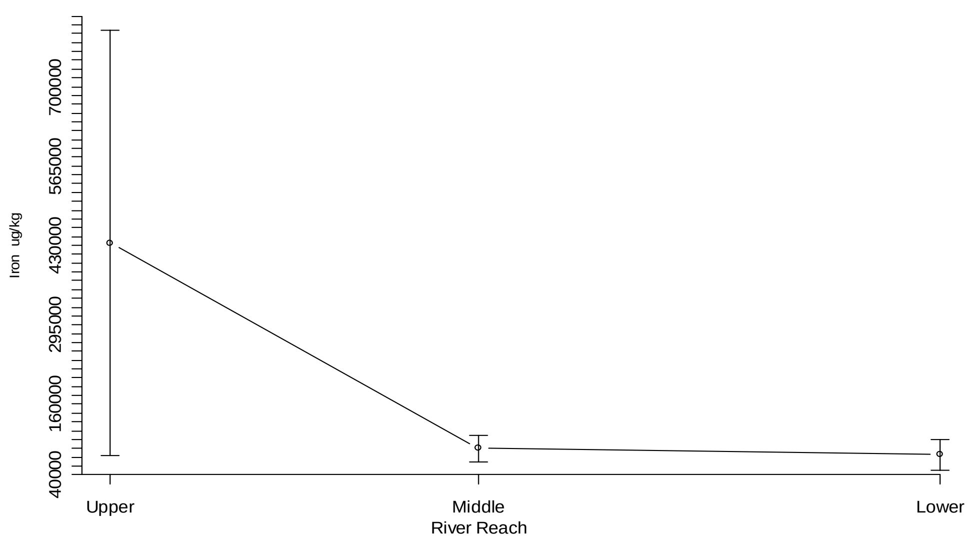


FIGURE E-53
Mean Concentration of Lead in Whole Sucker by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

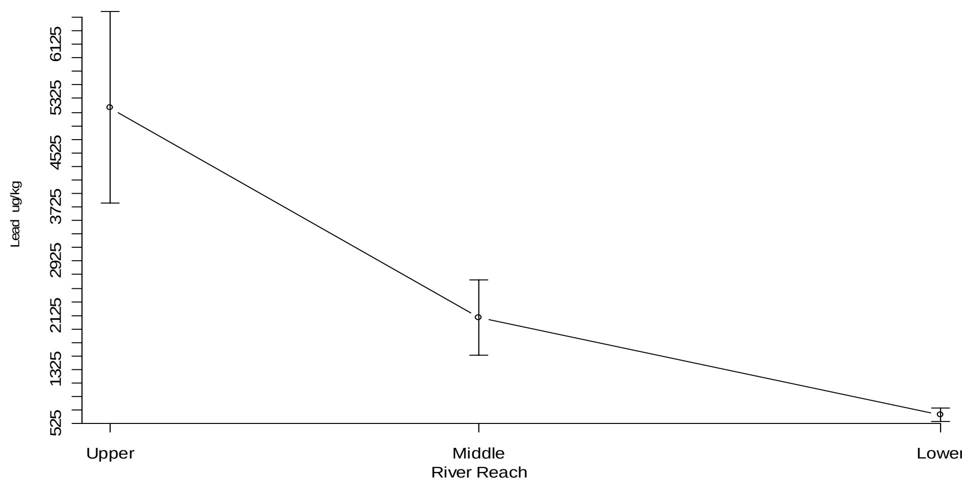


FIGURE E-54
Mean Concentration of Nickel in Whole Sucker by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

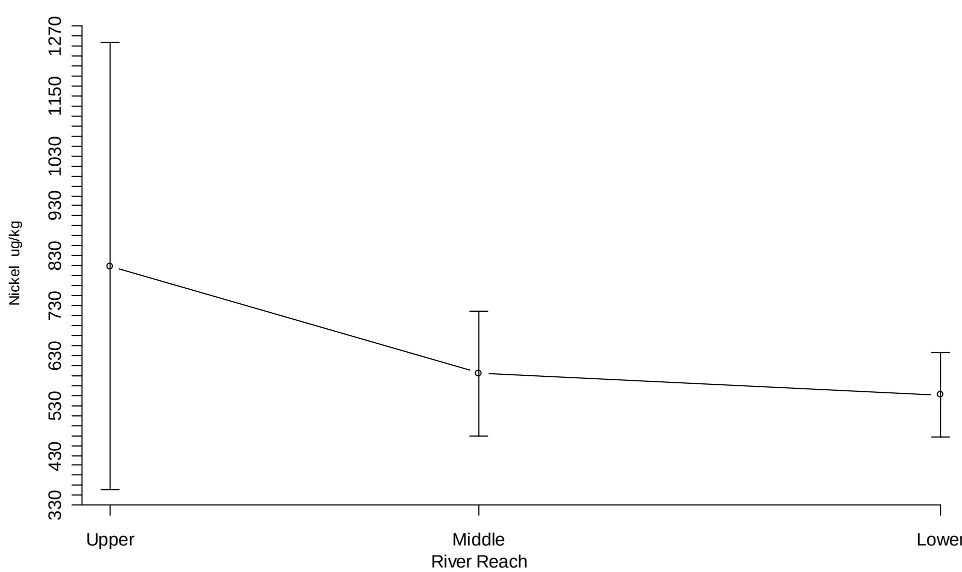


FIGURE E-55
Mean Concentration of Selenium in Whole Sucker by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

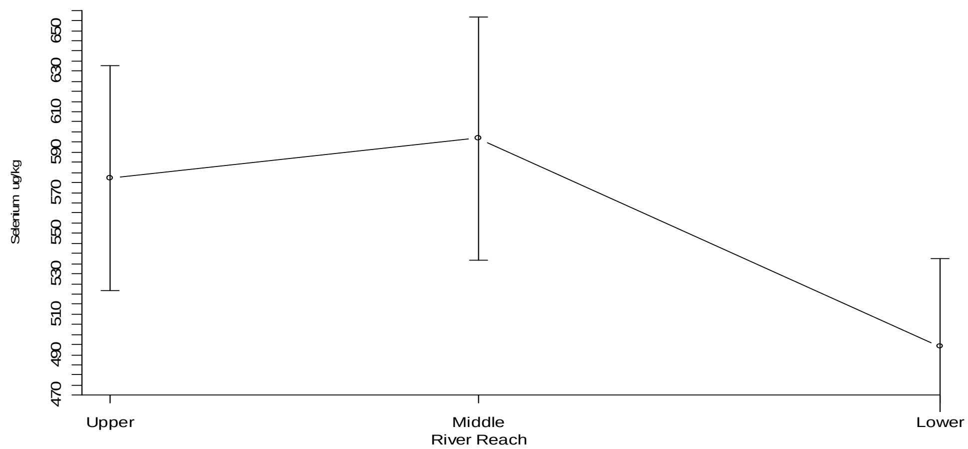


FIGURE E-56
Mean Concentration of Uranium in Whole Sucker by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

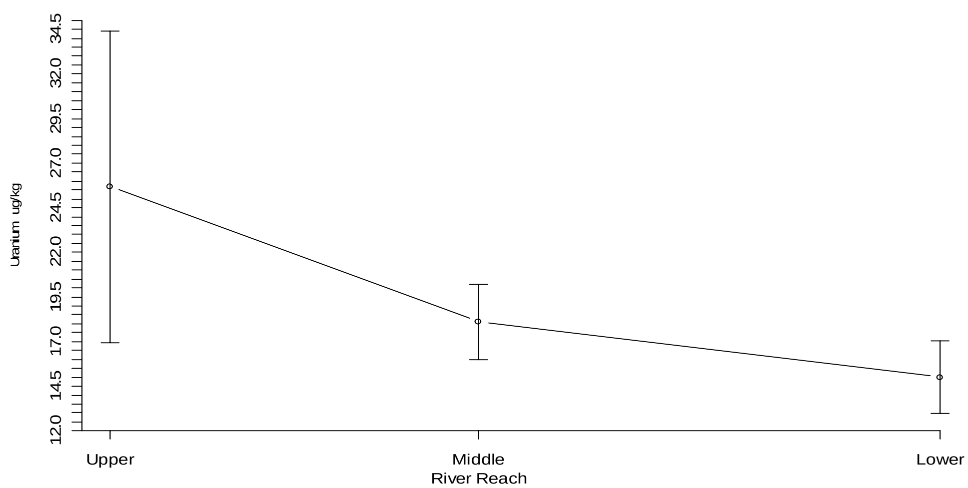


FIGURE E-57
Mean Concentration of Zinc in Whole Sucker by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

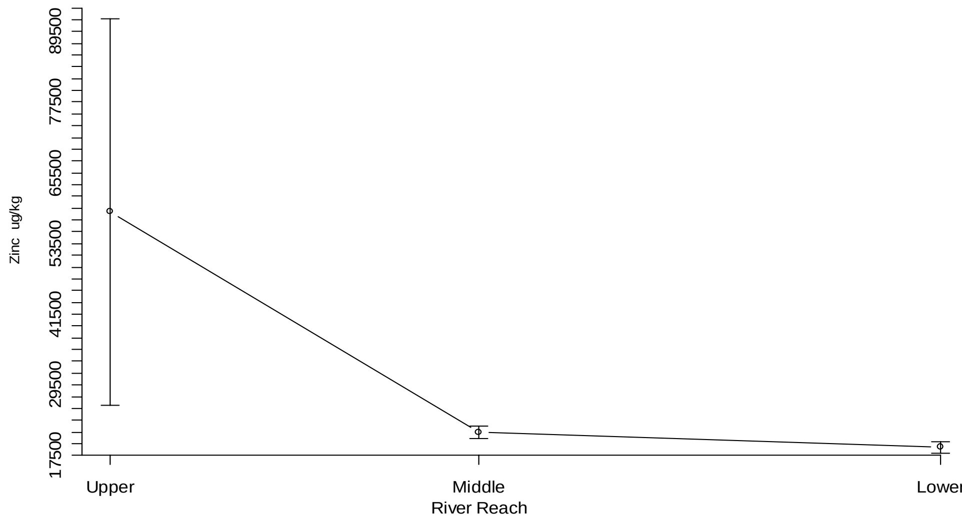


FIGURE E-58
Mean Concentration of Mercury in Whole Sucker by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

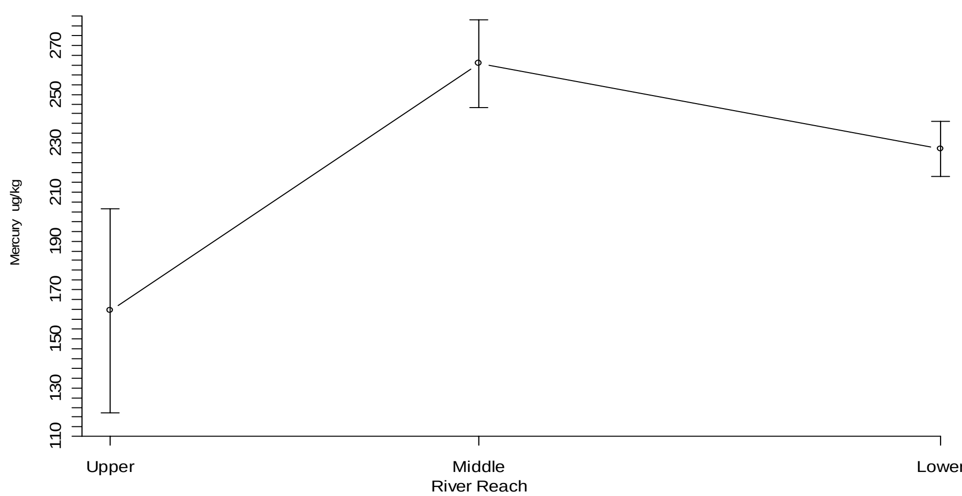


FIGURE E-59
Mean Concentration of TCDF in Whole Sucker by River Ranch (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

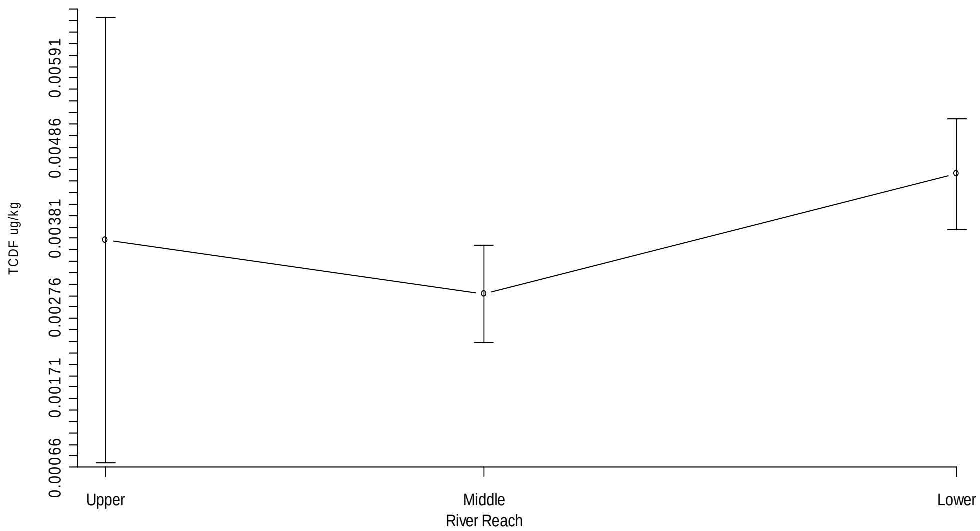


FIGURE E-60
Mean Concentration of Total PCB in Whole Sucker by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

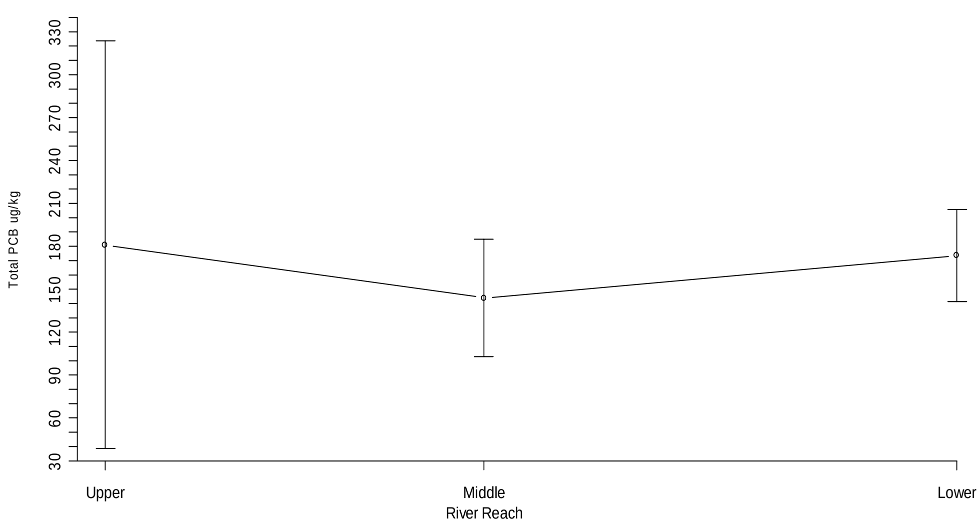


FIGURE E-61
Mean Concentration of Aluminum in Whole Burbot by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

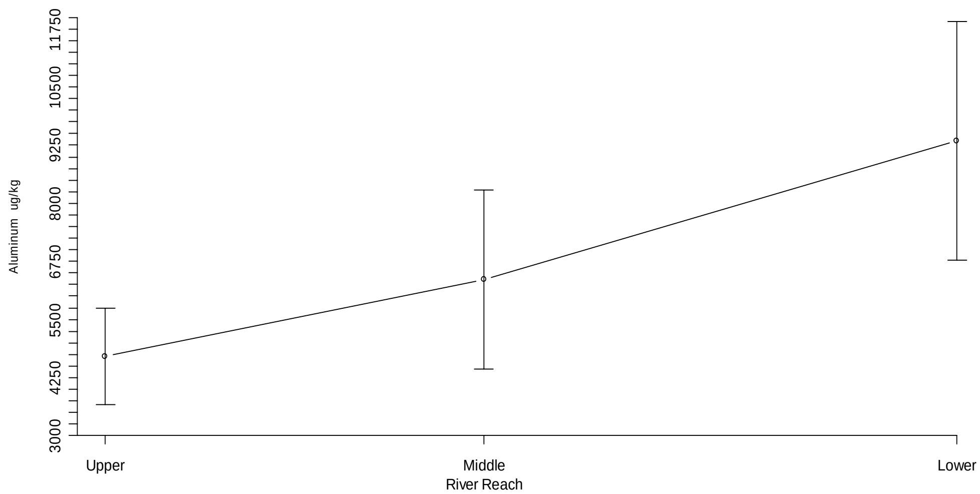


FIGURE E-62
Mean Concentration of Arsenic in Whole Burbot by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

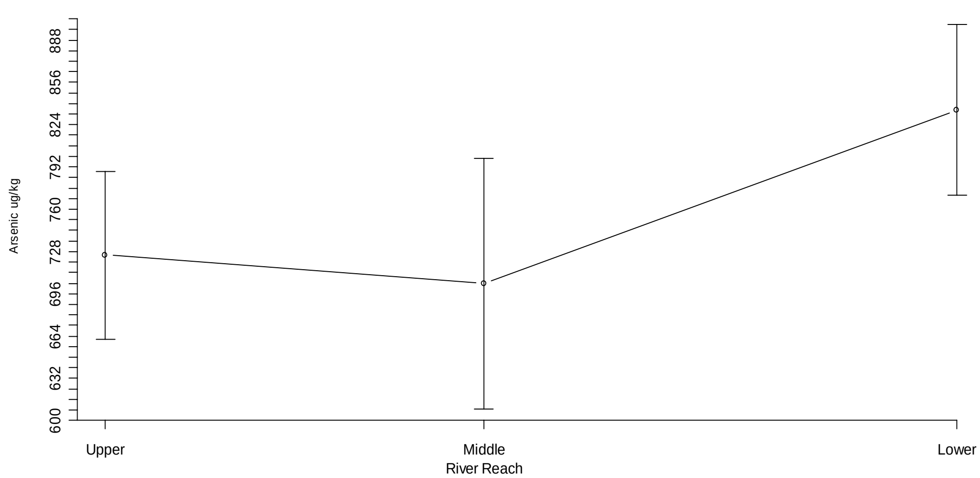


FIGURE E-63
Mean Concentration of Barium in Whole Burbot by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

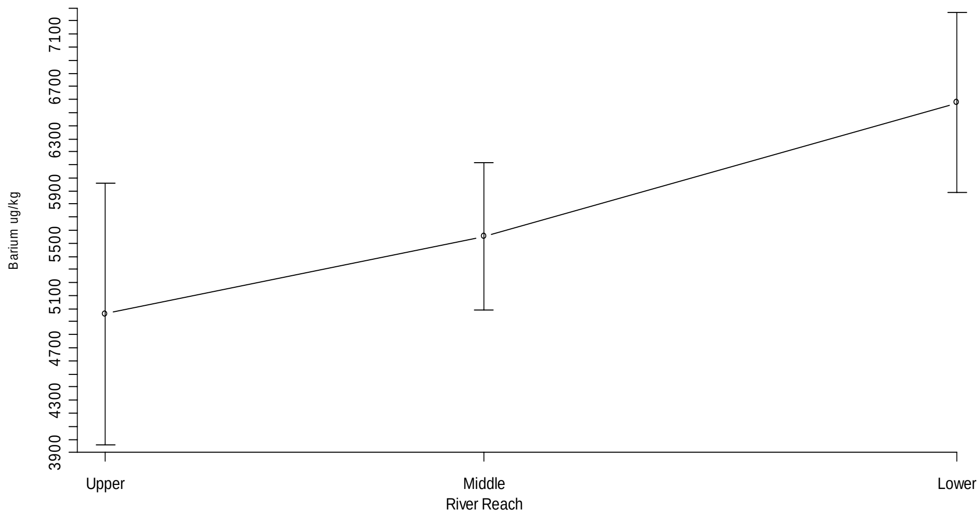


FIGURE E-64
Mean Concentration of Cadmium in Whole Burbot by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

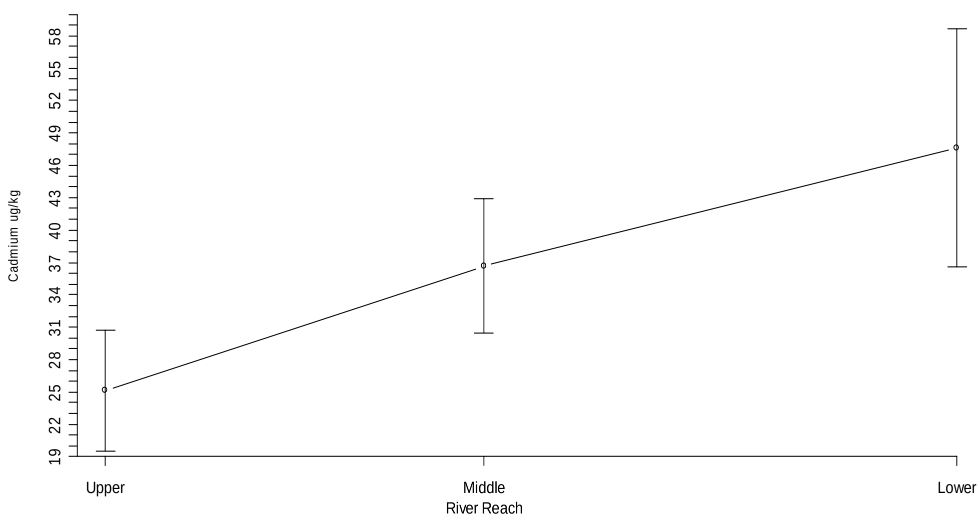


FIGURE E-65
Mean Concentration of Chromium in Whole Burbot by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

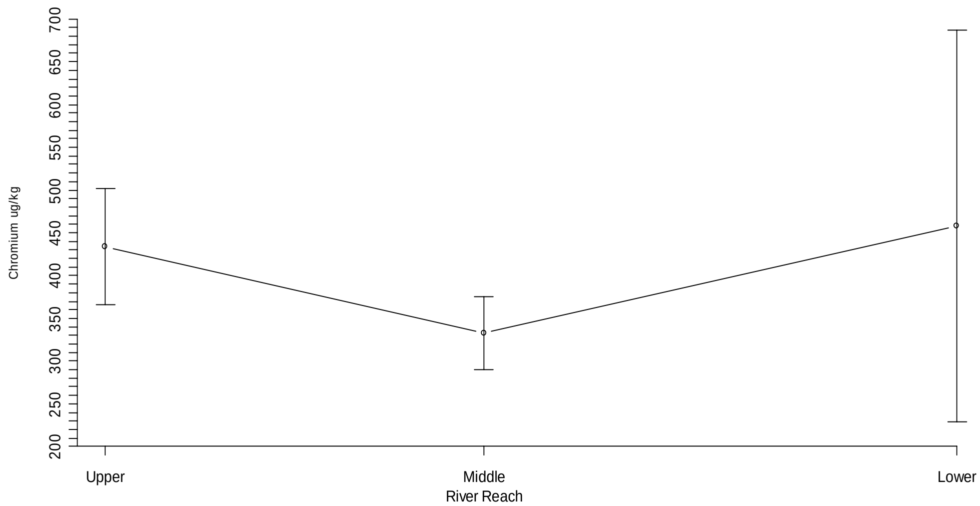


FIGURE E-66
Mean Concentration of Copper in Whole Burbot by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

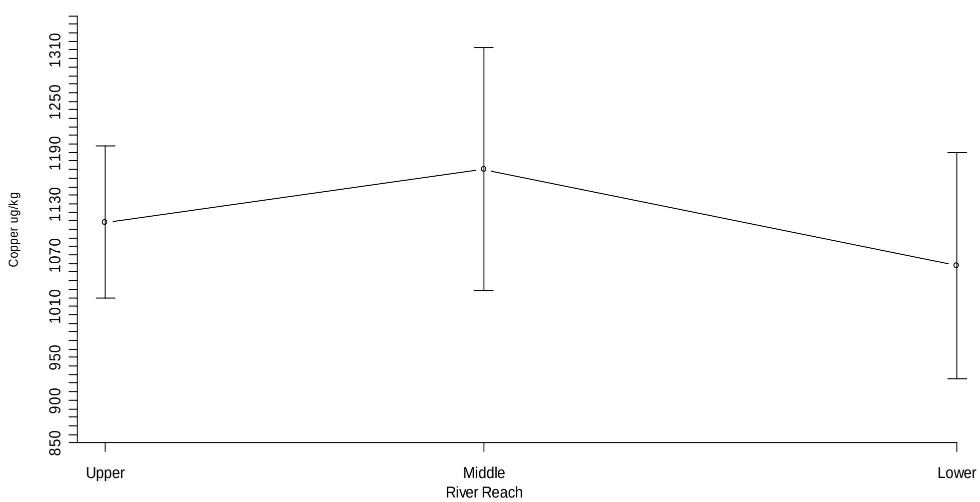


FIGURE E-67
Mean Concentration of Iron in Whole Burbot by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

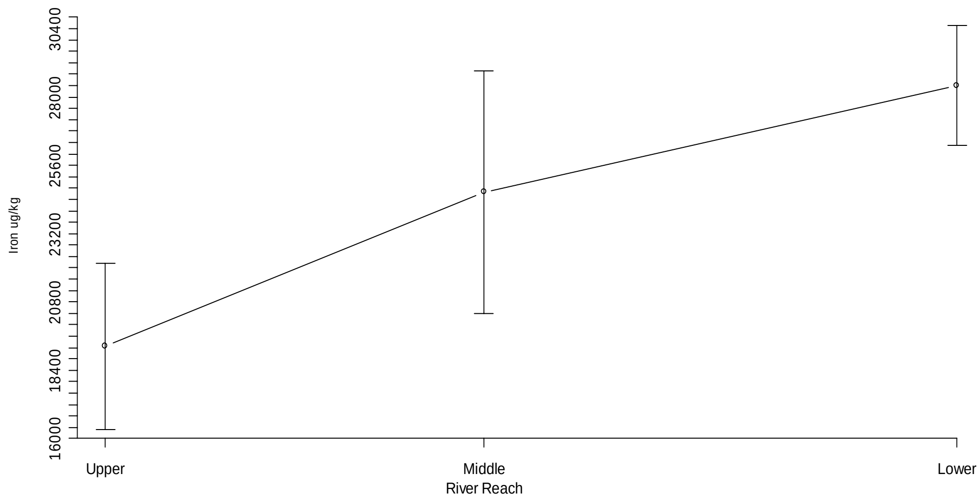


FIGURE E-68
Mean Concentration of Lead in Whole Burbot by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

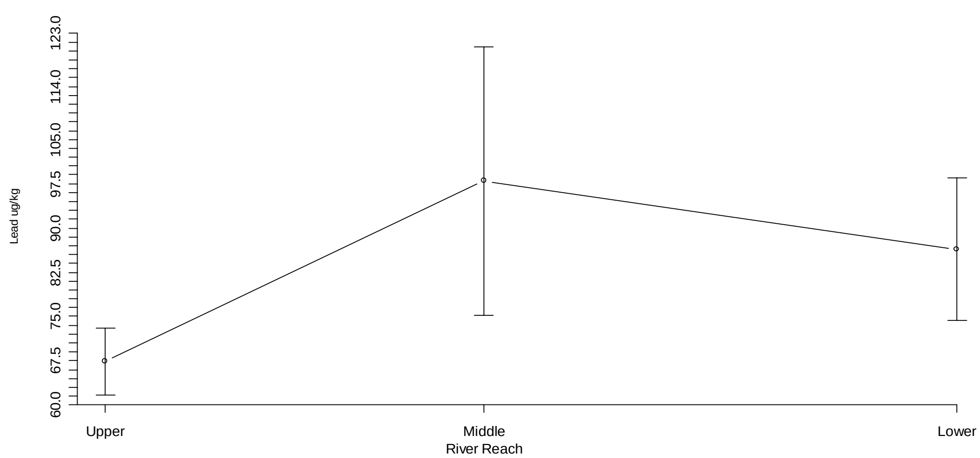


FIGURE E-69
Mean Concentration of Nickel in Whole Burbot by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

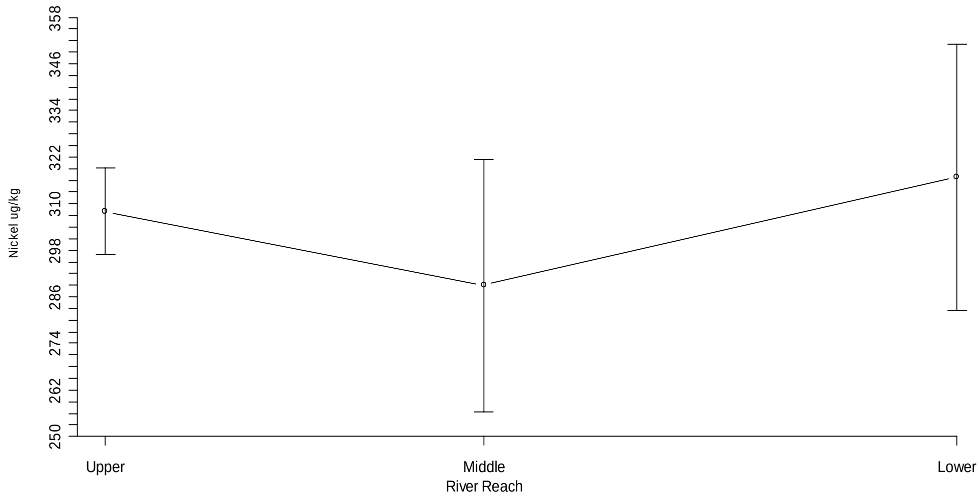


FIGURE E-70
Mean Concentration of Selenium in Whole Burbot by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

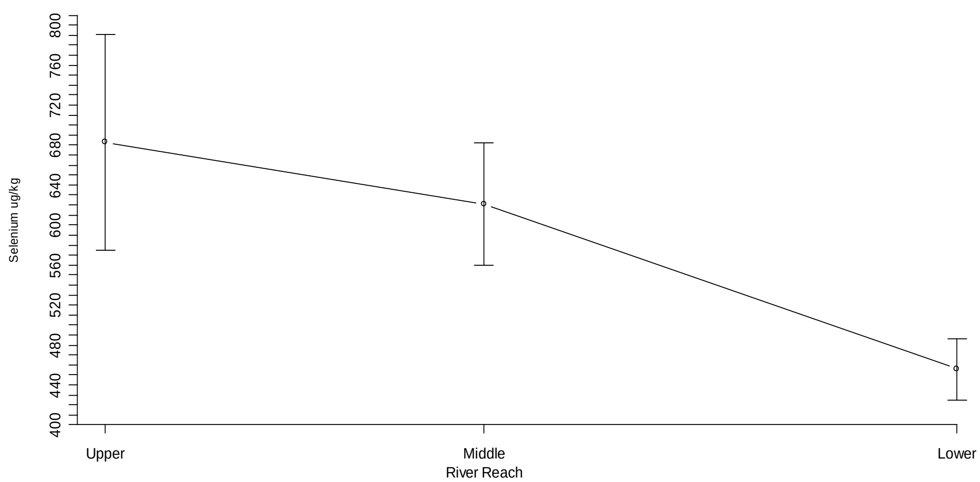


FIGURE E-71
Mean Concentration of Uranium in Whole Burbot by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

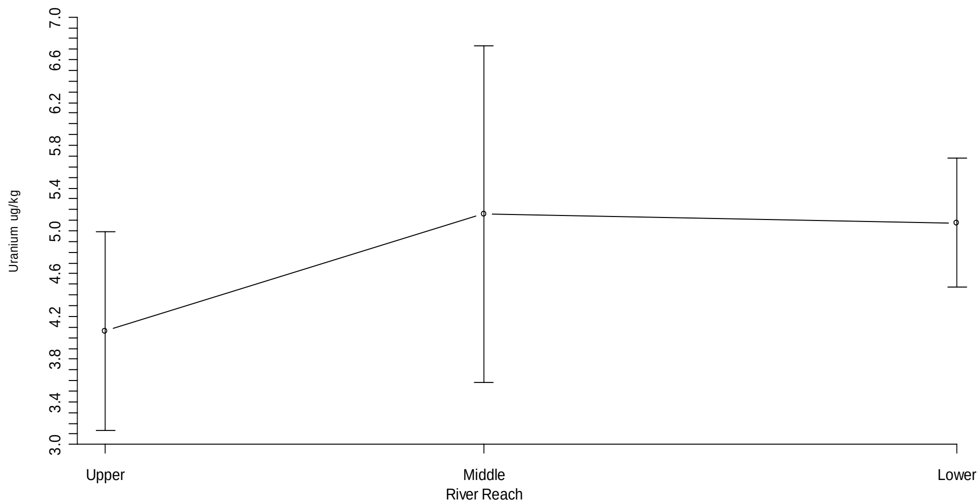


FIGURE E-72
Mean Concentration of Zinc in Whole Burbot by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

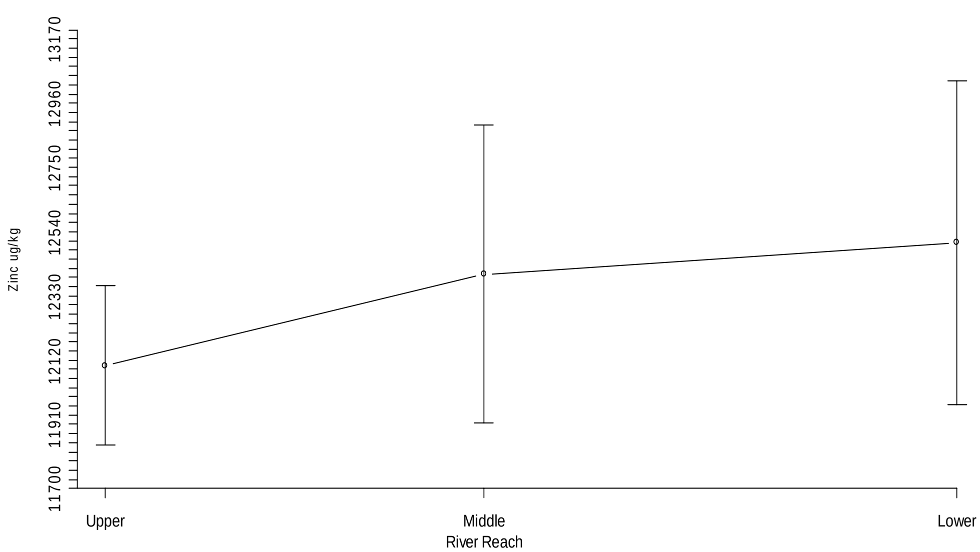


FIGURE E-73
Mean Concentration of Mercury in Whole Burbot by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

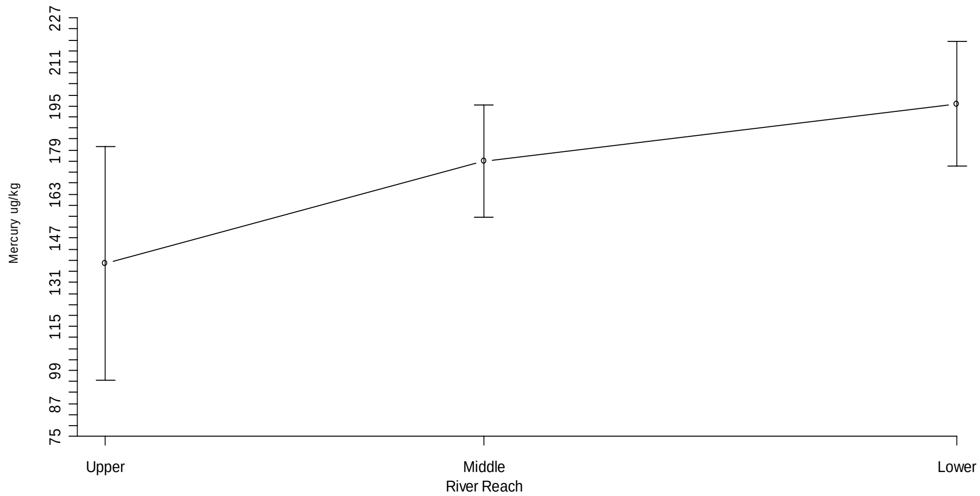


FIGURE E-74
Mean Concentration of Total PCB in Whole Burbot by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

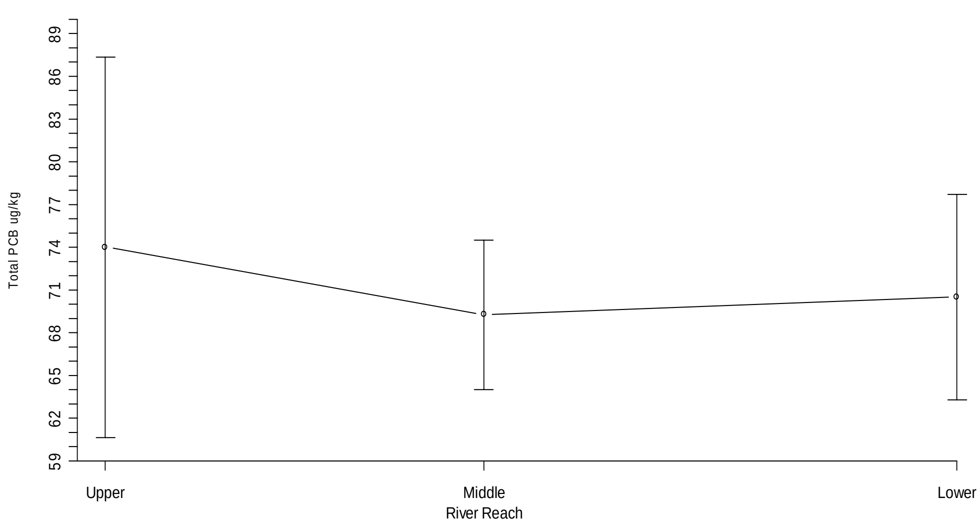


FIGURE E-75
Mean Concentration of TCDF in Whole Burbot by River Reach (Lower, Middle and Upper) and Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

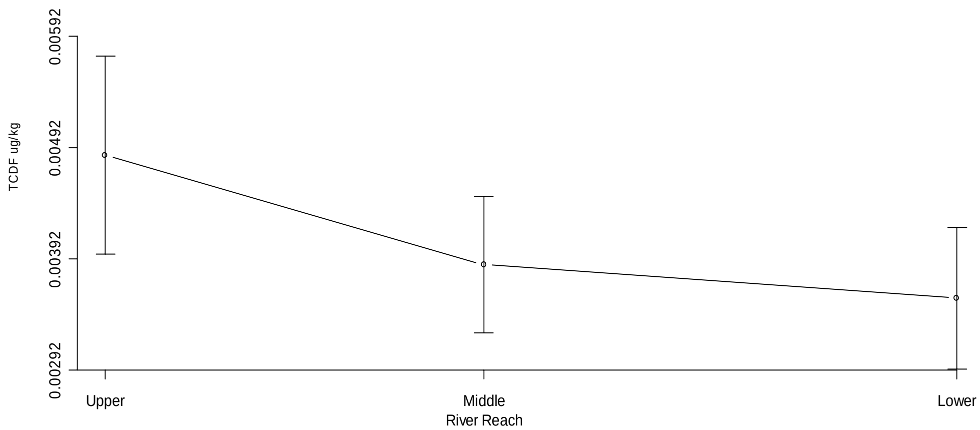


FIGURE E-76
Mean Concentration of Aluminum by Reach (Upper, Middle, and Lower) with Associated Asymptotic 95% Confidence Intervals for a) All Species b) Expanded Plot for Species with Concentrations Less than 19,630 μg/kg
Upper Columbia River RI/FS

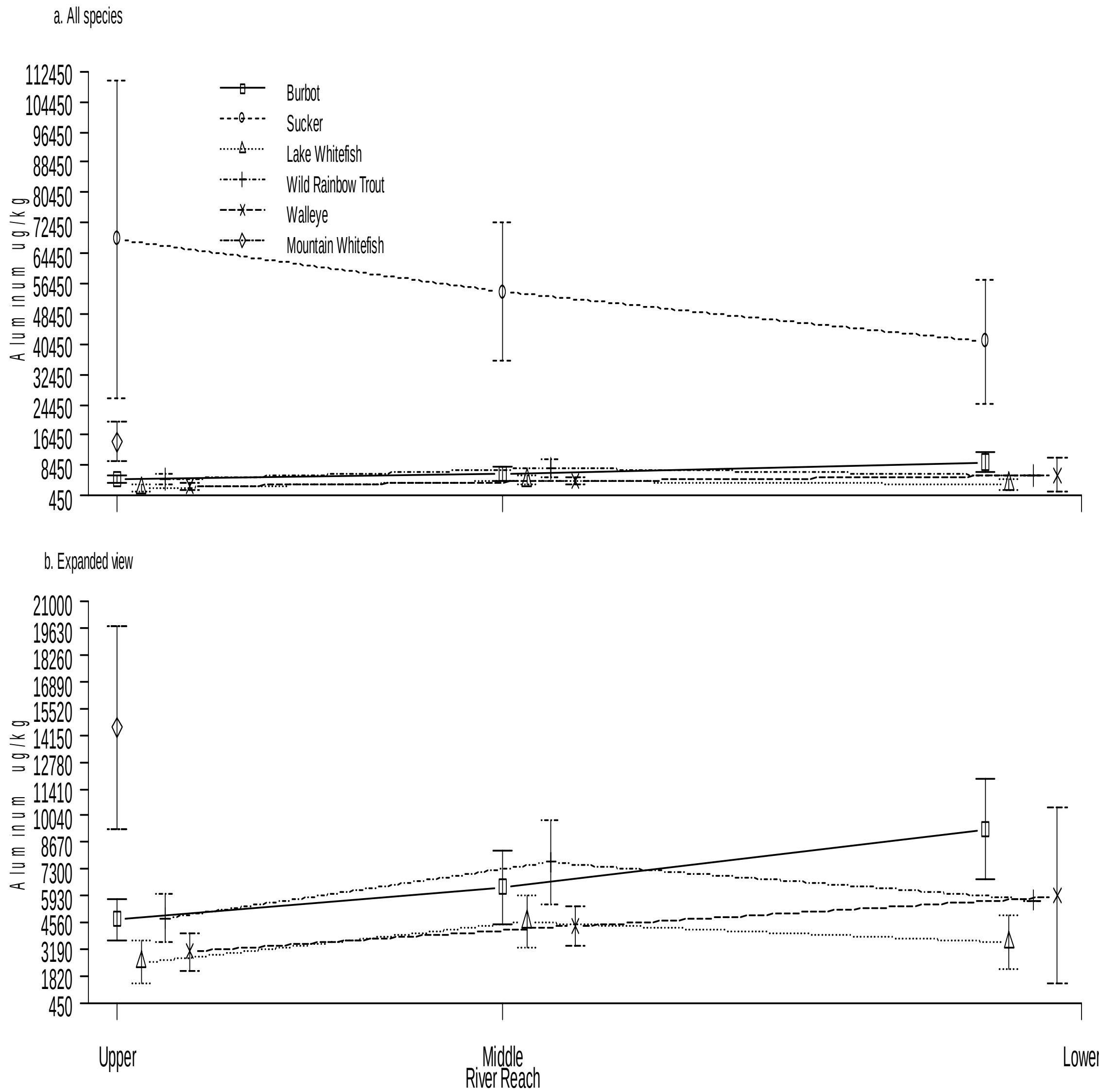


FIGURE E-77
Mean Concentration of Arsenic by Reach (Upper, Middle, and Lower) with Associated Asymptotic 95% Confidence Intervals for a) All Species b) Expanded Plot for Species with Concentrations Less than 300 μg/kg
Upper Columbia River RI/FS

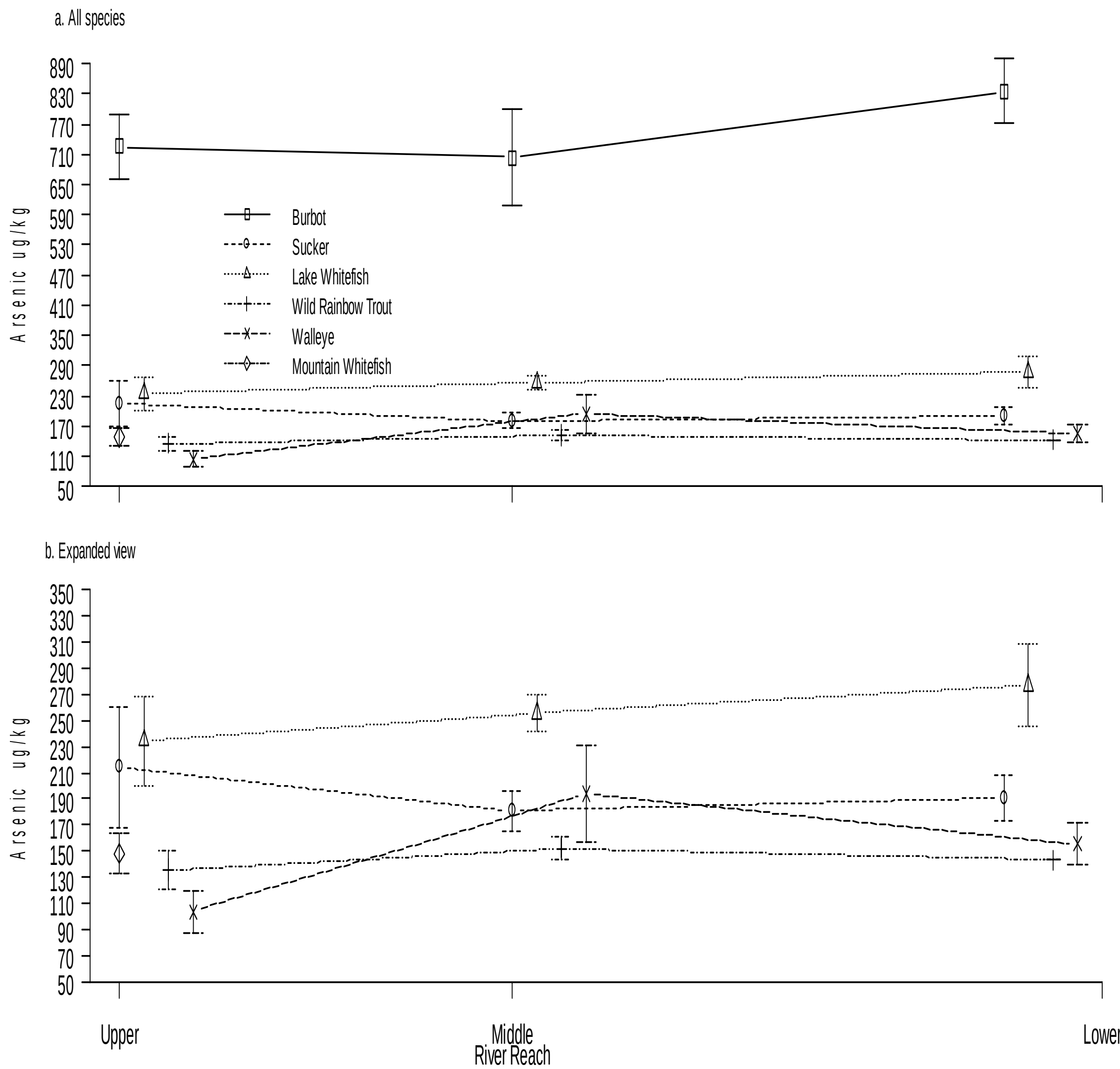


FIGURE E-78
Mean Concentration of Barium by Reach (Upper, Middle, and Lower) with Associated Asymptotic 95% Confidence Intervals for a) All Species b) Expanded Plot for Species with Concentrations Less than 1450 μg/kg
Upper Columbia River RI/FS

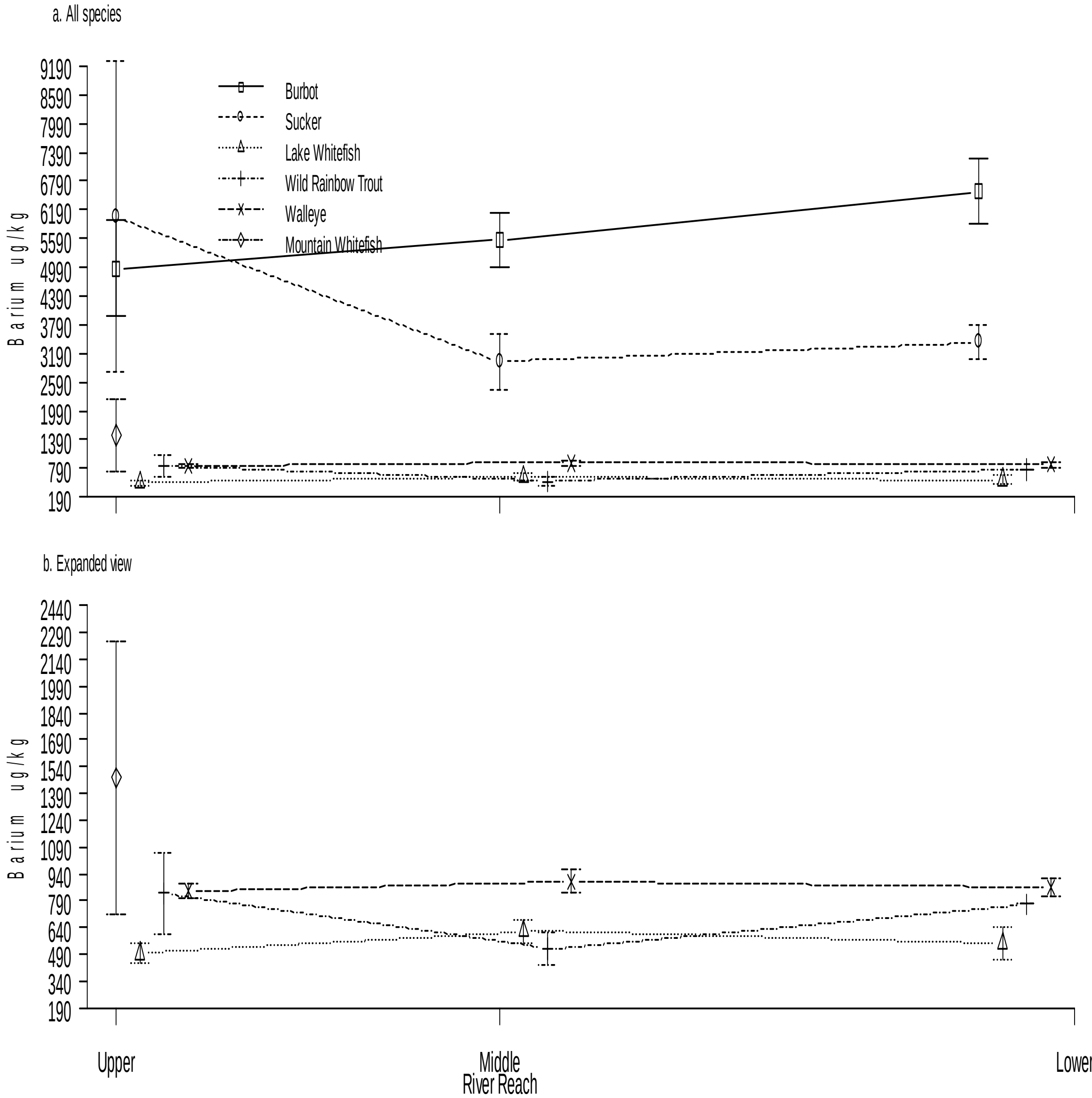


FIGURE E-79
Mean Concentration of Cadmium by Reach (Upper, Middle, and Lower) with Associated Asymptotic 95% Confidence Intervals for a) All Species b) Expanded Plot for Species with Concentrations Less than 130 µg/kg
Upper Columbia River RI/FS

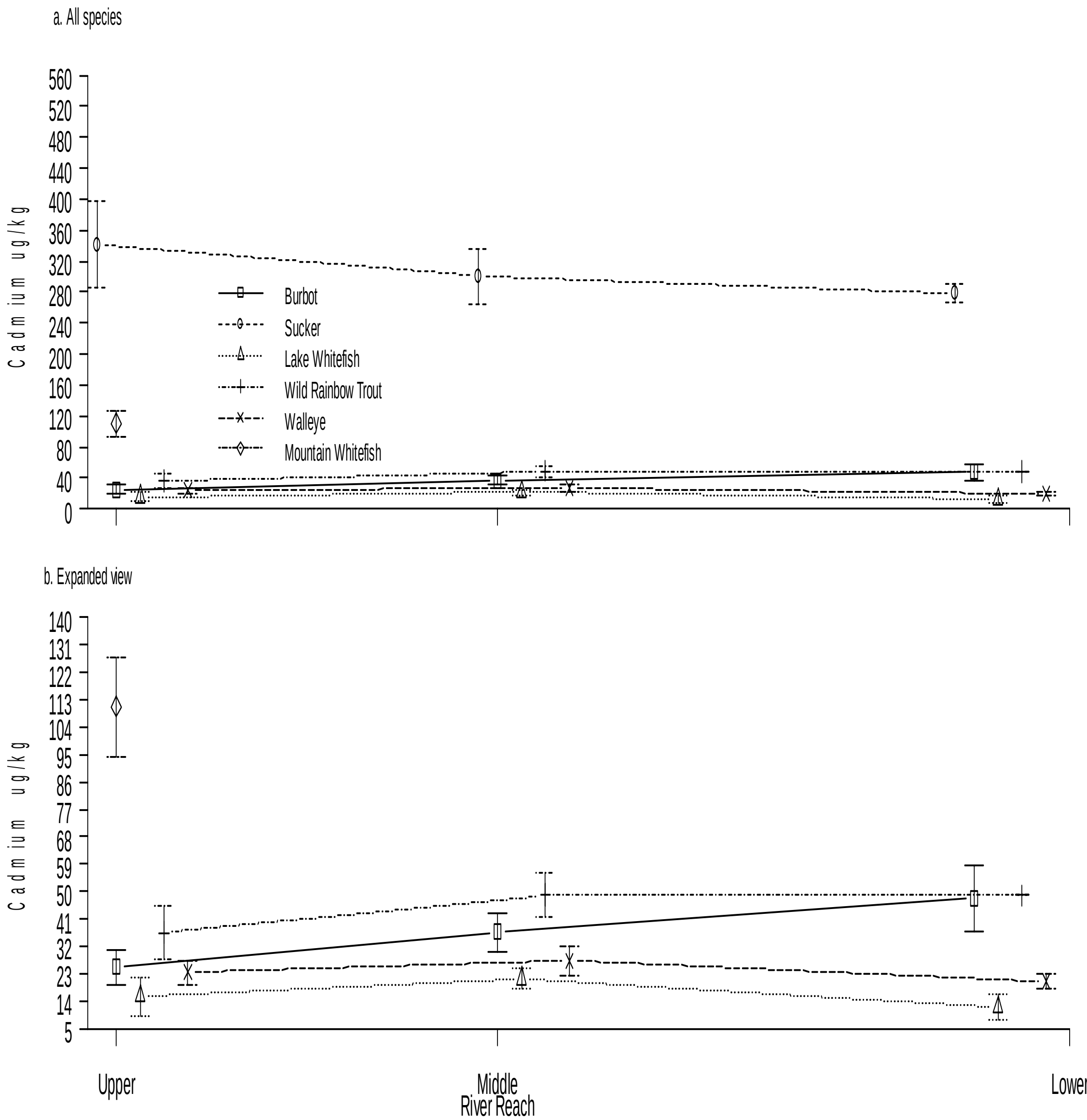


FIGURE E-80
Mean Concentration of Chromium by Reach (Upper, Middle, and Lower) with Associated Asymptotic 95% Confidence Intervals for a) All Species b) Expanded Plot for Species with Concentrations Less than 1150 μg/kg
Upper Columbia River RI/FS

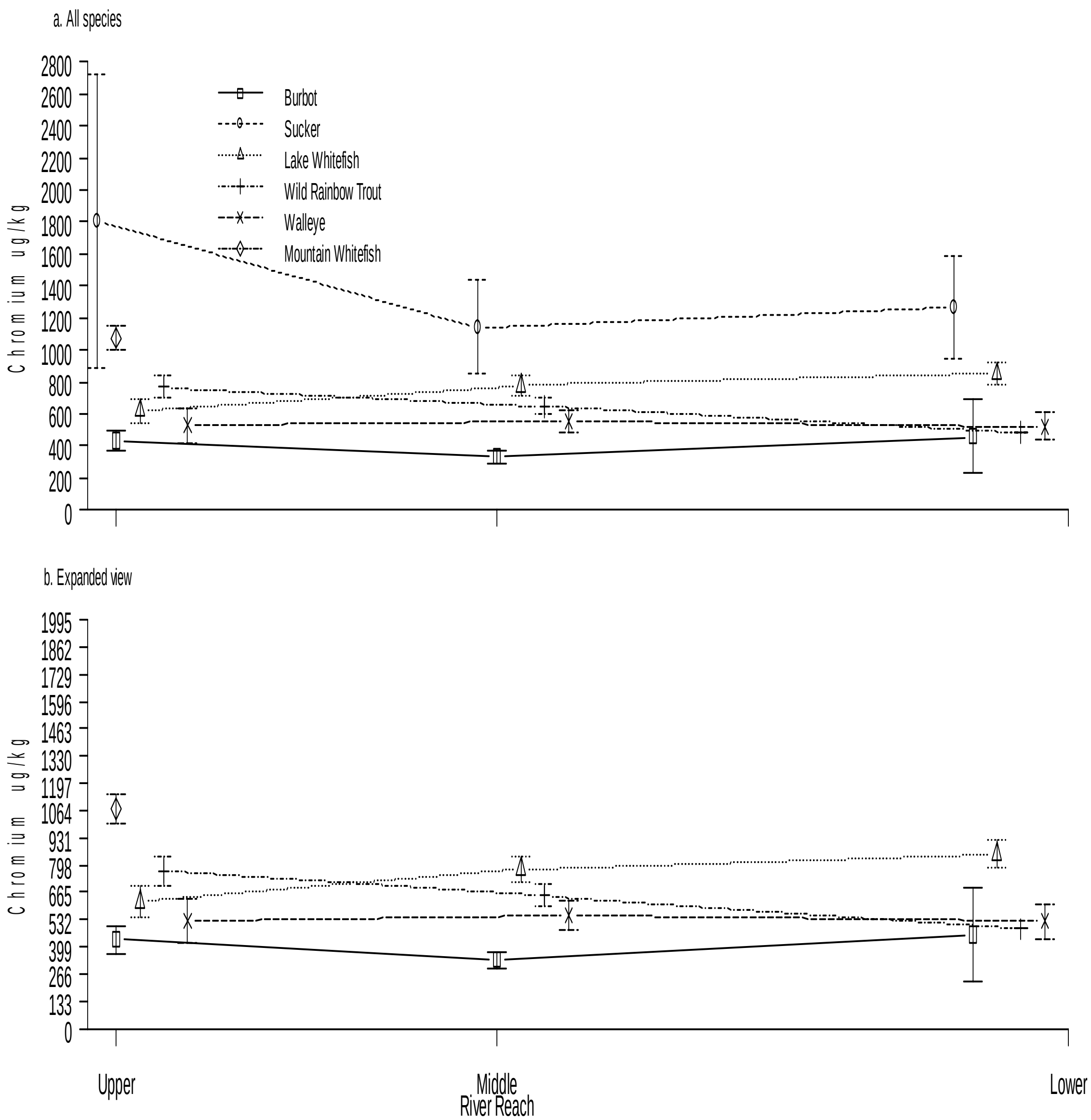


FIGURE E-81
Mean Concentration of Copper in Whole Fish by Reach (Upper, Middle, and Lower) with Associated Asymptotic 95% Confidence Intervals for a) All Species b) Expanded Plot for Species with Concentrations Less than 1750 μg/kg
Upper Columbia River RI/FS

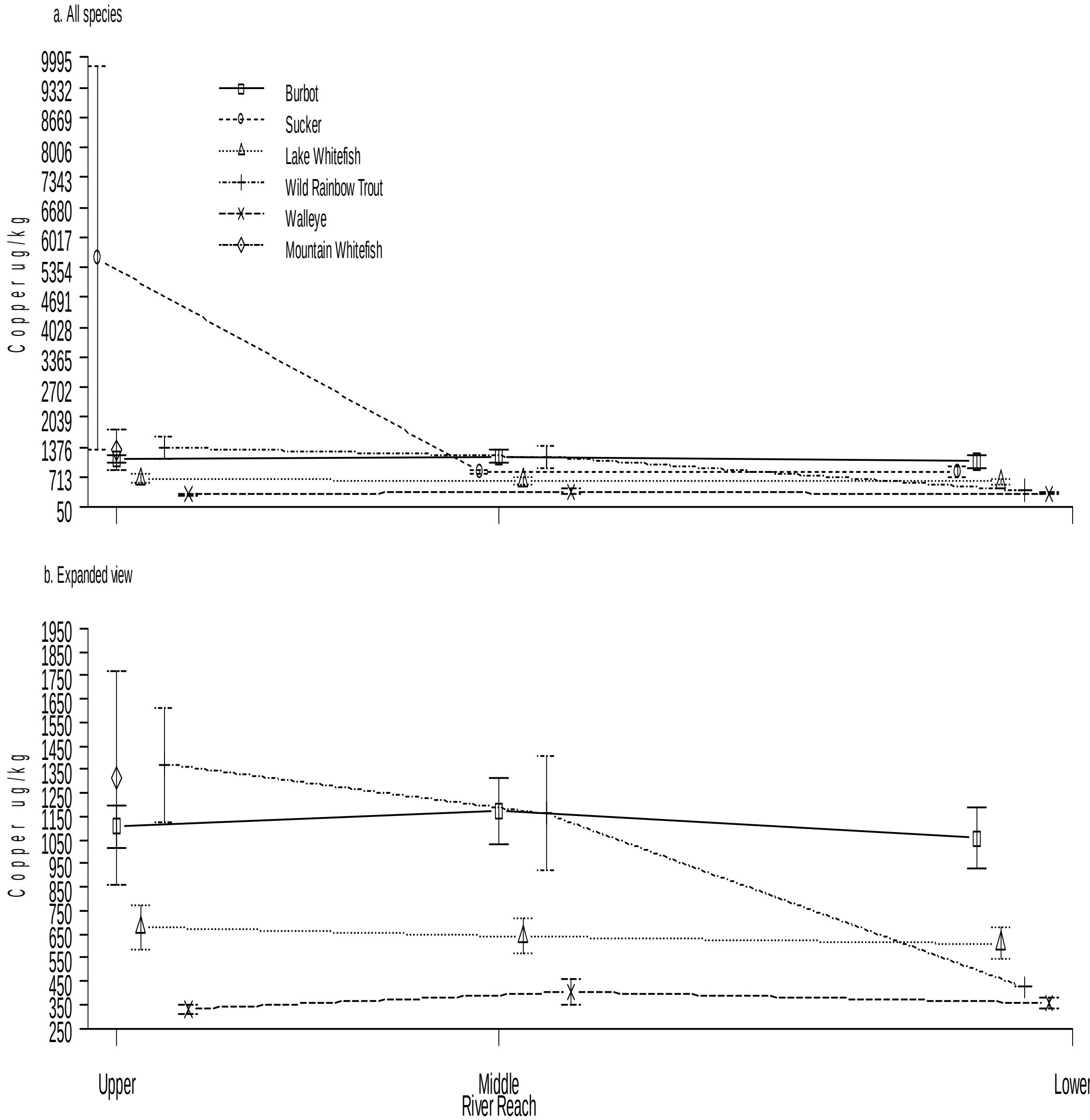


FIGURE E-82
Mean Concentration of Iron in Whole Fish by Reach (Upper, Middle, and Lower) with Associated Asymptotic 95% Confidence Intervals for a) All Species b) Expanded Plot for Species with Concentrations Less than 29,000 μg/kg
Upper Columbia River RI/FS

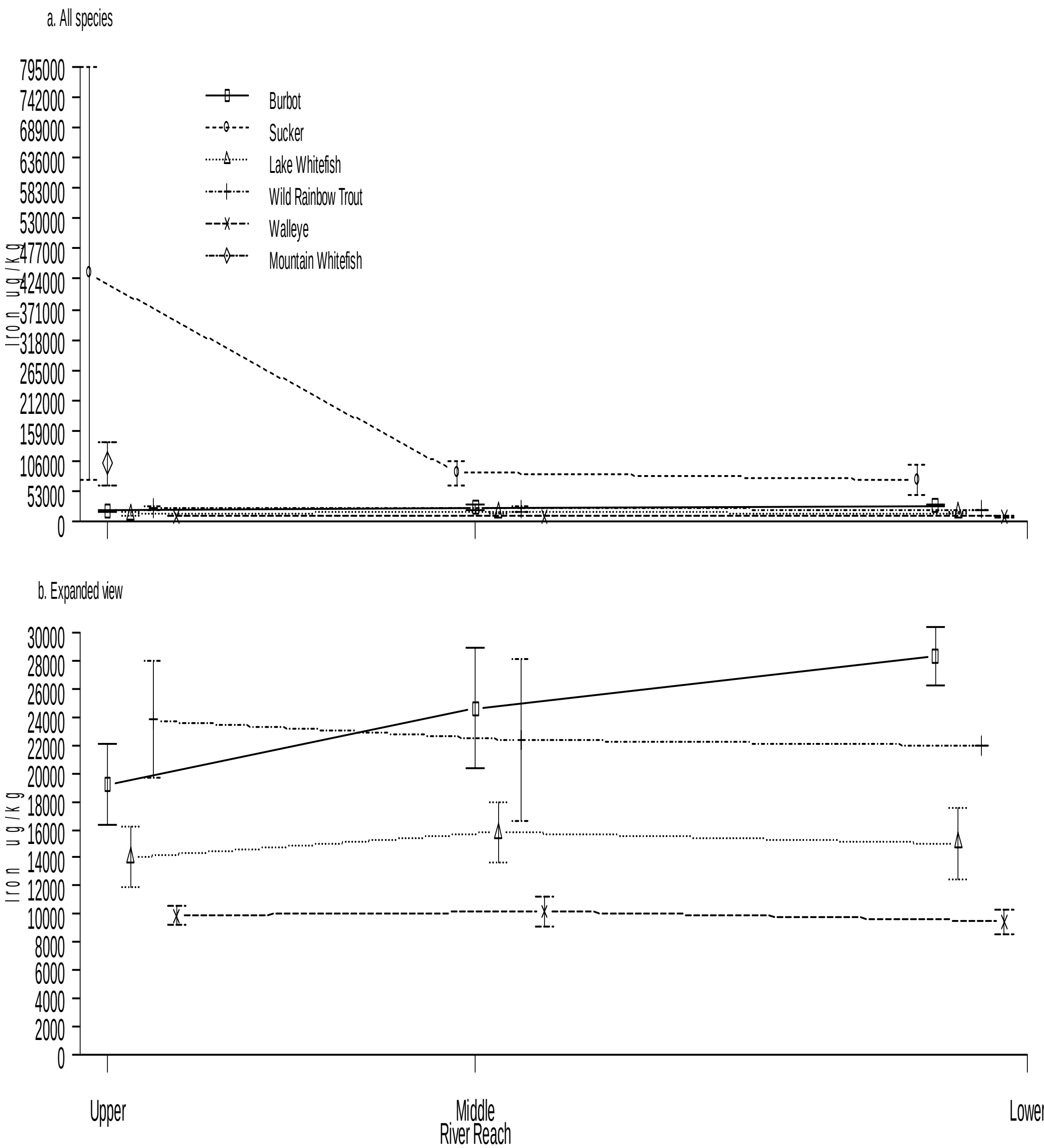


FIGURE E-83
Mean Concentration of Lead in Whole Fish by Reach (Upper, Middle, and Lower) with Associated Asymptotic 95% Confidence Intervals for a) All Species b) Expanded Plot for Species with Concentrations Less than 140 μg/kg
Upper Columbia River RI/FS

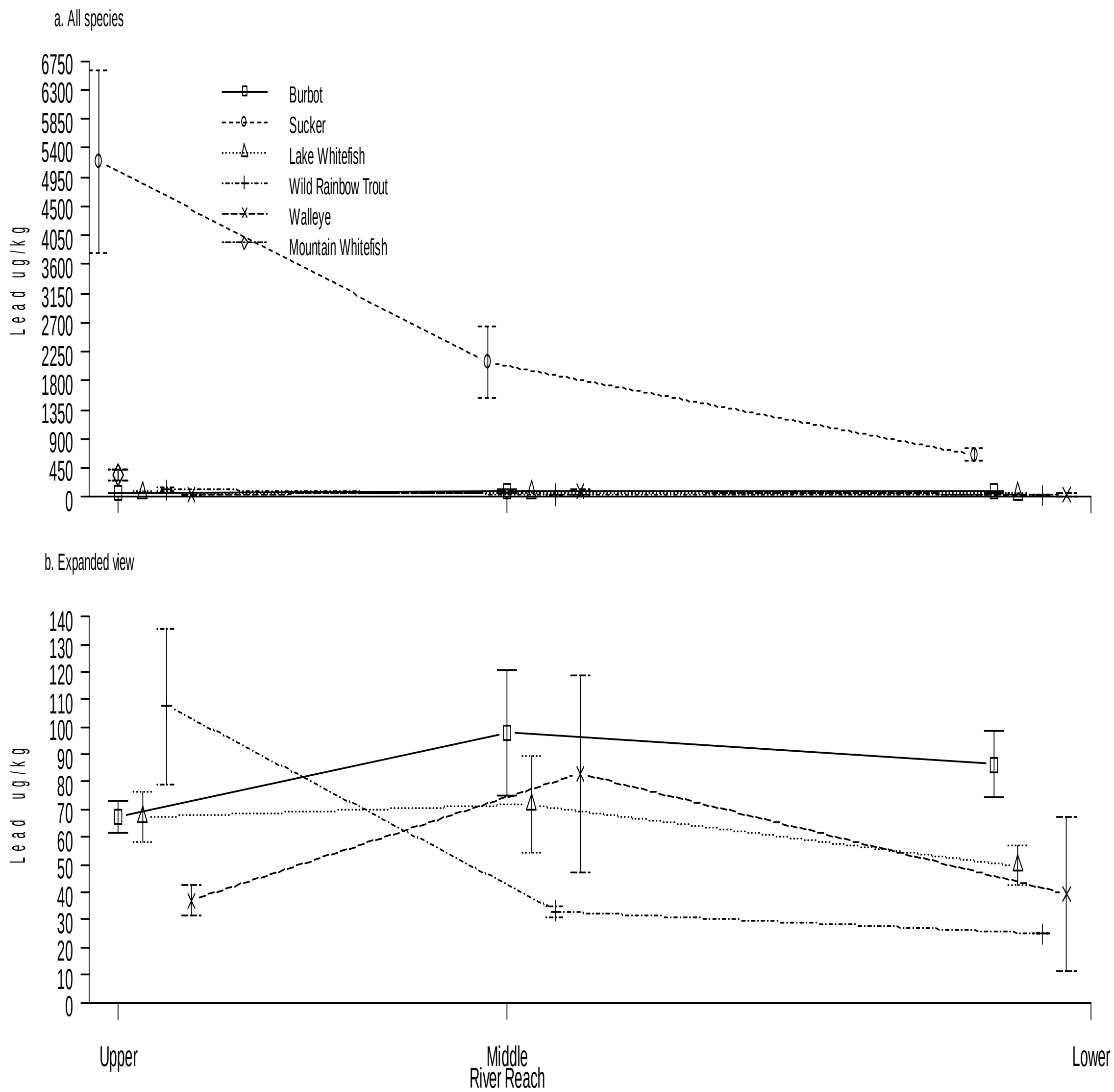


FIGURE E-84
Mean Concentration of Nickel in Whole Fish by Reach (Upper, Middle, and Lower) with Associated Asymptotic 95% Confidence Intervals for a) All Species b) Expanded Plot for Species with Concentrations Less than 430 μg/kg
Upper Columbia River RI/FS

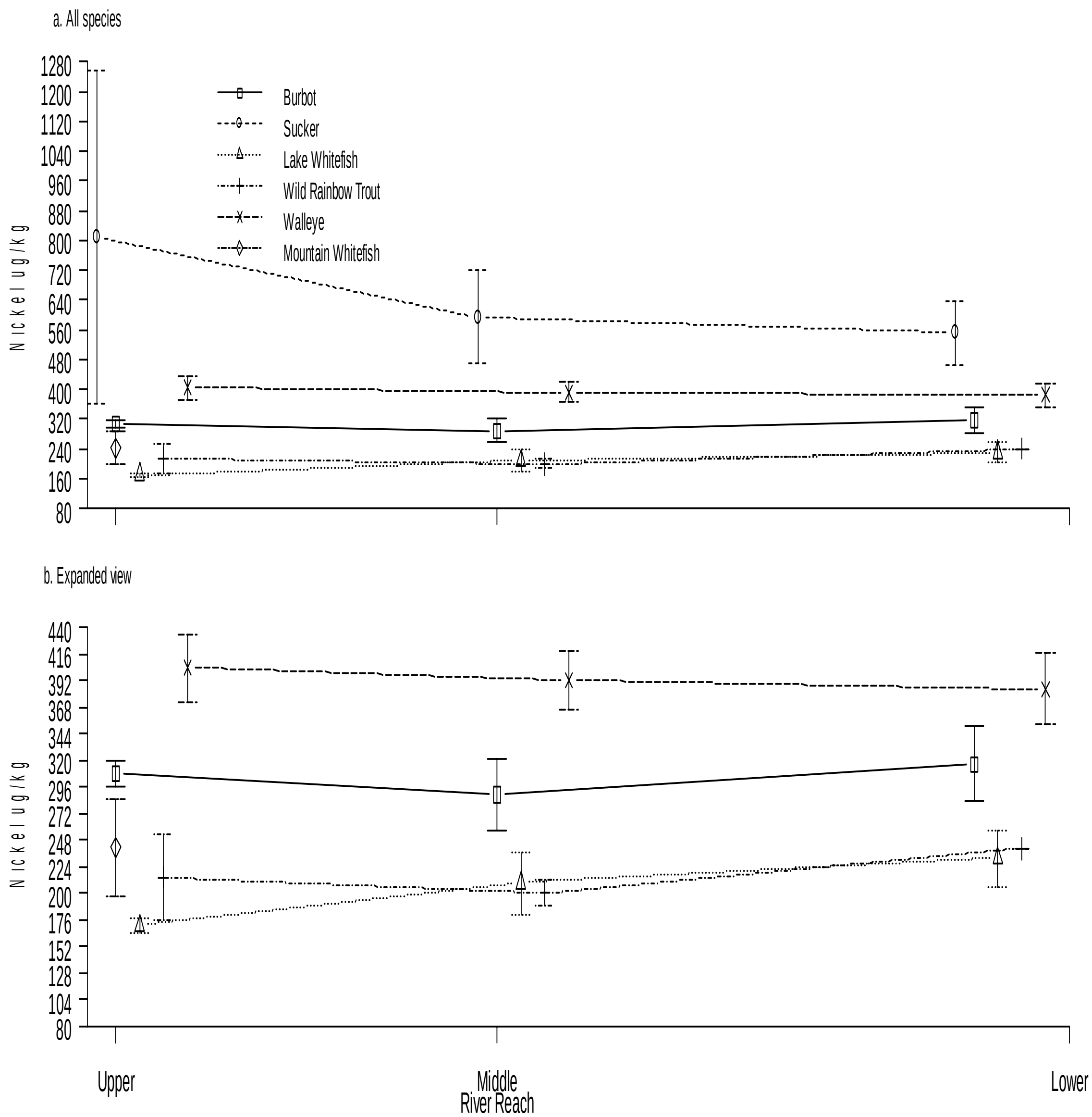


FIGURE E-85
Mean Concentration of Selenium in Whole Fish by Reach (Upper, Middle, and Lower) with Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS

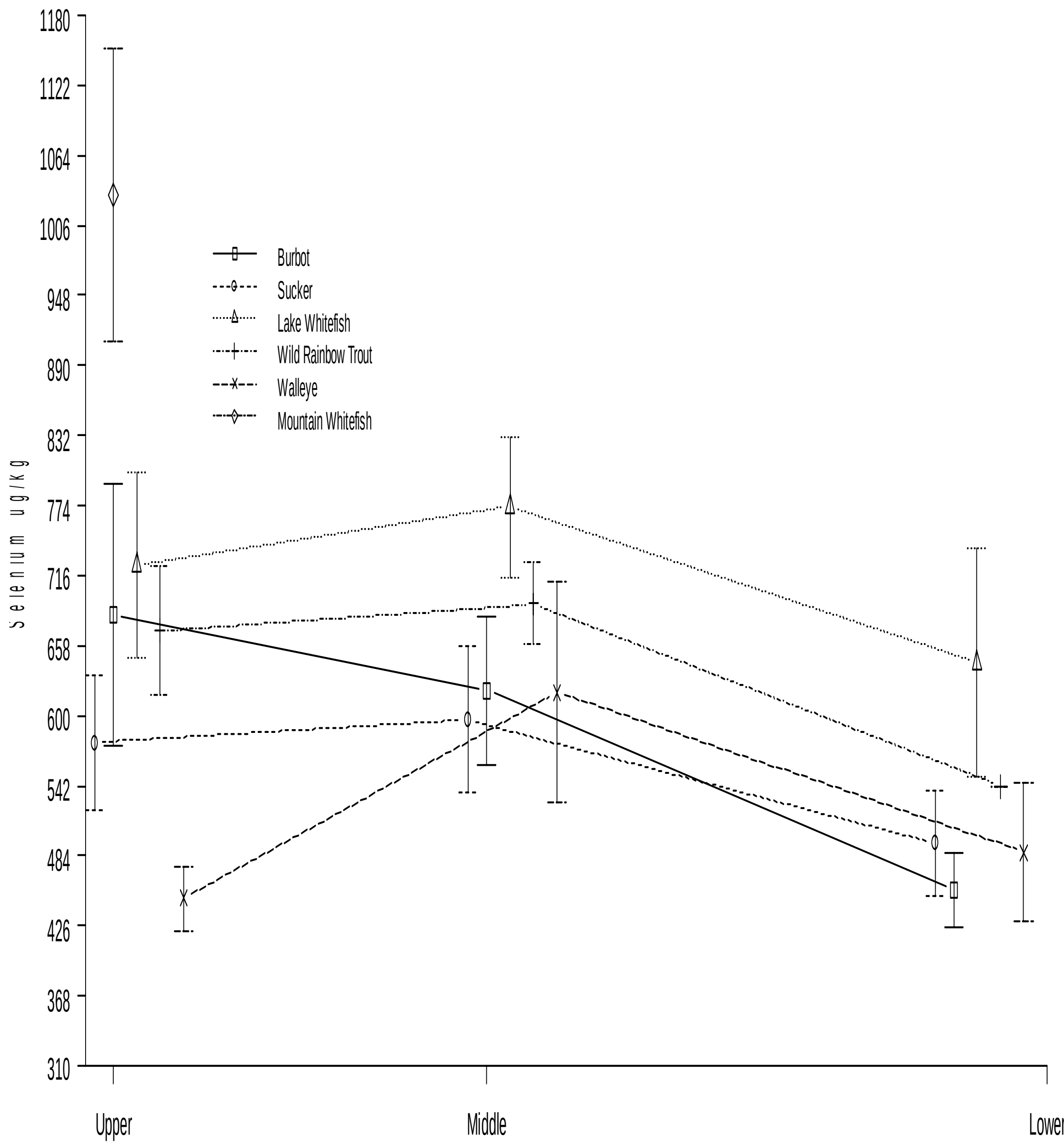


FIGURE E-86
Mean Concentration of Uranium by Reach (Upper, Middle, and Lower) with Associated Asymptotic 95% Confidence Intervals for a) All Species b) Expanded Plot for Species with Concentrations Less than 7.0 μg/kg
Upper Columbia River RI/FS

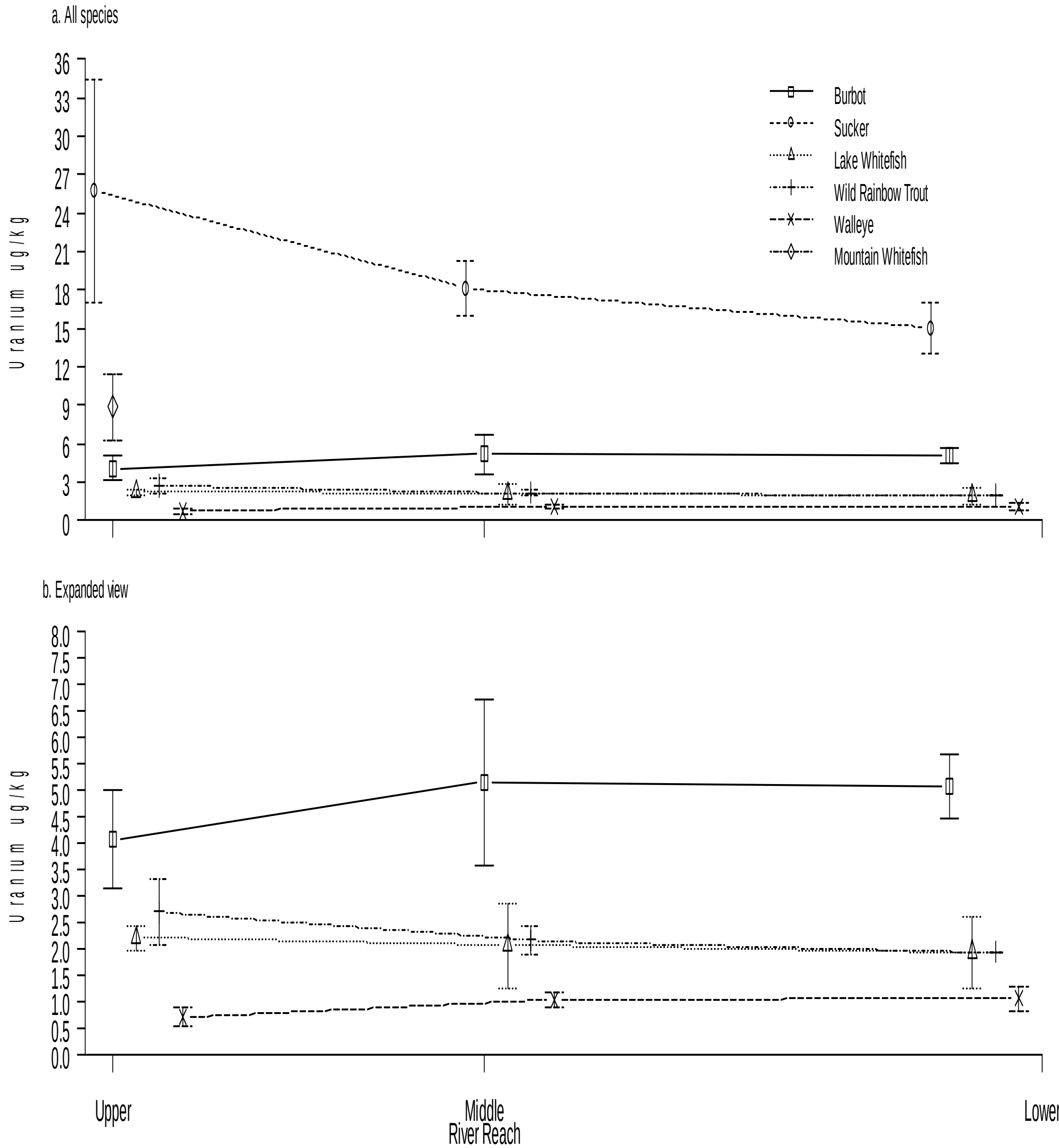


FIGURE E-87
Mean Concentration of Zinc by Reach (Upper, Middle, and Lower) with Associated Asymptotic 95% Confidence Intervals for a) All Species b) Expanded Plot for Species with Concentrations Less than 13,000 μg/kg
Upper Columbia River RI/FS

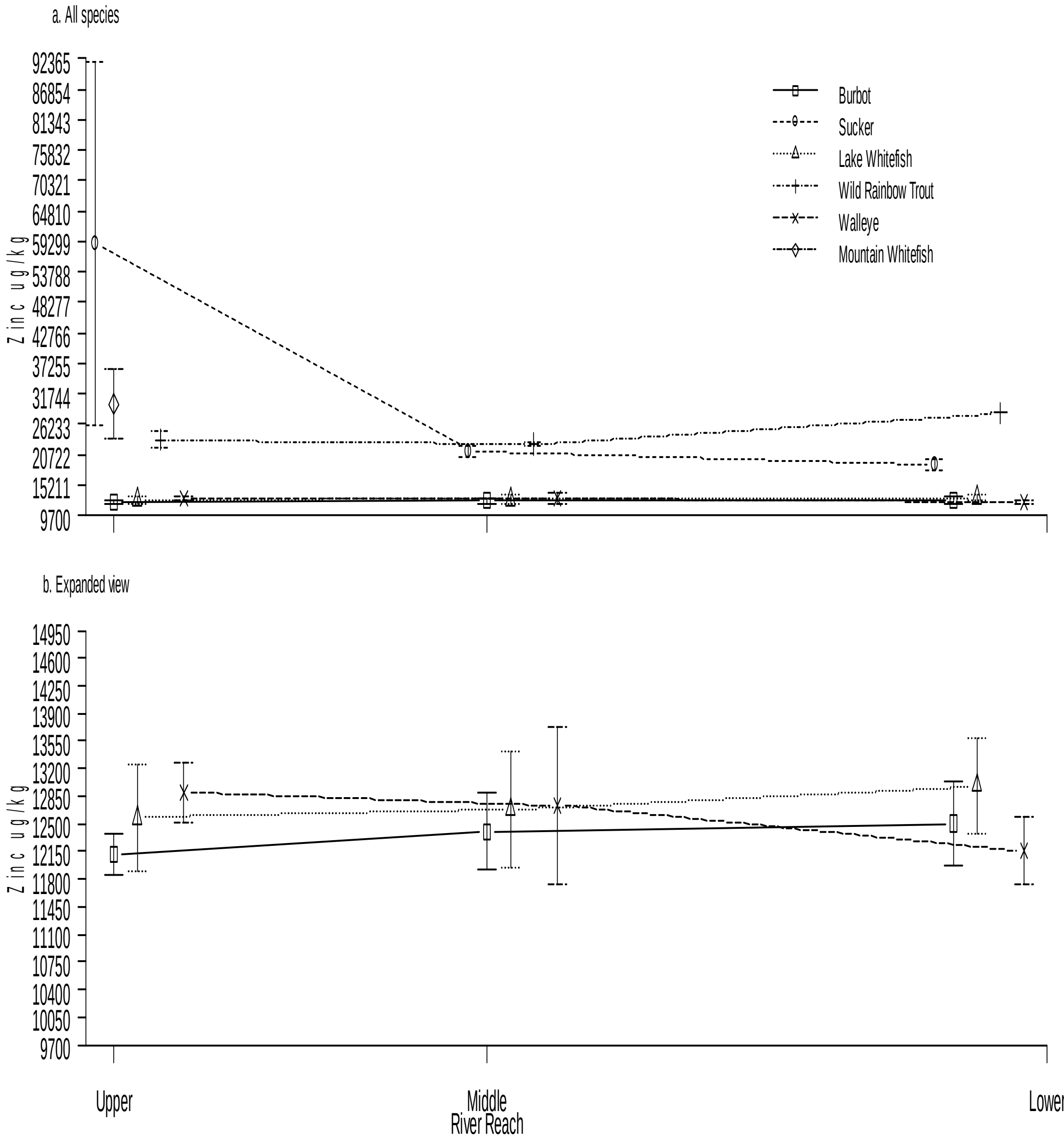


FIGURE E-88
Mean Concentration of Mercury in Whole Fish by Reach (Upper, Middle, and Lower) with Associated Asymptotic 95% Confidence Intervals for a) All Species b) Expanded Plot for Species with Concentrations Less than 90 μg/kg
Upper Columbia River RI/FS

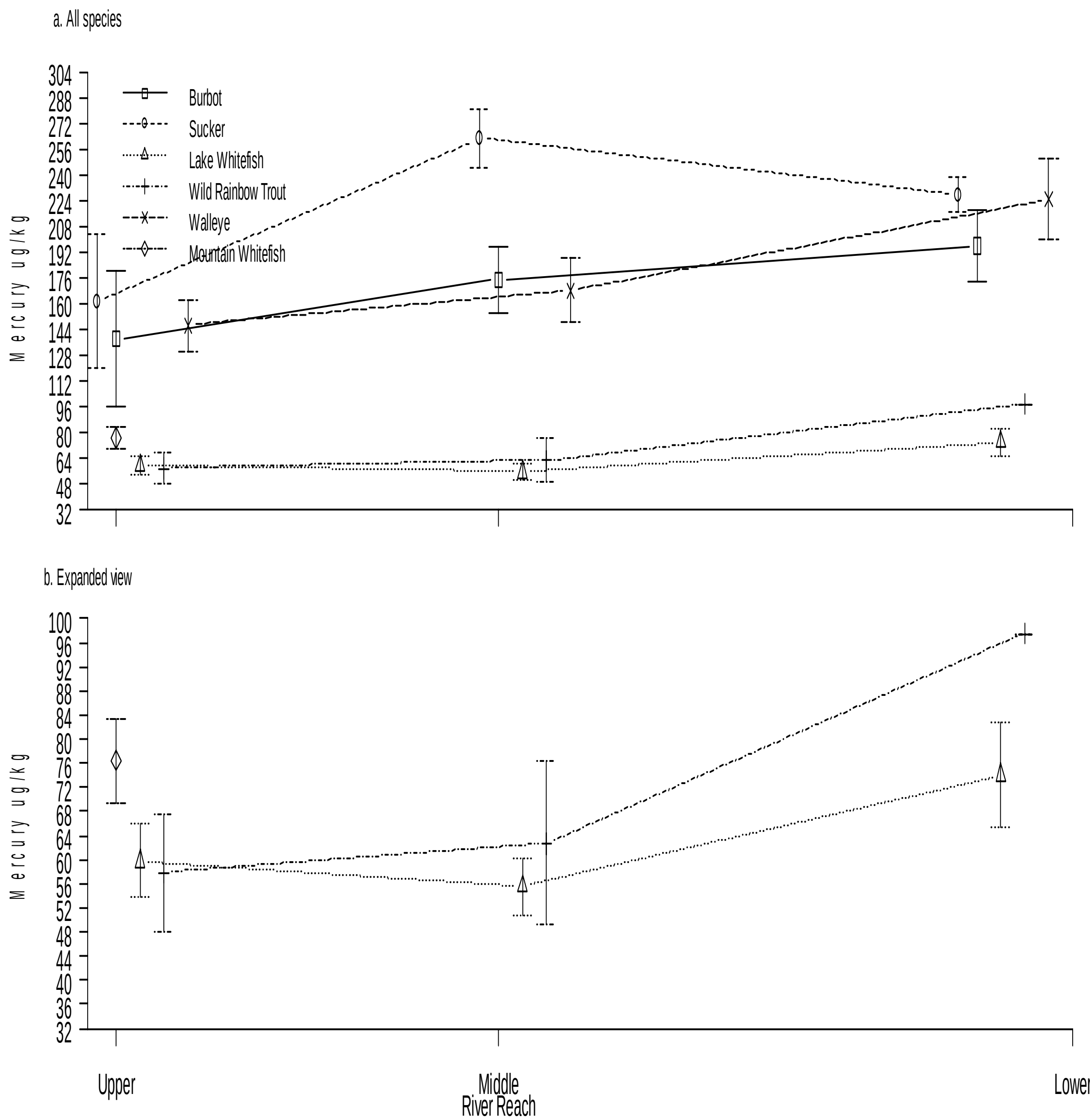


FIGURE E-89
Mean Concentration of Total PCB by Reach (Upper, Middle, and Lower) with Associated Asymptotic 95% Confidence Intervals for a) All Species b) Expanded Plot for Species with Concentrations Less than 110 μg/kg
Upper Columbia River RI/FS

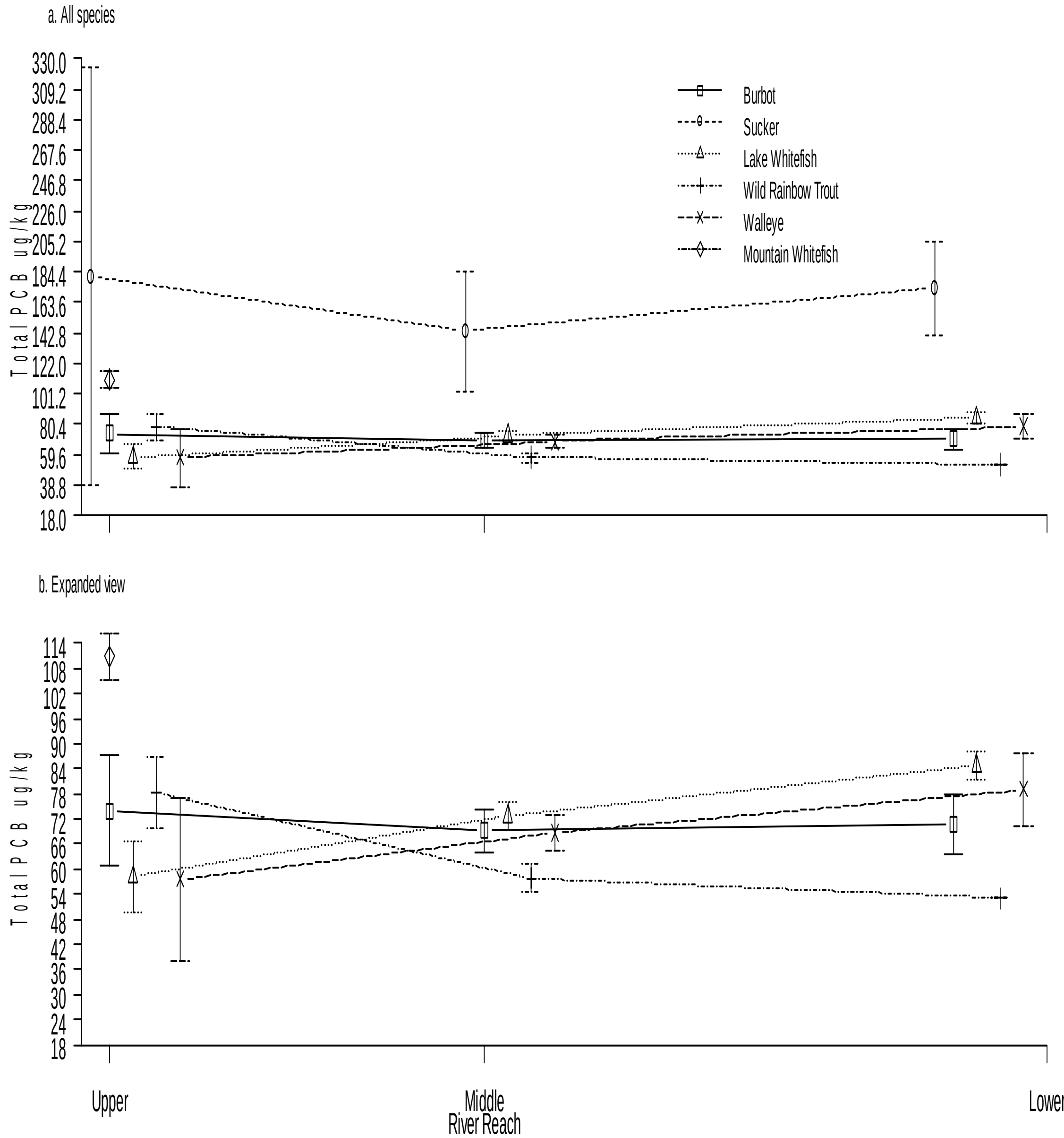
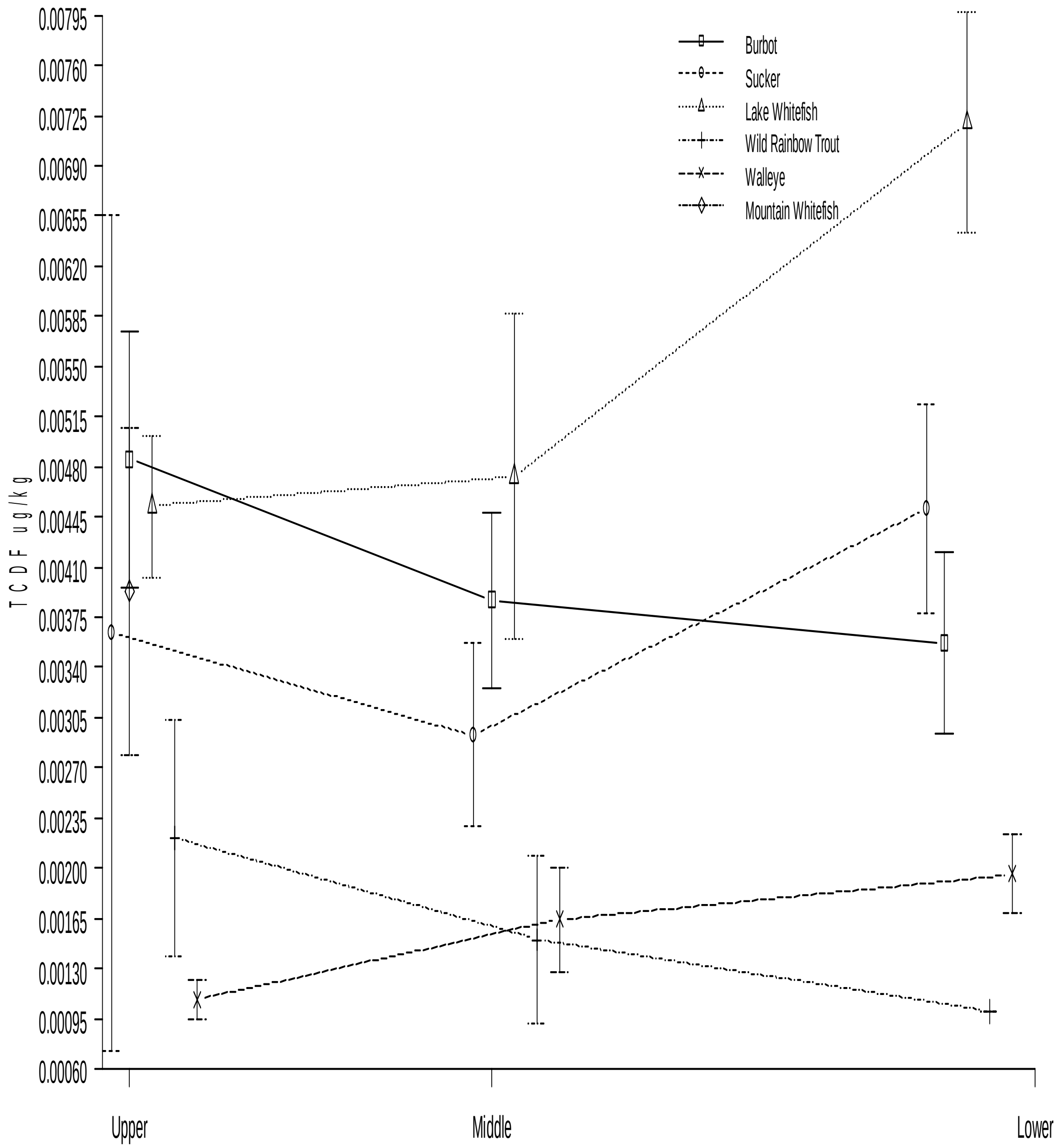


FIGURE E-90
Mean Concentration of TCDF in Whole Fish by Reach (Upper, Middle, and Lower) with Associated Asymptotic 95% Confidence Intervals
Upper Columbia River RI/FS



APPENDIX F

Data Validation Reports

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

March 16, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05364201 – 05424009)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Forty Seven (47) tissue samples were analyzed for total elements by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05364201	05364202	05364203	05364204	05364205	05364206	05364207
05364208	05364209	05364210	05374200	05374201	05374202	05374203
05374204	05374205	05374206	05374207	05374208	05374209	05374210
05374213	05374214	05374215	05374216	05374217	05374218	05374219
05374220	05374221	05374222	05374223	05374224	05374225	05374226
05414001	05414002	05414003	05414004	05414005	05414006	05414007
05424001	05424002	05424005	05424006	05424009		

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory's Quality Assurance Manual, the project QAPP, the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013" and the reviewer's judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding time from the date of collection to the date of digestion and analyses were met for all elements (180 days). Samples were collected on 9/6/05 thru 10/20/05. ICP-AES analysis was conducted on 2/1/06 thru 2/20/06, ICP-MS analysis on 2/8/06 thru 2/25/06 and mercury analyses on 1/31/06 and 2/1/06.

2.0 INSTRUMENT CALIBRATION/VERIFICTION - Acceptable

For ICP-AES analysis, instrument calibration was performed with a blank and six multi-component standards. Recoveries for instrument verification standards (98-110%) met recovery (90-110%) criterion.

For ICP-MS analysis, instrument calibration was performed with a blank and five multi-component standards. Recoveries for instrument verification standards (96-107%) met the recovery (90-110%) criterion.

For mercury, instrument calibration was performed with a blank and eight standards. Correlation coefficients (0.999) met the criterion ($\geq$ 0.995). Recoveries for verification standards (88-105%) met the recovery (80-120%) criterion.

3.0 ICP-AES INTERFERENCE CHECK SAMPLE (ICS) - Acceptable

ICS recoveries met the acceptance criterion ($\pm$ MRL) for all elements.

4.0 LABORATORY CONTROL SAMPLES (LCS) - Acceptable

An aqueous Laboratory Control Sample and a fish tissue reference standard were digested and analyzed. Recoveries for the aqueous LCS (96-108%) met percent recovery requirements (85-115%) and recoveries for the fish tissue standard were within the control limits.

5.0 BLANKS - Acceptable

Preparation and instrument control blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results.

6.0 MATRIX SPIKE ANALYSIS

Matrix spikes were analyzed for samples 05374210, 05424002 and 05424006. Percent recoveries (82-122%) met the recovery criterion (75-125%) for all elements with the exception of aluminum (56-59%). Affected sample results were qualified (J or UJ).

7.0 DUPLICATE SAMPLE ANALYSIS – Acceptable

Duplicate samples were analyzed for samples 05374210, 05424002 and 05424006. Relative percent differences ($\leq$ 17%) were within the control limits ($\pm$ 20%).

8.0 ICP-AES SERIAL DILUTION – Acceptable

A five-fold serial dilution was analyzed for samples 05374210, 05424002 and 05424006. Percent differences ($\leq$ 9%) met the control limits ($\leq$ 10%) for all applicable elements.

9.0 ASSESSMENT SUMMARY

All results for total elements were reported on a “wet weight” basis. The following is a summary of qualified data:

A number of reported values for aluminum were qualified (J or UJ) due to a low matrix spike recovery. Qualified aluminum values may be biased low.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

May 15, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05424057 – 05424080)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Twenty Four (24) tissue samples were analyzed for total elements by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05424057	05424058	05424059	05424060	05424061	05424062	05424063
05424064	05424065	05424066	05424067	05424068	05424069	05424070
05424071	05424072	05424073	05424074	05424075	05424076	05424077
05424078	05424079	05424080				

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory's Quality Assurance Manual, the project QAPP, the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013" and the reviewer's judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding times from the date of collection to the date of digestion and analyses were within the water criteria (180 days). Samples were collected on 10/18/05 thru 10/22/05. ICP-AES analysis was conducted on 4/10/06 thru 4/17/06 and ICP-MS analysis on 3/31/06 thru 4/17/06.

2.0 INSTRUMENT CALIBRATION/VERIFICTION - Acceptable

For ICP-AES analysis, instrument calibration was performed with a blank and six multi-component standards. Recoveries for instrument verification standards (98-108%) met recovery (90-110%) criterion.

For ICP-MS analysis, instrument calibration was performed with a blank and five multi-component standards. Recoveries for instrument verification standards (93-107%) met the recovery (90-110%) criterion.

3.0 ICP-AES INTERFERENCE CHECK SAMPLE (ICS) - Acceptable

ICS recoveries met the acceptance criterion ($\pm$ MRL) for all elements.

4.0 LABORATORY CONTROL SAMPLES (LCS)

An aqueous Laboratory Control Sample and a fish tissue reference standard were digested and analyzed. Recoveries for the aqueous LCS (96-112%) met percent recovery requirements (85-115%) and recoveries for the fish tissue standard were within the control limits with the exception of magnesium and zinc. Magnesium data for 05424057 thru 05424073 and zinc data for 05424074 thru 05424080 were qualified (J) and may be biased high.

5.0 BLANKS - Acceptable

Preparation and instrument control blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results.

6.0 MATRIX SPIKE ANALYSIS - Acceptable

Matrix spikes were analyzed for samples 05424064 and 05424074. Percent recoveries (78-119%) met the recovery criterion (75-125%) for all elements.

7.0 DUPLICATE SAMPLE ANALYSIS

Duplicate samples were analyzed for samples 05424064 and 05424074. Relative percent differences ($\leq$ 18%) were within the control limits ($\pm$ 20%) with the exception of calcium (25%). Calcium data for 05424057 thru 05424073 were qualified (J).

8.0 ICP-AES SERIAL DILUTION – Acceptable

A five-fold serial dilution was analyzed for samples 05424064 and 05424074. Percent differences ($\leq$ 9%) met the control limits ($\leq$ 10%) for all applicable elements.

9.0 ASSESSMENT SUMMARY

For those tests for which Manchester Environmental Laboratory has been NELAC accredited, all requirements of the current NELAC Standard have been met. The analyses for this sample set consisted of two digestion batches consisting of samples 05424057 - 05424073 and 05424074 – 05424080. The following is a summary of qualified data:

A number of magnesium and zinc results were qualified (J) due to high recoveries for the laboratory control sample. Qualified magnesium and zinc values may be biased high.

A number of calcium results were qualified (J) due to a high relative percent difference for the sample duplicate.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

May 5, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05424016 – 05424043)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Twenty Eight (28) tissue samples were analyzed for total elements by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05424016	05424017	05424018	05424019	05424020	05424021	05424022
05424023	05424024	05424025	05424026	05424027	05424028	05424029
05424030	05424031	05424032	05424033	05424034	05424035	05424036
05424037	05424038	05424039	05424040	05424041	05424042	05424043

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory’s Quality Assurance Manual, the project QAPP, the “USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013” and the reviewer’s judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding time from the date of collection to the date of digestion and analyses were met for all elements (180 days). Samples were collected on 10/18/05 thru 10/21/05. ICP-AES analysis was conducted on 3/29/06 thru 3/20/06 and ICP-MS analysis on 3/30/06 thru 4/4/06.

2.0 INSTRUMENT CALIBRATION/VERIFICTION - Acceptable

For ICP-AES analysis, instrument calibration was performed with a blank and six multi-component standards. Recoveries for instrument verification standards (94-110%) met recovery (90-110%) criterion.

For ICP-MS analysis, instrument calibration was performed with a blank and five multi-component standards. Recoveries for instrument verification standards (93-107%) met the recovery (90-110%) criterion.

3.0 ICP-AES INTERFERENCE CHECK SAMPLE (ICS) - Acceptable

ICS recoveries met the acceptance criterion (± MRL) for all elements.

4.0 LABORATORY CONTROL SAMPLES (LCS) - Acceptable

An aqueous Laboratory Control Sample and a fish tissue reference standard were digested and analyzed. Recoveries for the aqueous LCS (95-108%) met percent recovery requirements (85-115%) and recoveries for the fish tissue standard were within the control limits.

5.0 BLANKS - Acceptable

Preparation and instrument control blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results.

6.0 MATRIX SPIKE ANALYSIS - Acceptable

Matrix spikes were analyzed for samples 05424024 and 05424026. Percent recoveries (76-118%) met the recovery criterion (75-125%) for all elements.

7.0 DUPLICATE SAMPLE ANALYSIS

Duplicate samples were analyzed for samples 05424024 and 05424026. Relative percent differences (≤ 14%) were within the control limits (± 20%) with the exception of calcium (27%) in 05424024. Affected samples were qualified (J).

8.0 ICP-AES SERIAL DILUTION – Acceptable

A five-fold serial dilution was analyzed for samples 05424024 and 05424026. Percent differences (≤ 6%) met the control limits (≤ 10%) for all applicable elements.

9.0 ASSESSMENT SUMMARY

All results for total elements were reported on a “dry weight” basis. The following is a summary of qualified data:

A number of reported values for calcium were qualified (J) due to a high relative percent difference for the sample duplicate.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

May 16, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05374245 – 05374256, 05414008, 05424044 - 05424056)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Twenty Six (26) tissue samples were analyzed for total elements by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05374245	05374246	05374247	05374248	05374249	05374250	05374251
05374252	05374253	05374254	05374255	05374256	05414008	05424044
05424045	05424046	05424047	05424048	05424049	05424050	05424051
05424052	05424053	05424054	05424055	05424056		

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory's Quality Assurance Manual, the project QAPP, the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013" and the reviewer's judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding times from the date of collection to the date of analyses were outside the water criteria (180 days). However, as the samples were frozen and the holding time did not exceed a one year criteria used for tissues, no action was taken. Samples were collected on 9/13/05 thru 10/21/05. ICP-AES analysis was conducted on 3/29/06 thru 4/18/06 and ICP-MS analysis on 3/30/06 thru 4/17/06.

2.0 INSTRUMENT CALIBRATION/VERIFICTION - Acceptable

For ICP-AES analysis, instrument calibration was performed with a blank and six multi-component standards. Recoveries for instrument verification standards (93-108%) met recovery (90-110%) criterion.

For ICP-MS analysis, instrument calibration was performed with a blank and five multi-component standards. Recoveries for instrument verification standards (94-104%) met the recovery (90-110%) criterion.

3.0 ICP-AES INTERFERENCE CHECK SAMPLE (ICS) - Acceptable

ICS recoveries met the acceptance criterion (± MRL) for all elements.

4.0 LABORATORY CONTROL SAMPLES (LCS)

An aqueous Laboratory Control Sample and a fish tissue reference standard were digested and analyzed. Recoveries for the aqueous LCS (96-110%) met percent recovery requirements (85-115%) and recoveries for the fish tissue standard were within the control limits with the exception of magnesium. Magnesium data for 05424050 thru 05424056 were qualified (J) and may be biased high.

5.0 BLANKS

Preparation and instrument control blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results with the exception of cobalt. Affected samples were qualified (U) for cobalt.

6.0 MATRIX SPIKE ANALYSIS - Acceptable

Matrix spikes were analyzed for samples 05424045 and 05424050. Percent recoveries (76-117%) met the recovery criterion (75-125%) for all elements.

7.0 DUPLICATE SAMPLE ANALYSIS

Duplicate samples were analyzed for samples 05424045 and 05424050. Relative percent differences (≤ 15%) were within the control limits (± 20%) with the exception of calcium (27%). Calcium data for 05374245 – 05374256, 05414008, 0542044 - 05424049 were qualified (J).

8.0 ICP-AES SERIAL DILUTION – Acceptable

A five-fold serial dilution was analyzed for samples 05424045 and 05424050. Percent differences (≤ 8%) met the control limits (≤ 10%) for all applicable elements.

9.0 ASSESSMENT SUMMARY

For those tests for which Manchester Environmental Laboratory has been NELAC accredited, all requirements of the current NELAC Standard have been met. The analyses for this sample set consisted of two digestion batches consisting of samples 05374245 – 05374256, 05414008, 0542044 - 05424049 and 05424050 – 05424056. The following is a summary of qualified data:

A number of cobalt results were qualified (U) due to the detection of cobalt in the sample preparation blank.

A number of magnesium results were qualified (J) due to a high recovery for the laboratory control sample. Qualified magnesium values may be biased high.

A number of calcium results were qualified (J) due to a high relative percent difference for the sample duplicate.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

May 15, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05374257 – 05374265)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Seven (7) tissue samples were analyzed for total elements by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05374257 05374258 05374261 05374262 05374263 05374264 05374265

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory's Quality Assurance Manual, the project QAPP, the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013" and the reviewer's judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding times from the date of collection to the date of digestion and analyses were outside the water criteria (180 days). However, as the samples were frozen and the holding time did not exceed a one year criteria used for tissues, no action was taken. Samples were collected on 9/13/05 and 9/14/05. ICP-AES analysis was conducted on 3/27/06 thru 4/19/06 and ICP-MS analysis on 3/30/06.

2.0 INSTRUMENT CALIBRATION/VERIFICTION - Acceptable

For ICP-AES analysis, instrument calibration was performed with a blank and six multi-component standards. Recoveries for instrument verification standards (96-108%) met recovery (90-110%) criterion.

For ICP-MS analysis, instrument calibration was performed with a blank and five multi-component standards. Recoveries for instrument verification standards (93-104%) met the recovery (90-110%) criterion.

3.0 ICP-AES INTERFERENCE CHECK SAMPLE (ICS) - Acceptable

ICS recoveries met the acceptance criterion (± MRL) for all elements.

4.0 LABORATORY CONTROL SAMPLES (LCS)

An aqueous Laboratory Control Sample and a fish tissue reference standard were digested and analyzed. Recoveries for the aqueous LCS (96-107%) met percent recovery requirements (85-115%) and recoveries for the fish tissue standard were within the control limits with the exception of sodium. Sodium values were qualified (J) and may be biased low.

5.0 BLANKS - Acceptable

Preparation and instrument control blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results.

6.0 MATRIX SPIKE ANALYSIS

Matrix spikes were analyzed for sample 05374257. Percent recoveries (79-116%) met the recovery criterion (75-125%) for all elements with the exception of copper (74%), iron (-14%) and zinc (186%). All copper, iron and zinc data were qualified (J). Iron data may be biased low whereas zinc data may be biased high.

7.0 DUPLICATE SAMPLE ANALYSIS

Duplicate samples were analyzed for sample 05374257. Relative percent differences (≤ 9%) were within the control limits (± 20%) with the exception of copper (24%). All copper data were qualified (J).

8.0 ICP-AES SERIAL DILUTION – Acceptable

A five-fold serial dilution was analyzed for sample 05374257. Percent differences (≤ 5%) met the control limits (≤ 10%) for all applicable elements.

9.0 ASSESSMENT SUMMARY

For those tests for which Manchester Environmental Laboratory has been NELAC accredited, all requirements of the current NELAC Standard have been met. The following is a summary of qualified data:

Sodium data were qualified (J) due to a low recovery for the laboratory control sample. Sodium values may be biased low.

Copper data were qualified (J) due to a low matrix spike recovery and a high relative percent difference for the sample duplicate.

Iron data were qualified (J) due to a low matrix spike recovery. Iron data may be biased low.

Zinc data were qualified (J) due to a high matrix spike recovery. Zinc data may be biased high.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

May 16, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05364216 – 05364222, 05414009 – 05414018, 05414025, 05414026)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Nineteen (19) tissue samples were analyzed for total elements by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05364216	05364217	05364218	05364219	05364220	05364221	05414222
05414009	05414010	05414011	05414012	05414013	05414014	05414015
05414016	05414017	05414018	05414025	05414026		

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory's Quality Assurance Manual, the project QAPP, the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013" and the reviewer's judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding times from the date of collection to the date of analyses were outside the water criteria (180 days). However, as the samples were frozen and the holding time did not exceed a one year criteria used for tissues, no action was taken. Samples were collected on 9/6/05 thru 10/14/05. ICP-AES analysis was conducted on 4/24/06 and ICP-MS analysis on 4/25/06.

2.0 INSTRUMENT CALIBRATION/VERIFICTION - Acceptable

For ICP-AES analysis, instrument calibration was performed with a blank and six multi-component standards. Recoveries for instrument verification standards (95-110%) met recovery (90-110%) criterion.

For ICP-MS analysis, instrument calibration was performed with a blank and five multi-component standards. Recoveries for instrument verification standards (91-110%) met the recovery (90-110%) criterion.

3.0 ICP-AES INTERFERENCE CHECK SAMPLE (ICS) - Acceptable

ICS recoveries met the acceptance criterion (± MRL) for all elements.

4.0 LABORATORY CONTROL SAMPLES (LCS) – Acceptable

An aqueous Laboratory Control Sample and a fish tissue reference standard were digested and analyzed. Recoveries for the aqueous LCS (101-109%) met percent recovery requirements (85-115%) and recoveries for the fish tissue standard were within the control limits.

5.0 BLANKS - Acceptable

Preparation and instrument control blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results.

6.0 MATRIX SPIKE ANALYSIS

Matrix spikes were analyzed for sample 05364221. Percent recoveries (82-120%) met the recovery criterion (75-125%) for all elements with the exception of aluminum (184%), copper (-131%), chromium (72%) and lead (-9%, 47%). Data for these elements were qualified (J). Aluminum values may be biased high whereas chromium values may be biased low.

7.0 DUPLICATE SAMPLE ANALYSIS

Duplicate samples were analyzed for sample 05364221. Relative percent differences (≤ 17%) were within the control limits (± 20%) with the exception of copper (23%), lead (100%) and zinc (39%). Data for these elements were qualified (J).

8.0 ICP-AES SERIAL DILUTION – Acceptable

A five-fold serial dilution was analyzed for sample 05364221. Percent differences (≤ 10%) met the control limits (≤ 10%) for all applicable elements.

9.0 ASSESSMENT SUMMARY

For those tests for which Manchester Environmental Laboratory has been NELAC accredited, all requirements of the current NELAC Standard have been met. The following is a summary of qualified data:

Aluminum data were qualified (J) due to a high spike recovery. Aluminum values may be biased high.

Chromium data were qualified (J) due to a low spike recovery. Chromium values may be biased low.

Copper and lead data were qualified (J) due to low spike recoveries and high relative percent differences for the duplicate sample comparison.

Zinc data were qualified (J) due to a high relative percent difference for the duplicate sample comparison.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

May 17, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05414019, 05414027 - 05414029, 05424081 - 05424094)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Eighteen (18) tissue samples were analyzed for total elements by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05414019	05414027	05414028	05414029	05424081	05424082	05424083
05424084	05424085	05424086	05424087	05424088	05414089	05424090
05424091	05424092	05424093	05424094			

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory's Quality Assurance Manual, the project QAPP, the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013" and the reviewer's judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding times from the date of collection to the date of preparation and analyses were within the water criteria (180 days). Samples were collected on 10/14/05 thru 10/19/05 and digested on 3/29/06. ICP-AES analysis was conducted on 4/25/06 and ICP-MS analysis on 4/27/06.

2.0 INSTRUMENT CALIBRATION/VERIFICTION - Acceptable

For ICP-AES analysis, instrument calibration was performed with a blank and six multi-component standards. Recoveries for instrument verification standards (94-108%) met recovery (90-110%) criterion.

For ICP-MS analysis, instrument calibration was performed with a blank and five multi-component standards. Recoveries for instrument verification standards (93-103%) met the recovery (90-110%) criterion.

3.0 ICP-AES INTERFERENCE CHECK SAMPLE (ICS) - Acceptable

ICS recoveries met the acceptance criterion (± MRL) for all elements.

4.0 LABORATORY CONTROL SAMPLES (LCS) - Acceptable

An aqueous Laboratory Control Sample and a fish tissue reference standard were digested and analyzed. Recoveries for the aqueous LCS (101-112%) met percent recovery requirements (85-115%) and recoveries for the fish tissue standard were within the control limits.

5.0 BLANKS - Acceptable

Preparation and instrument control blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results.

6.0 MATRIX SPIKE ANALYSIS

Matrix spikes were analyzed for samples 05414019. Percent recoveries (76-114%) met the recovery criterion (75-125%) for all elements with the exception of aluminum (71%) and manganese (-0.3%; 55%). Aluminum and manganese data were qualified (J). Aluminum values may be biased low.

7.0 DUPLICATE SAMPLE ANALYSIS

Duplicate samples were analyzed for samples 05414019. Relative percent differences (≤ 20%) were within the control limits (± 20%) with the exception of barium (31%), lead (31%), manganese (31%) and calcium (50%). Results for these elements were qualified (J).

8.0 ICP-AES SERIAL DILUTION – Acceptable

A five-fold serial dilution was analyzed for samples 05414019. Percent differences (≤ 6%) met the control limits (≤ 10%) for all applicable elements.

9.0 ASSESSMENT SUMMARY

For those tests for which Manchester Environmental Laboratory has been NELAC accredited, all requirements of the current NELAC Standard have been met. The following is a summary of qualified data:

Aluminum results were qualified (J) due to a low matrix spike recovery. Aluminum values may be biased low.

Manganese results were qualified (J) due to low matrix spike recoveries and a high relative percent difference for the duplicate sample comparison.

Barium, calcium and lead results were qualified (J) due to high relative percent differences for the duplicate sample comparison.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

May 17, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05424095, 05424096, 05424253 - 05424258, 05424265 - 05424270)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Fourteen (14) tissue samples were analyzed for total elements by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05424095	05424096	05424253	05424254	05424255	05424256	05424257
05424258	05424265	05424266	05424267	05424268	05414269	05424270

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory's Quality Assurance Manual, the project QAPP, the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013" and the reviewer's judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding times from the date of collection to the date of preparation and analyses were within the water criteria (180 days). Samples were collected on 10/18/05 and 10/19/05 and digested on 4/03/06. ICP-AES analysis was conducted on 5/1/06 and ICP-MS analysis on 4/27/06.

2.0 INSTRUMENT CALIBRATION/VERIFICTION - Acceptable

For ICP-AES analysis, instrument calibration was performed with a blank and six multi-component standards. Recoveries for instrument verification standards (90-109%) met recovery (90-110%) criterion.

For ICP-MS analysis, instrument calibration was performed with a blank and five multi-component standards. Recoveries for instrument verification standards (93-104%) met the recovery (90-110%) criterion.

3.0 ICP-AES INTERFERENCE CHECK SAMPLE (ICS) - Acceptable

ICS recoveries met the acceptance criterion (± MRL) for all elements.

4.0 LABORATORY CONTROL SAMPLES (LCS) - Acceptable

An aqueous Laboratory Control Sample and a fish tissue reference standard were digested and analyzed. Recoveries for the aqueous LCS (101-112%) met percent recovery requirements (85-115%) and recoveries for the fish tissue standard were within the control limits.

5.0 BLANKS - Acceptable

Preparation and instrument control blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results.

6.0 MATRIX SPIKE ANALYSIS

Matrix spikes were analyzed for sample 05424096. Percent recoveries (77-120%) met the recovery criterion (75-125%) for all elements with the exception of iron (16%). Iron data were qualified (J). Iron values may be biased low.

7.0 DUPLICATE SAMPLE ANALYSIS

Duplicate samples were analyzed for sample 05424096. Relative percent differences (≤ 20%) were within the control limits (± 20%) with the exception of barium (27%), calcium (40%) and manganese (23%). Results for these elements were qualified (J).

8.0 ICP-AES SERIAL DILUTION – Acceptable

A five-fold serial dilution was analyzed for sample 05424096. Percent differences (≤ 5%) met the control limits (≤ 10%) for all applicable elements.

9.0 ASSESSMENT SUMMARY

For those tests for which Manchester Environmental Laboratory has been NELAC accredited, all requirements of the current NELAC Standard have been met. The following is a summary of qualified data:

Iron results were qualified (J) due to a low matrix spike recovery. Iron values may be biased low.

Barium, calcium and manganese results were qualified (J) due to high relative percent differences for the duplicate sample comparison.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

May 16, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05364211 – 05364215, 05414020 – 05414022, 05414024, 05424097 – 05424099, 05424250 – 05424252, 05424259, 05424260, 05424262, 05424263)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Nineteen (19) tissue samples were analyzed for total elements by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05364211	05364212	05364213	05364214	05364215	05414020	05414021
05414022	05414024	05424097	05424098	05424099	05424250	05424251
05424252	05424259	05424260	05424262	05424263		

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory's Quality Assurance Manual, the project QAPP, the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013" and the reviewer's judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding times from the date of collection to the date of analyses were outside the water criteria (180 days). However, as the samples were frozen and the holding time did not exceed a one year criteria used for tissues, no action was taken. Samples were collected on 9/7/05 thru 10/19/05. ICP-AES analysis was conducted on 4/27/06 and ICP-MS analysis on 4/27/06 and 4/28/06.

2.0 INSTRUMENT CALIBRATION/VERIFICTION - Acceptable

For ICP-AES analysis, instrument calibration was performed with a blank and six multi-component standards. Recoveries for instrument verification standards (96-108%) met recovery (90-110%) criterion.

For ICP-MS analysis, instrument calibration was performed with a blank and five multi-component standards. Recoveries for instrument verification standards (91-103%) met the recovery (90-110%) criterion.

3.0 ICP-AES INTERFERENCE CHECK SAMPLE (ICS) - Acceptable

ICS recoveries met the acceptance criterion (± MRL) for all elements.

4.0 LABORATORY CONTROL SAMPLES (LCS) - Acceptable

An aqueous Laboratory Control Sample and a fish tissue reference standard were digested and analyzed. Recoveries for the aqueous LCS (97-107%) met percent recovery requirements (85-115%) and recoveries for the fish tissue standard were within the control limits.

5.0 BLANKS - Acceptable

Preparation and instrument control blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results.

6.0 MATRIX SPIKE ANALYSIS

Matrix spikes were analyzed for sample 05414020. Percent recoveries (76-125%) met the recovery criterion (75-125%) for all elements with the exception of manganese (-27%, -32%). Manganese data were qualified (J).

7.0 DUPLICATE SAMPLE ANALYSIS

Duplicate samples were analyzed for sample 05414020. Relative percent differences (≤ 18%) were within the control limits (± 20%) with the exception of manganese (32%) and nickel (21%). Manganese and nickel data were qualified (J).

8.0 ICP-AES SERIAL DILUTION – Acceptable

A five-fold serial dilution was analyzed for sample 05414020. Percent differences (≤ 4%) met the control limits (≤ 10%) for all applicable elements.

9.0 ASSESSMENT SUMMARY

For those tests for which Manchester Environmental Laboratory has been NELAC accredited, all requirements of the current NELAC Standard have been met. Barium was reported for both the ICP-AES and ICP-MS analyses. No significant differences were observed between the two data sets. The following is a summary of qualified data:

Manganese results were qualified (J) due to a low recoveries for the matrix spikes and a high relative percent difference for the duplicate sample comparison.

Nickel results were qualified (J) due to a high relative percent difference for the duplicate sample comparison.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

May 17, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05414023, 05424261, 05424264)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Three (3) tissue samples were analyzed for total elements by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05414023 05424261 05424264

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory's Quality Assurance Manual, the project QAPP, the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013" and the reviewer's judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding times from the date of collection to the date of preparation and analyses were within the water criteria (180 days). Samples were collected on 10/14/05 and 10/18/05 and digested on 4/5/06. ICP-AES analysis was conducted on 4/25/06 and ICP-MS analysis on 4/18/06.

2.0 INSTRUMENT CALIBRATION/VERIFICTION - Acceptable

For ICP-AES analysis, instrument calibration was performed with a blank and six multi-component standards. Recoveries for instrument verification standards (94-108%) met recovery (90-110%) criterion.

For ICP-MS analysis, instrument calibration was performed with a blank and five multi-component standards. Recoveries for instrument verification standards (95-103%) met the recovery (90-110%) criterion.

3.0 ICP-AES INTERFERENCE CHECK SAMPLE (ICS) - Acceptable

ICS recoveries met the acceptance criterion (± MRL) for all elements.

4.0 LABORATORY CONTROL SAMPLES (LCS) - Acceptable

An aqueous Laboratory Control Sample and a fish tissue reference standard were digested and analyzed. Recoveries for the aqueous LCS (100-110%) met percent recovery requirements (85-115%) and recoveries for the fish tissue standard were within the control limits.

5.0 BLANKS - Acceptable

Preparation and instrument control blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results.

6.0 MATRIX SPIKE ANALYSIS

Matrix spikes were analyzed for sample 05424261. Percent recoveries (93-122%) met the recovery criterion (75-125%) for all elements with the exception of antimony (56%; 56%) and nickel (127%). Antimony and nickel data were qualified (J). Antimony values may be biased low whereas nickel values may be biased high.

7.0 DUPLICATE SAMPLE ANALYSIS - Acceptable

Duplicate samples were analyzed for sample 05424261. Relative percent differences (≤ 6%) were within the control limits (± 20%).

8.0 ICP-AES SERIAL DILUTION – Acceptable

A five-fold serial dilution was analyzed for sample 05424261. Percent differences (≤ 7%) met the control limits (≤ 10%) for all applicable elements.

9.0 ASSESSMENT SUMMARY

For those tests for which Manchester Environmental Laboratory has been NELAC accredited, all requirements of the current NELAC Standard have been met. The following is a summary of qualified data:

Antimony results were qualified (J) due to a low matrix spike recoveries. Antimony values may be biased low.

Nickel results were qualified (J) due to a high matrix spike recovery. Nickel values may be biased high.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

March 22, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Mercury in Fish Tissue (05424016 – 05424043)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Twenty eight (28) tissue samples were analyzed for total mercury by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05424016	05424017	05424018	05424019	05424020	05424021	05424022
05424023	05424024	05424025	05424026	05424027	05424028	05424029
05424030	05424031	05424032	05424033	05424034	05424035	05424036
05424037	05424038	05424039	05424040	05424041	05424042	05424043

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory's Quality Assurance Manual, the project QAPP, the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013" and the reviewer's judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding time from the date of collection to the date of digestion and analyses were met for all elements (180 days). Samples were collected on 10/18/05 thru 10/21/05. Mercury analyses was conducted on 2/9/06.

2.0 INSTRUMENT CALIBRATION/VERIFICTION - Acceptable

For mercury, instrument calibration was performed with a blank and eight standards. Correlation coefficients (0.999) met the criterion ($\geq$ 0.995). Recoveries for verification standards (102-105%) met the recovery (80-120%) criterion. Low level standard recoveries (105-109%) met the recovery (70-130%) criterion.

3.0 LABORATORY CONTROL SAMPLES (LCS) - Acceptable

An aqueous Laboratory Control Sample and a fish tissue reference standard were digested and analyzed. Recoveries for the aqueous LCS (104-105%) met percent recovery requirements (85-115%) and recoveries for the fish tissue standard were within established control limits.

4.0 BLANKS - Acceptable

Preparation and instrument control blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results.

5.0 MATRIX SPIKE ANALYSIS - Acceptable

Matrix spikes were analyzed for samples 05424024, 05424026 and 05424034. Percent recoveries (93-99%) met the recovery criterion (75-125%) for all samples.

6.0 DUPLICATE SAMPLE ANALYSIS – Acceptable

Duplicate samples were analyzed for samples 05424024, 05424026 and 05424034. Relative percent differences ($\leq$ 6%) were within the control limits ($\pm$ 20%).

7.0 ASSESSMENT SUMMARY

All results for total elements were reported on a “wet weight” basis. No data were qualified for this review.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

March 22, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Mercury in Fish Tissue (05374227–05374244; 05424010-05424015)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Twenty four (24) tissue samples were analyzed for total mercury by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05374227	05374228	05374229	05374230	05374231	05374232	05374233
05374234	05374235	05374236	05374237	05374238	05374239	05374240
05374241	05374242	05374243	05374244	05424010	05424011	05424012
05424013	05424014	05424015				

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory's Quality Assurance Manual, the project QAPP, the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013" and the reviewer's judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding time from the date of collection to the date of digestion and analyses were met for all elements (180 days). Samples were collected on 9/13/05 thru 10/22/05. Mercury analyses was conducted on 1/17/06.

2.0 INSTRUMENT CALIBRATION/VERIFICTION - Acceptable

For mercury, instrument calibration was performed with a blank and eight standards. Correlation coefficients (0.999) met the criterion ($\geq$ 0.995). Recoveries for verification standards (87-93%) met the recovery (80-120%) criterion. Low level standard recoveries (89-104%) met the recovery (70-130%) criterion.

3.0 LABORATORY CONTROL SAMPLES (LCS) - Acceptable

Both aqueous and fish tissue reference standards were digested and analyzed. Recoveries for the aqueous LCS (86-91%) met percent recovery requirements (85-115%) with the exception of one standard (83%). As this was within 20% of the true value (Functional Guidelines), no action was taken. Recoveries for the fish tissue standard were within established control limits.

4.0 BLANKS - Acceptable

Preparation and instrument blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results.

5.0 MATRIX SPIKE ANALYSIS - Acceptable

Matrix spikes were analyzed for samples 05374228, 05374237 and 05424010. Percent recoveries (78-83%) met the recovery criterion (75-125%) for all samples.

6.0 DUPLICATE SAMPLE ANALYSIS – Acceptable

Duplicate samples were analyzed for samples 05374228, 05374237 and 05424010. Relative percent differences ($\leq$ 4%) were within the control limits ($\pm$ 20%).

7.0 ASSESSMENT SUMMARY

All results for total elements were reported on a “wet weight” basis. No data were qualified for this review.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

March 22, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Mercury in Fish Tissue (05374245–05374256; 05414008; 05424044-05424056)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Twenty six (26) tissue samples were analyzed for total mercury by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05374245	05374246	05374247	05374248	05374249	05374250	05374251
05374252	05374253	05374254	05374255	05374256	05414008	05424044
05424045	05424046	05424047	05424048	05424049	05424050	05424051
05424052	05424053	05424054	05424055	05424056		

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory's Quality Assurance Manual, the project QAPP, the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013" and the reviewer's judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding time from the date of collection to the date of digestion and analyses were met for all elements (180 days). Samples were collected on 9/13/05 thru 10/21/05. Mercury analyses was conducted on 2/15/06.

2.0 INSTRUMENT CALIBRATION/VERIFICTION - Acceptable

For mercury, instrument calibration was performed with a blank and eight standards. Correlation coefficients (0.999) met the criterion ($\geq$ 0.995). Recoveries for verification standards (100-104%) met the recovery (80-120%) criterion. Low level standard recoveries (106-114%) met the recovery (70-130%) criterion.

3.0 LABORATORY CONTROL SAMPLES (LCS) - Acceptable

Both aqueous and fish tissue reference standards were digested and analyzed. Recoveries for the aqueous LCS (98-102%) met percent recovery requirements (85-115%). Recoveries for the fish tissue standard were within established control limits.

4.0 BLANKS - Acceptable

Preparation and instrument blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results.

5.0 MATRIX SPIKE ANALYSIS - Acceptable

Matrix spikes were analyzed for samples 05374245, 05374255 and 05424045. Percent recoveries (89-98%) met the recovery criterion (75-125%) for all samples.

6.0 DUPLICATE SAMPLE ANALYSIS – Acceptable

Duplicate samples were analyzed for samples 05374245, 05374255 and 05424045. Relative percent differences ($\leq$ 9%) were within the control limits ($\pm$ 20%).

7.0 ASSESSMENT SUMMARY

All results for total elements were reported on a “wet weight” basis. No data were qualified for this review.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

March 22, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Mercury in Fish Tissue (05374257, 05374258; 05374261-05374265)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Seven (7) tissue samples were analyzed for total mercury by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05374257 05374258 05374261 05374262 05374263 05374264 05374265

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory's Quality Assurance Manual, the project QAPP, the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013" and the reviewer's judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding time from the date of collection to the date of digestion and analyses were met for all elements (180 days). Samples were collected on 9/13/05 thru 9/14/05. Mercury analyses was conducted on 2/15/06.

2.0 **INSTRUMENT CALIBRATION/VERIFICTION** - Acceptable

For mercury, instrument calibration was performed with a blank and eight standards. Correlation coefficients (0.999) met the criterion ($\geq$ 0.995). Recoveries for verification standards (100-104%) met the recovery (80-120%) criterion. Low level standard recoveries (105-106%) met the recovery (70-130%) criterion.

3.0 **LABORATORY CONTROL SAMPLES (LCS)** - Acceptable

Both aqueous and fish tissue reference standards were digested and analyzed. Recoveries for the aqueous LCS (101-102%) met percent recovery requirements (85-115%). Recoveries for the fish tissue standard were within established control limits.

4.0 **BLANKS** - Acceptable

Preparation and instrument blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results.

5.0 **MATRIX SPIKE ANALYSIS** - Acceptable

A matrix spike analysis was conducted for sample 05374257. Percent recoveries (84-89%) met the recovery criterion (75-125%).

6.0 **DUPLICATE SAMPLE ANALYSIS** – Acceptable

A duplicate analysis was conducted for sample 05374257. The relative percent difference ($\leq$ 1%) was within the criterion ($\pm$ 20%).

7.0 **ASSESSMENT SUMMARY**

All results for total elements were reported on a “wet weight” basis. No data were qualified for this review.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

March 22, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Mercury in Fish Tissue (05424057-05424080)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Twenty four (24) tissue samples were analyzed for total mercury by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05424057	05424058	05424059	05424060	05424061	05424062	05424063
05424064	05424065	05424066	05424067	05424068	05424069	05424070
05424071	05424072	05424073	05424074	05424075	05424076	05424077
05424078	05424079	05424080				

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory's Quality Assurance Manual, the project QAPP, the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013" and the reviewer's judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding time from the date of collection to the date of digestion and analyses were met for all elements (180 days). Samples were collected on 10/18/05 thru 10/22/05. Mercury analyses was conducted on 3/14/06.

2.0 INSTRUMENT CALIBRATION/VERIFICTION - Acceptable

For mercury, instrument calibration was performed with a blank and seven standards. Correlation coefficients (0.999) met the criterion ($\geq$ 0.995). Recoveries for verification standards (96-98%) met the recovery (80-120%) criterion. Low level standard recoveries (97-101%) met the recovery (70-130%) criterion.

3.0 LABORATORY CONTROL SAMPLES (LCS) - Acceptable

Both aqueous and fish tissue reference standards were digested and analyzed. Recoveries for the aqueous LCS (98-101%) met percent recovery requirements (85-115%). Recoveries for the fish tissue standard were within established control limits.

4.0 BLANKS - Acceptable

Preparation and instrument blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results.

5.0 MATRIX SPIKE ANALYSIS - Acceptable

Matrix spikes were analyzed for samples 05424064 and 05424077. Percent recoveries (92-102%) met the recovery criterion (75-125%).

6.0 DUPLICATE SAMPLE ANALYSIS – Acceptable

Duplicate samples were analyzed for samples 05424064 and 05424077. Relative percent differences ($\leq$ 8%) were within the criterion ($\pm$ 20%).

7.0 ASSESSMENT SUMMARY

All results for total elements were reported on a “wet weight” basis. No data were qualified for this review.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

March 28, 2006

Reply To
Attn. Of: **OEA-095**

MEMORANDUM

SUBJECT: Data Validation for Upper Columbia RI-FS, Analysis of Total Mercury in Fish Tissue (05364221, 05364222, 05414009-05414019, 05424081-05424096)

FROM: Donald Matheny, Chemist
Technical Support Unit, OEA

TO: Sally Thomas, Regional Project Manager
Office of Environmental Cleanup (ECL-111)

CC: Jim Stefanoff, CH2MHill

The data validation of inorganic analyses for the above sample set is complete. Twenty nine (29) tissue samples were analyzed for total mercury by the USEPA Region 10 Manchester Environmental Laboratory, Port Orchard, WA. Sample numbers are as follows:

05364221	05364222	05414009	05414010	05414011	05414012	05414013
05414014	05414015	05414016	05414017	05414018	05414019	05424081
05424082	05424083	05424084	05424085	05424086	05424087	05424088
05424089	05424090	05424091	05424092	05424093	05424094	05424095
05424096						

DATA QUALIFICATIONS

Data qualifications are based on the quality control requirements outlined in the Laboratory's Quality Assurance Manual, the project QAPP, the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013" and the reviewer's judgment. The comments presented herein are based on the documentation provided for the review.

1.0 TIMELINESS - Acceptable

The holding time from the date of collection to the date of digestion and analyses were met for all elements (180 days). Samples were collected on 9/6/05 thru 10/19/05. Mercury analyses was conducted on 2/23/06 thru 3/9/06.

2.0 INSTRUMENT CALIBRATION/VERIFICTION - Acceptable

For mercury, instrument calibrations were performed with a blank and seven standards. Correlation coefficients (0.999) met the criterion ($\geq$ 0.995). Recoveries for verification standards (97-100%) met the recovery (80-120%) criterion. Low level standard recoveries (91-105%) met the recovery (70-130%) criterion.

3.0 LABORATORY CONTROL SAMPLES (LCS) - Acceptable

Both aqueous and fish tissue reference standards were digested and analyzed. Recoveries for the aqueous LCS (98-100%) met percent recovery requirements (85-115%). Recoveries for the fish tissue standard were within established control limits.

4.0 BLANKS - Acceptable

Preparation and instrument blanks were prepared and analyzed in accordance with method requirements. Blank values were either non-detected or below a concentration that could impact sample results.

5.0 MATRIX SPIKE ANALYSIS - Acceptable

Matrix spikes were analyzed for samples 05364221, 05414019 and 05424088. Percent recoveries (94-100%) met the recovery criterion (75-125%).

6.0 DUPLICATE SAMPLE ANALYSIS – Acceptable

Duplicate samples were analyzed for samples 05364221, 05414019 and 05424088. Relative percent differences ($\leq$ 5%) were within the criterion ($\pm$ 20%).

7.0 ASSESSMENT SUMMARY

All results for total elements were reported on a “wet weight” basis. For those tests for which Manchester Environmental Laboratory has been NELAC accredited, all requirements of the current NELAC Standard have been met. No data were qualified for this review.

DATA QUALIFIERS

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. The analyte may or may not be present in the sample.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

February 3, 2006

MEMORANDUM

SUBJECT: Data Review for PCB Aroclors and Percent Lipids in fish tissue for Upper Columbia River

Project Code: TEC-774G Account Code: 05T10P302DD2C106XLA00

FROM: Steven Reimer, Chemist, USEPA Region 10 Laboratory
Office of Environmental Assessment

TO: Sally Thomas, Project Manager, USEPA Region 10
Office of Environmental Cleanup

CC: Kevin Rochlin, USEPA Region 10
Office of Environmental Cleanup

Monica Tonel, USEPA Region 10
Office of Environmental Cleanup

Jim Stefanoff, CH2M Hill

The data review of the PCB Aroclor analysis results for the fish tissue samples has been completed. The samples were prepared and analyzed by the USEPA Region 10 Laboratory staff located in Manchester, WA using EPA methods SW-846 3541, 3620, 3665A and 8082.

Reviewed in this report are data for sample numbers:
05364201 05364202 05364203 05364204 05364205 05364206 05364207 05364208
05364209 05364210

DATA QUALIFICATIONS

The following comments refer to laboratory performance in meeting the quality control specifications outlined in the analytical method, the Manchester Laboratory Quality Assurance Manual, standard operating procedures, and professional judgment. For those tests for which the USEPA Region 10 Laboratory has been NELAC accredited, all requirements of the current NELAC Standard have been met.

The conclusions presented herein are based on the information provided for the review.

Holding Time - Acceptable

The samples were received frozen on November 16, extracted December 29 and January 5 and analyzed on January 31, 2006. The holding time criteria of one year for frozen tissue and 40 days for extracts were met.

Initial Calibration - Acceptable

An initial calibration was acquired on January 31, 2006. A seven point quadratic calibration was used for 1016 and 1260. Single points were analyzed for Aroclors 1221, 1232, 1242, 1248, 1254, 1262 and 1268. All points used Coefficient of Determination > 0.995. The residual difference from calculation of the value of each calibration point against the appropriate calibration curve was <20% of the calibration point.

Continuing Calibration – Acceptable

The continuing calibration check was within the criterion of $\pm$15% of the expected value for each analyte.

Blanks - Acceptable

A method blank was prepared and analyzed to evaluate the potential for laboratory contamination and the effect on sample results. The target analytes were not detected at the quantitation limit in the blank.

Surrogates - Acceptable

A solution containing decachlorobiphenyl was added as a surrogate for this analysis. All surrogate recoveries were within the expected range of 50 to 150%.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Separate aliquots of two samples, 05364201 and 05364206, were spiked in duplicate with a solution of Aroclors 1260 and 1016 and analyzed with the other samples. The MS/MSD recoveries were within the 30 to 150%, <50% RSD criteria for sample 05364201.
The recoveries for 1016 in 05364206 were also within the criteria. Once the native contribution of 1260 was subtracted from the total the calculated recovery was low to near zero. Results for Aroclor 1260 in sample 05364206 were qualified as estimated, “J”, due to the low recovery. There were no other indications of Aroclor 1260 recovery problems from the other MS/MSD pair or the LCSs. All three aliquots were from the same jar (N4). The low recovery is likely to stem from sample homogeneity, with the native amount of Aroclor 1260 higher in the aliquot taken for analysis than in those taken for the MS/MSD.

Laboratory Control Sample - Acceptable

Data for laboratory control samples (LCS) are generated to provide information on the accuracy of the analytical method and the laboratory performance. Two blank aliquots were spiked with a solution of Aroclors 1016 and 1260. Both LCSs met the applied recovery criterion of 70-130%.

Target Compound Identification - Acceptable

PCBs were identified in most samples. Four of the samples, 05364202 through 05364205, contain PCBs at levels that are near the reporting limit and the patterns do not match any of the Aroclor standards. They have been quantitated as Aroclor 1260 and qualified as “NJ”. Five of the samples, 05364206 through 05364210, contain Aroclor 1260 with a contribution from 1254 resulting in a poor pattern match. They have been reported as Aroclor 1260 qualified as estimated “J.”

Compound Quantitation

The initial calibration functions were used for calculations. Reported quantitation limits were based on the initial calibration standards, the sample size used for the analysis and the final extract volume.
Five of the samples, 05364201 through 05364205, contain PCBs at levels that are near the reporting limit with patterns that do not match any of the Aroclor standards. They have been quantitated as Aroclor 1260 and qualified as tentatively identified and the quantity estimated “NJ”.
Five of the samples, 05364206 through 05364210, contain PCBs that originated in Aroclor 1260 and 1254. The 1260 is higher in concentration and the samples are quantitated as Aroclor 1260 and qualified as estimated “J.”.

Manual Integrations - Acceptable

Manual integrations were reviewed and found to be acceptable.

Percent Lipid Determination – Acceptable

Percent lipids were determined from a portion of the extract generated for the PCB analysis. This procedure determines non-polar lipids.

Overall Assessment

All requirements for data qualifiers from the preceding sections were accumulated. Each sample data summary sheet and each compound was checked for positive or negative results. From this, the overall need for data qualifiers for each analysis was determined. In cases where more than one of the preceding sections required data qualifiers, the most restrictive qualifier has been added to the data.

In general, all unqualified data can be used without restriction. The usefulness of qualified data should be treated according to the severity of the qualifier. Should questions arise regarding the qualification of data and its relation to the usefulness, the reader is encouraged to contact Steven Reimer at the Region 10 Laboratory, phone number (360)871-8718.

LABORATORY QUALIFIER/REMARK CODE DEFINITIONS

Qualifier/ Remark Code	Definition (Codes Assigned to Values)
<	**Microbiology –** Level of target organism present in the sample is less than detection limit. The reported value is the detection limit. **Flash Point –** The expected flash point temperature is less than the reported value.
>	**Microbiology –** Level of target organism exceeds upper limit for acceptable range of countable colonies (MF only) or exceeds MPN indices based on number of positive tubes (MPN only). The reported value is the upper limit. **Flash Point –** If the sample has a flashpoint, it is greater than the reported value.
J	The identification of the analyte is acceptable; the reported value is an estimate.
JK	The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL	The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
K	The identification of the analyte is acceptable; the reported value may be biased high. The actual value is expected to be less than the reported value.
L	The identification of the analyte is acceptable; the reported value may be biased low. The actual value is expected to be greater than the reported value.
N	There is presumptive evidence that the analyte is present; the analyte is reported as a tentative identification.
NJ	There is presumptive evidence that the analyte is present; the analyte is reported as a tentative identification. The reported value is an estimate.
U	The analyte was not detected at or above the reported value.
UJ	The analyte was not detected at or above the reported value. The reported value is an estimate.

Qualifier/ Remark Code	Definition (Codes With No Reported Values)
A	Absent – The target parameter was analyzed for but was not present or was undetected. No value is reported with this qualification.
NA	Not Applicable, the parameter was not analyzed for, or there is no analytical result for this parameter. No value is reported with this qualification.
P	Present at an undetermined level – The target parameter is present but not quantifiable or no quantifiable result was determined. No value is reported with this qualification.

Qualifier/ Remark Code	**Definition (Codes With No Reported Values)**
R	The presence or absence of the analyte can not be determined from the data due to severe quality control problems. The data are rejected and considered unusable. No value is reported with this qualification.
T	A trace of the subject parameter was present. For asbestos analysis the subject parameter was identified but at a low level that a quantifiable percentage of content is unreliable. No value is reported with this qualification.
TNTC	Too Numerous To Count – Any membrane where the total number of bacterial colonies exceeds 200 per membrane, or if the colonies are not distinct enough for accurate counting (i.e. confluent growth).

Qualifier/ Remark Code	**Definition (Codes Assigned To Values Generated via Field or Screening Methods)**
F	The associated datum was generated using field methods and/or screening methods. The identification of the analyte is acceptable and the reported value has been found to be acceptable for use.
JF	The associated datum was generated using field methods and/or screening methods. The identification of the analyte is acceptable and the reported value is an estimate.
JKF	The associated datum was generated using field methods and/or screening methods. The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JLF	The associated datum was generated using field methods and/or screening methods. The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UF	The associated datum was generated using field methods and/or screening methods. The analyte was not detected at or above the reported value.
UJF	The associated datum was generated using field methods and/or screening methods. The analyte was not detected at or above the reported value. The reported value is an estimate.

Qualifier/ Remark Code	**Cross Reference to Older Codes**
A	UND, ND – Undetected, Not detected
NA	NAR, NAF – No analytical result, Not analyzed for
P	PNQ – Present but not quantified
R	REJ - Rejected
T	TRACE

NOTE: For any qualifier code see the QA memo or case narrative for a more detailed description of its use.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

April 15, 2006

Reply to
Attn of: MGREPOGR
OEA-095

MEMORANDUM

Subject: Data Validation Report for the Polychlorinated Biphenyl (PCB) Aroclor and Percent Lipid (% lipid) Analysis of Fish Tissue Samples Collected for the Phase I Upper Columbia River (UCR) Remedial Investigation/Feasibility Study (RI/FS) September 2005

From: Ginna Grepo-Grove, Senior Chemist
Technical Support Unit, OEA

To: Sally Thomas, RPM, UCR, Fish Tissue Study
USEPA, ECL

Jim Stefanoff, Project Manager, CH2MHill
Artemis Antipas, QA Manager, CH2MHill

The quality assurance (QA) review of 57 fish tissue samples collected from the above referenced site has been completed. These samples were analyzed for PCB Aroclors in accordance with the SW846 Method 8082, "*Polychlorinated Biphenyls by Gas Chromatography*". The analyses were performed by the USEPA Manchester Environmental Laboratory located in Port Orchard WA. The following samples were evaluated in this validation report:

Field Sample Numbers	Sample Description	Region 10 Sample Tracking Number
WE3F15	Walleye FSCA#3 Comp# 1 - 5 Fish Fillet Skin-on (R & L)	05374200
WE3F25	Walleye FSCA#3 Comp# 2 - 5 Fish Fillet Skin-on (R & L)	05374201
WE3F35	Walleye FSCA#3 Comp# 3 - 5 Fish Fillet Skin-on (R & L)	05374202
WE3F45	Walleye FSCA#3 Comp# 4 - 5 Fish Fillet Skin-on (R & L)	05374203
WE3F55	Walleye FSCA#3 Comp# 5 - 5 Fish Fillet Skin-on (R & L)	05374204
WE3O15	Walleye FSCA#3 Comp# 1 - 5 Offals	05374205
WE3O25	Walleye FSCA#3 Comp# 2 - 5 Offals	05374206
WE3O35	Walleye FSCA#3 Comp# 3 - 5 Offals	05374207
WE3O45	Walleye FSCA#3 Comp# 3 -5 Offals	05374208
WE3O55	Walleye FSCA#3 Comp# 5 -5 Offals	05374209

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Field Sample Numbers	Sample Description	Region 10 Sample Tracking Number
WE4W15	Walleye FSCA#4 Whole body Comp #1 - 5 Fish	05374210
WE4W25	Walleye FSCA#4 Whole body Comp # 2 - 5 Fish	05374213
WE4W35	Walleye FSCA#4 Whole body Comp # 3 - 5 Fish	05374214
WE4W45	Walleye FSCA#4 Whole body Comp # 4 - 5 Fish	05374215
WE4W55	Walleye FSCA#4 Whole body Comp # 5- 5 Fish	05374216
WE6F15	Walleye FSCA#6 Comp# 1 - 5 Fish Fillet Skin-on (R & L)	05374217
WE6F25	Walleye FSCA#6 Comp# 2 - 5 Fish Fillet Skin-on (R & L)	05374218
WE6F35	Walleye FSCA#6 Comp# 3 - 5 Fish Fillet Skin-on (R & L)	05374219
WE6F45	Walleye FSCA#6 Comp# 4 - 5 Fish Fillet Skin-on (R & L)	05374220
WE6F55	Walleye FSCA#6 Comp# 5 - 5 Fish Fillet Skin-on (R & L)	05374221
WE6O15	Walleye FSCA#6 Comp# 1 -5 Offals	05374222
WE6O25	Walleye FSCA#6 Comp# 2 - 5 Offals	05374223
WE6O35	Walleye FSCA#6 Comp# 3 - 5 Offals	05374224
WE6O45	Walleye FSCA#6 Comp# 4 - Offals	05374225
WE6O55	Walleye FSCA#6 Comp# 5 - Offals	05374226
LW3W15	Lake White Fish FSCA#3 Whole body Comp# 1 - 5 Fish	05374227
LW3W55	Lake White Fish FSCA#3 Whole body Comp# 5 - 5 Fish	05374228
LW3W25	Lake White Fish FSCA#3 Whole body Comp# 2 - 5 Fish	05374229
LW3W35	Lake White Fish FSCA#3 Whole body Comp# 3 - 5 Fish	05374230
LW3W45	Lake White Fish FSCA#3 Whole body Comp# 4 - 5 Fish	05374231
LW5W25	Lake White Fish FSCA#5 Whole body Comp# 2 - 5 Fish	05374234
LW5W15	Lake White Fish FSCA#5 Whole body Comp# 1 - 5 Fish	05374235
LW5W35	Lake White Fish FSCA#5 Whole body Comp# 3 - 5 Fish	05374236
LW5W45	Lake White Fish FSCA#5 Whole body Comp# 4 - 5 Fish	05374237
LW5W55	Lake White Fish FSCA#5 Whole body Comp# 5 - 5 Fish	05374238
LW4W25	Lake White Fish FSCA#4 Whole body Comp# 2 - 5 Fish	05374239
LW4W35	Lake White Fish FSCA#4 Whole body Comp# 3 - 5 Fish	05374240
LW4W45	Lake White Fish FSCA#4 Whole body Comp# 4 - 5 Fish	05374241
LW4W55	Lake White Fish FSCA#4 Whole body Comp# 4 - 5 Fish	05374242
LW6W13	Lake White Fish FSCA#6 Whole body Comp# 1 - 3 Fish	05374243
LW4W15	Lake White Fish FSCA#4 Whole body Comp# 1 - 5 Fish	05374244
RW1F15	Rainbow Trout Wild FSCA#1 Comp#1 -5 Fish Fillets Skin-on (L &R)	05374245
RW1F25	Rainbow Trout Wild FSCA#1 Comp#2 -5 Fish Fillets Skin-on (L &R)	05374246
RW1F35	Rainbow Trout Wild FSCA#1 Comp#3 -5 Fish Fillets Skin-on (L &R)	05374247
RW1F45	Rainbow Trout Wild FSCA#1 Comp#4 -5 Fish Fillets Skin-on (L &R)	05374248
RW1F55	Rainbow Trout Wild FSCA#1 Comp#5 -5 Fish Fillets Skin-on (L &R)	05374249
RW1F65	Rainbow Trout Wild FSCA#1 Comp#6 -5 Fish Fillets Skin-on (L &R) *	05374250
RW1O15	Rainbow Trout Wild FSCA#1 Comp# 1 -5 Offals	05374251
RW1O25	Rainbow Trout Wild FSCA#1 Comp# 2 -5 Offals	05374252
RW1O35	Rainbow Trout Wild FSCA#1 Comp# 3 -5 Offals	05374253
RW1O45	Rainbow Trout Wild FSCA#1 Comp# 4 -5 Offals	05374254
RW1O55	Rainbow Trout Wild FSCA #1 Comp# 1 - 5 Offals	05374255
RW1O65	Rainbow Trout Wild FSCA #1 Comp# 6 - 5 Offals *	05374256
MW1W45	Mountain Whitefish FSCA#1 Whole body Comp# 4 - 5 Fish	05374257
MW1W55	Mountain Whitefish FSCA#1 Whole body Comp# 5 - 5 Fish	05374258
MW1W65	Mountain Whitefish FSCA#1 Whole body Comp# 6 - 5 Fish *	05374261
MW1W75	Mountain Whitefish FSCA#1 Whole body Comp# 7 - 5 Fish *	05374262
MW1W15	Mountain Whitefish FSCA#1 Whole body Comp# 1 - 5 Fish	05374263
MW1W25	Mountain Whitefish FSCA#1 Whole body Comp# 2 - 5 Fish	05374264
MW1W35	Mountain Whitefish FSCA#1 Whole body Comp# 3 - 5 Fish	05374265

* Field Duplicate/Triplicate

DATA QUALIFICATIONS

The following comments refer to the laboratory's performance in meeting the Quality Control specifications outlined in the Phase 1 Fish Tissue Sampling Quality Assurance Project Plan (QAPP) for the Upper Columbia River Site CERCLA RI/FS, the analytical method SW846 Method 8082, the MEL's Standard Operating Procedure (SOP) #Or_Fish3541 and the MEL SOP for lipid determination.

The conclusions presented herein are based on the information provided for the review.

Field Sample Collection

The fish tissue sample collection was accomplished through a multi-agency/tribal effort with the CH2MHill team as the overall lead. Sample vessels and vessel operators were provided by the following tribal and federal agencies under an interagency or sub–contracting agreement with EPA and/or CH2MHill: Spokane Tribe of Indians, Confederated Tribes of the Colville Reservation, US Fish and Wildlife Services and the USEPA Investigation and Engineering Unit, of the Office of Environmental Assessment.

The sample collection dates were based on the fish availability and fish species' spawning season. There were two sample collection events conducted, first one was conducted in September 2005 and the second one was in October 2005. The fish species that were collected from the designated fish sample collection areas (FSCA 1 -6) were Walleye (*Sander vitreus*) Rainbow trout (*Oncorhynchus mykiss*), Lake white fish (*Coregonus clupeaformis*), Large-scale sucker (*Catastomas macrocheilus*), and Burbot (*Lota lota*). Long-nose suckers and Mountain whitefish were not originally listed in the QAPP as target fish species but were also collected and added to the target fish species due to their availability in the FSCAs. The mountain white fish were analyzed while the long-nose suckers were archived. The rainbow trout samples were grouped into three categories – wild, hatchery and mixed wild and hatchery. Only the wild and hatchery rainbow trouts were analyzed for the compounds of concern. The mixed wild and hatchery rainbow trouts were archived for future analysis, if needed.

The fish samples were generally collected using gill nets, electro-fishing, burbot traps and angling, if necessary. The field sample collection process was audited by the project's EPA and CH2MHill QA Managers. There were no significant problems encountered during sample collection, on-site processing, sampling documentation and sample shipment.

Sample Processing and Chain-of-Custody Documentation

CH2MHill set-up a trailer dedicated for the on-site fish sample processing which included visual inspection of the fish, sex determination, conducting field measurements (fish length and weight) and otolith removal. Otholiths are then later sent to the State Fish and Wildlife for fish age determination. All of the field forms generated for these measurements and determination were evaluated and cross – checked with the homogenization forms and chain-of-custody (COC) documentation. All of the field measurements, field sampling documentation (COCs) and sample preservation (freezing to -20C) were conducted by CH2MHill within 24 hours of sample collection.

Frozen whole fish samples were shipped to CH2MHill laboratory - Applied Science Laboratory (ASL) located in Corvallis, OR for filleting (if needed), homogenization, compositing, aliquot distribution and storage. There were four types of tissues prepared and analyzed for the compounds of potential concern (COPCs) for the sites, namely: fillets with skin-on, offals (remaining tissue, internal organs and fish bones after filleting, guts (for large scale sucker only) and whole body (includes fish head, skin and entrails).

As specified in the EPA approved site QAPP, the following tissue types and homogenates were prepared by ASL and shipped to USEPA Manchester Environmental Laboratory (MEL) for subsequent PCB Aroclor, metals, percent lipids and speciated arsenic analyses and/or archival:

- Walleye – fillets and offals at three FSCAs and whole body composites from three FSCAs
- Rainbow trout – fillets and offals at three FSCAs and whole body composites from three FSCAs
- Lake whitefish – whole body composites
- Mountain whitefish – whole body composites
- Large scale sucker – whole body; guts/internal organs composites
- Burbot – whole body composites
- Long-nose suckers – whole body composites

Sample Homogenization and Compositing

Fish samples from each sample location were individually homogenized at ASL. The fish samples were grinded using a commercial grade stainless steel blender/grinder (Robo-Coupe Blixer 6) with liquid nitrogen. Equal amounts of homogenized whole body, fillet or offal tissue samples were mixed and composited to form a single sample. The homogenization forms and the resulting fish sample composites were evaluated by this reviewer. There were no discrepancies noted between the sample collection forms, homogenization forms and the sample composite COCs. Fillet and whole body samples included the fish skin. Care was taken to prevent cross-contamination between sample homogenates. Prior to the start of the project samples, homogenization process was audited by the project's EPA and CH2MHill QA Managers. To monitor processing cross-contamination, proof blanks were collected at the QAPP specified frequency and sent to the Contract Laboratory program (CLP) for the analysis of the project target compound.

<u>Deviation from the QAPP</u>: In a mock sample processing and homogenization conducted during the EPA's and CH2MHill's QA lab audit, it was found out that otoliths were very hard to remove when the fish samples were already frozen. In addition, subjecting the fish to freezing and defrosting raptures the internal organs, make the fish muscles mushy and thus made the separation of fillets from the offals quite a challenge.

To avoid cross–contamination of the fish tissue samples with the offals and to better preserve the otholiths, it was agreed by the project team that the removal of otolith will be conducted on-site after field measurements and before sample preservation (freezing to -20C) and if bench space and resources will allow, filleting of fish samples will also be performed on-site prior to freezing the samples.

Sample Receipt and Storage

All of the sample homogenates were received frozen and intact at MEL from ASL. The remaining whole fish samples (un-homogenized) were also sent to MEL for archiving and maybe future chemical analysis, if needed. After inspection, inventory and logging-in, the sample homogenates and un-homogenized fish samples were stored in a freezer at -20C. The fish samples remained frozen at -20C while waiting for extraction and analysis. The temperature of the freezer used for sample storage is monitored 24 hours by MEL. The integrity of the fish samples and homogenates were maintained by MEL while on storage, during and after extraction and analysis.

COC Corrective Action

There were two COC corrective actions initiated by MEL to reconcile discrepancies between the regional tracking sample numbers and the field sample numbers for a few of the samples in this sample delivery group. The corrective actions and resolutions were sufficiently documented and new regional tracking sample numbers were issued by ALS to correct the regional sample number duplication.

Holding Times - Acceptable

All of the fish sample analyses met the project-specified extraction and analytical holding times of 6 months from the date of sample collection. None of the data were qualified on this basis.

The list of samples, cross-referenced to the fish species, station locations, and the dates of sample collection, VTSR at the lab, extraction, extract clean-up and analysis dates are listed in Table 1 at the end of this report.

Sample Preparation and Clean-up

All of the samples were extracted following the technical specifications of the analytical methods used. Prior to acid clean-up, 10% of the primary extracts were taken for % lipid determination. The rest of the primary extracts went through concentrated sulfuric acid clean-up (SW846 Method 3665) to isolate the PCBs and remove most of the organic material that would interfere with the analysis. A 35% or 70% fraction of the original extract (depending on the amount extracted) was concentrated to 1.0 ml and passed through florisil cartridge clean-up (SW846 Method 3620) prior to GC analysis.

All of the analysts involved in sample extraction, extract clean-up and analysis of the samples in this data package performed an acceptable initial demonstration of capability (IDOC) studies prior to handling the samples.

In addition, the efficiency of the sample extraction procedure, clean-up and analytical processes were also monitored through the routine analysis of in-house Quality Control sample analyses and incorporation of routine-in-house QC checks (recoveries of the surrogate standards and the spike compounds in the laboratory control samples and matrix spike and duplicate analyses).

Instrument Performance Checks - Acceptable

A dual-column GC analyses was used during the PCB Aroclor analysis. The designated primary column used in the quantitation of target compounds was Restek's CLP2 in all analytical sequences. The secondary, confirmatory column was Restek's CLP1. Baseline and retention time shifts were monitored and the instrument remained stable throughout the course of the analyses. None of the data were qualified on this basis.

Initial Calibrations - Acceptable

Five ICALs using 5-concentration levels of Aroclors 1016 and 1260 and one ICLA using 5-concentration levels of Aroclor 1254 were performed and used during the analysis of the samples listed in this validation report. A single–point concentration was analyzed for Aroclors 1221, 1232, 1242, 1248, 1254, 1262 and 1268 with each 1016/1260 ICAL. The frequency of analysis and the regression coefficients of the 5 major peaks used in the Aroclor identification and quantitation were all >0.995 for the primary column. Some of the peaks of from the secondary column did not meet the criteria of r>0.995, however, since this column was only used for confirmatory analyses, none of the data were qualified on this basis.

Continuing Calibrations - Acceptable

A mid-point concentration Aroclro 1016/1260 and/or Aroclor 1254 were analyzed for continuing calibration verification (CCVs) checks. The CCvs met the criteria for the frequency of analysis, the percent differences (%D) of the daily calibration factors (CFs) as compared to the mean CFs from the ICALs and the retention time shifts. None of the data were qualified on this basis.

Quantitation and Reporting Limits (QLs & RLs)

The QLs which are based on the lowest concentration level of the Aroclors in the ICALs, the amount of sample extracted and the final extract volume were about twice the project analytical concentration goals (ACGs) listed in Table 2-3 of the QAPP. Aroclor detections at concentrations <QLs, however, were reported by MEL with an estimated, "J", qualifier. All of the target compounds detected in the samples were calculated off the primary column using the CFs from the applicable ICALs.

Due to the low level concentrations of Aroclors 1260 and 1254 native to most of the fish samples and interferences of other organic materials causing baseline noise and drifts, the RLs of most of the non-detected Aroclors in the samples were elevated to about 10 times the QLs.

The concentrations of the Aroclors 1260 mixed with 1254 detected in most of the samples were qualified estimated, "J", due to the co-eluting peaks used in the calculations.

Laboratory Method Blanks - Acceptable

The frequency of analysis of laboratory blank was met. All of the method blanks associated with the fish sample extraction, clean-up and analyses were clean. None of the data were qualified on this basis.

Homogenization Proof Blanks – Acceptable

A composite of final rinses during the decontamination of the Robo-Coupe Blixer 6 used for fish tissue and offal homogenization were collected. An aliquot of the composite rinses called "proof blanks" were collected every three days and shipped to the Superfund Contract Laboratory Program (CLP) labs. A total of 17 proof blanks were shipped to A4 Laboratory, Inc. of Woodlands TX and were analyzed for semi-volatile organic compounds (SVOCs), pesticides and PCB Aroclors. No PCB Aroclors were detected in any of the proof blanks. None of the fish tissue sample results were qualified on this basis.

Analytical Sequence - Acceptable

All of the standards, blanks, samples and QC samples were analyzed in accordance with the method specified analytical sequence. All of the analytical sequences were also bracketed by the continuing calibration check standards. None of the data were qualified on this basis.

Surrogate Recoveries – Acceptable

Decachlorobiphenyl (DCB) was used as the surrogate standard during PCB Aroclor analyses. Known concentrations of DCB were added to all samples and QC samples to monitor efficiency during sample extraction, clean-up and analysis. The DCB surrogate recoveries for all samples, QC samples and dilution runs were acceptable (50-150%). The DCB retention time shifts were also within the established retention time windows. None of the data were qualified on this basis.

Matrix Spike and Matrix Spike Duplicate (MS/MSD) Analysis

Samples WE4W15 (05374210), LW3W55 (05374228), LW5W15 (05374235), RW1F15 (05374245) and MW1W45 (05374257) were the designated QC samples and analyzed for MS and MSD. The frequency of analysis of MS/MSD (about 10%) was met. Known concentrations of Aroclors 1016 and 1260 were spiked into the QC samples and went through the same extraction, clean-up and analytical procedures as the project samples.

The MS/MSD recoveries and relative percent differences (RPDs) criteria (30-150% and 50%, respectively) of the Aroclor 1016 and 1260 were met for all QC samples with the following exceptions:

- The Aroclor 1260 MS/MSD recoveries in the QC samples WE4W15 (05374210) and MW1W45 (05374257), however, did not meet the acceptance criteria due to the Aroclor 1254/1260 mixture native to the samples interfering with the calculations. The amount of 1254/1260 in sample 05374257 was greater than 4 times the amount of spike. The data associated with this QC sample were not qualified. Since the detected Aroclor (1254/1260) in sample 05374210 was already qualified due to peak co-elutions, no further qualification is warranted due to MS/MSD recoveries.

- The recovery and relative percent difference (RPD) criteria for the Aroclors 1016 and 1260 in the QC samples LW3W55 MS 4and MSD met the acceptance criteria. None of the data associated with these QC samples were qualified on this basis.

The lipid analytical method does not include MS/MSD analyses.

Laboratory Control Sample and Duplicate Analyses (LCS/LCSD) – Acceptable

Four sets of LCS and LCSD were prepared and analyzed with the samples. For LCS and LCSD, the hydromatrix extraction media was spiked with known concentrations of Aroclors 1016 and 1260. The frequency of analysis, recovery (70-130%) and RPD (50%) criteria were met for all LCS and LCSD analyses. None of the PCB Aroclor sample data were qualified on this basis. There were no LCS/LCSD runs for lipid determination.

Analytical Duplicate Analyses - Acceptable

Samples LW4W45 (05374241), RW1O15 (05374251) and MW1W65 (05374261) were analyzed in duplicates. A mixture of Aroclors 1254 and 1260 were detected during the initial and duplicate analysis of all three QC samples. The RPDs between the concentrations of 1254/1260 detected in the original and duplicate sample runs ranged from 3-21%. The RPDs of the % lipids calculated the original and duplicate %lipid runs ranged form 9 – 24%. All of the RPDs were acceptable and within the QC limits of 50%. None of the data were qualified on this basis.

Field Duplicate Sample Analyses – Acceptable

RW1F55 (05374249) and RW1F65 (05374250) are field duplicate samples submitted blind to MEL. A mixture of Aroclors 1260 and 1254 were identified in both samples at 21.6 and 19.1 ug/Kg estimated concentrations, respectively. The % lipids was 4.9% and 4.3% (RPD=6.7%). There was not much variability between the lipids and Aroclor duplicate values. None of the wild trout fillet Aroclor data was qualified on this basis.

MW1W45 (05374257), MW1W65 (05374261) and MW1W75 (05374262) are field triplicate samples submitted blind to MEL. Aroclors 1260/1254 was detected in all three samples at estimated concentrations of 65.5, 37.6 and 53.1 ug/Kg, respectively. The %RSD was 27% for the Aroclors and 16.6% for the lipids. There was not much variability between the lipids and Aroclor duplicate values. None of the mountain whitefish PCB data were qualified on this basis.

Compound Identification

Aroclors 1254 and 1260 were evidently present in all of the samples. The chromatogram overlays for the Aroclors 1260, 1254 and sample runs were mapped and evaluated by this reviewer. In instances where concentrations of Aroclors 1254 and 1260 were very low that only the major co-eluting peaks are quantifiable, the Aroclor detections were reported by the analysts as a combined Aroclor 1254/1260 with an estimated qualification. Where Aroclor 1254 and 1260 peaks could be isolated, separate concentrations for each Aroclor was reported. All of the extracts went through additional clean-ups when needed. Other than the usual low-level baseline noise, there were no other interferences observed with the chromatograms. All of the Aroclors reported somewhat matched the standard fingerprint patterns. All of the Aroclors identified were verified and are acceptable.

Laboratory Contact

The laboratory was not contacted for this review.

Overall Assessment

All of the samples were analyzed in accordance with the method specifications. There were no significant problems found with the data. The data, as qualified, are acceptable and can be used for all purposes.

Data Qualifiers		
	U	The analyte was not detected at or above the reported numeric result.
	J	The analyte was positively identified. The associated numerical result is an estimate.
	UJ	The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample.
	R	The data are unusable for all purposes.
	N	There is evidence the analyte is present in this sample.
	JN	There is evidence that the analyte is present. The associated numerical result is an estimate.

TABLE 1- SUMMARY OF HOLDING TIMES

Sample Number	Region 10 Sample Tracking Number	Date Sample Collection	VTSR at CH2M Lab	CH2MHill Homogenization Date	VTSR at MEL	Extraction Date	% Lipid Analysis Date	PCB Analysis Date
WE3F15	05374200	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/23/06
WE3F25	05374201	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/23/06
WE3F35	05374202	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/23/06
WE3F45	05374203	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/23/06
WE3F55	05374204	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/23/06
WE3O15	05374205	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/23/06
WE3025	05374206	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/31/06
WE3O35	05374207	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/31/06
WE3O45	05374208	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/31/06
WE3O55	05374209	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/31/06
WE4W15	05374210	09/10/05	09/14/05	11/09/05	11/16/05	01/09/06	01/09/06	01/23/06
WE4W25	05374213	09/12/05	09/14/05	11/09/05	11/16/05	01/09/06	01/09/06	01/23/06
WE4W35	05374214	09/12/05	09/14/05	11/09/05	11/16/05	01/09/06	01/09/06	01/31/06
WE4W45	05374215	09/12/05	09/14/05	11/09/05	11/16/05	01/09/06	01/09/06	01/31/06
WE4W55	05374216	09/12/05	09/14/05	11/09/05	11/16/05	01/09/06	01/09/06	01/23/06
WE6F15	05374217	09/14/05	09/15/05	11/11/05	11/16/05	01/09/06	01/09/06	01/23/06
WE6F25	05374218	09/14/05	09/15/05	11/11/05	11/16/05	01/10/06	01/10/06	02/16/06
WE6F35	05374219	09/14/05	09/15/05	11/11/05	11/16/05	01/10/06	01/10/06	02/16/06
WE6F45	05374220	09/14/05	09/15/05	11/13/05	11/16/05	01/10/06	01/10/06	02/16/06
WE6F55	05374221	09/14/05	09/15/05	11/13/05	11/16/05	01/10/06	01/10/06	02/16/06
WE6O15	05374222	09/14/05	09/15/05	11/11/05	11/16/05	01/10/06	01/10/06	02/17/06
WE6O25	05374223	09/14/05	09/15/05	11/11/05	11/16/05	01/10/06	01/10/06	02/17/06
WE6O35	05374224	09/14/05	09/15/05	11/11/05	11/16/05	01/10/06	01/10/06	02/17/06
WE6O45	05374225	09/14/05	09/15/05	11/13/05	11/16/05	01/10/06	01/10/06	02/17/06
WE6O55	05374226	09/14/05	09/15/05	11/13/05	11/16/05	01/10/06	01/10/06	02/17/06
LW3W15	05374227	09/13/05	09/14/05	11/22/05	12/08/05	01/10/06	01/10/06	02/16/06
LW3W55	05374228	09/13/05	09/14/05	11/22/05	12/08/05	01/17/06	01/17/06	02/16/06
LW3W25	05374229	09/14/05	09/15/05	11/21/05	12/08/05	01/17/06	01/17/06	02/16/06
LW3W35	05374230	09/14/05	09/15/05	10/14/05	12/08/05	01/17/06	01/17/06	02/17/06
LW3W45	05374231	09/14/05	09/15/05	11/21/05	12/08/05	01/17/06	01/17/06	02/17/06
LW3W75	05374233	09/14/05	09/15/05	11/21/05	12/08/05	01/17/06	01/17/06	02/17/06
LW5W15	05374235	09/15/05	09/16/05	11/16/05	12/08/05	01/31/06	01/31/06	03/07/06
LW5W35	05374236	09/15/05	09/16/05	11/16/05	12/08/05	01/31/06	01/31/06	03/07/06
LW5W45	05374237	09/15/05	09/16/05	11/22/05	12/08/05	01/31/06	01/31/06	03/07/06
LW5W55	05374238	09/15/05	09/16/05	11/28/05	12/08/05	01/31/06	01/31/06	03/07/06

Sample Number	Region 10 Sample Tracking Number	Date Sample Collection	VTSR at CH2M Lab	CH2MHill Homogenization Date	VTSR at MEL	Extraction Date	% Lipid Analysis Date	PCB Analysis Date
LW4W25	05374239	09/17/05	09/18/05	11/22/05	12/08/05	01/31/06	01/31/06	03/07/06
LW4W35	05374240	09/17/05	09/18/05	11/22/05	12/08/05	01/31/06	01/31/06	03/08/06
LW4W45	05374241	09/17/05	09/18/05	11/28/05	12/08/05	01/31/06	01/31/06	03/08/06
LW4W55	05374242	09/17/05	09/18/05	11/28/05	12/08/05	02/01/06	02/01/06	03/08/06
LW6W13	05374243	09/17/05	09/18/05	11/18/05	12/08/05	02/01/06	02/01/06	03/08/06
LW4W15	05374244	09/17/05	09/18/05	11/21/05	12/08/05	02/01/06	02/01/06	03/08/06
RW1F15	05374245	09/13/05	09/14/05	12/20/05	01/06/06	02/01/06	02/01/06	03/08/06
RW1F25	05374246	09/13/05	09/14/05	12/22/05	01/06/06	02/01/06	02/01/06	03/08/06
RW1F35	05374247	09/13/05	09/14/05	12/22/05	01/06/06	02/01/06	02/01/06	03/08/06
RW1F45	05374248	09/13/05	09/14/05	12/23/05	01/06/06	02/01/06	02/01/06	03/08/06
RW1F55	05374249	09/13/05	09/14/05	12/21/05	01/06/06	02/01/06	02/01/06	03/08/06
RW1F65	05374250	09/13/05	09/14/05	12/21/05	01/06/06	02/01/06	02/01/06	03/08/06
RW1O15	05374251	09/13/05	09/14/05	12/20/05	01/06/06	02/01/06	02/01/06	03/08/06
RW1O25	05374252	09/13/05	09/14/05	12/22/05	01/06/06	02/01/06	02/01/06	03/08/06
RW1O35	05374253	09/13/05	09/14/05	12/22/05	01/06/06	02/07/06	02/07/06	03/08/06
RW1O45	05374254	09/13/05	09/14/05	12/23/05	01/06/06	02/07/06	02/07/06	03/08/06
RW1O55	05374255	09/13/05	10/22/05	12/21/05	01/06/06	02/07/06	02/07/06	03/08/06
RW1O65	05374256	09/13/05	10/22/05	12/21/05	01/06/06	02/07/06	02/07/06	03/08/06
MW1W45	05374257	09/13/05	09/14/05	11/29/05	01/12/06	02/07/06	02/07/06	03/08/06
MW1W55	05374258	09/13/05	09/14/05	11/30/05	01/12/06	02/07/06	02/07/06	03/08/06
MW1W65	05374261	09/14/05	09/14/05	11/29/05	01/12/06	02/15/06	02/15/06	03/08/06
MW1W75	05374262	09/43/05	09/14/05	11/29/05	01/12/06	02/15/06	02/15/06	03/08/06
MW1W15	05374263	09/13/05	09/14/05	11/30/05	01/12/06	02/15/06	02/15/06	03/08/06
MW1W25	05374264	09/13/05	09/14/05	11/29/05	01/12/06	02/15/06	02/15/06	03/08/06
MW1W35	05374265	09/13/05	09/14/05	11/30/05	01/12/06	02/15/06	02/15/06	03/08/06
LW4W45 Dup	05374241 D	09/17/05	09/18/05	11/28/05	12/08/05	02/15/06	02/15/06	03/08/06
RW1O15 Dup	05374251 D	09/13/05	09/14/05	12/20/05	01/06/06	02/15/06	02/15/06	03/08/06
MW1W65 Dup	05374261 D	09/14/05	09/14/05	11/29/05	01/12/06	02/15/06	02/15/06	03/08/06

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

May 15, 2006

Reply to
Attn of: MGREPOGR
OEA-095

MEMORANDUM

Subject: Data Validation Report for the Polychlorinated Biphenyl (PCB) Aroclor and Percent Lipid (% lipid) Analysis of Fish Tissue Samples Collected for the Phase I Upper Columbia River (UCR) Remedial Investigation/Feasibility Study (RI/FS) September 2005

From: Ginna Grepo-Grove, Senior Chemist
Technical Support Unit, OEA

To: Sally Thomas, RPM, UCR, Fish Tissue Study
USEPA, ECL

CC: Marc Stifelman, Human Health Risk Assessment, USEPA. OEA
Burt Shephard, Ecological Risk Asessment, USEPA, OEA
Jim Stefanoff, Project Manager, CH2MHill
Artemis Antipas, QA Manager, CH2MHill

The quality assurance (QA) review of 198 fish tissue samples collected from the above referenced site has been completed. These samples were analyzed for PCB Aroclors in accordance with the SW846 Method 8082, "*Polychlorinated Biphenyls by Gas Chromatography*". The analyses were performed by the USEPA Manchester Environmental Laboratory located in Port Orchard,WA. The following samples were evaluated in this validation report:

Field Sample Numbers	Sample Description	Region 10 Sample Tracking Number
WE1F15	Walleye FSCA#1 Comp# 1 - 5 Fish Fillet Skin-on (R & L)	05364201
WE1F25	Walleye FSCA#1 Comp# 2 - 5 Fish Fillet Skin-on (R & L)	05364202
WE1F35	Walleye FSCA#1 Comp# 3 - 5 Fish Fillet Skin-on (R & L)	05364203
WE1F45	Walleye FSCA#1 Comp# 4 - 5 Fish Fillet Skin-on (R & L)	05364204

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Field Sample Numbers	Sample Description	Region 10 Sample Tracking Number
WE1F55	Walleye FSCA#1 Comp# 5 - 5 Fish Fillet Skin-on (R & L)	05364205
WE1O15	Walleye FSCA#1 Comp# 1 - 5 Offals	05364206
WE1O25	Walleye FSCA#1 Comp# 2 - 5 Offals	05364207
WE1O35	Walleye FSCA#1 Comp# 3 - 5 Offals	05364208
WE1O45	Walleye FSCA#1 Comp# 4 - 5 Offals	05364209
WE1O55	Walleye FSCA#1 Comp# 5 - 5 Offals	05364210
LS1W25	Lake White Fish FSCA#1 Whole body Comp# 2 - 5 Fish	05364221
LS2W35	Lake White Fish FSCA#1 Whole body Comp# 3 - 5 Fish	05364222
WE3F15	Walleye FSCA#3 Comp# 1 - 5 Fish Fillet Skin-on (R & L)	05374200
WE3F25	Walleye FSCA#3 Comp# 2 - 5 Fish Fillet Skin-on (R & L)	05374201
WE3F35	Walleye FSCA#3 Comp# 3 - 5 Fish Fillet Skin-on (R & L)	05374202
WE3F45	Walleye FSCA#3 Comp# 4 - 5 Fish Fillet Skin-on (R & L)	05374203
WE3F55	Walleye FSCA#3 Comp# 5 - 5 Fish Fillet Skin-on (R & L)	05374204
WE3O15	Walleye FSCA#3 Comp# 1 - 5 Offals	05374205
WE3O25	Walleye FSCA#3 Comp# 2 - 5 Offals	05374206
WE3O35	Walleye FSCA#3 Comp# 3 - 5 Offals	05374207
WE3O45	Walleye FSCA#3 Comp# 3 -5 Offals	05374208
WE3O55	Walleye FSCA#3 Comp# 5 -5 Offals	05374209
WE4W15	Walleye FSCA#4 Whole body Comp #1 - 5 Fish	05374210
WE4W25	Walleye FSCA#4 Whole body Comp # 2 - 5 Fish	05374213
WE4W35	Walleye FSCA#4 Whole body Comp # 3 - 5 Fish	05374214
WE4W45	Walleye FSCA#4 Whole body Comp # 4 - 5 Fish	05374215
WE4W55	Walleye FSCA#4 Whole body Comp # 5- 5 Fish	05374216
WE6F15	Walleye FSCA#6 Comp# 1 - 5 Fish Fillet Skin-on (R & L)	05374217
WE6F25	Walleye FSCA#6 Comp# 2 - 5 Fish Fillet Skin-on (R & L)	05374218
WE6F35	Walleye FSCA#6 Comp# 3 - 5 Fish Fillet Skin-on (R & L)	05374219
WE6F45	Walleye FSCA#6 Comp# 4 - 5 Fish Fillet Skin-on (R & L)	05374220
WE6F55	Walleye FSCA#6 Comp# 5 - 5 Fish Fillet Skin-on (R & L)	05374221
WE6O15	Walleye FSCA#6 Comp# 1 -5 Offals	05374222
WE6O25	Walleye FSCA#6 Comp# 2 - 5 Offals	05374223
WE6O35	Walleye FSCA#6 Comp# 3 - 5 Offals	05374224
WE6O45	Walleye FSCA#6 Comp# 4 - Offals	05374225
WE6O55	Walleye FSCA#6 Comp# 5 - Offals	05374226
LW3W15	Lake White Fish FSCA#3 Whole body Comp# 1 - 5 Fish	05374227
LW3W55	Lake White Fish FSCA#3 Whole body Comp# 5 - 5 Fish	05374228
LW3W25	Lake White Fish FSCA#3 Whole body Comp# 2 - 5 Fish	05374229
LW3W35	Lake White Fish FSCA#3 Whole body Comp# 3 - 5 Fish	05374230
LW3W45	Lake White Fish FSCA#3 Whole body Comp# 4 - 5 Fish	05374231
RH5W65	Rainbow Trout Hatchery FSCA #5 Whole body Comp# 6 -5 Fish*	05374232
RH5W75	Rainbow Trout Hatchery FSCA #5 Whole body Comp# 7 -5 Fish*	05374233
LW5W25	Lake White Fish FSCA#5 Whole body Comp# 2 - 5 Fish	05374234
LW5W15	Lake White Fish FSCA#5 Whole body Comp# 1 - 5 Fish	05374235
LW5W35	Lake White Fish FSCA#5 Whole body Comp# 3 - 5 Fish	05374236
LW5W45	Lake White Fish FSCA#5 Whole body Comp# 4 - 5 Fish	05374237
LW5W55	Lake White Fish FSCA#5 Whole body Comp# 5 - 5 Fish	05374238

Field Sample Numbers	Sample Description	Region 10 Sample Tracking Number
LW4W25	Lake White Fish FSCA#4 Whole body Comp# 2 - 5 Fish	05374239
LW4W35	Lake White Fish FSCA#4 Whole body Comp# 3 - 5 Fish	05374240
LW4W45	Lake White Fish FSCA#4 Whole body Comp# 4 - 5 Fish	05374241
LW4W55	Lake White Fish FSCA#4 Whole body Comp# 4 - 5 Fish	05374242
LW6W13	Lake White Fish FSCA#6 Whole body Comp# 1 - 3 Fish	05374243
LW4W15	Lake White Fish FSCA#4 Whole body Comp# 1 - 5 Fish	05374244
RW1F15	Rainbow Trout Wild FSCA#1 Comp#1 -5 Fish Fillets Skin-on (L &R)	05374245
RW1F25	Rainbow Trout Wild FSCA#1 Comp#2 -5 Fish Fillets Skin-on (L &R)	05374246
RW1F35	Rainbow Trout Wild FSCA#1 Comp#3 -5 Fish Fillets Skin-on (L &R)	05374247
RW1F45	Rainbow Trout Wild FSCA#1 Comp#4 -5 Fish Fillets Skin-on (L &R)	05374248
RW1F55	Rainbow Trout Wild FSCA#1 Comp#5 -5 Fish Fillets Skin-on (L &R) *	05374249
RW1F65	Rainbow Trout Wild FSCA#1 Comp#6 -5 Fish Fillets Skin-on (L &R) *	05374250
RW1O15	Rainbow Trout Wild FSCA#1 Comp# 1 -5 Offals	05374251
RW1O25	Rainbow Trout Wild FSCA#1 Comp# 2 -5 Offals	05374252
RW1O35	Rainbow Trout Wild FSCA#1 Comp# 3 -5 Offals	05374253
RW1O45	Rainbow Trout Wild FSCA#1 Comp# 4 -5 Offals	05374254
RW1O55	Rainbow Trout Wild FSCA #1 Comp# 1 - 5 Offals *	05374255
RW1O65	Rainbow Trout Wild FSCA #1 Comp# 6 - 5 Offals *	05374256
MW1W45	Mountain Whitefish FSCA#1 Whole body Comp# 4 - 5 Fish	05374257
MW1W55	Mountain Whitefish FSCA#1 Whole body Comp# 5 - 5 Fish	05374258
MW1W65	Mountain Whitefish FSCA#1 Whole body Comp# 6 - 5 Fish *	05374261
MW1W75	Mountain Whitefish FSCA#1 Whole body Comp# 7 - 5 Fish *	05374262
MW1W15	Mountain Whitefish FSCA#1 Whole body Comp# 1 - 5 Fish	05374263
MW1W25	Mountain Whitefish FSCA#1 Whole body Comp# 2 - 5 Fish	05374264
MW1W35	Mountain Whitefish FSCA#1 Whole body Comp# 3 - 5 Fish	05374265
WE2W15	Walleye FSCA#2 Whole body Comp# 1 - 5 fish	05414001
WE2W25	Walleye FSCA#2 Whole body Comp# 2 - 5 fish	05414002
WE2W35	Walleye FSCA#2 Whole body Comp# 3 - 5 fish	05414003
WE2W45	Walleye FSCA#2 Whole body Comp# 4 - 5 fish	05414004
WE2W55	Walleye FSCA#2 Whole body Comp# 5 - 5 fish*	05414005
WE2W65	Walleye FSCA#2 Whole body Comp# 6 - 5 fish*	05414006
WE2W75	Walleye FSCA#2 Whole body Comp# 7 - 5 fish*	05414007
RW2W53	Rainbow Trout Wild FSCA #2 Whole body Comp# 5 – 3 Fish	05414008
LS2W15	Large Scale Sucker FSCA# 2 Whole body Comp# 1 – 5 Fish	05414009
LS2W25	Large Scale Sucker FSCA# 2 Whole body Comp# 2 – 5 Fish *	05414010
LS2W35	Large Scale Sucker FSCA# 2 Whole body Comp# 3 – 5 Fish	05414011
LS2W45	Large Scale Sucker FSCA# 2 Whole body Comp# 4 – 5 Fish	05414012
LS2W65	Large Scale Sucker FSCA# 2 Whole body Comp# 6 – 5 Fish *	05414013
LS2W75	Large Scale Sucker FSCA# 3 Whole body Comp# 1 – 5 Fish *	05414014
LS3W15	Large Scale Sucker FSCA# 3 Whole body Comp# 2 – 5 Fish	05414015
LS3W25	Large Scale Sucker FSCA# 3 Whole body Comp# 3 – 5 Fish	05414016
LS3W35	Large Scale Sucker FSCA# 3 Whole body Comp# 3 – 5 Fish	05414017
LS3W55	Large Scale Sucker FSCA# 3 Whole body Comp# 5 – 5 Fish	05414018
LS4W25	Large Scale Sucker FSCA# 4 Whole body Comp# 2 – 5 Fish	05414019
WE5W15	Walleye FSCA#5 Whole body Comp# 1 - 5 fish	05424001

Field Sample Numbers	Sample Description	Region 10 Sample Tracking Number
WE5W25	Walleye FSCA#5 Whole body Comp# 2 - 5 fish	05424002
WE5W35	Walleye FSCA#5 Whole body Comp# 3 -5 fish	05424005
WE6W65	Walleye FSCA#6 Whole body Comp# 6 - 5 fish	05424006
WE6W75	Walleye FSCA#6 Whole body Comp# 7 - 5 fish	05424009
LW2W15	Lake Whitefish FSCA #2 Whole Body Comp #1 – 5 fish	05424010
LW2W25	Lake Whitefish FSCA #2 Whole Body Comp #2 – 5 fish	05424011
LW2W45	Lake Whitefish FSCA #2 Whole Body Comp #4 – 5 fish	05424012
LW2W55	Lake Whitefish FSCA #2 Whole Body Comp #5 – 5 fish	05424013
LW2W35	Lake Whitefish FSCA #2 Whole Body Comp #31 – 5 fish	05424014
LW6W23	Lake Whitefish FSCA #6 Whole Body Comp #2 – 3 fish	05424015
RH3F15	Rainbow Trout Hatchery FSCA #3 Fillet (R& L – skin on)# Comp #1 -5 Fish	05424016
RH3F25	Rainbow Trout Hatchery FSCA #3 Fillet (R& L – skin on)# Comp #2 -5 Fish	05424017
RH3F35	Rainbow Trout Hatchery FSCA #3 Fillet (R& L – skin on)# Comp #3 -5 Fish	05424018
RH3O15	Rainbow Trout Hatchery FSCA #3 Offal Comp #1 – 5 Fish	05424019
RH3O25	Rainbow Trout Hatchery FSCA #3 Offal Comp #2 – 5 Fish	05424020
RH3O35	Rainbow Trout Hatchery FSCA #3 Offal Comp #3 – 5 Fish	05424021
RH4W15	Rainbow Trout Hatchery FSCA #4 Whole body Comp #1 – 5 Fish	05424022
RH4W25	Rainbow Trout Hatchery FSCA #4 Whole body Comp #2 – 5 Fish	05424023
RH4W35	Rainbow Trout Hatchery FSCA #4 Whole body Comp #3 – 5 Fish	05424024
RH4W45	Rainbow Trout Hatchery FSCA #4 Whole body Comp #4 – 5 Fish	05424025
RH4W55	Rainbow Trout Hatchery FSCA #4 Whole body Comp #5 – 5 Fish	05424026
RH5W15	Rainbow Trout Hatchery FSCA #5 Whole body Comp #1 – 5 Fish	05424027
RH5W25	Rainbow Trout Hatchery FSCA #5 Whole body Comp #2 – 5 Fish	05424028
RH5W35	Rainbow Trout Hatchery FSCA #5 Whole body Comp #3 – 5 Fish	05424029
RH5W45	Rainbow Trout Hatchery FSCA #5 Whole body Comp #4 – 5 Fish	05424030
RH5W55	Rainbow Trout Hatchery FSCA #5 Whole body Comp #5 – 5 Fish *	05424031
RH5W65	Rainbow Trout Hatchery FSCA #5 Whole body Comp #6 – 5 Fish *	05424032
RH5W75	Rainbow Trout Hatchery FSCA #5 Whole body Comp #7 – 5 Fish *	05424033
RH6F15	Rainbow Trout Hatchery FSCA #6Fillet (R& L – skin on)# Comp #1 -5 Fish	05424034
RH6F25	Rainbow Trout Hatchery FSCA #6Fillet (R& L – skin on)# Comp #2 -5 Fish	05424035
RH6F35	Rainbow Trout Hatchery FSCA #6Fillet (R& L – skin on)# Comp #3 -5 Fish	05424036
RH6F45	Rainbow Trout Hatchery FSCA #6Fillet (R& L – skin on)# Comp #4 -5 Fish	05424037
RH6F55	Rainbow Trout Hatchery FSCA #6Fillet (R& L – skin on)# Comp #5 -5 Fish	05424038
RH6O15	Rainbow Trout Hatchery FSCA #6- Offal Comp #1 – 5 Fish	05424039
RH6O25	Rainbow Trout Hatchery FSCA #6- Offal Comp #2 – 5 Fish	05424040
RH6O35	Rainbow Trout Hatchery FSCA #6- Offal Comp #3 – 5 Fish	05424041
RH6O45	Rainbow Trout Hatchery FSCA #6- Offal Comp #4 – 5 Fish	05424042
RH6O55	Rainbow Trout Hatchery FSCA #6- Offal Comp #5 – 5 Fish	05424043
RW2W15	Rainbow Trout Wild FSCA #2 Whole body Comp #1 – 5 Fish	05424044
RW2W25	Rainbow Trout Wild FSCA #2 Whole body Comp #2 – 5 Fish	05424045
RW2W35	Rainbow Trout Wild FSCA #2 Whole body Comp #3 – 5 Fish *	05424046
RW2W45	Rainbow Trout Wild FSCA #2 Whole body Comp #4 – 5 Fish	05424047
RW2W65	Rainbow Trout Wild FSCA #2 Whole body Comp #6– 5 Fish *	05424048
RW2W75	Rainbow Trout Wild FSCA #2 Whole body Comp #7– 5 Fish *	05424049
RW3F15	Rainbow Trout Wild FSCA #3 Fillet (R& L – skin on)# Comp #1 -5 Fish	05424050

Field Sample Numbers	Sample Description	Region 10 Sample Tracking Number
RW3F25	Rainbow Trout Wild FSCA #3 Fillet (R& L – skin on)# Comp #1 -5 Fish	05424051
RW3O15	Rainbow Trout Wild FSCA #3 Offal Comp #1 – 5 Fish	05424052
RW3O25	Rainbow Trout Wild FSCA #3 Offal Comp #1 – 5 Fish	05424053
RW5W15	Rainbow Trout Wild FSCA #5 Whole body Comp #1 – 5 Fish	05424054
RW6F14	Rainbow Trout Wild FSCA #6 Fillet (R& L – skin on)# Comp #1 -5 Fish	05424055
RW6O14	Rainbow Trout Wild FSCA #6 Offal Comp #1 – 5 Fish	05424056
BB2W13	Burbot FSCA #2 Whole body Comp #1 – 3 Fish	05424057
BB2W23	Burbot FSCA #2 Whole body Comp #2 – 3 Fish	05424058
BB2W33	Burbot FSCA #2 Whole body Comp #3 – 3 Fish	05424059
BB3W15	Burbot FSCA #3 Whole body Comp #1 – 5 Fish	05424060
BB3W25	Burbot FSCA #3 Whole body Comp #2 – 5 Fish	05424061
BB3W35	Burbot FSCA #3 Whole body Comp #3 – 5 Fish *	05424062
BB3W45	Burbot FSCA #3 Whole body Comp #4 – 5 Fish	05424063
BB3W55	Burbot FSCA #3 Whole body Comp #4 – 5 Fish	05424064
BB3W65	Burbot FSCA #3 Whole body Comp #6 – 5 Fish *	05424065
BB3W75	Burbot FSCA #3 Whole body Comp #7 – 5 Fish *	05424066
BB4W15	Burbot FSCA # 4 Whole body Comp #1 – 5 Fish	05424067
BB4W25	Burbot FSCA # 4 Whole body Comp #2 – 5 Fish	05424068
BB4W35	Burbot FSCA # 4 Whole body Comp #3 – 5 Fish	05424069
BB4W45	Burbot FSCA # 4 Whole body Comp #4 – 5 Fish	05424070
BB5W15	Burbot FSCA # 5 Whole body Comp #1 – 5 Fish	05424071
BB5W25	Burbot FSCA # 5 Whole body Comp #2 – 5 Fish	05424072
BB5W35	Burbot FSCA # 5 Whole body Comp #3 – 5 Fish	05424073
BB5W45	Burbot FSCA # 5 Whole body Comp #4 – 5 Fish	05424074
BB5W55	Burbot FSCA # 5 Whole body Comp #5 – 5 Fish	05424075
BB6W15	Burbot FSCA # 6 Whole body Comp #1 – 5 Fish	05244076
BB6W25	Burbot FSCA # 6 Whole body Comp #2 – 5 Fish	05424077
BB6W35	Burbot FSCA # 6 Whole body Comp #3 – 5 Fish	05424078
BB6W45	Burbot FSCA # 6 Whole body Comp #4 – 5 Fish	05424079
BB6W55	Burbot FSCA #6Whole body Comp #5 – 5 Fish	05424080
LS1W45	Large Scale Sucker FSCA #1 Whole body Comp #4 – 5 Fish	05424081
LS4W15	Large Scale Sucker FSCA #4 Whole body Comp #1– 5 Fish	05424082
LS4W35	Large Scale Sucker FSCA #4 Whole body Comp #3– 5 Fish	05424083
LS4W45	Large Scale Sucker FSCA #4 Whole body Comp #4 – 5 Fish	05424084
LS4W55	Large Scale Sucker FSCA #4 Whole body Comp #5 – 5 Fish	05424085
LS5W15	Large Scale Sucker FSCA #5 Whole body Comp #1 – 5 Fish	05424086
LS5W25	Large Scale Sucker FSCA #5 Whole body Comp #2 – 5 Fish	05424087
LS5W35	Large Scale Sucker FSCA #5 Whole body Comp #3 – 5 Fish	05424088
LS5W45	Large Scale Sucker FSCA #5 Whole body Comp #4 – 5 Fish	05424089
LS5W55	Large Scale Sucker FSCA #5 Whole body Comp #5 – 5 Fish	05424090
LS6W15	Large Scale Sucker FSCA #6 Whole body Comp #1 – 5 Fish	05424091
LS6W25	Large Scale Sucker FSCA #6 Whole body Comp #2 – 5 Fish	05424092
LS6W35	Large Scale Sucker FSCA #6 Whole body Comp # 3 – 5 Fish *	05424093
LS6W45	Large Scale Sucker FSCA #6 Whole body Comp #4 – 5 Fish	05424094
LS6W65	Large Scale Sucker FSCA #6 Whole body Comp #6 – 5 Fish *	05424095

Field Sample Numbers	Sample Description	Region 10 Sample Tracking Number
LS6W75	Large Scale Sucker FSCA #6 Whole body Comp #7 – 5 Fish *	05424096
LS1G50769	Large Scale Sucker Guts FSCA 1 Comp #50769	05424097
LS1G50771	Large Scale Sucker Guts FSCA 1 Comp #50771	05424099
LS1W50769	Large Scale Sucker FSCA 1Whole body (no guts) Comp #50769	05424253
LS1W50770	Large Scale Sucker FSCA 1Whole body (no guts) Comp # 50770	05424254
LS1W50771	Large Scale Sucker FSCA 1Whole body (no guts) Comp # 50771	05424255
LS1W50775	Large Scale Sucker FSCA 1Whole body (no guts) Comp # 50775	05424256
LS1W50778	Large Scale Sucker FSCA 1Whole body (no guts) Comp # 50778	05424257
LS1W60778	Large Scale Sucker FSCA 1Whole body (no guts) Comp #60778	05424258
LS6W50727	Large Scale Sucker FSCA 6 Whole body (no guts) Comp # 50727	05424265
LS6W50732	Large Scale Sucker FSCA 6 Whole body (no guts) Comp # 50732	05424266
LS6W50734	Large Scale Sucker FSCA 6 Whole body (no guts) Comp # 50734	05424267
LS6W50744	Large Scale Sucker FSCA 6 Whole body (no guts) Comp # 50744	05424268
LS6W50747	Large Scale Sucker FSCA 6 Whole body (no guts) Comp # 50747	05424269
LS6W60734	Large Scale Sucker FSCA 6 Whole body (no guts) Comp # 60734	05424270

* Field Duplicate/Triplicate

DATA QUALIFICATIONS

The following comments refer to the laboratory's performance in meeting the Quality Control specifications outlined in the Phase 1 Fish Tissue Sampling Quality Assurance Project Plan (QAPP) for the Upper Columbia River Site CERCLA RI/FS, the analytical method SW846 Method 8082, the MEL's Standard Operating Procedure (SOP) #Or_Fish3541 and the MEL SOP for lipid determination.

The conclusions presented herein are based on the information provided for the review.

Field Sample Collection

The fish tissue sample collection was accomplished through a multi-agency/tribal effort with the CH2MHill team as the overall lead. Sample vessels and vessel operators were provided by the following tribal and federal agencies under an interagency or sub–contracting agreement with EPA and/or CH2MHill: Spokane Tribe of Indians, Confederated Tribes of the Colville Reservation, US Fish and Wildlife Services and the USEPA Region 10 Investigation and Engineering Unit of the Office of Environmental Assessment.

The sample collection dates were based on the fish availability and fish species' spawning season. There were two sample collection events conducted, first one was conducted in September 2005 and the second one was in October 2005. The fish species that were collected from the designated fish sample collection areas (FSCA 1 -6) were Walleye (*Sander vitreus*), Rainbow trout (*Oncorhynchus mykiss*), Lake white fish (*Coregonus clupeaformis*), Large-scale sucker (*Catastomas macrocheilus*), and Burbot (*Lota lota*). Long-nose suckers and Mountain whitefish were not originally listed in the QAPP as target fish species but were also collected and added to the target fish species due to their availability in the FSCAs. The mountain white fish were analyzed while the long-nose suckers were archived. The rainbow trout samples were grouped into three categories – wild, hatchery and mixed wild and hatchery. Only the wild and hatchery rainbow trouts were analyzed for the chemical compounds of concern. The mixed wild and hatchery rainbow trouts were archived for future analysis, if needed.

The fish samples were generally collected using gill nets, electro-fishing, burbot traps and angling, if necessary. The field sample collection process was audited by the project's EPA and CH2MHill QA Managers. There were no significant problems encountered during sample collection, on-site processing, sampling documentation and sample shipment.

Sample Processing and Chain-of-Custody Documentation

CH2MHill set-up a trailer dedicated for the on-site fish sample processing which included visual inspection of the fish, sex determination, conducting field measurements (fish length and weight) and otolith removal. Otholiths are then later sent to the Washington Department of Fish and Wildlife (WDFW) for fish age determination. All of the field forms generated for these measurements and determination were evaluated and cross –checked with the homogenization forms and chain-of-custody (COC) documentation. All of the field measurements, field sampling documentation and sample preservation (freezing to -20C) were conducted by CH2MHill within 24 hours of sample collection.

Frozen whole fish samples were shipped to CH2MHill laboratory, Applied Science Laboratory (ASL), located in Corvallis, OR for filleting (if needed), homogenization, compositing, aliquot distribution and storage. There were four types of tissue sample composites prepared and analyzed for the chemical compounds of potential concern (COPCs) for the site, namely: fish fillets (both right and left side) with skin-on, offals (remaining tissue, internal organs and fish bones after filleting), guts (for large scale sucker only) and whole body (includes fish head, skin and entrails).

As specified in the EPA approved site QAPP, the following tissue types and homogenates were prepared by ASL and shipped to USEPA Manchester Environmental Laboratory (MEL) for subsequent PCB Aroclor, metals, percent lipids and speciated arsenic analyses and/or archival:

- Walleye – fillets and offals at three FSCAs and whole body composites from three FSCAs
- Rainbow trout – fillets and offals at three FSCAs and whole body composites from three FSCAs
- Lake whitefish – whole body composites
- Mountain whitefish – whole body composites
- Large scale sucker – whole body and guts/internal organs composites for metals analyses only
- Burbot – whole body composites
- Long-nose suckers – whole body composites

Sample Homogenization and Compositing

Fish samples from each sample location were individually homogenized at ASL. Appendix C lists the homogenized individual fish samples comprising a composite sample per fish specie. The fish samples were grinded using a commercial grade stainless steel blender/grinder (Robo-Coupe Blixer 6) with liquid nitrogen. Equal amounts of homogenized whole body, fillet or offal tissue samples were mixed and composited to form a single sample. The homogenization forms and the resulting fish sample composites were evaluated by this reviewer. There were no major discrepancies noted between the sample collection forms, homogenization forms and the sample composite chain-of-custody documentation. Fillet samples are comprised of both right and left side with skin on. Whole body sample homogenates included the fish skin. Care was taken to prevent cross-contamination between sample homogenates. Prior to the start of the project samples, the filleting, removal of otholiths and homogenization processes were audited by the project's EPA and CH2MHill QA Managers. To monitor processing cross-contamination, proof blanks were collected at the QAPP specified frequency and sent to the Contract Laboratory Program (CLP) laboratory for the analysis of the project target compound.

Deviation from the QAPP: In a mock sample processing and homogenization conducted during the EPA's and CH2MHill's QA lab audit, it was found out that otoliths were very hard to remove when the fish samples were already frozen. In addition, subjecting the fish to freezing and defrosting raptures the internal organs, make the fish muscles mushy and thus, made the separation of fillets from the offals quite a challenge.

To avoid cross–contamination of the fish tissue samples with the offals and to better preserve the otholiths, it was agreed by the project team that the removal of otolith will be conducted on-site after field measurements and before sample preservation (freezing to -20C) and if bench space and resources will allow, filleting of fish samples will also be performed on-site prior to freezing the samples.

Fish Age Determination

The following methods were used to determine the age of the fish: otoliths (inner ear of a fish) were used to determine the age of Lake whitefish, burbot and mountain whitefish. Both otholiths and scales were used to determine the age of the walleye, wild and hatchery rainbow trouts. The opercular covers (also called opercula) were used for large-scale suckers.

Otholith, scales and operculas were read with the knowledge of the place of capture, sex and size of the fish. The readings were performed by only one individual, Mr. John Sneva of WDFW. Precision and consistency of readings were checked through the comparison of annuli (otholiths) and the occuli (scales) readings when both specimens are available.

Fish age logs indicated the approximate ages of fish species comprising a composite as follows: lake whitefish ranged from 1-3 years; hatchery rainbow trout ranged from 1-2 years; wild rainbow trout from 1-4 years; mountain whitefish ranged from 0-15 years old; large-scale suckers, nine were <10 years old while the age of the rest of this specie ranged from >10-36 years old, walleyes and burbot ranged from 1-2 years.

Sample Receipt and Storage

All of the sample homogenates were received frozen and intact at MEL from ASL. The remaining whole fish samples (un-homogenized) were also sent to MEL for archiving and maybe future chemical analysis, if needed. After inspection, inventory and logging-in, the sample homogenates and un-homogenized fish samples were stored in a freezer at -20C. The fish samples remained frozen at -20C while waiting for extraction and analysis. The temperature of the freezer used for sample storage is monitored 24 hours by

MEL. The integrity of the fish samples and homogenates were maintained by MEL while on storage, during and after extraction and analysis.

COC Corrective Action

There were two COC corrective actions initiated by MEL to reconcile discrepancies between the regional tracking sample numbers and the field sample numbers for a few of the samples in this sample delivery group. The corrective actions and resolutions were sufficiently documented and new regional tracking sample numbers were issued by ALS to correct the regional sample number duplication.

Some minor discrepancies and missing information were also noted on the composite sample numbers listed on the COCs and the fish processing forms. ASL (represented by Mr. Robert Wong) and CH2MHill QA Manager, (Ms. Artemis Antipas) were contacted to clarify and correct these discrepancies on April 26, 2006. An explanation, reasons for the discrepancies and corrections were immediately sent to the reviewer.

Holding Times - Acceptable

A few of the fish sample analyses missed the project-specified extraction and analytical holding times of 6 months from the date of sample collection. However, none of the PCB data were qualified since the PSEP and National Fish Advisory holding times recommended for frozen fish tissue samples for PCB analyses is one year.

The list of samples, cross-referenced to the fish species, station locations, and the dates of sample collection, VTSR at the lab, extraction, extract clean-up and PCB and % lipid analysis dates are listed in Table 1 – Summary of Holding Times, at the end of this report.

Sample Preparation and Clean-up

All of the samples were extracted following the technical specifications of the analytical methods used. Prior to acid clean-up, 10% of the primary extracts were taken for % lipid determination. The rest of the primary extracts went through concentrated sulfuric acid clean-up (SW846 Method 3665) to isolate the PCBs and remove most of the organic material that would interfere with the analysis. Most of the samples also underwent through additional acid-base back extract clean-up to further remove oily interferences in the extracts. A 35% or 70% fraction of the original extract (depending on the amount extracted) was concentrated to 1.0 ml and passed through florisil cartridge clean-up (SW846 Method 3620) prior to GC analysis.

All of the analysts involved in sample extraction, extract clean-up and analysis of the samples in this data package performed an acceptable initial demonstration of capability (IDOC) studies prior to handling the samples.

In addition, the efficiency of the sample extraction procedure, clean-up and analytical processes were also monitored through the routine analysis of in-house Quality Control sample analyses and incorporation of routine-in-house QC checks (recoveries of the surrogate standards and the spike compounds in the laboratory control samples and matrix spike and duplicate analyses).

A single concentration polybrominated diphenyl ether (PBDE) standard runs were also conducted to monitor the presence of PBDE that would be potentially interfering with the Aroclor analyses.

Instrument Performance Checks - Acceptable

A dual-column GC analyses was used during the PCB Aroclor analysis. The designated primary column used in the quantitation of target compounds was Restek's CLP2 in all analytical sequences. The secondary, confirmatory column was Restek's CLP1. Baseline and retention time shifts were monitored and the instrument remained stable throughout the course of the analyses. None of the data were qualified on this basis.

Initial Calibrations - Acceptable

Five ICALs using 5-concentration levels of Aroclors 1016 and 1260 and one ICLA using 5-concentration levels of Aroclor 1254 were performed and used during the analysis of the samples listed in this validation report. A single–point concentration was analyzed for Aroclors 1221, 1232, 1242, 1248, 1254, 1262 and 1268 with each 1016/1260 ICAL. The frequency of analysis and the regression coefficients of the 5 major peaks used in the Aroclor identification and quantitation were all >0.995 for the primary column. Some of the peaks of from the secondary column did not meet the criteria of r>0.995, however, since this column was only used for confirmatory analyses, none of the data were qualified on this basis.

Continuing Calibrations - Acceptable

A mid-point concentration Aroclor 1016/1260 and/or Aroclor 1254 were analyzed for continuing calibration verification (CCVs) checks. The CCvs met the criteria for the frequency of analysis, the percent differences (%D) of the daily calibration factors (CFs) as compared to the mean CFs from the ICALs and the retention time shifts. None of the data were qualified on this basis.

Quantitation and Reporting Limits (QLs & RLs)

The QLs which are based on the lowest concentration level of the Aroclors in the ICALs, the amount of sample extracted and the final extract volume were about twice the project analytical concentration goals (ACGs) listed in Table 2-3 of the QAPP. Aroclor detections at concentrations <QLs, however, were reported by MEL with an estimated, "J", qualifier. All of the target compounds detected in the samples were calculated off the primary column using the CFs from the applicable ICALs.

Due to the low level concentrations of Aroclors 1260 and 1254 native to all of the fish samples and the interferences of other organic materials causing baseline noise and drifts, the reporting limits (RLs) for most of the non-detected Aroclors in the samples were elevated to about 10 times the QLs.

The concentrations of the Aroclors 1260 mixed with 1254 detected in most of the samples were qualified estimated, "J", due to the co-eluting peaks used in the calculations. PCB results from samples with poor chromatographic separations due to the interfering oily peaks were qualified estimated, "J", with a possible high bias.

Laboratory Method Blanks - Acceptable

The frequency of analysis of laboratory blank was met. All of the method blanks associated with the fish sample extraction, clean-up and analyses were clean. None of the data were qualified on this basis.

Homogenization Proof Blanks – Acceptable

A composite of final rinses during the decontamination of the Robo-Coupe Blixer 6 used for fish tissue and offal homogenization were collected. An aliquot of the composite rinses called "proof blanks" were collected every three days and shipped to the Superfund Contract Laboratory Program (CLP) labs. A total of 17 proof blanks were shipped to A4 Laboratory, Inc. of Woodlands TX and were analyzed for semi-volatile organic compounds (SVOCs), pesticides and PCB Aroclors. No PCB Aroclors were detected in any of the proof blanks. None of the fish tissue sample results were qualified on this basis.

Analytical Sequence - Acceptable

All of the standards, blanks, samples and QC samples were analyzed in accordance with the method specified analytical sequence. All of the analytical sequences were also bracketed by the continuing calibration check standards. None of the data were qualified on this basis.

Surrogate Recoveries – Acceptable

Tetrachloro-m-xylene (TCX) and decachlorobiphenyl (DCB) were used as the surrogate standards during analyses. Known concentrations of TCX and DCB were added to all samples and QC samples to monitor efficiency during sample extraction, clean-up and analysis. DCB is the surrogate associated with most of the PCB Aroclors. The DCB surrogate recoveries for all samples, QC samples and dilution runs were acceptable (50-150%). The DCB retention time shifts were also within the established retention time windows. None of the data were qualified on this basis.

Matrix Spike and Matrix Spike Duplicate (MS/MSD) Analysis

Sixteen QC samples were analyzed for MS/MD. Samples WE1F15 (05364201), LS1W25 (05364221), WE4W15 (05374210), LW3W55 (05374228), LW5W15 (05374235), RW1F15 (05374245), MW1W45 (05374257), RW2W53 (05414008), LS4W25 (05414019), WE5W25 (05424002), WE6W65 (05424006), LW2W15 (05424010), RH4W35 (05424024), RH4W55 (05424026), RW2W25 (05424045), RW3O15 (05424052), BB3W55 (05424064), BB5W45 (05414074) and LS4W15 (05424082) were the designated QC samples and analyzed for MS and MSD. The frequency of analysis of MS/MSD (10%) was met. Known concentrations of Aroclors 1016 and 1260 were spiked into the QC samples and went through the same extraction, clean-up and analytical procedures as the project samples.

The MS/MSD recoveries and relative percent differences (RPDs) criteria (30-150% and 50%, respectively) for the Aroclor 1016 were met for all QC samples. The recoveries of the low level Aroclor 1260 spiked into most of the QC samples could not be determined accurately due to the presence of Aroclors 1254 and 1260 in the samples and were reported as "NA" by the lab. To compensate for the Aroclors that are native to the QC samples, higher concentration levels of Aroclors 1016 and 1260 were spiked into the QC samples BB3W55 (05424064), BB5W45 (05414074) and LS4W15 (05424082). The Aroclor 1016 and 1260 recoveries for these three MS/MSD pairs were acceptable and ranged from 81 – 117%. None of the data were qualified on the basis of MS/MSD analyses.

Laboratory Control Sample and Duplicate Analyses (LCS/LCSD) – Acceptable

For LCS and LCSD, the hydromatrix extraction media was spiked with known concentrations of Aroclors 1016 and 1260. The frequency of analysis, recovery (70-130%) and RPD (50%) criteria were met for all LCS and LCSD analyses. None of the PCB Aroclor sample data were qualified on this basis. The analysis of LCS/LCSD is not applicable to lipid determination.

Analytical Duplicate Analyses - Acceptable

Samples LW4W45 (05374241), RW1O15 (05374251) and MW1W65 (05374261) were analyzed in duplicates. A mixture of Aroclors 1254 and 1260 were detected during the initial and duplicate analysis of all three QC samples. The RPDs between the concentrations of 1254/1260 detected in the original and duplicate sample runs ranged from 3-21%. The RPDs of the % lipids calculated the original and duplicate % lipid runs ranged form 9 – 24%. All of the RPDs were acceptable and within the QC limits of 50%. None of the data were qualified on this basis.

Field Duplicate Sample Analyses – Acceptable

RW1F55 (05374249) and RW1F65 (05374250) are the field duplicate samples of wild rainbow trout fillets collected from FSCA 1. A mixture of Aroclors 1260 and 1254 were identified in both samples at 21.6 and 19.1 ug/Kg estimated concentrations, respectively. The % lipids was 4.9% and 4.3% (RPD=6.7%). There was not much variability between the lipids and Aroclor duplicate values. None of the wild trout fillet Aroclor data was qualified on this basis.

RW1O55 (05374255) and RW1O65 (05374256) are the field duplicate samples of wild rainbow trout offals collected from FSCA 1. A mixture of Aroclors 1260 and 1254 were identified in both samples at 35 and 39.2 ug/Kg estimated concentrations, respectively. The % lipids was 11.2 % and 11.6 % (RPD=3.5%). There was not much variability between the lipids and Aroclor duplicate values. None of the wild trout offal Aroclor data was qualified on this basis.

MW1W45 (05374257), MW1W65 (05374261) and MW1W75 (05374262) are the mountain whitefish field triplicate samples collected from FSCA 1 submitted blind to MEL. Aroclors 1260/1254 was detected in all three samples at estimated concentrations of 65.5, 37.6 and 53.1 ug/Kg, respectively. The %RSD was 27% for the Aroclors and 16.6% for the lipids. There was not much variability between the lipids and Aroclor duplicate values. None of the mountain whitefish PCB data were qualified on this basis.

RW2W35 (05424046), RW2W65 (05424048) and RW2W75 (905424049) are the wild rainbow trout whole body field triplicates collected from FSCA 2. Aroclors 1254 and 1260 were detected in all three samples at the following concentrations: PCBs 1254 are 8.9 and 1260 at 20 ug/Kg in sample RW2W35; PCBs 1254 are 11 and 1260 at 20 ug/Kg in sample RW2W65 and PCBs 1254 are at 9.2 and 1260 at 22 ug/Kg in sample RW2W75. The PCB 1254 and 1260 %RSDs are 12% and 6%, respectively. The % lipids were 10.2, 9.7 and 9.9 yielding a %RSD of 4%. There was not much variability between the lipids and Aroclor triplicate values. None of the wild rainbow trout (whole body) PCB or % lipid data was qualified on this basis.

LS2W25 (05414010), LS2W65 (05414013) and LS2W75 (05414014) are the large scale sucker (whole body) field triplicate samples collected from FSCA 2 submitted blind to MEL. Aroclors 1254 and 1260 were detected in all three samples at the following concentrations: PCBs 1254 at 29 and 1260 at 67 ug/Kg in sample LS2W25; PCBs 1254 at 23 and 1260 at 59 ug/Kg in sample LS2W65 and PCBs 1254 at 20 and 1260 at 42 ug/Kg in sample LS2W75. The PCB 1254 and 1260 %RSDs are 19% and 23%, respectively. The % lipids were 3.3, 2.8 and 2.4, yielding a %RSD of 16%. There was not much variability between the lipids and Aroclor triplicate values. None of the large scale sucker PCB or % lipid data was qualified on this basis.

RH5W55 (05424031), RH5W65 (05424032) and RH5W75 (05424033) are the hatchery rainbow trout field triplicates collected from FSCA 5. PCBs 1254 at 4.3 and 1260 at 4.2 ug/Kg in sample RH5W55; PCB 1254 at 5.0 and PCB 1260 at 6.7 ug/Kg in sample RH5W65 and PCBs 1254 at 5.7 and 1260 at 5.0 ug/Kg in sample RH5W75. The PCB 1254 and 1260 %RSDs are 14% and 24%, respectively. The % lipids were 9, 9.4 and 9.7, yielding a %RSD of 4%. There was not much variability between the lipids and Aroclor triplicate values. None of the hatchery rainbow trout PCB or % lipid data was qualified on this basis.

BB3W35 (05424062), BB3W65 (5424065) and BB3W75 (05424066) are the burbot field triplicate samples collected from FSCA 3. Combined Aroclors 1254/1260 was detected in all three samples at the following concentrations: 31 ug/Kg in BB3W35; 38 ug/Kg in sample BB3W65 and 37 ug/Kg in sample BB#W75. The PCB 1254/1260 %RSD is 11 %. The % lipids were 1.2, 1.3 and 1.1, yielding a %RSD of 8 %. There was not much variability between the lipids and Aroclor triplicate values. None of the burbot PCB or % lipid data was qualified on this basis.

LS6W35 (05424093), LS6W65 (05424095) and LS6W75 (05424096) are the large scale sucker (whole body) field triplicate samples collected from FSCA 6 submitted blind to MEL. Combined Aroclors 1254/1260 was detected in all three samples at the following concentrations: 87 ug/Kg in sample LS6W35; 71 ug/Kg in sample LS6W65 and 80 ug/Kg in sample LS6W75. The PCB 1254/1260 %RSD is 10%. The % lipids were 6.9, 6.3 and 6.6, yielding a %RSD of 5%. There was not much variability between the lipids and Aroclor triplicate values. None of the large scale sucker PCB or % lipid data was qualified on this basis.

Compound Identification

Aroclors 1254 and 1260 were evidently present in all of the samples. The chromatogram overlays for the Aroclors 1260, 1254 and sample runs were mapped and evaluated by this reviewer. In instances where concentrations of Aroclors 1254 and 1260 were very low that only the major co-eluting peaks are quantifiable, the Aroclor detections were reported by the analysts as a combined Aroclor 1254/1260 with an estimated qualification. Where Aroclor 1254 and 1260 peaks could be isolated, separate concentrations for each Aroclor was reported. All of the extracts went through additional clean-ups when needed. Other than the usual low-level baseline noise, there were no other interferences observed with the chromatograms. All of the Aroclors reported somewhat matched the standard fingerprint patterns. All of the Aroclors identified were verified and are acceptable.

Laboratory Contact

The laboratory was not contacted for this review.

Overall Assessment

All of the samples were analyzed in accordance with the method specifications. There were no significant problems found with the data. The data, as qualified, are acceptable and can be used for all purposes.

Data Qualifiers		
	U	The analyte was not detected at or above the reported numeric result.
	J	The analyte was positively identified. The associated numerical result is an estimate.
	UJ	The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample.
	R	The data are unusable for all purposes.
	N	There is evidence the analyte is present in this sample.
	JN	There is evidence that the analyte is present. The associated numerical result is an estimate.

TABLE 1- SUMMARY OF HOLDING TIMES

Sample Number	Region 10 Sample Tracking Number	Date Sample Collection	VTSR at CH2M Lab	CH2MHill Homogenization Date	VTSR at MEL	Extraction Date	% Lipid Analysis Date	PCB Analysis Date
WE1F15	05364201	09/06/05	9/14/05	11/07/05	11/16/05	01/06/06	01/06/06	01/31/06
WE1F25	05364202	09/06/05	9/14/05	11/07/05	11/16/05	01/06/06	01/06/06	01/31/06
WE1F35	05364203	09/06/05	9/4/05	11/07/05	11/16/05	01/06/06	01/06/06	01/31/06
WE1F45	05364204	09/06/05	9/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/31/06
WE1F55	05364205	09/06/05	9/4/05	11/08/05	11/16/05	01/06/06	01/06/06	01/31/06
WE1O15	05364206	09/06/05	9/14/05	11/07/05	11/16/05	01/06/06	01/06/06	01/31/06
WE1O25	05364207	09/06/05	9/14/05	11/07/05	11/16/05	01/06/06	01/06/06	01/31/06
WE1O35	05364208	09/06/05	9/14/05	11/07/05	11/16/05	01/06/06	01/06/06	01/31/06
WE1O45	05364209	09/06/05	9/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/31/06
WE1O55	05364210	09/06/05	9/1405	11/08/05	11/16/05	01/06/06	01/06/06	01/31/06
LS1W25	05364221	09/06/05	09/14/05	01/06/06	02/02/06	04/27/06	04/27/06	04/27/06
LS2W35	05364222	09/06/05	09/14/05	01/06/06	02/02/06	04/25/06	04/25/06	04/25/06
WE3F15	05374200	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/23/06
WE3F25	05374201	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/23/06
WE3F35	05374202	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/23/06
WE3F45	05374203	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/23/06
WE3F55	05374204	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/23/06
WE3O15	05374205	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/23/06
WE3025	05374206	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/31/06
WE3O35	05374207	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/31/06
WE3O45	05374208	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/31/06
WE3O55	05374209	09/10/05	09/14/05	11/08/05	11/16/05	01/06/06	01/06/06	01/31/06
WE4W15	05374210	09/10/05	09/14/05	11/09/05	11/16/05	01/09/06	01/09/06	01/23/06
WE4W25	05374213	09/12/05	09/14/05	11/09/05	11/16/05	01/09/06	01/09/06	01/23/06
WE4W35	05374214	09/12/05	09/14/05	11/09/05	11/16/05	01/09/06	01/09/06	01/31/06
WE4W45	05374215	09/12/05	09/14/05	11/09/05	11/16/05	01/09/06	01/09/06	01/31/06
WE4W55	05374216	09/12/05	09/14/05	11/09/05	11/16/05	01/09/06	01/09/06	01/23/06
WE6F15	05374217	09/14/05	09/15/05	11/11/05	11/16/05	01/09/06	01/09/06	01/23/06
WE6F25	05374218	09/14/05	09/15/05	11/11/05	11/16/05	05/02/06	01/10/06	02/16/06
WE6F35	05374219	09/14/05	09/15/05	11/11/05	11/16/05	01/10/06	01/10/06	02/16/06
WE6F45	05374220	09/14/05	09/15/05	11/13/05	11/16/05	01/10/06	01/10/06	02/16/06

Sample Number	Region 10 Sample Tracking Number	Date Sample Collection	VTSR at CH2M Lab	CH2MHill Homogenization Date	VTSR at MEL	Extraction Date	% Lipid Analysis Date	PCB Analysis Date
WE6F55	05374221	09/14/05	09/15/05	11/13/05	11/16/05	01/10/06	01/10/06	02/16/06
WE6O15	05374222	09/14/05	09/15/05	11/11/05	11/16/05	01/10/06	01/10/06	02/17/06
WE6O25	05374223	09/14/05	09/15/05	11/11/05	11/16/05	01/10/06	01/10/06	02/17/06
WE6O35	05374224	09/14/05	09/15/05	11/11/05	11/16/05	01/10/06	01/10/06	02/17/06
WE6O45	05374225	09/14/05	09/15/05	11/13/05	11/16/05	01/10/06	01/10/06	02/17/06
WE6O55	05374226	09/14/05	09/15/05	11/13/05	11/16/05	01/10/06	01/10/06	02/17/06
LW3W15	05374227	09/13/05	09/14/05	11/22/05	12/08/05	01/10/06	01/10/06	02/16/06
LW3W55	05374228	09/13/05	09/14/05	11/22/05	12/08/05	01/17/06	01/17/06	02/16/06
LW3W25	05374229	09/14/05	09/15/05	11/21/05	12/08/05	01/17/06	01/17/06	02/16/06
LW3W35	05374230	09/14/05	09/15/05	10/14/05	12/08/05	01/17/06	01/17/06	02/17/06
LW3W45	05374231	09/14/05	09/15/05	11/21/05	12/08/05	01/17/06	01/17/06	02/17/06
LW3W65	05374232	09/14/05	09/15/05	11/21/05	12/08/05	03/21/06	03/21//06	04/18/06
LW3W75	05374233	09/14/05	09/15/05	11/21/05	12/08/05	01/17/06	01/17/06	02/17/06
LW5W25	05374234	09/14/05	09/15/05	11/21/05	12/08/05	03/21/06	03/21/06	04/18/06
LW5W15	05374235	09/15/05	09/16/05	11/16/05	12/08/05	01/31/06	01/31/06	03/07/06
LW5W35	05374236	09/15/05	09/16/05	11/16/05	12/08/05	01/31/06	01/31/06	03/07/06
LW5W45	05374237	09/15/05	09/16/05	11/22/05	12/08/05	01/31/06	01/31/06	03/07/06
LW5W55	05374238	09/15/05	09/16/05	11/28/05	12/08/05	01/31/06	01/31/06	03/07/06
LW4W25	05374239	09/17/05	09/18/05	11/22/05	12/08/05	01/31/06	01/31/06	03/07/06
LW4W35	05374240	09/17/05	09/18/05	11/22/05	12/08/05	01/31/06	01/31/06	03/08/06
LW4W45	05374241	09/17/05	09/18/05	11/28/05	12/08/05	01/31/06	01/31/06	03/08/06
LW4W55	05374242	09/17/05	09/18/05	11/28/05	12/08/05	02/01/06	02/01/06	03/08/06
LW6W13	05374243	09/17/05	09/18/05	11/18/05	12/08/05	02/01/06	02/01/06	03/08/06
LW4W15	05374244	09/17/05	09/18/05	11/21/05	12/08/05	02/01/06	02/01/06	03/08/06
RW1F15	05374245	09/13/05	09/14/05	12/20/05	01/06/06	02/01/06	02/01/06	03/08/06
RW1F25	05374246	09/13/05	09/14/05	12/22/05	01/06/06	02/01/06	02/01/06	03/08/06
RW1F35	05374247	09/13/05	09/14/05	12/22/05	01/06/06	02/01/06	02/01/06	03/08/06
RW1F45	05374248	09/13/05	09/14/05	12/23/05	01/06/06	02/01/06	02/01/06	03/08/06
RW1F55	05374249	09/13/05	09/14/05	12/21/05	01/06/06	02/01/06	02/01/06	03/08/06
RW1F65	05374250	09/13/05	09/14/05	12/21/05	01/06/06	02/01/06	02/01/06	03/08/06

Sample Number	Region 10 Sample Tracking Number	Date Sample Collection	VTSR at CH2M Lab	CH2MHill Homogenization Date	VTSR at MEL	Extraction Date	% Lipid Analysis Date	PCB Analysis Date
RW1O15	05374251	09/13/05	09/14/05	12/20/05	01/06/06	02/01/06	02/01/06	03/08/06
RW1O25	05374252	09/13/05	09/14/05	12/22/05	01/06/06	02/01/06	02/01/06	03/08/06
RW1O35	05374253	09/13/05	09/14/05	12/22/05	01/06/06	02/07/06	02/07/06	03/08/06
RW1O45	05374254	09/13/05	09/14/05	12/23/05	01/06/06	02/07/06	02/07/06	03/08/06
RW1O55	05374255	09/13/05	10/22/05	12/21/05	01/06/06	02/07/06	02/07/06	03/08/06
RW1O65	05374256	09/13/05	10/22/05	12/21/05	01/06/06	02/07/06	02/07/06	03/08/06
MW1W45	05374257	09/13/05	09/14/05	11/29/05	01/12/06	02/07/06	02/07/06	03/08/06
MW1W55	05374258	09/13/05	09/14/05	11/30/05	01/12/06	02/07/06	02/07/06	03/08/06
MW1W65	05374261	09/14/05	09/14/05	11/29/05	01/12/06	02/15/06	02/15/06	03/08/06
MW1W75	05374262	09/43/05	09/14/05	11/29/05	01/12/06	02/15/06	02/15/06	03/08/06
MW1W15	05374263	09/13/05	09/14/05	11/30/05	01/12/06	02/15/06	02/15/06	03/08/06
MW1W25	05374264	09/13/05	09/14/05	11/29/05	01/12/06	02/15/06	02/15/06	03/08/06
MW1W35	05374265	09/13/05	09/14/05	11/30/05	01/12/06	02/15/06	02/15/06	03/08/06
WE2W15	05414001	10/12/05	10/18/05	11/10/05	11/16/05	03/15/06	03/15/06	04/19/06
WE2W25	05414002	10/12/05	10/18/05	11/10/05	11/16/05	03/15/06	03/15/06	04/19/06
WE2W35	05414003	10/12/05	10/18/05	11/10/05	11/16/05	03/15/06	03/15/06	04/19/06
WE2W45	05414004	10/12/05	10/18/05	11/10/05	11/16/05	03/15/06	03/15/06	04/19/06
WE2W55	05414005	10/12/05	10/18/05	11/10/05	11/16/05	03/15/06	03/15/06	04/19/06
WE2W65	05414006	10/12/05	10/18/05	11/10/05	11/16/05	03/15/06	03/15/06	04/19/06
WE2W75	05414007	10/12/05	10/18/05	11/10/05	11/16/05	03/15/06	03/15/06	04/19/06
RW2W53	05414008	10/13/05	10/19/05	01/11/06	02/02/06	03/17/06	03/17/06	04/17/06
LS2W15	05414009	10/13/05	10/19/05	01/11/06	02/02/06	03/17/06	03/17/06	04/17/06
LS2W25	05414010	10/13/05	10/19/05	01/09/06	02/02/06	03/17/06	03/17/06	04/17/06
LS2W35	05414011	10/12/05	10/19/05	01/11/06	02/02/06	05/02/06	05/02/06	05/11/06
LS2W45	05414012	10/12/05	10/19/05	01/10/06	02/02/06	03/17/06	03/17/06	04/18/06
LS2W65	05414013	10/13/05	10/19/05	01/09/06	02/02/06	03/17/06	03/17/06	04/18/06
LS3W75	05414014	10/14/05	10/19/05	01/09/06	02/02/06	03/17/06	03/17/06	04/17/06
LS3W15	05414015	10/14/05	10/19/05	01/19/06	02/02/06	03/17/06	03/17/06	04/17/06
LS3W25	05414016	10/14/05	10/19/05	01/20/06	02/02/06	03/17/06	03/17/06	04/18/06
LS3W35	05414017	10/14/05	10/19/05	01/23/06	02/02/06	04/03/06	04/03/06	04/27/06

Sample Number	Region 10 Sample Tracking Number	Date Sample Collection	VTSR at CH2M Lab	CH2MHill Homogenization Date	VTSR at MEL	Extraction Date	% Lipid Analysis Date	PCB Analysis Date
LS3W55	05414018	10/14/05	10/19/05	01/23/06	02/02/06	04/03/05	04/03/05	04/27/06
LS4W25	05414019	10/14/05	10/19/05	01/23/06	02/02/06	03/21/06	03/21/06	04/18/06
WE5W15	05424001	10/17/05	10/13/05	11/10/05	12/08/05	03/21/06	03/21/06	04/18/06
WE5W25	05424002	10/17/05	10/18/05	11/09/05	12/08/05	03/21/06	03/21/06	04/18/06
WE5W35	05424005	10/17/05	10/18/05	11/11/05	11/16/05	03/21/06	03/21/06	04/18/06
WE6W65	05424006	10/20/05	10/23/05	11/09/05	11/16/05	03/21/06	03/21/06	04/18/06
WE6W75	05424009	10/20/05	10/23/05	11/09/05	11/16/05	03/21/06	03/21/06	04/18/06
LW2W15	05424010	10/18/05	10/19/05	11/17/05	12/08/05	03/21/06	03/21/06	04/18/06
LW2W25	05424011	10/18/05	10/19/05	11/16/05	12/08/05	03/27/06	03/27/06	04/19/06
LW2W45	05424012	10/18/05	10/19/05	11/28/05	12/08/05	03/27/06	03/27/06	04/19/06
LW2W55	05424013	10/20/05	10/23/05	11/28/05	12/08/05	03/27/06	03/27/06	04/19/06
LW2W35	05424014	10/19/05	10/20/05	11/15/05	12/08/05	03/27/06	03/27/06	04/19/06
LW6W23	05424015	10/22/05	10/23/05	11/18/05	12/08/05	03/28/06	03/28/06	04/25/06
RH3F15	05424016	10/18/05	10/22/05	12/01/05	12/22/05	03/27/06	03/27/06	04/19/06
RH3F25	05424017	10/18/05	10/22/05	12/02/05	12/22/05	03/27/06	03/27/06	04/19/06
RH3F35	05424018	10/18/05	10/22/05	12/05/05	12/22/05	03/27/06	03/27/06	04/19/06
RH3O15	05424019	10/18/05	10/22/05	12/01/05	12/22/05	03/27/06	03/27/06	04/19/06
RH3O25	05424020	10/18/05	10/22/05	12/02/05	12/22/05	03/27/06	03/27/06	04/19/06
RH3O35	05424021	10/18/05	10/22/05	12/05/05	12/22/05	03/27/06	03/27/06	04/19/06
RH4W15	05424022	10/18/05	10/22/05	12/13/05	12/22/05	03/27/06	03/27/06	04/19/06
RH4W25	05424023	10/18/05	10/22/05	12/12/05	12/22/05	03/27/06	03/27/06	04/19/06
RH4W35	05424024	10/18/05	10/22/05	12/14/05	12/22/05	03/27/06	03/27/06	04/19/06
RH4W45	05424025	10/18/05	10/22/05	12/13/05	12/22/05	03/27/06	03/27/06	04/19/06
RH4W55	05424026	10/18/05	10/22/05	12/13/05	12/22/05	03/27/06	03/27/06	04/19/06
RH5W15	05424027	10/20/05	10/22/05	12/08/05	12/22/05	03/27/06	03/27/06	04/19/06
RH5W25	05424028	10/20/05	10/22/05	12/09/05	12/22/05	03/27/06	03/27/06	04/19/06
RH5W35	05424029	10/20/05	10/22/05	12/08/05	12/22/05	03/28/06	03/28/06	04/25/06
RH5W45	05424030	10/21/05	10/22/05	12/09/05	12/22/05	03/28/06	03/28/06	04/25/06
RH5W55	05424031	10/21/05	10/22/05	12/06/05	12/22/05	03/28/06	03/28/06	04/25/06
RH5W65	05424032	10/20/05	10/22/05	12/07/05	12/22/05	03/28/06	03/28/06	04/25/06

Sample Number	Region 10 Sample Tracking Number	Date Sample Collection	VTSR at CH2M Lab	CH2MHill Homogenization Date	VTSR at MEL	Extraction Date	% Lipid Analysis Date	PCB Analysis Date
RH5W75	05424033	10/20/05	10/22/05	12/07/05	12/22/05	03/28/06	03/28/06	04/25/06
RH6F15	05424034	10/21/05	10/22/05	12/14/05	12/22/05	03/28/06	03/28/06	04/25/06
RH6F25	05424035	10/21/05	10/22/05	12/15/05	12/22/05	03/28/06	03/28/06	04/25/06
RH6F35	05424036	10/21/05	10/22/05	12/15/05	12/22/05	03/28/06	03/28/06	04/25/06
RH6F45	05424037	10/21/05	10/22/05	12/15/05	12/22/05	03/28/06	03/28/06	04/25/06
RH6F55	05424038	10/21/05	10/22/05	12/15/05	12/22/05	03/28/06	03/28/06	04/25/06
RH6O15	05424039	10/21/05	10/22/05	12/15/05	12/22/05	03/28/06	03/28/06	04/25/06
RH6O25	05424040	10/21/05	10/22/05	12/15/05	12/22/05	03/28/06	03/28/06	04/25/06
RH6O35	05424041	10/21/05	10/22/05	12/15/05	12/22/05	03/28/06	03/28/06	04/25/06
RH6O45	05424042	10/21/05	10/22/05	12/15/05	12/22/05	03/28/06	03/28/06	04/25/06
RH6O55	05424043	10/21/05	10/22/05	12/15/05	12/22/05	03/28/06	03/28/06	04/25/06
RW2W15	05424044	10/18/05	10/22/05	12/16/05	01/06/06	03/28/06	03/28/06	04/25/06
RW2W25	05424045	10/19/05	10/22/05	12/17/05	01/06/06	03/28/06	03/28/06	04/25/06
RW2W35	05424046	10/18/05	10/22/05	12/17/05	01/06/06	03/28/06	03/28/06	04/25/06
RW2W45	05424047	10/18/05	10/22/05	12/16/05	01/06/06	03/29/06	03/29/06	04/25/06
RW2W65	05424048	10/18/05	10/22/05	12/17/05	01/06/06	03/29/06	03/29/06	04/25/06
RW2W75	05424049	10/18/05	10/22/05	12/17/05	01/06/06	03/29/06	03/29/06	04/25/06
RW3F15	05424050	10/19/05	10/22/05	12/19/05	01/06/06	03/29/06	03/29/06	04/25/06
RW3F25	05424051	10/19/05	10/22/05	12/19/05	01/06/06	03/29/06	03/29/06	04/25/06
RW3O15	05424052	10/19/05	10/22/05	12/19/05	01/06/06	03/29/06	03/29/06	04/26/06
RW3O25	05424053	10/19/05	10/22/05	12/19/05	01/06/06	03/29/06	03/29/06	04/26/06
RW5W15	05424054	10/20/05	10/22/05	12/16/05	01/06/06	03/29/06	03/29/06	04/26/06
RW6F14	05424055	10/21/05	10/22/05	12/19/05	01/06/06	03/29/06	03/29/06	04/26/06
RW6O14	05424056	10/21/05	10/22/05	12/20/05	01/06/06	03/29/06	03/29/06	04/26/06
BB2W13	05424057	10/18/05	10/22/05	12/27/05	01/20/06	03/29/06	03/29/06	04/26/06
BB2W23	05424058	10/18/05	10/22/05	12/27/05	01/20/06	03/29/06	03/29/06	04/26/06
BB2W33	05424059	10/18/05	10/22/05	12/27/05	01/20/06	03/29/06	03/29/06	04/26/06
BB3W15	05424060	10/18/05	10/22/05	12/30/05	01/20/06	03/29/06	03/29/06	04/26/06
BB3W25	05424061	10/18/05	10/22/05	01/03/06	01/20/06	03/29/06	03/29/06	04/26/06
BB3W35	05424062	10/18/05	10/22/05	01/04/06	01/20/06	03/29/06	03/29/06	04/26/06

Sample Number	Region 10 Sample Tracking Number	Date Sample Collection	VTSR at CH2M Lab	CH2MHill Homogenization Date	VTSR at MEL	Extraction Date	% Lipid Analysis Date	PCB Analysis Date
BB3W45	05424063	10/18/05	10/22/05	01/04/06	01/20/06	03/29/06	03/29/06	04/26/06
BB3W55	05424064	10/18/05	10/22/05	01/04/06	01/20/06	03/29/06	03/29/06	04/26/06
BB3W65	05424065	10/18/05	10/22/05	01/04/06	01/20/06	03/29/06	03/29/06	04/26/06
BB3W75	05424066	10/18/05	10/22/05	01/04/06	01/20/06	03/29/06	03/29/06	04/26/06
BB4W15	05424067	10/19/05	10/22/05	01/04/06	01/20/06	03/29/06	03/29/06	04/26/06
BB4W25	05424068	10/18/05	10/22/05	01/05/06	01/20/06	03/29/06	03/29/06	04/26/06
BB4W35	05424069	10/19/05	10/22/05	01/05/06	01/20/06	03/29/06	03/29/06	04/26/06
BB4W45	05424070	10/19/05	10/22/05	01/05/06	01/20/06	03/29/06	03/29/06	04/26/06
BB5W15	05424071	10/20/05	10/24/06	12/27/06	01/20/06	03/31/06	03/31/06	04/26/06
BB5W25	05424072	10/22/05	10/24/06	12/28/06	01/20/06	03/31/06	03/31/06	04/26/06
BB5W35	05424073	10/22/05	10/24/06	12/28/06	01/20/06	03/31/06	03/31/06	04/26/06
BB5W45	05424074	10/22/05	10/24/06	12/28/06	01/20/06	03/31/06	03/31/06	04/26/06
BB5W55	05424075	10/22/05	10/24/06	12/28/06	01/20/06	03/31/06	03/31/06	04/26/06
BB6W15	05244076	10/22/06	10/24/06	12/30/05	01/20/06	03/31/06	03/31/06	04/26/06
BB6W25	05424077	10/22/06	10/24/06	12/29/05	01/20/06	03/31/06	03/31/06	04/26/06
BB6W35	05424078	10/22/06	10/24/06	12/29/05	01/20/06	03/31/06	03/31/06	04/26/06
BB6W45	05424079	10/22/06	10/24/06	12/30/05	01/20/06	03/31/06	03/31/06	04/26/06
BB6W55	05424080	10/22/05	10/24/05	12/30/05	01/20/06	03/29/06	03/29/06	04/27/06
LS1W45	05424081	10/19/05	10/22/05	01/09/06	02/02/06	04/03/06	04/03/06	04/27/06
LS4W15	05424082	10/16/05	10/19/05	01/16/06	02/02/06	04/03/06	04/03/06	05/05/06
LS4W35	05424083	10/16/05	10/19/05	01/16/06	02/02/06	04/03/06	04/03/06	05/11/06
LS4W45	05424084	10/16/05	10/19/05	01/14/06	02/02/06	04/03/06	04/03/06	04/27/06
LS4W55	05424085	10/16/05	10/19/05	01/14/06	02/02/06	04/03/06	04/03/06	05/11/06
LS5W15	05424086	10/17/05	10/22/05	01/12/06	02/02/06	04/03/06	04/03/06	04/27/06
LS5W25	05424087	10/17/05	10/22/05	01/08/06	02/02/06	04/03/06	04/03/06	05/11/06
LS5W35	05424088	10/17/05	10/22/05	01/12/06	02/02/06	04/03/06	04/03/06	05/11/06
LS5W45	05424089	10/17/05	10/22/05	01/11/06	02/02/06	04/03/06	04/03/06	05/11/06
LS5W55	05424090	10/17/05	10/22/05	01/13/06	02/02/06	04/03/06	04/03/06	04/27/06
LS6W15	05424091	10/18/05	10/22/05	01/18/06	02/02/06	04/03/06	04/03/06	04/27/06
LS6W25	05424092	10/18/05	10/22/05	01/17/06	02/02/06	04/03/06	04/03/06	04/27/06

Sample Number	Region 10 Sample Tracking Number	Date Sample Collection	VTSR at CH2M Lab	CH2MHill Homogenization Date	VTSR at MEL	Extraction Date	% Lipid Analysis Date	PCB Analysis Date
LS6W35	05424093	10/18/05	10/22/05	01/17/06	02/02/06	04/03/06	04/03/06	04/27/06
LS6W45	05424094	10/18/05	10/22/05	01/19/06	02/02/06	04/03/06	04/03/06	04/27/06
LS6W65	05424095	10/18/05	10/22/05	01/17/06	02/02/06	04/03/06	04/03/06	04/27/06
LS6W75	05424096	10/18/05	10/22/05	01/17/06	02/02/06	04/03/06	04/03/06	04/27/06
LS1G50769	05424097	10/19/05	10/22/05	01/06/06	02/02/06	NA *	04/18/06	NA *
LS1G50771	05424099	10/19/05	10/22/05	01/06/06	02/02/06	NA	04/18/06	NA
LS1W50769	05424253	10/19/05	10/22/05	01/06/06	02/02/06	NA	04/18/06	NA
LS1W50770	05424254	10/19/05	10/22/05	01/06/06	02/02/06	NA	04/18/06	NA
LS1W50771	05424255	10/19/05	10/22/05	01/06/06	02/02/06	NA	04/18/06	NA
LS1W50775	05424256	10/19/05	10/22/05	01/06/06	02/02/06	NA	04/18/06	NA
LS1W50778	05424257	10/19/05	10/22/05	01/06/06	02/02/06	NA	04/13/06	NA
LS1W60778	05424258	10/19/05	10/22/05	01/19/06	02/02/06	NA	04/13/06	NA
LS6W50727	05424265	10/18/05	10/22/05	01/19/06	02/02/06	NA	04/13/06	NA
LS6W50732	05424266	10/18/05	10/22/05	01/19/06	02/02/06	NA	04/18/06	NA
LS6W50734	05424267	10/18/05	10/22/05	01/14/06	02/02/06	NA	04/13/06	NA
LS6W50744	05424268	10/18/05	10/22/05	01/19/06	02/02/06	NA	04/13/06	NA
LS6W50747	05424269	10/18/05	10/22/05	01/19/06	02/02/06	NA	04/18/06	NA
LS6W60734	05424270	10/18/05	10/22/05	01/19/06	02/02/06	NA	04/18/06	NA

* NA – Not Analyzed.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

May 8, 2006

Reply to
Attn of: MGREPOGR
OEA-095

MEMORANDUM

Subject: Data Validation Report for the Polychlorinated Dibenzodioxins (PCDD) and Polychlorinated Dibenzofurans (PCDF) Analysis of the Fish Tissue Samples Collected for the Phase I Upper Columbia River (UCR) Remedial Investigation/Feasibility Study (RI/FS) September 2005

From: Ginna Grepo-Grove, Senior Chemist
Technical Support Unit, OEA

To: Sally Thomas, RPM, UCR, Fish Tissue Study
USEPA, ECL

Marc Stifelman, Human Health Risk Assessment, USEPA, OEA
Burt Shephard, Ecological Risk Assessment, USEPA, OEA
Jim Stefanoff, Project Manager, CH2MHill
Artemis Antipas, QA Manager, CH2MHill

The quality assurance (QA) review of 186 fish tissue samples collected from the above referenced site has been completed. These samples were analyzed for PCDD/PCDF in accordance with the Contract Laboratory Program's (CLP) Statement of Work (SOW) for the Multi-Media, Multi-Concentration Dioxins and Furans Analysis (DLM02.0) and the Project - Modified Analysis and Flexibility Clause. The analyses were performed by Paradigm Analytical of Wilmington, NC. The following samples were evaluated in this validation report:

Field Sample Number	Sample Description	Region Tracking Number	CLP Tag Number	Paradigm Laboratory Number
WE1F15	Walleye FSCA#1 Comp# 1 - 5 Fish Fillets Skin-on (R & L)	05364201	274154	G619-9-1
WE1F25	Walleye FSCA#1 Comp# 2 - 5 Fish Fillet Skin-on (R & L)	05364 202	274162	G619-9-2
WE1F35	Walleye FSCA#1 Comp# 3 - 5 Fish Fillet Skin-on (R & L)	05364203	274174	G619-9-3
WE1F45	Walleye FSCA#1 Comp# 4 - 5 Fish Fillet Skin-on (R & L)	05364204	274186	G619-9-4
WE1F55	Walleye FSCA#1 Comp# 5 - 5 Fish Fillet Skin-on (R & L)	05364205	274199	G619-9-5
WE1O15	Walleye FSCA#1 Comp# 1 - 5 Offals	05364206	274158	G619-9-6

Field Sample Number	Sample Description	Region Tracking Number	CLP Tag Number	Paradigm Laboratory Number
WE1O25	Walleye FSCA#1 Comp# 2 - 5 Offals	05364207	274168	G619-9-7
WE1O35	Walleye FSCA#1 Comp# 3 - 5 Offals	05364208	274180	G619-9-8
WE1O45	Walleye FSCA#1 Comp# 4 - 5 Offals	05364209	274193	G619-9-9
WE1O55	Walleye FSCA#1 Comp# 5 - 5 Offals	05364210	274785	G619-9-10
WE3F15	Walleye FSCA#3 Comp# 1 - 5 Fish Fillet Skin-on (R & L)	05374200	274782	G619-9-11
WE3F25	Walleye FSCA#3 Comp# 2 - 5 Fish Fillet Skin-on (R & L)	05374201	274374	G619-9-12
WE3F35	Walleye FSCA#3 Comp# 3 - 5 Fish Fillet Skin-on (R & L)	05374202	274264	G619-9-13
WE3F45	Walleye FSCA#3 Comp# 4 - 5 Fish Fillet Skin-on (R & L)	05374203	274769	G619-9-14
WE3F55	Walleye FSCA#3 Comp# 5 - 5 Fish Fillet Skin-on (R & L)	05374204	274252	G619-9-15
WE3O15	Walleye FSCA#3 Comp# 1 - 5 Offals	05374205	274756	G619-9-16
WE3O35	Walleye FSCA#3 Comp# 3 - 5 Offals	05374206	274762	G619-9-17
WE3O45	Walleye FSCA#3 Comp# 3 -5 Offals	05374207	274791	G619-8-18
WE3O55	Walleye FSCA#3 Comp# 5 -5 Offals	05374208	274257	G619-9-19
WE4W15	Walleye FSCA#4 Wholebody Comp #1 - 5 Fish	05374209	NA **	G619-9-20
LW2W15	Lake White Fish FSCA#2 Whole body Comp# 1 - 5 Fish	05424010	274051	G619-10-1
LW2W25	Lake White Fish FSCA#2 Whole body Comp# 2 - 5 Fish	05424011	274072	G619-10-2
LW2W35	Lake White Fish FSCA#2 Whole body Comp# 3 - 5 Fish	05424014	274079	G619-10-3
LW2W45	Lake White Fish FSCA#2 Whole body Comp# 4 - 5 Fish	05424012	274086	G619-10-4
LW3W25	Lake White Fish FSCA#3 Whole body Comp# 2 - 5 Fish *	05374229	274574	G619-10-5
LW3W55	Lake White Fish FSCA#3 Whole body Comp# 5 - 5 Fish	05374228	274675	G619-10-6
LW4W15	Lake White Fish FSCA#4 Whole body Comp# 1 - 5 Fish	05374244	274392	G619-10-7
LW4W45	Lake White Fish FSCA#4 Whole body Comp# 4 - 5 Fish	05374241	274702	G619-10-8
LW5W15	Lake White Fish FSCA#5 Whole body Comp# 1 - 5 Fish	05374235	274717	G619-10-9
LW5W25	Lake White Fish FSCA#5 Whole body Comp# 2 - 5 Fish	05374234	274724	G619-10-10
LW5W35	Lake White Fish FSCA#5 Whole body Comp# 3 - 5 Fish	05374236	274731	G619-10-11
LW5W45	Lake White Fish FSCA#5 Whole body Comp# 4 - 5 Fish	05374237	274737	G619-10-12
LW5W55	Lake White Fish FSCA#5 Whole body Comp# 5 - 5 Fish	05374238	274745	G619-10-13
LW6W13	Lake White Fish FSCA#6 Whole body Comp# 1 - 3 Fish	05374243	274099	G619-10-14
LW6W23	Lake White Fish FSCA#6 Whole body Comp# 2 - 3 Fish	05424015	274620	G619-10-15
WE2W55	Walleye FSCA#2 Whole body Comp# 5 - 5 fish*	05414005	274368	G619-10-16
WE2W65	Walleye FSCA#2 Whole body Comp# 6 - 5 fish*	05414006	274372	G619-10-17
WE2W75	Walleye FSCA#2 Whole body Comp# 7 - 5 fish*	05414007	274496	G619-10-18
WE5W15	Walleye FSCA#5 Whole body Comp# 1 - 5 fish	05424001	274481	G619-10-19
WE5W25	Walleye FSCA#5 Whole body Comp# 2 - 5 fish	05424002	274615	G619-10-20
WE2W15	Walleye FSCA#2 Whole body Comp# 1 - 5 fish	05414001	274359	G619-11-1
WE2W25	Walleye FSCA#2 Whole body Comp# 2 - 5 fish	05414002	274382	G619-11-2
WE2W35	Walleye FSCA#2 Whole body Comp# 3 - 5 fish	05414003	274459	G619-11-3
WE2W45	Walleye FSCA#2 Whole body Comp# 4 - 5 fish	05414004	274631	G619-11-4
WE3025	Walleye FSCA#3 Comp# 2 - 5 Offals	05374206	274451	G619-11-5
WE4W25	Walleye FSCA#4 Whole body Comp# 2 -5 fish	05374213	274292	G619-11-6
WE4W35	Walleye FSCA#4 Whole body Comp# 3 -5 fish	05374214	274352	G619-11-7
WE4W45	Walleye FSCA#4 Whole body Comp# 4 -5 fish	05374215	274474	G619-11-8
WE4W55	Walleye FSCA#4 Whole body Comp# 5 -5 fish	05374216	274468	G619-11-9
WE5W35	Walleye FSCA#5 Whole body Comp# 3 -5 fish	05424005	274603	G619-11-10
WE6F15	Walleye FSCA#6 Comp# 1 - 5 Fish Fillet Skin-on (R & L)	05374217	274504	G619-11-11
WE6F25	Walleye FSCA#6 Comp# 2 - 5 Fish Fillet Skin-on (R & L)	05374218	274663	G619-11-12
WE6F35	Walleye FSCA#6 Comp# 3 - 5 Fish Fillet Skin-on (R & L)	05374219	274518	G619-11-13
WE6F45	Walleye FSCA#6 Comp# 4 - 5 Fish Fillet Skin-on (R & L)	05374220	274533	G619-11-14
WE6F55	Walleye FSCA#6 Comp# 5 - 5 Fish Fillet Skin-on (R & L)	05374221	274543	G619-11-15
WE6O15	Walleye FSCA#6 Comp# 1 -5 Offals	05374222	274511	G619-11-16
WE6O25	Walleye FSCA#6 Comp# 2 - 5 Offals	05374223	274666	G619-11-17

Field Sample Number	Sample Description	Region Tracking Number	CLP Tag Number	Paradigm Laboratory Number
WE6O35	Walleye FSCA#6 Comp# 3 - 5 Offals	05374224	274524	G619-11-18
WE6O45	Walleye FSCA#6 Comp# 4 - Offals	05374225	274537	G619-11-19
WE6O55	Walleye FSCA#6 Comp# 5 - Offals	05374226	274657	G619-11-20
WE6W65	Walleye FSCA#6 Whole body Comp# 6 - 5 fish*	05424006	274488	G619-12-1
WE6W75	Walleye FSCA#6 Whole body Comp# 7 - 5 fish	05424009	274354	G619-12-2
LW2W55	Lake White Fish FSCA#2 Whole body Comp# 5 - 5 Fish	05424013	274982	G619-12-3
LW3W15	Lake White Fish FSCA#3 Whole body Comp# 1 - 5 Fish	05374227	274553	G619-12-4
LW3W35	Lake White Fish FSCA#3 Whole body Comp# 3 - 5 Fish	05374230	274588	G619-12-5
LW3W45	Lake White Fish FSCA#3 Whole body Comp# 4 - 5 Fish	05374231	274595	G619-12-6
LW3W65	Lake White Fish FSCA#3 Whole body Comp# 6 -5 Fish*	05374232	274567	G619-12-7
LW3W75	Lake White Fish FSCA#3 Whole body Comp# 7 -5 Fish*	05374233	274581	G619-12-8
LW4W25	Lake White Fish FSCA#4 Whole body Comp# 2 - 5 Fish	05374239	274560	G619-12-9
LW4W35	Lake White Fish FSCA#4 Whole body Comp# 3 - 5 Fish	05374240	274696	G619-12-10
LW4W55	Lake White Fish FSCA#4 Whole body Comp# 4 - 5 Fish	05374242	274710	G619-12-11
WE6W65	Walleye FSCA#6 Whole body Comp# 6 - 5 fish * (analytical dup)	05424007	274609	G619-12-12
RH6F35	Rainbow Trout Hatchery FSCA#6 Comp# 3 5 -Fish Fillets Skin-on (L&R)	05424036	284838	G619-12-13
RH6F45	Rainbow Trout Hatchery FSCA#6 Comp# 4 5 -Fish Fillets Skin-on (L&R)	05424037	273449	G619-12-14
RH6F65	Rainbow Trout Hatchery FSCA#6 Comp# 6 5 - Fish Fillets Skin-on (L&R) *	05424038	274443	G619-12-15
RH6O15	Rainbow Trout Hatchery FSCA#6 Comp# 1 -5 Offals	05424039	274817	G619-12-16
RH6O25	Rainbow Trout Hatchery FSCA#6 Comp# 2 -5 Offals *	05424040	274830	G619-12-17
RH6O35	Rainbow Trout Hatchery FSCA#6 Comp# 3 -5 Offals	05424041	274844	G619-12-18
RH6O45	Rainbow Trout Hatchery FSCA#6 Comp# 3 -5 Offals	05424042	273443	G619-12-18
RH6O65	Rainbow Trout Hatchery FSCA#6 Comp# 6 -5 Offals *	05424043	274448	G619-12-20
RH3F15	Rainbow Trout Hatchery FSCA#3 Comp# 1 -5 Fish Fillets Skin-on (L&R)	05424016	274955	G619-13-1
RH3F25	Rainbow Trout Hatchery FSCA#3 Comp# 2 -5 Fish Fillets Skin-on (L&R)	05424017	274969	G619-13-2
RH3F35	Rainbow Trout Hatchery FSCA#3 Comp# 3 -5 Fish Fillets Skin-on (L&R)	05424018	274981	G619-13-3
RH3O15	Rainbow Trout Hatchery FSCA#3 Comp# 1 -5 Offals	05424019	274962	G619-13-4
RH3O25	Rainbow Trout Hatchery FSCA#3 Comp# 2 -5 Offals	05424020	274976	G619-13-5
RH3O35	Rainbow Trout Hatchery FSCA#3 Comp# 3 -5 Offals	05424021	274988	G619-13-6
RH4W15	Rainbow Trout Hatchery FSCA#4 Whole body Comp # 1 - 5 Fish	05424022	274995	G619-13-7
RH4W25	Rainbow Trout Hatchery FSCA#4 Whole body Comp # 2 - 5 Fish	05424023	274855	G619-13-8
RH4W35	Rainbow Trout Hatchery FSCA#4 Whole body Comp # 3 - 5 Fish	05424024	274864	G619-13-9
RH4W45	Rainbow Trout Hatchery FSCA#4 Whole body Comp # 4 - 5 Fish	05424025	274882	G619-13-10
RH4W55	Rainbow Trout Hatchery FSCA#4 Whole body Comp # 5 - 5 Fish	05424026	274890	G619-13-11
RH5W15	Rainbow Trout Hatchery FSCA#5 Whole body Comp # 1 - 5 Fish	05424027	274918	G619-13-12
RH5W25	Rainbow Trout Hatchery FSCA#5 Whole body Comp # 2 - 5 Fish	05424028	274925	G619-13-13
RH5W35	Rainbow Trout Hatchery FSCA#5 Whole body Comp # 3 - 5 Fish	05424029	274931	G619-13-14
RH5W45	Rainbow Trout Hatchery FSCA#5 Whole body Comp # 4 - 5 Fish	05424031	274938	G619-13-15
RH5W55	Rainbow Trout Hatchery FSCA#5 Whole body Comp # 5 - 5 Fish *	05424032	274947	G619-13-16
RH5W65	Rainbow Trout Hatchery FSCA#5 Whole body Comp # 6 -5 Fish*	05424033	274904	G619-13-17
RH5W75	Rainbow Trout Hatchery FSCA#5 Whole body Comp # 6 -5 Fish*	05424034	274803	G619-13-18
RH6F15	Rainbow Trout Hatchery FSCA#6 Comp#1 -5 Fish Fillets Skin-on (L& R)	05424035	274810	G619-13-19
RH6F25	Rainbow Trout Hatchery FSCA#6 Comp# 2 -5 Fish Fillets Skin-on (L& R) *	05424033	274823	G619-13-20
RW1F15	Rainbow Trout Wild FSCA#1 Comp#1 -5 Fish Fillets Skin-on (L &R)	05374245	274439	G619-16-1
RW1F25	Rainbow Trout Wild FSCA#1 Comp#2 -5 Fish Fillets Skin-on (L &R)	05374246	274419	G619-16-2
RW1F35	Rainbow Trout Wild FSCA#1 Comp#3 -5 Fish Fillets Skin-on (L &R)	05374247	274431	G619-16-3
RW1F45	Rainbow Trout Wild FSCA#1 Comp#4 -5 Fish Fillets Skin-on (L &R)	05374248	274315	G619-16-4
RW1F55	Rainbow Trout Wild FSCA#1 Comp#5 -5 Fish Fillets Skin-on (L &R) *	05374249	274323	G619-16-5
RW1F65	Rainbow Trout Wild FSCA#1 Comp#6 -5 Fish Fillets Skin-on (L &R) *	05374250	274344	G619-16-6
RW1O15	Rainbow Trout Wild FSCA#1 Comp# 1 -5 Offals	05374251	274301	G619-16-7
RW1O25	Rainbow Trout Wild FSCA#1 Comp# 2 -5 Offals	05374252	274410	G619-16-8

Field Sample Number	Sample Description	Region Tracking Number	CLP Tag Number	Paradigm Laboratory Number
RW1O35	Rainbow Trout Wild FSCA#1 Comp# 3 -5 Offals	05374253	274429	G619-16-9
RW1O45	Rainbow Trout Wild FSCA#1 Comp# 4 -5 Offals	05374254	274309	G619-16-10
MW1W15	Mountain Whitefish FSCA#1 Whole body Comp# 1 - 5 Fish	05374263	273720	G619-16-11
MW1W25	Mountain Whitefish FSCA#1 Whole body Comp# 2 - 5 Fish	05374264	273726	G619-16-12
MW1W35	Mountain Whitefish FSCA#1 Whole body Comp# 3 - 5 Fish	05374265	273732	G619-16-13
MW1W45	Mountain Whitefish FSCA#1 Whole body Comp# 4 - 5 Fish *	05374257	273739	G619-16-14
MW1W55	Mountain Whitefish FSCA#1 Whole body Comp# 5 - 5 Fish	05374258	276706	G619-16-15
MW1W65	Mountain Whitefish FSCA#1 Whole body Comp# 6 - 5 Fish *	05374261	273742	G619-16-16
MW1W75	Mountain Whitefish FSCA#1 Whole body Comp# 7 - 5 Fish *	05374262	276726	G619-16-17
RW2W15	Rainbow Trout Wild FSCA # 2 Whole body Comp# 1 - 5 Fish	05424044	273435	G619-17-1
RW2W25	Rainbow Trout Wild FSCA # 2 Whole body Comp# 2 - 5 Fish	05424045	274349	G619-17-2
RW2W35	Rainbow Trout Wild FSCA # 2 Whole body Comp# 3 - 5 Fish *	05424046	273707	G619-17-3
RW2W45	Rainbow Trout Wild FSCA # 2 Whole body Comp# 4 - 5 Fish	05424047	273560	G619-17-4
RW2W65	Rainbow Trout Wild FSCA # 2 Whole body Comp# 6 - 5 Fish *	05424048	273414	G619-17-5
RW2W75	Rainbow Trout Wild FSCA # 2 Whole body Comp# 5 - 5 Fish *	05424049	273413	G619-17-6
RW3F15	Rainbow Trout Wild FSCA #3 Comp# 1 - 5 Fish Fillets Skin-on (L&R)	05424050	273599	G619-17-7
RW3F25	Rainbow Trout Wild FSCA #3 Comp# 2 -5 Fish Fillets Skin-on (L&R)	05424051	273572	G619-17-8
RW3O15	Rainbow Trout Wild FSCA #3 Comp# 1 -5 Offals	05424052	273564	G619-17-9
RW3O25	Rainbow Trout Wild FSCA #3 Comp #2 – 5 Offals	05424053	273585	G619-17-10
RW5W15	Rainbow Trout Wild FSCA #5 Whole body Comp# 1 - 5 Fish	05424054	273580	G619-17-11
RW6F14	Rainbow Trout Wild FSCA #6 Comp# 1 - 5 Fish Fillets Skin-on (L&R)	05424055	273591	G619-17-12
RW6O14	Rainbow Trout Wild FSCA #6 Comp# 1 - 5 Offals	05424056	273597	G619-17-13
RW1O55	Rainbow Trout Wild FSCA #1 Comp# 1 - 5 Offals *	05374255	274325	G619-17-14
RW1O65	Rainbow Trout Wild FSCA #1 Comp# 6 - 5 Offals *	05374256	274337	G619-17-15
BB2W13	Burbot FSCA # 1 Comp# 1 - 3 Fish	05424057	276720	G619-18-1
BB2W23	Burbot FSCA # 1 Comp# 2 - 3 Fish	05424058	276747	G619-18-2
BB2W33	Burbot FSCA # 1 Comp# 3 - 3 Fish	05424059	276712	G619-18-3
BB3W15	Burbot FSCA# 3 Whole body Comp# 1 – 5 Fish	05424060	276741	G619-18-4
BB3W25	Burbot FSCA# 3 Whole body Comp# 2 – 5 Fish	05424061	277006	G619-18-5
BB3W35	Burbot FSCA# 3 Whole body Comp# 3 – 5 Fish *	05424062	277013	G619-18-6
BB3W45	Burbot FSCA# 3 Whole body Comp# 4 – 5 Fish	05424063	277032	G619-18-7
BB3W55	Burbot FSCA# 3 Whole body Comp# 5 – 5 Fish	05424064	277039	G619-18-8
BB3W65	Burbot FSCA# 3 Whole body Comp# 6 – 5 Fish *	05424065	277019	G619-18-9
BB3W75	Burbot FSCA# 3 Whole body Comp# 7 – 5 Fish *	05424066	277028	G619-18-10
BB4W15	Burbot FSCA# 4 Whole body Comp# 1 – 5 Fish	05424067	276904	G619-18-11
BB4W25	Burbot FSCA# 4 Whole body Comp# 2 – 5 Fish	05424068	276932	G619-18-12
BB4W35	Burbot FSCA# 4 Whole body Comp# 3 – 5 Fish	05424069	276939	G619-19-1
BB4W45	Burbot FSCA# 4 Whole body Comp# 4 – 5 Fish	05424070	276946	G619-19-2
BB5W15	Burbot FSCA# 5 Whole body Comp# 1 – 5 Fish	05424071	277125	G619-19-3
BB5W25	Burbot FSCA# 5 Whole body Comp# 2 – 5 Fish	05424072	277111	G619-19-4
BB5W35	Burbot FSCA# 5 Whole body Comp# 3 – 5 Fish	05424073	276911	G619-19-5
BB5W45	Burbot FSCA# 5 Whole body Comp# 4 – 5 Fish	05424074	276918	G619-19-6
BB5W55	Burbot FSCA# 5 Whole body Comp# 5 – 5 Fish	05424075	277104	G619-19-7
BB6W15	Burbot FSCA# 6 Whole body Comp# 1 – 5 Fish	05424076	277134	G619-19-8
BB6W25	Burbot FSCA# 6 Whole body Comp# 2 – 5 Fish	05424077	277148	G619-19-9
BB6W35	Burbot FSCA# 6 Whole body Comp# 3 – 5 Fish	05424078	277450	G619-19-10
BB6W45	Burbot FSCA# 6 Whole body Comp# 4 – 5 Fish	05424079	277442	G619-19-11
BB6W55	Burbot FSCA# 6 Whole body Comp# 5 – 5 Fish	05424080	277141	G619-19-12
LS1W25	Large Scale Sucker FSCA# 1 Whole body Comp# 2 – 5 Fish	05364221	276661	G619-20-1
LS1W35	Large Scale Sucker FSCA# 1 Whole body Comp# 3 – 5 Fish	05364222	276684	G619-20-2
LS1W45	Large Scale Sucker FSCA# 1 Whole body Comp# 4 – 5 Fish	05424081	276692	G619-20-3

Field Sample Number	Sample Description	Region Tracking Number	CLP Tag Number	Paradigm Laboratory Number
LS2W15	Large Scale Sucker FSCA# 2 Whole body Comp# 1 – 5 Fish	05414009	276697	G619-20-4
LS2W25	Large Scale Sucker FSCA# 2 Whole body Comp# 2 – 5 Fish *	05414010	277406	G619-20-5
LS2W35	Large Scale Sucker FSCA# 2 Whole body Comp# 3 – 5 Fish	05414011	277420	G619-20-6
LS2W45	Large Scale Sucker FSCA# 2 Whole body Comp# 4 – 5 Fish	05414012	277434	G619-20-7
LS2W65	Large Scale Sucker FSCA# 2 Whole body Comp# 6 – 5 Fish *	05414013	277416	G619-20-8
LS3W75	Large Scale Sucker FSCA# 3 Whole body Comp# 1 – 5 Fish *	05414014	277424	G619-20-9
LS3W15	Large Scale Sucker FSCA# 3 Whole body Comp# 2 – 5 Fish	05414015	276451	G619-20-10
LS3W25	Large Scale Sucker FSCA# 3 Whole body Comp# 3 – 5 Fish	05414016	276456	G619-20-11
LS3W35	Large Scale Sucker FSCA# 3 Whole body Comp# 4 – 5 Fish	05414017	276465	G619-20-12
LS3W55	Large Scale Sucker FSCA# 3 Whole body Comp# 5 – 5 Fish	05414018	276470	G619-20-13
LS4W15	Large Scale Sucker FSCA# 4 Whole body Comp# 1 – 5 Fish	05424080	276477	G619-20-14
LS4W25	Large Scale Sucker FSCA# 4 Whole body Comp# 2 – 5 Fish	05414019	276482	G619-20-15
LS4W35	Large Scale Sucker FSCA# 4 Whole body Comp# 3 – 5 Fish	05424083	276757	G619-21-1
LS4W45	Large Scale Sucker FSCA# 4 Whole body Comp# 4 – 5 Fish	05424084	**	G619-21-2
LS4W55	Large Scale Sucker FSCA# 4 Whole body Comp# 5 – 5 Fish	05424085	276763	G619-21-3
LS5W15	Large Scale Sucker FSCA# 5 Whole body Comp# 1 – 5 Fish	05424086	276776	G619-21-4
LS5W25	Large Scale Sucker FSCA# 5 Whole body Comp# 2 – 5 Fish	05424087	276786	G619-21-5
LS5W35	Large Scale Sucker FSCA# 5 Whole body Comp# 3 – 5 Fish	05424088	276569	G619-21-6
LS5W45	Large Scale Sucker FSCA# 5 Whole body Comp# 4 – 5 Fish	05424089	276593	G619-21-7
LS5W55	Large Scale Sucker FSCA# 5 Whole body Comp# 5 – 5 Fish	05424090	276574	G619-21-8
LS6W15	Large Scale Sucker FSCA# 6 Whole body Comp# 1 – 5 Fish	05424091	276581	G619-21-9
LS6W25	Large Scale Sucker FSCA# 6 Whole body Comp# 2 – 5 Fish	05424092	276589	G619-21-10
LS6W35	Large Scale Sucker FSCA# 6 Whole body Comp# 3 – 5 Fish *	05424093	276793	G619-21-11
LS6W45	Large Scale Sucker FSCA# 6 Whole body Comp# 4 – 5 Fish	05424094	276800	G619-21-12
LS6W65	Large Scale Sucker FSCA# 6 Whole body Comp# 6 – 5 Fish *	05424095	277219	G619-21-13
LS6W75	Large Scale Sucker FSCA# 6 Whole body Comp# 7 – 5 Fish *	05424096	277204	G619-21-14
RW2W53	Rainbow Trout Wild FSCA #2 Whole body Comp# 5 – 3 Fish	05414008	276555	G619-21-15

* Duplicate/Triplicate
** - Not Received by Paradigm Lab
NA – Not Analyzed

A holding time summary cross-checking the chain or custody, fish processing and sample integrity traceability listing the fish tissue samples collected and analyzed for dioxins/furans with the corresponding Region 10 sample tracking numbers, field sample numbers and laboratory identification numbers and dates of collection, homogenization and verified time of sample receipt (VTSR) at the different laboratories, extraction and analyses are summarized in Table 1 and Appendix B at the end of this validation report.

DATA QUALIFICATIONS

The following comments refer to the laboratory performance in meeting the Quality Control specifications outlined in the Phase 1 Fish Tissue Sampling Quality Assurance Project Plan (QAPP) for the Upper Columbia River Site CERCLA RI/FS, the Contract Laboratory Program's (CLP) Statement of Work (SOW) for the Multi-Media, Multi-Concentration Dioxins and Furans Analysis (DLM02.0) and the Project - Modified Analysis and Flexibility Clause. Some of the data quality elements were qualified using the reviewer's professional judgment.

The conclusions presented herein are based on the information provided for the review.

Field Sample Collection

The fish tissue sample collection was accomplished through a multi-agency/tribal effort with the CH2MHill team as the overall lead in the field. Sample vessels and vessel operators were provided by the following tribal and federal agencies under an interagency or sub–contracting agreement with EPA and/or CH2MHill: Spokane Tribe of Indians, Confederated Tribes of the Colville Reservation, US Fish and Wildlife Services and the USEPA Investigation and Engineering Unit of the Office of Environmental Assessment.

The sample collection dates were based on the fish availability and fish species' spawning season. There were two sample collection events conducted, the first one was conducted in September 2005 and the second one was in October 2005. The fish species that were collected from the designated fish sample collection areas (FSCA 1 through 6) were Walleye (*Sander vitreus*), Rainbow trout (*Oncorhynchus mykiss*), Lake white fish (*Coregonus clupeaformis*), Large-scale sucker (*Catastomas macrocheilus*), and Burbot (*Lota lota*). Long-nose suckers and Mountain whitefish were not originally listed in the QAPP as target fish species but were also collected and added to the target fish species due to their availability in the FSCAs. The mountain white fish were analyzed while the long-nose suckers were archived. The rainbow trout samples were grouped into three categories – wild, hatchery and mixed wild and hatchery. Only the wild and hatchery rainbow trouts were analyzed for the compounds of concern. The mixed wild and hatchery rainbow trouts were archived for future analysis, if needed.

The fish samples were generally collected using gill nets, electro-fishing, burbot traps and angling, if necessary. The field sample collection process was audited by the project's EPA and CH2MHill QA Managers. There were no significant problems encountered during sample collection, on-site processing, sampling documentation and sample shipment.

Sample Processing and Chain-of-Custody Documentation

CH2MHill set-up a trailer dedicated for the on-site fish sample processing which included visual inspection of the fish, sex determination, conducting field measurements (fish length and weight) and otolith, scale and opercular covers (large scale suckers only) removal for subsequent fish age determination by the Washington State Department of Fish and Wildlife (WSDFW). All of the field forms generated for these measurements and determination were evaluated and cross –checked with the homogenization forms and chain-of-custody (COC) documentation. All of the field measurements, field sampling documentation (COCs) and sample preservation (freezing to -20C) were conducted by CH2MHill within 24 hours of sample collection.

Frozen whole fish samples were shipped to CH2MHill laboratory - Applied Science Laboratory (ASL) located in Corvallis, OR for filleting (if needed), homogenization, compositing, aliquot distribution and storage. There were four types of tissues prepared and analyzed for the compounds of potential concern (COPCs) for the sites, namely: fillets, left and right side with skin-on, offals (remaining tissue, internal organs and fish bones after filleting), guts (for large scale sucker only) and whole body (includes fish head, skin and entrails).

As specified in the EPA approved site QAPP, the following tissue types and homogenates were prepared by ASL and shipped to USEPA Manchester Environmental Laboratory (MEL) for subsequent PCB Aroclor, metals, percent lipids and speciated arsenic analyses and/or archival:

- Walleye – fillets and offals at three FSCAs and whole body composites from three FSCAs
- Rainbow trout (wild and hatchery) – fillets and offals at three FSCAs and whole body composites from three FSCAs
- Lake whitefish – whole body composites
- Mountain whitefish – whole body composites
- Large scale sucker – whole body composites for organics; guts/internal organs composites-metals
- Burbot – whole body composites
- Long-nose suckers – whole body composites (archived)

Some discrepancies and missing information were noted on the composite sample numbers listed on the COCs and the fish processing forms. ASL (represented by Mr. Robert Wong) and CH2MHill QA Manager, (Ms. Artemis Antipas) were contacted to clarify and correct these discrepancies on April 26, 2006. An explanation and reasons for the discrepancies were immediately sent to the reviewer. See the attached communication logs at the end of this validation memo.

Sample Homogenization and Compositing

Each individual fish collected was given identification number, tagged and individually homogenized at ASL using a commercial grade stainless steel blender/grinder (Robo-Coupe Blixer 6) with liquid nitrogen. Equal amounts of homogenized whole body, fillet or offal tissue samples were mixed and composited to form a single sample. The homogenization forms and the resulting fish sample composites were evaluated by this reviewer. There were no discrepancies noted between the sample collection forms, homogenization forms and the sample composite COCs. Fillet and whole body samples included the fish skin. Care was taken to prevent cross-contamination between sample homogenates. Prior to the start of the project samples, the homogenization process was audited by the project's EPA and CH2MHill QA Managers. To monitor processing cross-contamination, proof blanks were collected at the QAPP specified frequency and sent to the Contract Laboratory program (CLP) for the analysis of the project target compound.

<u>Corrective Action: Deviation from the QAPP as a result of field and sample processing assessment</u>: In a mock sample processing and homogenization conducted during the EPA's and CH2MHill's QA lab audit, it was found out that otoliths were very hard to remove when the fish samples were already frozen. In addition, subjecting the fish to freezing and defrosting raptures the internal organs, make the fish muscles mushy and thus made the separation of fillets from the offals quite a challenge. To avoid cross–contamination of the fish tissue samples with the offals and to better preserve the otholiths, it was agreed

by the project team that the removal of otolith will be conducted on-site after field measurements and before sample preservation (freezing to -20C) and if bench space and resources will allow, filleting of fish samples will also be performed on-site prior to freezing the samples.

Fish Age Determination and Range

The following methods were used to determine the age of the fish: otoliths (inner ear of a fish) were used to determine the age of Lake whitefish, burbot and mountain whitefish. Both otholiths and scales were used to determine the age of the walleye, wild and hatchery rainbow trouts. The opercular covers (also called opercula) were used determine the age of large-scale suckers.

Otholith, scales and operculas were read with the knowledge of the place of capture, sex and size of the fish. The readings were performed by only one individual Mr. John Sneva of WSDFW. Precision and consistency of readings were checked through the comparison of annuli (otholiths) and the occuli (scales) readings when both specimens are available. The fish age are based on visual readings (duplicate readings, if additional otholiths or scales were available) and maybe estimated range. There was no second party independent readings or validation conducted with these age estimates.

Fish age logs indicated the following: age of lake whitefish ranged from 1-3 years old; hatchery rainbow trouts ranged mostly 1-2 years; wild rainbow trouts from 1-4 years old; mountain whitefish ranged from 0-15 years old; large-scale suckers nine of which were <10 years old; the rest ranged from >10-36 years of age; walleye and burbot from 2-5 years old.

Sample Receipt and Storage

All of the samples were received frozen and intact at the USEPA MEL from CH2MHill lab. After inspection, inventory and logging-in, the sample homogenates were stored in a freezer at -20C while waiting for extraction and analysis. The samples evaluated in this validation report were shipped by MEL to Paradigm Lab from January 26, 2006 to March 24, 2006. All of the fish tissue samples were received intact and still frozen at the verified time of sample receipt (VTSR) at Paradigm Labs.

Holding Times - Acceptable

All of the fish tissue samples were frozen at -20 ^{o}C while on storage at MEL and samples were still frozen when received at Paradigm Lab. The integrity of the samples was preserved while on storage at MEL and during shipment. All of the sample analyses met the contractual extraction and contractual analytical holding times of 10 days from the VTSR and 30 days from the extraction date, respectively. All of the samples also met the method and project extraction and analytical holding times of one year from the date of sample collection. None of the dioxin or furan data were qualified on this basis. The list of samples, cross-referenced to the fish species, station location, and the dates of sample collection, VTSR at the lab, extraction, extract clean-up and analysis dates are listed in Table 1 at the end of this report. The list of individual fish comprising a composite sample can be found in Appendix B of this report.

Sample Preparation - Acceptable

All of the samples were extracted following the specifications of the flexibility clause and the DLM02.0 SOW. The primary extracts went through special clean-up processes specified in the SOW to remove the chlorinated diphenyl ethers (CDPEs) and other organic material interferences in the extract. The efficiency of the clean-up process was monitored by the recoveries of the clean-up standard, $^{37}Cl_4$ -2,3,7,8-TCDD.

Instrument Performance Checks - Acceptable

The primary sample analyses were conducted using the DB-5 column. For tetrachlorodibenzofuran (TCDF) confirmation, additional runs were performed on a DB-225 column. Both columns met the isomer specificity requirements for 2, 3, 7, 8- tetrachlorodibenzo-p-dioxin (TCDD), TCDF and other PCDD/PCDF isomers. The frequency of analysis, minimum resolving power of >10,000, signal-to-noise (S/N) ratios, ion abundance ratios, retention times and the % valley criteria were also met at the beginning and end of each analytical sequence. The appropriate switching times for the Selected Ion Current Profile (SICP) descriptors and the chromatographic resolutions were established from the first and last eluting isomers per descriptor. The chromatographic separations between the isomer eluting closest to 2,3,7, 8-TCDD and 2,3,78-TCDF as expressed by percent (%) valley were all less than 25% for both columns used. The absolute retention times (RTs) of the internal standard $^{13}C_{12}$ - 2, 3, 7, 8-TCDD were greater than 25 minutes. Homologues do not overlap between homologue descriptors switching times. The instrument used remained stable throughout each analytical sequence. None of the data were qualified on this basis.

Initial Calibrations - Acceptable

The frequency of analysis of the initial calibrations (ICALs) in both columns DB5 and DB225 were met. The instruments' resolutions of >10,000 resolving power were maintained throughout the course of all the analytical sequences. The percent relative standard deviations (%RSDs) for all the native and isotope-labeled compounds in all ICALs were less than 20%. The chromatographic separations between the isomer eluting closest to 2, 3, 7, 8-TCDD and 2, 3, 7, 8-TCDF as expressed by percent (%) valley were all less than 25%. The absolute retention times (RTs) of the internal standard $^{13}C_{12}$ - 1,2,3,4-TCDD were greater than 25 minutes in the primary column, DB-5 and >15 minutes in the confirmatory column, DB225. All of the calibration standards were analyzed at the concentrations specified by the flexibility clause, the S/N ratios are >10 including the lowest standard (CS0), the ion abundance ratios and relative retention times (RRTs) in reference to both $_{13}$C-1,2,3,4-TCDD and $_{13}$C-1,2,3,7,8,9-HxCDD as internal standards were within the control limits. None of the reported results were qualified on this basis.

Continuing Calibrations - Acceptable

All of the continuing calibration verification standards (CCVs) associated with the samples met the criteria for frequency of analysis, mass resolutions, ion abundance ratios, isomer specificity, absolute RTs, RRTs in reference to both $_{13}$C-1,2,3,4-TCDD and $_{13}$C-1,2,3,7,8,9-HxCDD as internal standards, the chromatographic resolutions, the S/N ratios >10 and the percent differences (%D) of the daily response factors (RF) as compared to the mean RF from the ICALs. None of the data were qualified on this basis.

On-Going Precision and Recovery (OPR) - Acceptable

The frequency of analysis and recovery criteria were met by all OPRs extracted and analyzed with the samples. None of the data were qualified on this basis.

Compound Quantitation and Detection Limits

All of the samples were analyzed at the project-required concentration levels. All of the samples were extracted at the project specified amount. All of the target compounds detected in the samples were calculated off the primary column using the mean relative response factors (RRF) from the initial calibrations and were at concentrations within the instrument's calibration range. All of the 2,3,7,8-TCDFs initially detected in the DB-5 primary column were re-analyzed on a second confirmatory column (DB-225). All 2, 3, 7, 8-TCDF detections were calculated off the DB-5 column because of the chlorinated diphenyl ether (CDPE) interference in the DB225 column.

Target compounds detected at concentrations less than the laboratory specified reporting limits were qualified estimated, "J". The reporting limits for some of the PCDDs/PCDFs detected in the samples were elevated and qualified non-detects due to interferences and contamination in the laboratory blank(s).

Detected compounds that met all of the identification criteria except for the mass ion abundance ratios were reported at the level of concentration detected (estimated maximum potential concentration-EMPC) and were qualified non-detects, "U", by this reviewer.

Compound Identification

Majority of the reported PCDDs/PCDFs met the technical acceptance criteria for compound identifications, i.e., S/N ratios greater than 2.5, ion abundance ratios, RRTs using both $^{13}C_{12}$ -1,2,3,4-TCDD and $^{13}C_{12}$ - 1,2,3,7,8,9-HxCDD as injection standards within the method specified limits and chromatographic resolutions. All of the reported results did not co-elute with CDPE's. Where co-elution with CDPEs were identified, the results were qualified as non-detects, "U", by this reviewer and reported at the level of detection due to interferences. Some of the PCDD/PCDF target compounds identified did not meet the ion abundance ratio criteria and were flagged as non-detects at the EMPC. Most of these compounds were also identified as contaminants in the laboratory blank (s).

Method Blanks

The frequency of analysis of laboratory blank was met. Trace levels of some of the target compounds were detected in the method blank and were qualified as follows in the associated samples: detections at concentrations >5x the value in their respective blank(s) were qualified non-detects, "U"; detection >5x the value in the blank(s) were not qualified on this basis. The following samples were qualified based on the contamination in the blank:

Method Blank	Extraction date	Compounds Detected	Amount Detected (pg/g)	Affected samples
LMB12330	01/29/06	1,2,3,7,8-PeCDD	0.192	All samples in the SDG: G619-9.
		2,3,7,8-TCDF	0.08	
		1,2,3,7,8-PeCDF	0.204	
		2,3,4,7,8-PeCDF	0.190	
		1, 2,3,6,7,8-HxCDF	0.150	
		2,3,4,6,7,8-HxCDF	0.174	
		Total TCDFs	0.08	
		Total PeCDDs	0.192	
		Total PeCDFs	0.394	
		Total HxCDFs	0.324	
LMB12351	02/09/06	1,2,3,4,6,7,8-HpCDD	0.294	All samples in SDG: G619-10.
		OCDD	2.41	
		2,3,7,8-TCDF	0.132	
		1,2,3,7,8-PeCDF	0.0760	
		2,3,4,7,8-PeCDF	0.0960	
		1,2,3,4,7,8-HxCDF	0.0760	
		1,2,3,6,7,8-HxCDF	0.0760	
		2,3,4,6,7,8-HxCDF	0.0780	
		1,2,3,7,8,9-HxCDF	0.0800	
		1,2,3,4,6,7,8-HpCDF	0.0680	
		OCDF	0.446	
		Total TCDFs	0.290	
		Total PeCDFs	0.132	
		Total HxCDDs	0.172	
		Total HxCDFs	0.310	
		Total HpCDDs	0.156	
LMB 12353	02/12/06	1,2,3,4,6,7,8-HpCDD	0.222	All sample in the SDG: G19-11
		OCDD	1.70	
		2,3,7,8-TCDF	0.150	
		1,2,3,7,8-PeCDF	0.114	
		2,3,4,7,8-PeCDF	0.102	
		1,2,3,4,6,7,8- HpCDF	0.060	
		OCDF	0.140	
		Total HpCDDs	0.134	
		Total TCDFs	0.150	
		Total PeCDFs	0.216	
		Total HpCDFs	0.180	
LMB12366	03/14/06	OCDD	1.19	All samples in the SDG: G619-16.
		2,3,4,7,8-PeCDD	0.108	
		Total PeCDD	0.108	
LMB12395	03/21/06	1,2,3,7,8- PeCDD	0.210	All samples in the SDG: G619-17
		1,2,3,7,8 – PeCDF	0.250	
		2,3,4,7,8-PeCDF	0.192	
		1,2,3,4,7,8-HxCDF	0.164	
		1,2,3,6,7,8-HxCDF	0.206	
		2,3,4,6,7,8 – HxCDF	0.222	
		1,2,3,7,8,9 - HxCDF	0.302	
		Total PeCDDs	0.210	
		Total PeCDFs	0.442	
		Total HxCDFs	0.894	
LMB12400	03/22/06	1,2,3,7,8-PeCDD	0.176	All samples in the SDG: G619-18
		1,2,3,7,8,9 - HxCDD	0.208	

Method Blank	Extraction date	Compounds Detected	Amount Detected (pg/g)	Affected samples
		1,2,3,4,6,7,8 – HpCDD	0.210	
		OCDD	0.944	
		2,3,7,8- TCDF	0.170	
		1,2,3,7,8-PeCDF	0.194	
		2,3,4,7,8-PeCDF	0.238	
		1,2,3,4,7,8 – HxCDF	0.196	
		1,2,3,6,7,8-HxCDF	0.176	
		2,3,4,6,7,8- HxCDF	0.142	
		1,2,3,7,8,9 – HxCDF	0.212	
		1,2,3,4,6,7,8 – HpCDF	0.178	
		1,2,3,4,7,8,9 – HpCDF	0.188	
		OCDF	0.518	
		Total PeCDDs	0.176	
		Total HxCDDs	0.560	
		Total HpCDDs	0.210	
		Total PeCDFs	0.432	
		Total HxCDFs	0.726	
		Total HpCDFs	0.366	
LMB12403	03/24/06	1,2,3,7,8-PeCDD	0.144	All samples in the SDG: G619-19
		1,2,3,7,8,9 - HxCDD	0.192 (EMPC)	
		OCDD	0.910	
		2,3,7,8- TCDF	0.252 (EMPC)	
		1,2,3,7,8-PeCDF	0.238	
		2,3,4,7,8-PeCDF	0.200 (EMPC)	
		1,2,3,4,7,8 – HxCDF	0.140	
		1,2,3,6,7,8-HxCDF	0.164	
		2,3,4,6,7,8- HxCDF	0.136	
		1,2,3,4,6,7,8 – HpCDF	0.116	
		1,2,3,4,7,8,9 – HpCDF	0.124	
		Total PeCDDs	0.144	
		Total PeCDFs	0.238	
		Total HxCDFs	0.576	
		Total HpCDFs	0.240	
LMB12410	03/30/06	1,2,3,7,8-PeCDF	0.188	All samples in the SDG: G619-20
		Total PeCDFs	0.188	
LMB12434	04/2/106	1,2,3,4,6,7,8-HpCDD	0.240	All samples in SDG: G619-21
		OCDD	1.11	
		1,2,3,7,8-PeCDF	0.088	
		2,3,4,7,8-PeCDF	0.124	

Field Duplicates/Triplicates

Field duplicates/triplicates were submitted blind to the laboratory for analysis. The decision to submit a duplicate or triplicate depends on the availability of fish tissue or offal homogenates. The following sample pairs or triplicates were analyzed for dioxins and furans:

Sample Name	Paradigm Lab Sample No	Detected Compounds	Concentrations (picogram/gram)	RPD/RSDs	Validation Qualifiers
LW3W25	G619-10-15	2,3,7,7-TCDF	3.67	7.2%	No qualifiers
LW3W65	G619-12-7		3.95		
LW3W75	G619-12-8		3.42		

Sample Name	Paradigm Lab Sample No	Detected Compounds	Concentrations (picogram/gram)	RPD/RSDs	Validation Qualifiers
WE2W55	G619-10-1	2,3,7,8- TCDF	1.13	5.8%	No qualifiers
WE2W65	G619-10-2		1.08		
WE2W75	G619-10-3		1.21		
MW1W45	G619-16-14	2,3,7,8- TCDF	3.39	2.6%	No qualifiers
MW1W65	G619-16-16		3.57		
MW1W75	G619-16-17		3.48		
LS2W25	G619-20-5				No qualifiers
LS2W65	G619-20-8				
LS2W75	G619-20-9				
LS6W35	G619-21-11	2,3,7,8-TCDF	3.86	3.5%	No qualifiers
LS6W65	G619-21-13		3.65		
LS6W75	G619-21-14		3.62		
RW2W35	G619-17-4	2,3,7,8- TCDF	3.95	10.8%	No qualifiers
RW2W65	G619-17-5		3.28		
RW2W75	G619-17-6		3.31		
RH5W55	G619-13-16	2,3,7,8-TCDF	1.42	7.5%	No qualifiers
RH5W65	G619-13-17		1.58		
RH5W75	G619-13-18		1.49		
RH6F25	G619-13-20	Trace 2,3,7,8-TCDF & OCDD	NA	NA	No qualifiers
RH6F65	G619-12-15	All NDs			
RH6O25	G619-12-17	2,3,7,8 – TCDF	2.07		
RH6O65	G619-12-20		2.24		
RW1F55	G619-16-5	2,3,7,8-TCDF	0.631 J	0.2 RPD	No qualifiers
RW1F65	G619-16-6		0.632 J		
RW1O55	G619-17-14	2,3,7,8-TCF	1.67	5.3 RPD	No qualifiers
RW1O65	G619-17-15		1.76		
BB3W65	G619-18-9	2,3,7,8-TCDF	3.09	7.1 %	No qualifiers
BB3W75	G619-18-10		3.21		
BB3W35	G619-18-6		2.79		

Toxicity Equivalence Quotients (TEQs)

TEQs were calculated and reported by the laboratory using the World Health Organization Toxicity Equivalent Factors (WHO TEFs) for the detected compounds and a 0 multiplier for the non-detected compounds. The detected dioxins and furans that were qualified as non-detect by the reviewer were not included in the re-calculated total TEQs. Report the re-calculated TEQs.

Analytical Sequence - Acceptable

All of the standards, blanks, samples and QC samples were analyzed in accordance with the method specified analytical sequence. Mass ion locks and resolution and window defining mix were analyzed and checked at the beginning and end of each analytical sequence. All of the analytical sequences were also bracketed by the continuing calibration check standards. None of the data were qualified on this basis.

Internal Standards Recoveries - Acceptable

All of the applicable technical acceptance criteria for the internal standards were met by all analyses performed. None of the data were qualified on this basis.

Surrogate Recoveries - Not Applicable

Surrogate was not required for this method. However, clean-up standard 37Cl-2, 3, 7, 8-TCDD was added to all samples and QC samples. The clean-up standard recoveries were acceptable for all analyses.

Laboratory Contact

The laboratory was contacted for this review to re-submit deliverable data forms that needed corrections. Paradigm responded immediately. All of the corrected forms were received prior to completion of this review.

Overall Assessment

All of the samples were analyzed in accordance with the method specifications. There were no significant problems found with the data. The data, as qualified, are acceptable and can be used for all purposes.

Data Qualifiers		
	U	The analyte was not detected at or above the reported numeric result.
	J	The analyte was positively identified. The associated numerical result is an estimate.
	UJ	The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample.
	R	The data are unusable for all purposes.
	N	There is evidence the analyte is present in this sample.
	JN	There is evidence that the analyte is present. The associated numerical result is an estimate.

TABLE 1- SUMMARY OF HOLDING TIMES

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

May 15, 2006

Reply to
Attn of: MGREPOGR
OEA-095

MEMORANDUM

Subject: Data Validation Report for the Polychlorinated Biphenyl (PCB) Congener Analysis of the Fish Tissue Samples Collected for the Phase I Upper Columbia River (UCR) Remedial Investigation/Feasibility Study (RI/FS) September 2005

From: Ginna Grepo-Grove, Senior Chemist
Technical Support Unit, OEA

To: Sally Thomas, RPM, UCR, Fish Tissue Study
USEPA, ECL

Marc Stifelman, Human Health Risk Assessment, USEPA, OEA
Burt Shephard, Ecological Risk Assessment, USEPA, OEA
Jim Stefanoff, Project Manager, CH2MHill
Artemis Antipas, QA Manager, CH2MHill

The quality assurance (QA) review of 38 fish tissue samples collected from the above referenced site has been completed. These samples were analyzed for 209 full PCB congener list in accordance with the Contract Laboratory Program's (CLP) *Statement of Work (SOW) for the Analysis of Chlorinated Biphenyl (CB) Congeners, Multi-Media, Multi-Concentration (CBC01.0 Revision May, 2005)* and the Method 1668A, "*Chlorinated Biphenyl Congeners in Water, Soil and Tissue by HRGC/HRMS, December 1999*" by Paradigm Analytical Laboratory of Wilmington NC.

The following fish tissue samples were evaluated in this report:

Field Sample Number	Sample Description	Region Tracking Number	CLP Tag Number	Paradigm Laboratory Number
WE1F45	Walleye FSCA#1 Comp# 4 - 5 Fish Fillet Skin-on (R & L)	05364204	274186	G619-9-4
WE1F55	Walleye FSCA#1 Comp# 5 - 5 Fish Fillet Skin-on (R & L)	05364205	274199	G619-9-5
WE1O45	Walleye FSCA#1 Comp# 4 - 5 Offals	05364209	274193	G619-9-9
WE3F25	Walleye FSCA#3 Comp# 2 - 5 Fish Fillet Skin-on (R & L)	05374201	274374	G619-9-12
RH5W55	Rainbow Trout Hatchery FSCA#5 Whole body Comp # 5 - 5 Fish	05424032	274949	G619-14-2
RH6F35	Rainbow Trout Hatchery FSCA#6 Comp# 3 5 -Fish Fillets Skin-on (L&R)	05424036	274841	G619-14- 3
RH6O35	Rainbow Trout Hatchery FSCA#6 Comp# 3 -5 Offals	05424041	274848	G619-14- 4
RW1F25	Rainbow Trout Wild FSCA#1 Comp#2 -5 Fish Fillets Skin-on (L &R)	05374246	274418	G619-14- 5

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Field Sample Number	Sample Description	Region Tracking Number	CLP Tag Number	Paradigm Laboratory Number
RW1O25	Rainbow Trout Wild FSCA#1 Comp# 2 -5 Offals	05374252	274412	G619-14- 6
RW2W45	Rainbow Trout Wild FSCA # 2 Whole body Comp# 4 - 5 Fish	05424047	273401	G619-14- 7
RW3F15	Rainbow Trout Wild FSCA #3 Comp# 1 - 5 Fish Fillets Skin-on (L&R)	05424050	273405	G619-14- 8
RW3O15	Rainbow Trout Wild FSCA #3 Comp# 1 -5 Offals	05424052	273556	G619-14- 9
RW5W15	Rainbow Trout Wild FSCA #5 Whole body Comp# 1 - 5 Fish	05424054	273578	G619-14- 10
WE2W55	Walleye FSCA#2 Whole body Comp# 5 - 5 fish*	05414005	284371	G619-14- 11
BB2W33	Burbot FSCA # 1 Comp# 3 - 3 Fish	05424059	276713	G619-14- 12
BB3W35	Burbot FSCA# 3 Whole body Comp# 3 – 5 Fish	05424062	277012	G619-14- 13
BB4W25	Burbot FSCA# 4 Whole body Comp# 2 – 5 Fish	05424068	276933	G619-14- 14
BB5W55	Burbot FSCA# 5 Whole body Comp# 5 – 5 Fish	05424075	277103	G619-14- 15
BB6W55	Burbot FSCA# 6 Whole body Comp# 5 – 5 Fish	05424080	277142	G619-14- 16
LS1W35	Large Scale Sucker FSCA# 1 Whole body Comp# 3 – 5 Fish	05364222	276680	G619-14- 17
LS2W45	Large Scale Sucker FSCA# 2 Whole body Comp# 4 – 5 Fish	05414012	277427	G619-14- 18
LS3W25	Large Scale Sucker FSCA# 3 Whole body Comp# 3 – 5 Fish	05414016	276455	G619-14- 19
LS4W55	Large Scale Sucker FSCA# 4 Whole body Comp# 5 – 5 Fish	05424085	26761	G619-14- 20
LS5W25	Large Scale Sucker FSCA# 5 Whole body Comp# 2 – 5 Fish	05424087	276783	G619-15-1
LS6W25	Large Scale Sucker FSCA# 6 Whole body Comp# 2 – 5 Fish	05424092	276587	G619-15-2
LW2W55	Lake White Fish FSCA#2 Whole body Comp# 5 - 5 Fish	05424013	274093	G619-15- 3
LW3W25	Lake White Fish FSCA#3 Whole body Comp# 2 - 5 Fish	05374229	274575	G619-15- 4
LW4W25	Lake White Fish FSCA#4 Whole body Comp# 2 - 5 Fish	05374239	274561	G619-15- 5
LW5W45	Lake White Fish FSCA#5 Whole body Comp# 4 - 5 Fish	05374237	274738	G619-15- 6
LW6W13	Lake White Fish FSCA#6 Whole body Comp# 1 - 3 Fish	05374243	274100	G619-15- 7
MW1W15	Mountain Whitefish FSCA#1 Whole body Comp# 1 - 5 Fish	05374263	273718	G619-15- 8
RH3F35	Rainbow Trout Hatchery FSCA#3 Comp# 3 -5 Fish Fillets Skin-on (L&R)	05424018	274985	G619-15- 9
RH3O35	Rainbow Trout Hatchery FSCA#3 Comp# 3 -5 Offals	05424021	274992	G619-15- 10
RH4W45	Rainbow Trout Hatchery FSCA#4 Whole body Comp # 4 - 5 Fish	05424025	274886	G619-15- 11
WE3025	Walleye FSCA#3 Comp# 2 - 5 Offals	05374206	274955	G619-15- 12
WE4W45	Walleye FSCA#4 Whole body Comp# 4 -5 fish	05374215	274477	G619-15- 13
WE5W25	Walleye FSCA#5 Whole body Comp# 2 - 5 fish	05424002	274617	G619-15- 14
WE6F35	Walleye FSCA#6 Comp# 3 - 5 Fish Fillet Skin-on (R & L)	05374219	274522	G619-15- 15
WE6O35	Walleye FSCA#6 Comp# 3 - 5 Offals	05374224	274529	G619-15- 16

DATA QUALIFICATIONS

The following comments refer to the laboratory performance in meeting the Quality Control specifications outlined in the Phase 1 Fish Tissue Sampling Quality Assurance Project Plan (QAPP) for the Upper Columbia River Site CERCLA RI/FS, the Contract Laboratory Program's (CLP) Statement of Work (SOW) for the Multi-Media, Multi-Concentration CB Congener Analysis (CB01.0) and the Project - Modified Analysis and Flexibility Clause. Some of the data quality elements were qualified using the reviewer's professional judgment.

The conclusions presented herein are based on the information provided for the review.

Field Sample Collection

The fish tissue sample collection was accomplished through a multi-agency/tribal effort with the CH2MHill team as the overall lead in the field. Sample vessels and vessel operators were provided by the following tribal and federal agencies under an interagency or sub–contracting agreement with EPA and/or CH2MHill: Spokane Tribe of Indians, Confederated Tribes of the Colville Reservation, US Fish and

Wildlife Services and the USEPA Investigation and Engineering Unit of the Office of Environmental Assessment.

The sample collection dates were based on the fish availability and fish species' spawning season. There were two sample collection events conducted, the first one was conducted in September 2005 and the second one was in October 2005. The fish species that were collected from the designated fish sample collection areas (FSCA 1 through 6) were Walleye (*Sander vitreus*), Rainbow trout (*Oncorhynchus mykiss*), Lake white fish (*Coregonus clupeaformis*), Large-scale sucker (*Catastomas macrocheilus*), and Burbot (*Lota lota*). Long-nose suckers and Mountain whitefish were not originally listed in the QAPP as target fish species but were also collected and added to the target fish species due to their availability in the FSCAs. The mountain white fish were analyzed while the long-nose suckers were archived. The rainbow trout samples were grouped into three categories – wild, hatchery and mixed wild and hatchery. Only the wild and hatchery rainbow trouts were analyzed for the compounds of concern. The mixed wild and hatchery rainbow trouts were archived for future analysis, if needed.

The fish samples were generally collected using gill nets, electro-fishing, burbot traps and angling, if necessary. The field sample collection process was audited by the project's EPA and CH2MHill QA Managers. There were no significant problems encountered during sample collection, on-site processing, sampling documentation and sample shipment.

Sample Processing and Chain-of-Custody Documentation

CH2MHill set-up a trailer dedicated for the on-site fish sample processing which included visual inspection of the fish, sex determination, conducting field measurements (fish length and weight) and otolith, scale and opercular covers (large scale suckers only) removal for subsequent fish age determination by the Washington State Department of Fish and Wildlife (WSDFW). All of the field forms generated for these measurements and determination were evaluated and cross –checked with the homogenization forms and chain-of-custody (COC) documentation. All of the field measurements, field sampling documentation (COCs) and sample preservation (freezing to -20C) were conducted by CH2MHill within 24 hours of sample collection.

Frozen whole fish samples were shipped to CH2MHill laboratory - Applied Science Laboratory (ASL) located in Corvallis, OR for filleting (if needed), homogenization, compositing, aliquot distribution and storage. There were four types of tissues prepared and analyzed for the compounds of potential concern (COPCs) for the sites, namely: fillets, left and right side with skin-on, offals (remaining tissue, internal organs and fish bones after filleting), guts (for large scale sucker only) and whole body (includes fish head, skin and entrails).

As specified in the EPA approved site QAPP, the following tissue types and homogenates were prepared by ASL and shipped to USEPA Manchester Environmental Laboratory (MEL) for subsequent PCB Aroclor, metals, percent lipids and speciated arsenic analyses and/or archival:

- Walleye – fillets and offals at three FSCAs and whole body composites from three FSCAs

- Rainbow trout (wild and hatchery) – fillets and offals at three FSCAs and whole body composites from three FSCAs

- Lake whitefish – whole body composites

• Mountain whitefish – whole body composites

• Large scale sucker – whole body composites for organics; guts/internal organs composites-metals

• Burbot – whole body composites

• Long-nose suckers – whole body composites (archived)

Some discrepancies and missing information were noted on the composite sample numbers listed on the COCs and the fish processing forms. ASL (represented by Mr. Robert Wong) and CH2MHill QA Manager, (Ms. Artemis Antipas) were contacted to clarify and correct these discrepancies on April 26, 2006. An explanation and reasons for the discrepancies were immediately sent to the reviewer. See the attached communication logs at the end of this validation memo.

Sample Homogenization and Compositing

Each individual fish collected was given identification number, tagged and individually homogenized at ASL using a commercial grade stainless steel blender/grinder (Robo-Coupe Blixer 6) with liquid nitrogen. Equal amounts of homogenized whole body, fillet or offal tissue samples were mixed and composited to form a single sample. The homogenization forms and the resulting fish sample composites were evaluated by this reviewer. There were no discrepancies noted between the sample collection forms, homogenization forms and the sample composite COCs. Fillet and whole body samples included the fish skin. Care was taken to prevent cross-contamination between sample homogenates. Prior to the start of the project samples, the homogenization process was audited by the project's EPA and CH2MHill QA Managers. To monitor processing cross-contamination, proof blanks were collected at the QAPP specified frequency and sent to the Contract Laboratory program (CLP) for the analysis of the project target compound.

<u>Corrective Action: Deviation from the QAPP as a result of field and sample processing assessment</u>: In a mock sample processing and homogenization conducted during the EPA's and CH2MHill's QA lab audit, it was found out that otoliths were very hard to remove when the fish samples were already frozen. In addition, subjecting the fish to freezing and defrosting raptures the internal organs, make the fish muscles mushy and thus made the separation of fillets from the offals quite a challenge. To avoid cross–contamination of the fish tissue samples with the offals and to better preserve the otholiths, it was agreed by the project team that the removal of otolith will be conducted on-site after field measurements and before sample preservation (freezing to -20C) and if bench space and resources will allow, filleting of fish samples will also be performed on-site prior to freezing the samples.

Fish Age Determination and Range

The following methods were used to determine the age of the fish: otoliths (inner ear of a fish) were used to determine the age of Lake whitefish, burbot and mountain whitefish. Both otholiths and scales were used to determine the age of the walleye, wild and hatchery rainbow trouts. The opercular covers (also called opercula) were used determine the age of large-scale suckers.

Otholith, scales and operculas were read with the knowledge of the place of capture, sex and size of the fish. The readings were performed by only one individual Mr. John Sneva of WSDFW. Precision and consistency of readings were checked through the comparison of annuli (otholiths) and the occuli (scales) readings when both specimens are available. The fish age are based on visual readings (duplicate readings, if additional otholiths or scales were available) and maybe estimated range. There was no second party independent readings or validation conducted with these age estimates.

Fish age logs indicated the following: age of lake whitefish ranged from 1-3 years old; hatchery rainbow trouts ranged mostly 1-2 years; wild rainbow trouts from 1-4 years old; mountain whitefish ranged from 0-15 years old; large-scale suckers nine of which were <10 years old; the rest ranged from >10-36 years of age; walleye and burbot from 2-5 years old.

Sample Receipt and Storage

All of the samples were received frozen and intact at the USEPA MEL from CH2MHill lab. After inspection, inventory and logging-in, the sample homogenates were stored in a freezer at -20C while waiting for extraction and analysis. The samples evaluated in this validation report were shipped by MEL to Paradigm Lab from January 26, 2006 to March 24, 2006. All of the fish tissue samples were received intact and still frozen at the verified time of sample receipt (VTSR) at Paradigm Labs.

Holding Times - Acceptable

All of the fish tissue samples were frozen at -20 ^{o}C while on storage at MEL and samples were still frozen when received at Paradigm Lab. The integrity of the samples was preserved while on storage at MEL and during shipment. All of the sample analyses met the <u>contractual extraction and analytical</u> holding times of 10 days from the VTSR and 30 days from the extraction date, respectively.

All of the samples also met the method and project extraction and analytical holding times of one year from the date of sample collection. None of the CB congener data were qualified on this basis. The list of samples, cross-referenced to the fish species, station location, and the dates of sample collection, VTSR at the lab, extraction, extract clean-up and analysis dates are listed in Table 1 at the end of this report. The list of individual fish comprising a composite sample can be found in Appendix B of this report.

Sample Preparation and Clean-up - Acceptable

Appropriate clean-up techniques (silica gel, acid/base back extraction, florisil columns) were used by the lab to remove the interfering organic materials during analysis. The sample chromatograms indicated that all of the chlorodiphenyl ethers (CDPEs) and other organic material in the samples were removed prior to analysis. None of the data were qualified on this basis.

Instrument Performance - Acceptable

The frequency of analysis, minimum resolving power of >10,000, the signal-to-noise (S/N) ratio, mass/ion (m/z) abundance ratios and the appropriate switching times for the Selected Ion Monitoring (SIM) descriptors and the chromatographic resolutions were met by the DB-1 column used in the analysis. Homologues do not overlap between homologue descriptors' switching times. The retention times (RTs) and relative retention times (RRTs) were within the retention time windows established during initial calibration. None of the data were qualified on this basis.

Initial Calibrations - Acceptable

All of the initial calibration (ICAL) curves met the technical acceptance criteria, i.e., percent relative standard deviations (%RSDs) of all native and deuterated CB congeners, signal-to-noise (S/N) ratio of >10 including the lowest standard (CS1), retention times, the instruments' resolving power >10,000 and the ion abundance criteria. The instruments' resolving power were maintained and remained stable throughout the course of the analytical sequences. None of the reported results were qualified on this basis.

Continuing Calibration Verifications (VERS) - Acceptable

The frequency of analysis, mass resolutions, S/N and m/z abundance ratios, native and labeled isotope standard recoveries, the RTs of the native compounds relative to the RRTs of the labeled isotopes, injection internal standard and clean-up standard recoveries were met by all VERs analyzed on both GC/MS systems. None of the data were qualified on this basis.

On-Going Precision and Recovery (OPR) - Acceptable

The frequency of analysis, mass resolutions, S/N and m/z abundance ratios, native and labeled isotope recoveries, the RRTs of the native compounds relative to the labeled isotopes and injection internal standard and clean-up standard recoveries were met by all OPRs extracted and analyzed with the samples and QC samples. None of the data were qualified on this basis.

Compound Quantitation and Detection Limits

All of the samples were analyzed at the project- required detection limits. The following CBs co-eluted in the primary column and were reported as combined CBs: *CB12 & 13*, *CB18 & CB30*, *CB20 & CB28*, *CB21 & CB33*, *CB26 & CB29*, *CB40 & CB71*, *CB44, CB65 & CB47*, *CB45 & CB51*, *CB49 & CB69*, *CB50 & CB53*, *CB59 & CB62*, *CB61, CB70*, *CB74 & CB76*, *CB85, CB116 & CB117*, *CB86, CB87, CB108*, *CB119& CB125*, *CB88 & CB91*, *CB90, CB101 & CB113*, *CB110 & CB115*, *CB107 & CB124*, *CB128 & CB166*, *CB129, CB138 & CB163*, *CB139 & CB140, CB135 & CB151*, *CB147 & CB149*, *CB153 & CB168*, *CB156 & CB157*, *CB171 & CB173*, *CB180 & CB193*, *CB183 & CB185*, *CB197 & CB200*, *CB198 & CB199*. CB detections with interferences were qualified estimated, "J", by this reviewer.

Some CB congeners were detected at concentrations that were over the calibration range. These samples were not analyzed at dilutions and the reported results were qualified estimated, "J". Data users should consider these flagged results as biased low and may be higher than was actually reported.

The PCB congener detection limits for some of the samples were elevated due to the detection of trace levels of some of the PCB congeners in their associated method blank(s). Even with elevated detection limits, the project-required detection limits for all CB congeners were met.

Compound Identification

All of the reported results met the technical acceptance criteria for PCB congener identification, i.e., S/N ratios greater than 2.5 and >10 for the labeled isotopes, RTs within 0.5% of the mean retention times calculated from the ICALs, ratios between the integrated areas of the method specified m/z pairs were within the method specified limits. There were no CDPE chromatographic interferences in the sample analyses.

Some of the CB results identified and reported did not meet the method specified mass-ion abundance ratio criteria and were given the "K" qualifier by the lab. The "K" qualifiers were crossed by this reviewer and the results were qualified as non-detects, "U", at the level of detection, if > reporting limits (RLs) or elevated at RLs when detected at concentrations <RLs.

Method Blanks

The frequency of analysis of laboratory blanks was met. Trace levels of CBs were detected in the method blanks.

Method Blank	Extraction Date	Detected Compounds	Conc. (pg/g)	5x Conc. (pg/g))	Validation Qualifier	Affected Samples
	01/30/06	PCB 1	0.520	2.60	<5x conc. LMB = U >5x conc. LMB- No flag	All samples in the SDG: G619-9
		PCB 2	0.804	4.02		
		PCB 3	0.882	4.41		
		PCB 4	0.944	4.72		
		PCB 6	0.500	1.00		
		PCB 8	2.64	13.2		
		PCB 11	23.9	119		
		PCB 15	3.25	16.3		
		PCB 16	1.55	7.75		
		PCB 17	1.42	7.10		
		PCB18	2.70	13.5		
		PCB 19	0.244	1.22		
		PCB 20	10.2	51.0		
		PCB 21	6.01	30.0		
		PCB 22	4.73	23.7		
		PCB 24	0.186	0.930		
		PCB 25	0.624	3.12		
		PCB 26	1.28	6.40		
		PCB 27	0.304	1.52		
		PCB 31	8.27	41.4		
		PCB 32	1.08	5.40		
		PCB 35	0.284	1.42		
		PCB 37	3.67	17.4		
		PCB 40	2.06	10.3		
		PCB 41	0.682	3.41		
		PCB 42	1.14	5.70		
		PCB 44	4.12	20.6		
		PCB 45	0.942	4.71		
		PCB 48	0.966	4.83		
		PCB 49	2.16	10.8		
		PCB 50	0.466	2.33		
		PCB 52	4.61	23.1		
		PCB 56	1.16	5.80		
		PCB 59	0.374	1.87		
		PCB 60	0.840	4.20		
		PCB 61	5.39	26.9		
		PCB 64	1.90	9.50		
		PCB 66	2.15	10.8		
		PCB 67	0.146	0.730		
		PCB 77	0.542	2.71		
		PCB 79	0.174	0.870		

Method Blank	Extraction Date	Detected Compounds	Conc. (pg/g)	5x Conc. (pg/g))	Validation Qualifier	Affected Samples
		PCB 82	0.854	4.27		
		PCB 83	0.470	2.35		
		PCB 84	1.21	6.05		
		PCB 85	1.06	5.30		
		PCB 86	4.45	22.3		
		PCB 88	0.530	2.65		
		PCB 90	4.15	20.8		
		PCB 92	0.840	4.20		
		PCB 95	2.94	14.7		
		PCB 98	0.304	1.52		
		PCB 99	1.58	7.90		
		PCB 105	2.48	12.4		
		PCB 107	0.360	1.80		
		PCB 109	0.342	1.71		
		PCB 110	6.16	30.8		
		PCB 112	0.270	1.35		
		PCB 118	4.46	22.3		
		PCB 126	0.346	1.73		
		PCB 128	0.914	4.57		
		PCB 129	5.72	28.6		
		PCB 132	2.28	11.4		
		PCB 135	1.60	8.00		
		PCB 136	0.734	2.67		
		PCB 141	0.862	4.31		
		PCB 146	0.582	2.91		
		PCB 147	3.79	18.9		
		PCB 153	3.40	17.0		
		PCB 156	0.734	3.676		
		PCB 158	0.506	2.53		
		PCB 164	0.376	1.88		
		PCB 167	0.264	1.32		
		PCB 170	0.650	3.25		
		PCB 171	0.420	2.10		
		PCB 174	0.766	3.83		
		PCB 177	0.466	2.33		
		PCB 179	0.372	1.86		
		PCB 180	1.42	7.10		
		PCB 183	0.680	3.40		
		PCB 187	1.05	5.25		
		PCB 189	0.184	0.920		
		PCB 198	0.446	2.23		
LMB12375	03/05/06	PCB 1	0.578	2.89		All samples in SDG: G619-14
		PCB 2	0.978	4.89		
		PCB 3	0.758	3.79		
		PCB 8	2.76	13.8		
		PCB 11	17.4	87.0		
		PCB 15	2.42	12.1		
		PCB 16	1.24	6.20		
		PCB 17	1.03	5.15		
		PCB 18	1.72	8.60		
		PCB 20	4.92	24.6		
		PCB 21	3.09	15.5		
		PCB 22	2.56	12.8		
		PCB 26	0.660	3.30		
		PCB 31	3.90	19.5		

Method Blank	Extraction Date	Detected Compounds	Conc. (pg/g)	5x Conc. (pg/g))	Validation Qualifier	Affected Samples
		PCB 32	0.712	3.56		
		PCB 37	2.13	10.7		
		PCB 40	0.910	4.55		
		PCB 44	2.24	11.2		
		PCB 49	1.00	5.00		
		PCB 52	1.84	9.20		
		PCB 61	2.96	14.8		
		PCB 64	0.962	4.81		
		PCB 66	1.34	6.70		
		PCB 86	1.64	8.20		
		PCB 90	1.76	8.80		
		PCB 95	1.38	6.90		
		PCB 110	2.13	10.7		
		PCB 118	1.35	6.75		
		PCB 129	2.14	10.7		
		PCB 153	1.34	6.70		
LMB12381	03/08/06	PCB 1	0.346	1.73		All samples in the SDG: G619-15
		PCB 2	0.492	2.46		
		PCB 3	0.630	3.15		
		PCB 4	0.498	2.49		
		PCB 6	0.364	1.82		
		PCB 8	1.58	7.90		
		PCB 9	0.148	0.740		
		PCB 11	7.70	38.5		
		PCB15	1.33	6.65		
		PCB 16	0.918	4.59		
		PCB 17	0.666	3.33		
		PCB 18	1.13	5.65		
		PCB 20	3.61	18.1		
		PCB 21	2.23	11.2		
		PCB 22	1.70	8.50		
		PCB 25	0.280	1.40		
		PCB 26	0.562	2.81		
		PCB 31	3.00	15.0		
		PCB 32	0.462	2.31		
		PCB 35	0.250	1.25		
		PCB 37	1.40	7.00		
		PCB 40	0.740	3.70		
		PCB 42	0.490	2.45		
		PCB 44	1.72	8.60		
		PCB 45	0.484	2.42		
		PCB 49	0.870	4.35		
		PCB 52	1.63	8.15		
		PCB 56	0.610	3.05		
		PCB 60	0.496	2.48		
		PCB 61	2.76	13.8		
		PCB 64	0.864	4.32		
		PCB 66	1.56	7.80		
		PCB 79	0.290	1.45		
		PCB 85	0.590	2.95		
		PCB 86	1.61	8.05		
		PCB 90	1.76	8.80		
		PCB 95	1.12	5.60		
		PCB 99	0.914	4.57		
		PCB 105	1.05	5.25		

Method Blank	Extraction Date	Detected Compounds	Conc. (pg/g)	5x Conc. (pg/g))	Validation Qualifier	Affected Samples
		PCB 107	0.408	2.04		
		PCB 109	0.222	1.11		
		PCB 110	2.12	10.6		
		PCB 118	2.00	10.0		
		PCB 128	0.588	2.94		
		PCB 129	2.25	11.25		
		PCB 132	0.672	3.36		
		PCB 141	0.518	2.59		
		PCB 147	1.18	5.90		
		PCB 153	2.25	11.25		
		PCB 156	0.660	3.30		
		PCB 180	1.13	5.65		
		PCB 187	0.754	3.77		
		PCB 209	0.464	2.32		

Toxicity Equivalence (TEQs)

The total PCB homologues and TEQ values were not calculated and reported by the laboratory.

Standard Reference Material (SRM)

Two aliquots of Lake Superior Fish Tissue SRM 1946 were submitted with the samples in two sample delivery groups (SDGs: G618-14 and G619-15). This SRM is a frozen tissue homogenate prepared from lake trout (*Salvelinus namaycush namaycush*) collected from Lake Superior (US/Canada) with certified concentrations of selected PCB Congeners and other organic and inorganic compounds.

The SRMs were received in Paradigm Labs with a cooler temperature of 12C and the homogenates were no longer frozen. The SRM 1946 has certified concentrations for the following PCB congeners: PCB 44, PCB 49, PCB 52, PCB 66, PCB 70, PCB 74, PCB 77, PCB 87, PCB95, PCB 99, PCB 101, PCB 105, PCB 110, PCB 118, PCB 126, PCB 128, PCB 138, PCB 146, PCB 149, PCB 153, PCB 156, PCB 169, PCB 170, PCB180, PCB 183, PCB 187, PCB 194, PCB 195, PCB 206 and PCB 209. The SRM also has reference values for the following PCB congeners: PCB 18, PCB 28, PCB 31, PCB 56, PCB 63, PCB 107, PCB 132, PCB 158, PCB 163, PCB 174, PCB 193 and PCB201.

The analysis of the SRMs yielded % recoveries that were acceptable for all certified and reference concentrations with the exception of the recoveries for PCBs 56 and 107 indicating low bias in the associated results. In addition, the low level PCB 169 was only recovered in one of the SRM run. Due to possible bias in the associated results, the reported results for PCBs 56, 107 and 169 were qualified estimated, “J”. Data users should consider the values reported for these three congeners as the lowest amount present in the samples.

Analytical Sequence - Acceptable

All of the standards, blanks, samples and QC samples were analyzed in accordance with the method specified analytical sequence. Mass ion locks and resolutions were checked every sequence. A window defining mix, calibration verifications, OPRs and method blanks were analyzed at the method required frequency. All of the analytical sequences were within an acceptable the 12- hour QC period and were bracketed by the resolution and continuing calibration check standards. None of the data were qualified on this basis.

Internal Standards Recoveries - Acceptable

Injection internal standards (IS), isotope-labeled PCB congeners and clean-up standards were added to all samples, QC samples to monitor the stability of the GC/MS systems, the exact amount of extract/standard injected and for concentration quantitation of native PCB congeners. All of the analyses met the internal and labeled standards' recovery criteria (25% to 150%). None of the data were qualified on this basis.

Laboratory Contact

The laboratory was not contacted for this review.

Overall Assessment

All of the samples were analyzed in accordance with the project and method specifications. The data, as qualified, are acceptable and can be used for all purposes.

		Data Qualifiers
	U	The analyte was not detected at or above the reported result.
	J	The analyte was positively identified. The associated numerical result is an estimate.
	UJ	The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample.
	R	The data are unusable for all purposes.
	N	There is evidence the analyte is present in this sample.
	JN	There is evidence that the analyte is present. The associated numerical result is an estimate.

Table 1- Holding Times Summary

Sample Number	Region Tracking Number	Paradigm Laboratory Number	Date Sample Collection	VTSR at CH2M Lab	CH2MHill Homogenization Date	VTSR at MEL	VTSR at Paradigm Lab	Date Extraction	Date Extract Clean-up	Date Analysis
WE1F45	05364204	G619-9-4	09/06/05	9/14/05	11/08/05	11/16/05	01/26/06	01/30/06	02/0106	02/03/06
WE1F55	05364205	G619-9-5	09/06/05	9/14/05	11/08/05	11/16/05	01/26/06	01/30/06	02/0106	02/03/06
WE1O45	05364209	G619-9-9	09/06/05	9/14/05	11/08/05	11/16/05	01/26/06	01/30/06	02/0106	02/03/06
WE3F25	05374201	G619-9-12	09/10/05	9/14/05	11/08/05	11/16/05	01/26/06	01/30/06	02/0106	02/03/06
RH5W55	05424031	G619-14-2	10/21/05	10/22/05	12/06/05	12/22/05	02/24/06	03/05/05	03/06/06	03/25/06
RH6F35	05424036	G619-14-3	10/21/05	10/22/05	12/15/05	12/22/05	02/24/06	03/05/05	03/06/06	03/25/06
RH6O35	05424041	G619-14-4	10/21/05	10/22/05	12/15/05	12/22/05	02/24/06	03/05/05	03/06/06	03/25/06
RW1F25	05374246	G619-14-5	09/13/05	09/14/05	12/22/05	01/06/06	02/24/06	03/05/05	03/06/06	03/29/06
RW1O25	05374252	G619-14-6	09/13/05	09/14/05	12/22/05	01/06/06	02/24/06	03/05/05	03/06/06	03/30/06
RW2W45	05424047	G619-14-7	10/18/05	10/22/05	12/16/05	01/06/06	02/24/06	03/05/05	03/06/06	04/05/06
RW3F15	05424050	G619-14-8	10/19/05	10/22/05	12/19/05	01/06/06	02/24/06	03/05/05	03/06/06	04/05/06
RW3O15	05424052	G619-14-9	10/19/05	10/22/05	12/19/05	01/06/06	02/24/06	03/05/05	03/06/06	03/28/06
RW5W15	05424054	G619-14-10	10/20/05	10/22/05	12/16/05	01/06/06	02/24/06	03/05/05	03/06/06	04/05/06
WE2W55	05414005	G619-14-11	10/12/05	10/13/05	11/10/05	12/08/05	02/24/06	03/05/05	03/06/06	03/28/06
BB2W33	05424059	G619-14-12	10/18/05	10/22/05	12/27/05	01/20/06	02/24/06	03/05/05	03/06/06	03/28/06
BB3W35	05424062	G619-14-13	10/18/05	10/22/05	01/04/06	01/20/06	02/24/06	03/05/05	03/06/06	03/29/06
BB4W25	05424068	G619-14-14	10/18/05	10/22/05	01/05/06	01/20/06	02/24/06	03/05/05	03/06/06	03/29/06
BB5W55	05424075	G619-14-15	10/22/05	10/24/05	12/28/05	01/20/06	02/24/06	03/05/05	03/06/06	03/29/06
BB6W55	05424080	G619-14-16	10/22/05	10/24/05	12/30/05	01/20/06	02/24/06	03/05/05	03/06/06	03/29/06
LS1W35	05364222	G619-14-17	09/06/05	09/14/05	01/06/06	02/02/06	02/24/06	03/05/05	03/06/06	04/05/06
LS2W45	05414012	G619-14-18	10/12/05	10/19/05	01/10/06	02/02/06	02/24/06	03/05/05	03/06/06	03/30/06
LS3W25	05414016	G619-14-19	10/14/05	10/19/05	01/20/06	02/02/06	02/24/06	03/05/05	03/06/06	03/29/06
LS4W55	05424085	G619-14-20	10/16/05	10/19/05	01/14/06	02/02/06	02/24/06	03/05/05	03/06/06	03/29/06
LS5W25	05424087	G619-15-1	10/17/05	10/22/05	01/08/06	02/02/06	02/24/06	03/09/06	03/10/06	03/30/06
LS6W25	05424092	G619-15-2	10/18/05	10/22/05	01/17/06	02/02/06	02/24/06	03/09/06	03/10/06	03/31/06
LW2W55	05424013	G619-15-3	10/20/05	10/23/05	11/28/05	12/08/05	02/24/06	04/09/06	04/10/06	04/13/06
LW3W25	05374229	G619-15-4	09/14/05	09/15/05	11/21/05	12/08/05	02/24/06	04/09/06	04/10/06	04/13/06
LW4W25	05374239	G619-15-5	09/17/05	09/18/05	11/22/05	12/08/05	02/24/06	04/09/06	04/10/06	04/13/06
LW5W45	05374237	G619-15-6	09/15/05	09/16/05	11/22/05	12/08/05	02/24/06	03/09/06	03/10/06	04/07/06
LW6W13	05374243	G619-15-7	09/17/05	09/18/05	11/18/05	12/08/05	02/24/06	04/09/06	04/10/06	04/13/06
MW1W15	05374263	G619-15-8	09/13/05	09/14/05	11/30/05	01/12/06	02/24/06	04/09/06	04/10/06	04/13/06
RH3F35	05424018	G619-15-9	10/18/05	10/22/05	12/05/05	12/22/05	02/24/06	03/09/06	03/10/06	04/02/06
RH3O35	05424021	G619-15-10	10/18/05	10/22/05	12/05/05	12/22/05	02/24/06	04/09/06	04/10/06	04/14/06
RH4W45	05424025	G619-15-11	10/18/05	10/22/05	12/13/05	12/22/05	02/24/06	03/09/06	03/10/06	04/02/06

Sample Number	Region Tracking Number	Paradigm Laboratory Number	Date Sample Collection	VTSR at CH2M Lab	CH2MHill Homogenization Date	VTSR at MEL	VTSR at Paradigm Lab	Date Extraction	Date Extract Clean-up	Date Analysis
WE3025	05374206	G619-15-12	09/10/05	09/14/05	11/08/05	11/16/05	02/24/06	04/09/06	04/10/06	04/14/06
WE4W45	05374215	G619-15-13	09/12/05	09/14/05	11/09/05	11/16/05	02/24/06	03/09/06	03/10/06	04/07/06
WE5W25	05424002	G619-15-14	10/17/05	10/18/05	11/09/05	12/08/05	02/24/06	03/09/06	03/10/06	04/06/06
WE6F35	05374219	G619-15-15	09/14/05	09/15/05	11/11/05	11/16/05	02/24/06	03/09/06	03/10/06	04/07/06
WE6O35	05374224	G619-15-16	09/14/05	09/15/05	11/11/05	11/16/05	02/24/06	04/09/06	04/10/06	04/14/06

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

DATE: April 26, 2006

TO: Sally Thomas, Project Manager, EPA Region 10
Office of Environmental Cleanup, Unit 3 Site Cleanup

From: Katie Adams, Chemist, EPA Region 10 Laboratory
Office of Environmental Assessment

SUBJECT: Data Review of the Arsenic Speciation Analyses for Upper Columbia River fish tissues
Project Code: TEC-774G
Account Code: 06T10P302DD2C106XLA00

The following is a data review of the arsenic speciation analyses of 10 fish tissue samples (Set #1) from the Upper Columbia River project. The analyses were done following an extraction and ion chromatography/ICP-MS procedure developed by NERL, ORD-Cincinnati. The work was performed by EPA chemists at the EPA Manchester Environmental Laboratory in Port Orchard, WA.

This review was conducted for the following samples:

05364201	05364206	05374204	05374209	05374214	05374220	05374225
05414005	05414006	05424005				

Data Qualifications

The following comments refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Plan, and the QAPP. For those tests for which the USEPA Region 10 Laboratory has been NELAP accredited, all requirements of the current NELAC Standard have been met. The qualifications recommended herein are based on the information provided for the review.

1.0 Timeliness - Acceptable

A specific holding time for the analysis of arsenic species in tissue samples has not been established. The samples were collected from 09/06/2005 to 10/17/2005, and were received by the laboratory on 11/16/2005. The analyses were completed on 03/01/2006. No data qualification was required based on holding time criteria.

2.0 Sample Preparation - Acceptable

The samples arrived at the laboratory already ground and homogenized; they were stored at -20ºC until further sample preparation could begin. The samples were freeze-dried prior to extraction.

A portion of each freeze-dried sample was treated with 0.83% tetramethyl ammonium hydroxide (TMAOH), and then neutralized with acetic acid, in order to extract the arsenic species from the tissue. An aliquot of this extract was analyzed for total arsenic. The efficiency of the TMAOH extraction was determined by comparing the amount of arsenic present in the extract to the amount of arsenic present in the original sample. A different portion of the TMAOH extract was analyzed by Ion Chromatography – Inductively Coupled Plasma – Mass Spectrometry (IC-ICP-MS) to separate and quantitate the ionic arsenic species. No qualification of the data was required based on sample preparation.

3.0 Total Arsenic Analysis - Acceptable

The total arsenic determination for the tissue samples was reviewed in the memorandum "Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05364201 – 05424009)," March 16, 2006.

The total arsenic determination for the TMAOH extracts was performed by ICP-MS on 02/24/2006, following laboratory procedures. Each sample digestate was analyzed along with a post-spike, and the resulting information was used to perform a single point Method of Standard Additions correction in order to compensate for the effects of the TMAOH matrix on the analysis.

All procedures met laboratory requirements; therefore, no qualification was necessary based on the analysis of the total arsenic in the sample extracts.

4.0 Ion Chromatography Determination - Acceptable

The anion chromatography analysis determines As^{+3} (Arsenite), As^{+5} (Arsenate), DMA (Dimethylarsinic acid), and MMA (Monomethylarsonic acid). Further characterization of the sample by cation chromatography was not an objective for this project.

Results for As^{+3} and As^{+5} are summed and reported as "inorganic arsenic." This is because the sample preparation and handling processes in this method do not always preserve the individual inorganic species; As^{+3} and As^{+5} interconvert over time.

Arsenobetaine (AsB) and other cationic species are not separated by this column, but elute together as one peak at the beginning of each chromatogram. Therefore, these results are reported together as "AsB + Cations." The "AsB+Cations" concentration has been estimated based on calibration standards containing AsB. Because other cations eluting with this peak may have different response factors than AsB, all results reported as "AsB+Cations" are qualified "J", estimated.

The "unknown species" listed in the report are likely to be anionic arsenosugars. An estimated concentration for these species is provided using a predetermined response factor, and the results are qualified "J". Further identification and quantitation of the arsenosugars isn't possible, as standards are not available. Note that in this case, the samples which contained unknown species all had one unidentified peak, with a similar retention time. Therefore it is likely that these samples each contained the same, single, arsenosugar.

5.0 Ion Chromatography Quality Control

All chromatography results were corrected for instrument drift by the analysis of a reference arsenic standard injected post-column, and measured prior to measurement of the species that have undergone the chromatographic separation.

The chromatographic analyses were calibrated with standards containing at least five different concentrations of each of the species being determined. The calibration curves were linear with an R^2 >0.995 for each species. The lowest point on the calibration curve was at the quantitation limit. All points on the calibration curve were within the acceptance range of the true value (10% for all points except the lowest standard, 30% for the lowest standard).

Calibration verification standards were analyzed before and after sample analysis. Second source standards were used for As^{+3} and As^{+5}; second source standards are not available for the remainder of the arsenic species. The recoveries of the calibration verification standards for each species met the 90 - 100% concentration acceptance criteria.

Laboratory control samples (spike blanks) are extracted and analyzed along with the tissue samples to verify the efficiency of laboratory procedures. The results met the recovery acceptance criterion (85 – 115% of the standard's true value).

Procedural blanks (extraction blanks) were extracted and analyzed with the samples to show potential contamination from the extraction or analytical procedure. The blank did not contain detectable levels of any of the arsenic species, except for trace levels of As^{+3}. We believe that the autosampler vials are responsible for this arsenic contamination. The only sample with As^{+3} levels above our reporting limit was the reference material DORM. The inorganic arsenic result for this sample was qualified "J" to indicate that the result may be biased high due to contamination.

Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed on sample 05364206 to provide information about the effect of the sample matrix on extraction and measurement methods. All matrix spike recoveries were within the acceptance limits of 75-125%.

Duplicate analyses for the chromatography were performed on samples 05364206 and 05424005 to evaluate the reproducibility of the procedure. All results which were above the quantitation limit were within the ±20% RPD criterion.

6.0 Reporting Limit/Quantitation Limits

The reporting limits and quantitation limits used for these sample results are based on our evaluation of the sensitivity of the chromatographic determination. We have established that standards at the quantitation limit can be measured within established limits of accuracy and precision, over the entire course of a chromatographic analysis. The reporting limit was established at a level at which the peaks are consistently distinguished from the background.

Sample results that are greater than the quantitation limit are reported with three significant figures.

Sample results that are greater than the reporting limit, but less than the quantitation limit, are reported with two significant figures and qualified "J", estimated.

Sample results for which a distinct peak is present, but below the reporting limit, are also reported with two significant figures and qualified "J", estimated.

Sample results for which no distinct peak is discernable, are given the value of the reporting limit, and qualified "U", undetected.

Final sample results are calculated based on the chromatography result, the weight of the TMAOH extract aliquot, and the weight of the dried sample that was taken for analysis. Results for the undetected species are calculated using the reporting limit concentration with weights mentioned above.

7.0 Overall Assessment of the Data

The efficiency of the analytical procedure is measured at two stages during the analysis. First, the extraction efficiency is determined by comparing the total concentration of arsenic in the sample extract, to the total concentration present in the tissue.

The second measure of efficiency is the chromatographic recovery. The chromatographic recovery is calculated by summing the individual chromatographic arsenical concentrations and dividing this by the total arsenic concentration present in the sample extract. This compares the quantity of arsenic injected onto the column, to the quantity eluting from the column.

The overall speciation recovery combines these two efficiencies, by comparing the total arsenic eluting from the column, to the amount present in the tissue samples.

Table A (attached) provides the efficiency results for each sample. Criteria for efficiency have not been established for the tissue matrix at this time.

Below are the definitions for the qualifiers used in the Inorganic area when qualifying data from Inorganic analysis.

DATA QUALIFIERS

U	-	The analyte was not detected at or above the reported value.
J	-	The identification of the analyte is acceptable; the reported value is an estimate.
JK	-	The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL	-	The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ	-	The analyte was not detected at or above the reported value. The reported value is an estimate.
NA	-	Not Applicable. The parameter was not analyzed for, or other is no analytical result for this parameter. No value is reported with this qualification.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

DATE: May 25, 2006

TO: Sally Thomas, Project Manager
Office of Environmental Cleanup, Unit 3 Site Cleanup, EPA Region 10

From: Katie Adams, Chemist
Office of Environmental Assessment, EPA Region 10

SUBJECT: Data Review of the Arsenic Speciation Analyses for Upper Columbia River Fish Tissues Set/Shipment #2

Project Code: TEC-774G
Account Code: 06T10P302DD2C106XLA00

The following is a data review of the arsenic speciation analyses of 10 fish tissue samples from the Upper Columbia River project. The analyses were done following an extraction and ion chromatography/ICP-MS procedure developed by NERL, ORD-Cincinnati. The work was performed by EPA chemists at the EPA Manchester Environmental Laboratory in Port Orchard, WA.

This review was conducted for the following samples:

05374229	05374232	05374241	05424012	05424017	05424020	05424024
05424028	05424037	05424042				

Data Qualifications

The following comments refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Plan, and the QAPP. For those tests for which the USEPA Region 10 Laboratory has been NELAC accredited, all requirements of the current NELAC Standard have been met. The qualifications recommended herein are based on the information provided for the review.

1.0 Timeliness - Acceptable

A specific holding time for the analysis of arsenic species in tissue samples has not been established. The samples were collected from 09/14/2005 to 10/21/2005, and were received by the laboratory on 12/22/2005. The analyses were completed on 04/10/2006. No data qualification was required based on holding time criteria.

2.0 Sample Preparation - Acceptable

The samples arrived at the laboratory already ground and homogenized; they were stored at -20ºC until further sample preparation could begin. The samples were freeze-dried prior to extraction.

A portion of each freeze-dried sample was treated with 0.83% tetramethyl ammonium hydroxide (TMAOH), and then neutralized with acetic acid, in order to extract the arsenic species from the tissue. An aliquot of this extract was analyzed for total arsenic. The efficiency of the TMAOH extraction was determined by comparing the amount of arsenic present in the extract to the amount of arsenic present in the original sample. A different portion of the TMAOH extract was analyzed by Ion Chromatography – Inductively Coupled Plasma – Mass Spectrometry (IC-ICP-MS) to separate and quantitate the ionic arsenic species. No qualification of the data was required based on sample preparation.

3.0 Total Arsenic Analysis - Acceptable

The total arsenic determination for the tissue samples was reviewed in the memorandum "Data Review of the Upper Columbia River RI-FS Total Metals in Fish Data, Shipment #2," May 10, 2006.

The total arsenic determination for the TMAOH extracts was performed by ICP-MS on 03/14/2006, following laboratory procedures. Each sample digestate was analyzed along with a post-spike, and the resulting information was used to perform a single point Method of Standard Additions correction in order to compensate for the effects of the TMAOH matrix on the analysis.

All procedures met laboratory requirements; therefore, no qualification was necessary based on the analysis of the total arsenic in the sample extracts.

4.0 Ion Chromatography Determination - Acceptable

The anion chromatography analysis determines As^{+3} (Arsenite), As^{+5} (Arsenate), DMA (Dimethylarsonic acid), MMA (Monomethylarsonic acid). Further characterization of the sample by cation chromatography was not an objective for this project.

Results for As^{+3} and As^{+5} are summed and reported as "inorganic arsenic." This is because the sample preparation and handling processes in this method do not always preserve the individual inorganic species; As^{+3} and As^{+5} interconvert over time.

Arsenobetaine (AsB) and other cationic species are not separated by this column, but elute together as one peak at the beginning of each chromatogram. Therefore, these results are reported together as "AsB + Cations." The "AsB + Cations" concentration has been estimated based on calibration standards containing AsB. Because other cations eluting with this peak may have different response factors than AsB, all results reported as "AsB + Cations" are qualified "J", estimated.

The "unknown species" listed in the report are likely to be anionic arsenosugars. An estimated concentration for these species is provided using a predetermined response factor, and the results are qualified "J". Further identification and quantitation of the arsenosugars isn't possible, as standards are not available. Note that in this case, arsenosugar peaks with several different retention times were observed in different samples.

5.0 Ion Chromatography Quality Control

All chromatography results were corrected for instrument drift by the analysis of a reference arsenic standard injected post-column, and measured prior to measurement of the species that have undergone the chromatographic separation.

The chromatographic analyses were calibrated with standards containing at least five different concentrations of each of the species being determined. The calibration curves were linear with an R^2 >0.995 for each species. The lowest point on the calibration curve was at the quantitation limit. All points on the calibration curve were within the acceptance range of the true value (10% for all points, 30% for the lowest standard) with the exception of MMA at 31% and 33%, respectively, on the two days of analysis. However, MMA results for all samples are below the minimum reporting limit; therefore, no high bias is evident, and no results required qualification.

Calibration verification standards were analyzed before and after sample analysis. Second source standards were used for As^{+3} and As^{+5}; second source standards are not available for the remainder of the arsenic species. The recoveries of the calibration verification standards for each species met the 90 - 100% concentration acceptance criteria with one exception. The recoveries of all species in a continuing verification standard on 04/12/2006 were biased low, with the recoveries for the species ranging from 81% to 85%. Therefore, all results for sample 05374241 were qualified (JL) indicating a possible low bias (this is the only sample from this set that was affected by the low recoveries of this control).

Laboratory control samples (spike blanks) are extracted and analyzed along with the tissue samples to verify the efficiency of laboratory procedures. The results met the recovery acceptance criterion (85 – 115% of the standard's true value).

Procedural blanks (extraction blanks) were extracted and analyzed with the samples to show potential contamination from the extraction or analytical procedure. The blank did not contain detectable levels of any of the arsenic species.

Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed on samples 05374229 and 05424017 to provide information about the effect of the sample matrix on extraction and measurement methods. All matrix spike recoveries were within the acceptance limits of 75-125%.

Duplicate analyses for the chromatography were performed on samples 05374229 and 05424017 to evaluate the reproducibility of the procedure. All results which were above the quantitation limit were within the ±20% RPD criterion.

6.0 Reporting Limit/Quantitation Limits

Arsenic species results are only reported for samples which had detectable levels of total arsenic. Samples 05374017, 05374017DU, and 05424037 did not contain measurable levels of total arsenic. Arsenic species results for these samples are reported "NA", not applicable.

The reporting limits and quantitation limits used for these samples results are based on our evaluation of the sensitivity of the chromatographic determination. We have established that standards at the quantitation limit can be measured within established limits of accuracy and precision, over the entire course of a chromatographic analysis. The reporting limit was established at a level at which the peaks are consistently distinguished from the background.

Sample results that are greater than the quantitation limit are reported with three significant figures.

Sample results that are greater than the reporting limit, but less than the quantitation limit, are reported with two significant figures and qualified "J", estimated.

Sample results for which no distinct peak is discernable, are given the value of the reporting limit, and qualified "U", undetected.

Final sample results are calculated based on the chromatography result, the weight of the TMAOH extract aliquot, and the weight of the dried sample that was taken for analysis. Results for the undetected species are calculated using the reporting limit concentration with weights mentioned above.

7.0 Overall Assessment of the Data

The efficiency of the analytical procedure is measured at two stages during the analysis. First, the extraction efficiency is determined by comparing the total concentration of arsenic in the sample extract, to the total concentration present in the tissue.

The second measure of efficiency is the chromatographic recovery. The chromatographic recovery is calculated by summing the individual chromatographic arsenical concentrations and dividing this by the total arsenic concentration present in the sample extract. This compares the quantity of arsenic injected onto the column, to the quantity eluting from the column.

The overall speciation recovery combines these two efficiencies, by comparing the total arsenic eluting from the column, to the amount present in the tissue samples.

Table A (attached) provides the efficiency results for each sample. Criteria for efficiency have not been established for the tissue matrix at this time.

Below are the definitions for the qualifiers used in the Inorganic area when qualifying data from Inorganic analysis.

DATA QUALIFIERS

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

NA - Not Applicable. The parameter was not analyzed for, or other is no analytical result for this parameter. No value is reported with this qualification.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

DATE: May 16, 2006

TO: Sally Thomas, Project Manager, EPA Region 10
Office of Environmental Cleanup, Unit 3 Site Cleanup

From: Katie Adams, Chemist, EPA Region 10 Laboratory
Office of Environmental Assessment

SUBJECT: Data Review of the Arsenic Speciation Analyses for Upper Columbia River fish tissues
Shipment #4
Project Code: TEC-774G
Account Code: 06T10P302DD2C106XLA00

The following is a data review of the arsenic speciation analyses of 13 fish tissue samples from the Upper Columbia River project. The analyses were done following an extraction and ion chromatography/ICP-MS procedure developed by NERL, ORD-Cincinnati. The work was performed by EPA chemists at the EPA Manchester Environmental Laboratory in Port Orchard, WA.

This review was conducted for the following samples:

05374249	05374250	05374255	05374256	05374257	05374261	05374263
05374265	05424046	05424048	05424051	05424053	05424054	

Data Qualifications

The following comments refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Plan, and the QAPP. For those tests for which the USEPA Region 10 Laboratory has been NELAC accredited, all requirements of the current NELAC Standard have been met. The qualifications recommended herein are based on the information provided for the review.

1.0 **Timeliness** - Acceptable

A specific holding time for the analysis of arsenic species in tissue samples has not been established. The samples were collected between 09/13/2005 to 10/20/2005, and were received by the laboratory on 01/12/2006. The analyses were completed on 04/12/2006. No data qualification was required based on holding time criteria.

2.0 **Sample Preparation -** Acceptable

The samples arrived at the laboratory already ground and homogenized; they were stored at -20ºC until further sample preparation could begin. The samples were freeze-dried prior to extraction.

A portion of each freeze-dried sample was treated with 0.83% tetramethyl ammonium hydroxide (TMAOH), then neutralized with acetic acid, in order to extract the arsenic species from the tissue. An aliquot of this extract was analyzed for total arsenic. The efficiency of the TMAOH extraction was determined by comparing the amount of arsenic present in the extract to the amount of arsenic present in the original sample. A different portion of the TMAOH extract was analyzed by Ion Chromatography – Inductively Coupled Plasma – Mass Spectrometry (IC-ICP-MS) to separate and quantitate the ionic arsenic species. No qualification of the data was required based on sample preparation.

3.0 Total Arsenic Analysis - Acceptable

The total arsenic determination for the tissue samples was reviewed in the memorandum "Data Validation for Upper Columbia River RI-FS, Analysis of Total elements in Fish Tissue (05374245 – 05374256, 05414008, 05424044 – 05424056)," May 16, 2006.

The total arsenic determination for the TMAOH extracts was performed by ICP-MS on 03/24/2006, following laboratory procedures. Each sample digestate was analyzed along with a post-spike, and the resulting information was used to perform a single point Method of Standard Additions correction in order to compensate for the effects of the TMAOH matrix on the analysis.

All procedures met laboratory requirements; therefore, no qualification was necessary based on the analysis of the total arsenic in the sample extracts.

4.0 Ion Chromatography Determination - Acceptable

The anion chromatography analysis determines As^{+3} (Arsenite), As^{+5} (Arsenate), DMA (Dimethylarsonic acid), MMA (Monomethylarsonic acid). Further characterization of the sample by cation chromatography was not an objective for this project.

Results for As^{+3} and As^{+5} are summed and reported as "inorganic arsenic." This is because the sample preparation and handling processes in this method do not always preserve the individual inorganic species; As^{+3} and As^{+5} interconvert over time.

Arsenobetaine (AsB) and other cationic species are not separated by this column, but elute together as one peak at the beginning of each chromatogram. Therefore, these results are reported together as "AsB + Cations." The "AsB + Cations" concentration has been estimated based on calibration standards containing AsB. Because other cations eluting with this peak may have different response factors than AsB, all results reported as "AsB + Cations" are qualified "J", estimated.

The "unknown species" listed in the report are likely to be anionic arsenosugars. An estimated concentration for these species is provided using a predetermined response factor, and the results are qualified "J". Further identification and quantitation of the arsenosugars isn't possible, as standards are not available. Note that in this case, arsenosugar peaks with several different retention times were observed in different samples.

5.0 Ion Chromatography Quality Control

All chromatography results were corrected for instrument drift by the analysis of a reference arsenic standard injected post-column, and measured prior to measurement of the species that have undergone the chromatographic separation.

The chromatographic analyses were calibrated with standards containing at least five different concentrations of each of the species being determined. The calibration curves were linear with an R^2 >0.995 for each species. The lowest point on the calibration curve was at the quantitation limit. All points on the calibration curve were within the acceptance range of the true value (10% for all points, 30% for the lowest standard), with the following exceptions:

As^{+3} and MMA were at 113% for a standard at 1 µg/L, and MMA was at 162% for the lowest standard (0.5 µg/L. However, results for As^{+3} and MMA for all samples are below the minimum reporting limit; therefore, no high bias is evident, and no results required qualification.

Calibration verification standards were analyzed before and after sample analysis. Second source standards were used for

As^{+3} and As^{+5}; second source standards are not available for the remainder of the arsenic species. The recoveries of the calibration verification standards for each species met the 90 - 100% concentration acceptance criteria.

Laboratory control samples (spike blanks) are extracted and analyzed along with the tissue samples to verify the efficiency of laboratory procedures. The results met the recovery acceptance criterion (85 – 115% of the standard's true value).

Procedural blanks (extraction blanks) were extracted and analyzed with the samples to show potential contamination from the extraction or analytical procedure. The blank did not contain detectable levels of any of the arsenic species, except for trace levels of As^{+3}. We believe that the autosampler vials are responsible for this arsenic contamination. None of the samples for which inorganic arsenic was reported had an As^{+3} component (all the inorganic arsenic in these cases was measured as As^{+5}). Therefore the As^{+3} contamination was not a contributing factor to the results, and no qualification was required.

Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed on samples 05374249 and 05374257 to provide information about the effect of the sample matrix on extraction and measurement methods. All matrix spike recoveries were within the acceptance limits of 75-125%.

Duplicate analyses for the chromatography were performed on samples 05374249 and 05374257 to evaluate the reproducibility of the procedure. All results which were above the quantitation limit were within the ±20% RPD criterion.

6.0 Reporting Limit/Quantitation Limits

The reporting limits and quantitation limits used for these samples results are based on our evaluation of the sensitivity of the chromatographic determination. We have established that standards at the quantitation limit can be measured within established limits of accuracy and precision, over the entire course of a chromatographic analysis. The reporting limit was established at a level at which the peaks are consistently distinguished from the background.

Sample results that are greater than the quantitation limit are reported with three significant figures.

Sample results that are greater than the reporting limit, but less than the quantitation limit, are reported with two significant figures and qualified "J", estimated.

Sample results for which no distinct peak is discernable, are given the value of the reporting limit, and qualified "U", undetected.

Final sample results are calculated based on the chromatography result, the weight of the TMAOH extract aliquot, and the weight of the dried sample that was taken for analysis. Results for the undetected species are calculated using the reporting limit concentration with weights mentioned above.

7.0 Overall Assessment of the Data

The efficiency of the analytical procedure is measured at two stages during the analysis. First, the extraction efficiency is determined by comparing the total concentration of arsenic in the sample extract, to the total concentration present in the tissue.

The second measure of efficiency is the chromatographic recovery. The chromatographic recovery is calculated by summing the individual chromatographic arsenical concentrations and dividing this by the total arsenic concentration present in the sample extract. This compares the quantity of arsenic injected onto the column, to the quantity eluting from the column.

The overall speciation recovery combines these two efficiencies, by comparing the total arsenic eluting from the column, to the amount present in the tissue samples.

Table A (attached) provides the efficiency results for each sample. Criteria for efficiency have not been established for the tissue matrix at this time.

Below are the definitions for the qualifiers used in the Inorganic area when qualifying data from Inorganic analysis.

DATA QUALIFIERS

U	-	The analyte was not detected at or above the reported value.
J	-	The identification of the analyte is acceptable; the reported value is an estimate.
JK	-	The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL	-	The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UJ	-	The analyte was not detected at or above the reported value. The reported value is an estimate.
NA	-	Not Applicable. The parameter was not analyzed for, or other is no analytical result for this parameter. No value is reported with this qualification.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

DATE: May 22, 2006

TO: Sally Thomas, Project Manager, EPA Region 10
Office of Environmental Cleanup, Unit 3 Site Cleanup

From: Katie Adams, Chemist, EPA Region 10 Laboratory
Office of Environmental Assessment

SUBJECT: Data Review of the Arsenic Speciation Analyses for Upper Columbia River fish tissues
Shipments 6 and 7
Project Code: TEC-774G
Account Code: 06T10P302DD2C106XLA00

The following is a data review of the arsenic speciation analyses of 8 fish tissue samples from the Upper Columbia River project. The analyses were done following an extraction and ion chromatography/ICP-MS procedure developed by NERL, ORD-Cincinnati. The work was performed by EPA chemists at the EPA Manchester Environmental Laboratory in Port Orchard, WA.

This review was conducted for the following samples:

05364217	05364218	05414011	05414013	05424062	05424065	05424069
05424079						

Data Qualifications

The following comments refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Plan, and the QAPP. For those tests for which the USEPA Region 10 Laboratory has been NELAC accredited, all requirements of the current NELAC Standard have been met. The qualifications recommended herein are based on the information provided for the review.

1.0 Timeliness - Acceptable

A specific holding time for the analysis of arsenic species in tissue samples has not been established. The samples were collected from 09/07/2005 to 10/22/2005, and were received by the laboratory on 01/20/2006 and 02/02/2006. The analyses were completed on 04/18/2006. No data qualification was required based on holding time criteria.

2.0 Sample Preparation - Acceptable

The samples arrived at the laboratory already ground and homogenized; they were stored at -20ºC until further sample preparation could begin. The samples were freeze-dried prior to extraction.

A portion of each freeze-dried sample was treated with 0.83% tetramethyl ammonium hydroxide (TMAOH), then neutralized with acetic acid, in order to extract the arsenic species from the tissue. An aliquot of this extract was analyzed for total arsenic. The efficiency of the TMAOH extraction was determined by comparing the amount of arsenic present in the extract to the amount of arsenic present in the original sample. A different portion of the TMAOH extract was analyzed by Ion Chromatography – Inductively Coupled Plasma – Mass Spectrometry (IC-ICP-MS) to separate and quantitate the ionic arsenic species. No qualification of the data was required based on sample preparation.

3.0 Total Arsenic Analysis - Acceptable

The total arsenic determination for the tissue samples was reviewed in the memoranda, "Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05424057 – 05424080)" and "Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05364216 – 05364222, 05414009 – 05414018, 05414025, 05414026)."

The total arsenic determination for the TMAOH extracts was performed by ICP-MS on 03/31/2006, following laboratory procedures. Each sample digestate was analyzed along with a post-spike, and the resulting information was used to perform a single point Method of Standard Additions correction in order to compensate for the effects of the TMAOH matrix on the analysis.

All procedures met laboratory requirements; therefore, no qualification was necessary based on the analysis of the total arsenic in the sample extracts.

4.0 Ion Chromatography Determination - Acceptable

The anion chromatography analysis determines As^{+3} (Arsenite), As^{+5} (Arsenate), DMA (Dimethylarsonic acid), MMA (Monomethylarsonic acid). Further characterization of the sample by cation chromatography was not an objective for this project.

Results for As^{+3} and As^{+5} are summed and reported as "inorganic arsenic." This is because the sample preparation and handling processes in this method do not always preserve the individual inorganic species; As^{+3} and As^{+5} interconvert over time.

Arsenobetaine (AsB) and other cationic species are not separated by this column, but elute together as one peak at the beginning of each chromatogram. Therefore, these results are reported together as "AsB + Cations." The "AsB + Cations" concentration has been estimated based on calibration standards containing AsB. Because other cations eluting with this peak may have different response factors than AsB, all results reported as "AsB + Cations" are qualified "J", estimated.

The "unknown species" listed in the report are likely to be anionic arsenosugars. An estimated concentration for these species is provided using a predetermined response factor, and the results are qualified "J". Further identification and quantitation of the arsenosugars isn't possible, as standards are not available.

5.0 Ion Chromatography Quality Control

All chromatography results were corrected for instrument drift by the analysis of a reference arsenic standard injected post-column, and measured prior to measurement of the species that have undergone the chromatographic separation.

The chromatographic analyses were calibrated with standards containing at least five different concentrations of each of the species being determined. The calibration curves were linear with an R^2 >0.995 for each species. The lowest point on the calibration curve was at the quantitation limit. All points on the calibration curve were within the acceptance range of the true value (10% for all points, 30% for the lowest standard), with the following exceptions:

As^{+3} and MMA were at 113% for a standard at 1 µg/L, and MMA was at 162% for the lowest standard (0.5 µg/L. However, results for As^{+3} and MMA for all samples are below the minimum reporting limit; therefore, no high bias is evident, and no results required qualification.

Calibration verification standards were analyzed before and after sample analysis. Second source standards were used for As^{+3} and As^{+5}; second source standards are not available for the remainder of the arsenic species. The recoveries of the calibration verification standards for each species met the 90 - 100% concentration acceptance criteria, with the following exceptions:

The recoveries of all species in a continuing verification standard on 04/12/2006 were biased low, with the recoveries for the species ranging from 81% to 85%. Therefore, all results for samples MEF032906ACO, 05364217, 05364217DU, 05364218, 05414011, and 05414013 were qualified (JL) indicating a possible low bias.

Also, the recoveries of MMA and As^{+5} in one of the calibration verification standards on 04/18/2006 were biased low at 89% and 88% respectively. MMA and Inorganic As results for samples 05424266 and 05424086 were qualified (JL) indicating a possible low bias.

Laboratory control samples (spike blanks) are extracted and analyzed along with the tissue samples to verify the efficiency of laboratory procedures. The results met the recovery acceptance criterion (85 – 115% of the standard's true value).

Procedural blanks (extraction blanks) were extracted and analyzed with the samples to show potential contamination from the extraction or analytical procedure. The blank did not contain detectable levels of any of the arsenic species, except for trace levels of As^{+3}. We believe that the autosampler vials are responsible for this arsenic contamination. No samples contained detectable levels of As^{+3}.

Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed on samples 05364217 and 05424062 to provide information about the effect of the sample matrix on extraction and measurement methods. All matrix spike recoveries were within the acceptance limits of 75-125%.

Duplicate analyses for the chromatography were performed on samples 05364217 and 05424062 to evaluate the reproducibility of the procedure. All results which were above the quantitation limit were within the ±20% RPD criterion.

6.0 Reporting Limit/Quantitation Limits

The reporting limits and quantitation limits used for these samples results are based on our evaluation of the sensitivity of the chromatographic determination. We have established that standards at the quantitation limit can be measured within established limits of accuracy and precision, over the entire course of a chromatographic analysis. The reporting limit was established at a level at which the peaks are consistently distinguished from the background.

Sample results that are greater than the quantitation limit are reported with three significant figures.

Sample results that are greater than the reporting limit, but less than the quantitation limit, are reported with two significant figures and qualified "J", estimated.

Sample results for which no distinct peak is discernable, are given the value of the reporting limit, and qualified "U", undetected.

Final sample results are calculated based on the chromatography result, the weight of the TMAOH extract aliquot, and the weight of the dried sample that was taken for analysis. Results for the undetected species are calculated using the reporting limit concentration with weights mentioned above.

7.0 Overall Assessment of the Data

The efficiency of the analytical procedure is measured at two stages during the analysis. First, the extraction efficiency is determined by comparing the total concentration of arsenic in the sample extract, to the total concentration present in the tissue.

The second measure of efficiency is the chromatographic recovery. The chromatographic recovery is calculated by summing the individual chromatographic arsenical concentrations and dividing this by the total arsenic concentration present in the sample extract. This compares the quantity of arsenic injected onto the column, to the quantity eluting from the column.

The overall speciation recovery combines these two efficiencies, by comparing the total arsenic eluting from the column, to the amount present in the tissue samples.

Table A (attached) provides the efficiency results for each sample. Criteria for efficiency have not been established for the tissue matrix at this time.

Below are the definitions for the qualifiers used in the Inorganic area when qualifying data from Inorganic analysis.

DATA QUALIFIERS

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; the reported value is an estimate.

JK - The identification of the analyte is acceptable; the reported value is an estimate and may be <u>biased high</u>. The actual value is expected to be less than the reported value.

JL - The identification of the analyte is acceptable; the reported value is an estimate and may be <u>biased low</u>. The actual value is expected to be greater than the reported value.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

NA - Not Applicable. The parameter was not analyzed for, or other is no analytical result for this parameter. <u>No value is reported with this qualification.</u>

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

DATE:	May 23, 2006
TO:	Sally Thomas, Project Manager, EPA Region 10 Office of Environmental Cleanup, Unit 3 Site Cleanup
From:	Katie Adams, Chemist, EPA Region 10 Laboratory Office of Environmental Assessment
SUBJECT:	Data Review of the Arsenic Speciation Analyses for Upper Columbia River fish tissues Shipment #7 Project Code: TEC-774G Account Code: 06T10P302DD2C106XLA00

The following is a data review of the arsenic speciation analyses of 12 fish tissue samples from the Upper Columbia River project. The analyses were done following an extraction and ion chromatography/ICP-MS procedure developed by NERL, ORD-Cincinnati. The work was performed by EPA chemists at the EPA Manchester Environmental Laboratory in Port Orchard, WA.

This review was conducted for the following samples:

05364212	05364213	05414024	05414029	05424081	05424086	05424251
05424252	05424257	05424258	05424260	05424266		

Data Qualifications

The following comments refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Plan, and the QAPP. For those tests for which the USEPA Region 10 Laboratory has been NELAC accredited, all requirements of the current NELAC Standard have been met. The qualifications recommended herein are based on the information provided for the review.

1.0 Timeliness - Acceptable

A specific holding time for the analysis of arsenic species in tissue samples has not been established. The samples were collected from 09/07/2005 to 10/19/2005, and were received by the laboratory on 02/02/2006. The analyses were completed on 04/18/2006. No data qualification was required based on holding time criteria.

2.0 Sample Preparation - Acceptable

The samples arrived at the laboratory already ground and homogenized; they were stored at -20ºC until further sample preparation could begin. The samples were freeze-dried prior to extraction.

A portion of each freeze-dried sample was treated with 0.83% tetramethyl ammonium hydroxide (TMAOH), then neutralized with acetic acid, in order to extract the arsenic species from the tissue. An aliquot of this extract was analyzed for total arsenic. The efficiency of the TMAOH extraction was determined by comparing the amount of arsenic present in the extract to the amount of arsenic present in the original sample. A different portion of the TMAOH extract was analyzed by Ion Chromatography – Inductively Coupled Plasma – Mass Spectrometry (IC-ICP-MS) to separate and quantitate the ionic arsenic species. No qualification of the data was required based on sample preparation.

3.0 Total Arsenic Analysis - Acceptable

The total arsenic determination for the tissue samples was reviewed in a series of memoranda, "Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05414019, 05414027 - 05414029, 05424081 - 05424094)", "Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05424095, 05424096, 05424253 - 05424258, 05424265 - 05424270)", and "Data Validation for Upper Columbia RI-FS, Analysis of Total Elements in Fish Tissue (05364211 – 05364215, 05414020 – 05414022, 05414024, 05424097 – 05424099, 05424250 – 05424252, 05424259, 05424260, 05424262, 05424263)."

The total arsenic determination for the TMAOH extracts was performed by ICP-MS on 04/17/2006, following laboratory procedures. Each sample digestate was analyzed along with a post-spike, and the resulting information was used to perform a single point Method of Standard Additions correction in order to compensate for the effects of the TMAOH matrix on the analysis.

All procedures met laboratory requirements; therefore, no qualification was necessary based on the analysis of the total arsenic in the sample extracts.

4.0 Ion Chromatography Determination - Acceptable

The anion chromatography analysis determines As^{+3} (Arsenite), As^{+5} (Arsenate), DMA (Dimethylarsonic acid), MMA (Monomethylarsonic acid). Further characterization of the sample by cation chromatography was not an objective for this project.

Results for As^{+3} and As^{+5} are summed and reported as "inorganic arsenic." This is because the sample preparation and handling processes in this method do not always preserve the individual inorganic species; As^{+3} and As^{+5} interconvert over time.

Arsenobetaine (AsB) and other cationic species are not separated by this column, but elute together as one peak at the beginning of each chromatogram. Therefore, these results are reported together as "AsB + Cations." The "AsB + Cations" concentration has been estimated based on calibration standards containing AsB. Because other cations eluting with this peak may have different response factors than AsB, all results reported as "AsB + Cations" are qualified "J", estimated.

The "unknown species" listed in the report are likely to be anionic arsenosugars. An estimated concentration for these species is provided using a predetermined response factor, and the results are qualified "J". Further identification and quantitation of the arsenosugars isn't possible, as standards are not available.

5.0 Ion Chromatography Quality Control

All chromatography results were corrected for instrument drift by the analysis of a reference arsenic standard injected post-column, and measured prior to measurement of the species that have undergone the chromatographic separation.

The chromatographic analyses were calibrated with standards containing at least five different concentrations of each of the species being determined. The calibration curves were linear with an R^2 >0.995 for each species. The lowest point on the calibration curve was at the quantitation limit. All points on the calibration curve were within the acceptance range of the true value (10% for all points, 30% for the lowest standard).

Calibration verification standards were analyzed before and after sample analysis. Second source standards were used for As^{+3} and As^{+5}; second source standards are not available for the remainder of the arsenic species. The recoveries of the calibration verification standards for each species met the 90 - 100% concentration acceptance criteria with the exceptions of the recoveries of MMA and As^{+5} in one of the calibration verification standards on 04/18/2006, which were biased low at 89% and 88% respectively. MMA and Inorganic As results for samples 05424266 and 05424086 were qualified (JL) indicating a possible low bias.

Laboratory control samples (spike blanks) are extracted and analyzed along with the tissue samples to verify the efficiency of laboratory procedures. The results met the recovery acceptance criterion (85 – 115% of the standard's true value).

Procedural blanks (extraction blanks) were extracted and analyzed with the samples to show potential contamination from the extraction or analytical procedure. The blank did not contain detectable levels of any of the arsenic species.

Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed on sample 05424257 to provide information about the effect of the sample matrix on extraction and measurement methods. All matrix spike recoveries were within the acceptance limits of 75-125%.

Duplicate analyses for the chromatography were performed on sample 05424257 to evaluate the reproducibility of the procedure. All results which were above the quantitation limit were within the ±20% RPD criterion.

6.0 Reporting Limit/Quantitation Limits

The reporting limits and quantitation limits used for these samples results are based on our evaluation of the sensitivity of the chromatographic determination. We have established that standards at the quantitation limit can be measured within established limits of accuracy and precision, over the entire course of a chromatographic analysis. The reporting limit was established at a level at which the peaks are consistently distinguished from the background.

Sample results that are greater than the quantitation limit are reported with three significant figures.

Sample results that are greater than the reporting limit, but less than the quantitation limit, are reported with two significant figures and qualified "J", estimated.

Sample results for which no distinct peak is discernable, are given the value of the reporting limit, and qualified "U", undetected.

Final sample results are calculated based on the chromatography result, the weight of the TMAOH extract aliquot, and the weight of the dried sample that was taken for analysis. Results for the undetected species are calculated using the reporting limit concentration with weights mentioned above.

7.0 Overall Assessment of the Data

The efficiency of the analytical procedure is measured at two stages during the analysis. First, the extraction efficiency is determined by comparing the total concentration of arsenic in the sample extract, to the total concentration present in the tissue.

The second measure of efficiency is the chromatographic recovery. The chromatographic recovery is calculated by summing the individual chromatographic arsenical concentrations and dividing this by the total arsenic concentration present in the sample extract. This compares the quantity of arsenic injected onto the column, to the quantity eluting from the column.

The overall speciation recovery combines these two efficiencies, by comparing the total arsenic eluting from the column, to the amount present in the tissue samples.

Table A (attached) provides the efficiency results for each sample. Criteria for efficiency have not been established for the tissue matrix at this time.

Below are the definitions for the qualifiers used in the Inorganic area when qualifying data from Inorganic analysis.

DATA QUALIFIERS

U	-	The analyte was not detected at or above the reported value.
J	-	The identification of the analyte is acceptable; the reported value is an estimate.
JK	-	The identification of the analyte is acceptable; the reported value is an estimate and may be <u>biased high</u>. The actual value is expected to be less than the reported value.
JL	-	The identification of the analyte is acceptable; the reported value is an estimate and may be <u>biased low</u>. The actual value is expected to be greater than the reported value.
UJ	-	The analyte was not detected at or above the reported value. The reported value is an estimate.
NA	-	Not Applicable. The parameter was not analyzed for, or other is no analytical result for this parameter. <u>No value is reported with this qualification.</u>

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

April 24, 2006

MEMORANDUM

SUBJECT: Data Review for Percent Lipids in fish tissue for Upper Columbia River

Project Code: TEC-774G Account Code: 05T10P302DD2C106XLA00

FROM: Peggy Knight, Chemist, USEPA Region 10 Laboratory
Office of Environmental Assessment

TO: Sally Thomas, Project Manager, USEPA Region 10
Office of Environmental Cleanup

CC: Kevin Rochlin, USEPA Region 10
Office of Environmental Cleanup

Monica Tonel, USEPA Region 10
Office of Environmental Cleanup

Jim Stefanoff, CH2M Hill

The data review of the lipid analysis results for twenty-five fish tissue samples has been completed. The samples were prepared and analyzed by the USEPA Region 10 Laboratory staff located in Manchester, WA using EPA methods SW-846 3541 with gravimetric analysis.

Reviewed in this report are data for sample numbers:

05364216	05364217	05364218	05364219	05364220	05414025	05414026	05414027
05414028	05414029	05424097	05424099	05424251	05424253	05424254	05424255
05424256	05424257	05424258	05424265	05424266	05424267	05424268	05424269
05424270							

DATA QUALIFICATIONS

The following comments refer to laboratory performance in meeting the quality control specifications outlined in the analytical method, the Manchester Laboratory Quality Assurance Manual, standard operating procedures, and professional judgment. For those tests for which the USEPA Region 10 Laboratory has been NELAC accredited, all requirements of the current

NELAC Standard have been met.

The conclusions presented herein are based on the information provided for the review.

Percent Lipid Determination – Acceptable

Percent lipids were determined from a portion of the extract generated for the PCB analysis. This procedure determines non-polar lipids.

Overall Assessment

All requirements for data qualifiers from the preceding sections were accumulated. Each sample data summary sheet and each compound was checked for positive or negative results. From this, the overall need for data qualifiers for each analysis was determined. In cases where more than one of the preceding sections required data qualifiers, the most restrictive qualifier has been added to the data.
In general, all unqualified data can be used without restriction. The usefulness of qualified data should be treated according to the severity of the qualifier. Should questions arise regarding the qualification of data and its relation to the usefulness, the reader is encouraged to contact Peggy Knight at the Region 10 Laboratory, phone number (360)871-8713.

LABORATORY QUALIFIER/REMARK CODE DEFINITIONS

Qualifier/ Remark Code	Definition (Codes Assigned to Values)
<	**Microbiology –** Level of target organism present in the sample is less than detection limit. The reported value is the detection limit.
	Flash Point – The expected flash point temperature is less than the reported value.
>	**Microbiology –** Level of target organism exceeds upper limit for acceptable range of countable colonies (MF only) or exceeds MPN indices based on number of positive tubes (MPN only). The reported value is the upper limit.
	Flash Point – If the sample has a flashpoint, it is greater than the reported value.
J	The identification of the analyte is acceptable; the reported value is an estimate.
JK	The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JL	The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
K	The identification of the analyte is acceptable; the reported value may be biased high. The actual value is expected to be less than the reported value.
L	The identification of the analyte is acceptable; the reported value may be biased low. The actual value is expected to be greater than the reported value.
N	There is presumptive evidence that the analyte is present; the analyte is reported as a tentative identification.
NJ	There is presumptive evidence that the analyte is present; the analyte is reported as a tentative identification. The reported value is an estimate.
U	The analyte was not detected at or above the reported value.
UJ	The analyte was not detected at or above the reported value. The reported value is an estimate.

Qualifier/ Remark Code	Definition (Codes With No Reported Values)
A	Absent – The target parameter was analyzed for but was not present or was undetected. No value is reported with this qualification.
NA	Not Applicable, the parameter was not analyzed for, or there is no analytical result for this parameter. No value is reported with this qualification.
P	Present at an undetermined level – The target parameter is present but not quantifiable or no quantifiable result was determined. No value is reported with this qualification.

Qualifier/ Remark Code	Definition (Codes With No Reported Values)
R	The presence or absence of the analyte can not be determined from the data due to severe quality control problems. The data are rejected and considered unusable. No value is reported with this qualification.
T	A trace of the subject parameter was present. For asbestos analysis the subject parameter was identified but at a low level that a quantifiable percentage of content is unreliable. No value is reported with this qualification.
TNTC	Too Numerous To Count – Any membrane where the total number of bacterial colonies exceeds 200 per membrane, or if the colonies are not distinct enough for accurate counting (i.e. confluent growth).

Qualifier/ Remark Code	Definition (Codes Assigned To Values Generated via Field or Screening Methods)
F	The associated datum was generated using field methods and/or screening methods. The identification of the analyte is acceptable and the reported value has been found to be acceptable for use.
JF	The associated datum was generated using field methods and/or screening methods. The identification of the analyte is acceptable and the reported value is an estimate.
JKF	The associated datum was generated using field methods and/or screening methods. The identification of the analyte is acceptable; the reported value is an estimate and may be biased high. The actual value is expected to be less than the reported value.
JLF	The associated datum was generated using field methods and/or screening methods. The identification of the analyte is acceptable; the reported value is an estimate and may be biased low. The actual value is expected to be greater than the reported value.
UF	The associated datum was generated using field methods and/or screening methods. The analyte was not detected at or above the reported value.
UJF	The associated datum was generated using field methods and/or screening methods. The analyte was not detected at or above the reported value. The reported value is an estimate.

Qualifier/ Remark Code	Cross Reference to Older Codes
A	UND, ND – Undetected, Not detected
NA	NAR, NAF – No analytical result, Not analyzed for
P	PNQ – Present but not quantified
R	REJ - Rejected
T	TRACE

NOTE: For any qualifier code see the QA memo or case narrative for a more detailed description of its use.