



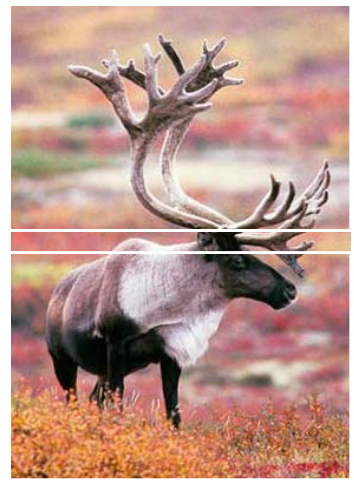
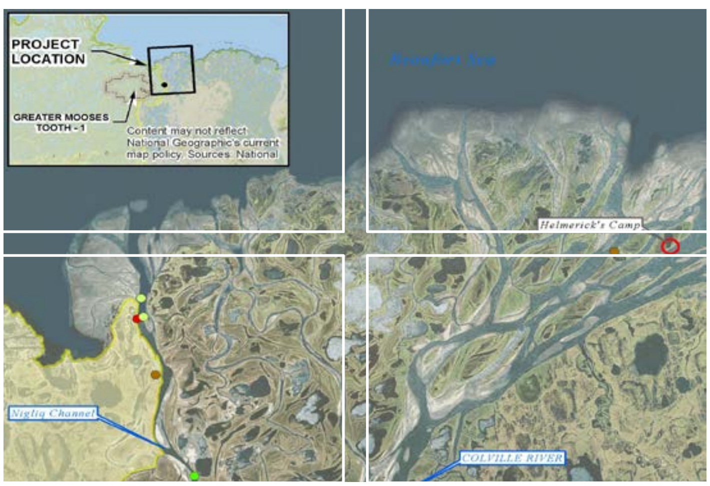

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Prepared for:

ConocoPhillips Alaska, Inc.

Subsistence Foods Study

2014 – 2015 Monitoring Report

September 2016

The world's leading sustainability consultancy

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Subsistence Foods Study
2014 – 2015 Monitoring Report

ConocoPhillips Alaska, Inc.

P.O. Box 100360

Anchorage, Alaska 99510-0360

26 September 2016

Prepared By: Leslie Davis
Environmental Scientist

Reviewed By: ______________________
Jeffrey D. Leety
Partner

ERM Alaska, Inc.
825 West 8th Avenue
Anchorage, Alaska 99501
(907) 258-4880
(907) 258-4033

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ACRONYMS AND ABBREVIATIONS

%...................... percent
µg/g................ micrograms per gram
µg/kg............. micrograms per kilogram
ABR................. Alaska Biological Research, Inc.
ADEC .... Alaska Department of Environmental Conservation
ADFG .... Alaska Department of Fish and Game
AMAP............. Arctic Monitoring and Assessment Programme
ALS .... ALS Environmental, Inc.
As .... arsenic
ATV .... all-terrain vehicle
Ba .... barium
BMP .... Best Management Practice
BLM .... Bureau of Land Management
°C .... degrees Celsius
Cd.................... cadmium
COC .... chain-of-custody
COPC............. contaminants of potential concern
CPAI .... ConocoPhillips Alaska, Inc.
Cu.................... copper
dw .... dry weight
DWM .... Department of Wildlife Management
ERM................ ERM Alaska, Inc.
FTMP .... Fish Tissue Monitoring Program
GMT................ Greater Moose's Tooth 1
GPS .... Global Positioning System
Hg .... mercury
IAP .... Integrated Activity Plan
KM .... Kaplan-Meier
L .... liter
mg/kg .... milligrams per kilogram
MDL................ method detection level
MRL .... method reporting limit
ND................... non-detect
ng/g................ nanogram per gram
Ni .... nickel
nmol................ nanomole
NPR-A .... National Petroleum Reserve-Alaska
NSB .... North Slope Borough
O&G................ oil and gas
PAH .... polycyclic aromatic hydrocarbons

Pb .... lead
POP .... persistent organic pollutants
ppb .... parts per billion
ppm .... parts per million
QAR .... quality assurance review
ROD .... Record of Decision
Se .... selenium
SIM .... select ion monitoring
SRB&A .... Stephen R. Braund and Associates
TW .... Tarone-Ware
USEPA .... United States Environmental Protection Agency
V .... Vanadium
VETS .... Veterinary Environmental Toxicology Services
ww .... wet weight
Zn .... zinc

EXECUTIVE SUMMARY

With the issue of the National Petroleum Reserve-Alaska Integrated Activity Plan Record of Decision, approximately 11.8 million acres of federally managed land on Alaska's North Slope were made available for oil and gas (O&G) leasing. Best Management Practices (BMPs) were established to balance O&G development with the protection of valuable surface resources, including subsistence-use resources. BMP A-11 requires lessees and permittees, in this case, ConocoPhillips Alaska, Inc. (CPAI), to conduct a study identifying the level of potential contaminants in subsistence foods prior to proposed permanent O&G development. To comply with BMP A-11, CPAI retained ERM Alaska, Inc. (ERM) to implement a monitoring study of potential contaminants associated with the proposed development. This report presents 2 years of data on the concentrations of select contaminants of potential concern (COPCs) found in raw tissues of subsistence-use species commonly harvested by residents of the village of Nuiqsut.

COPCs selected for the subsistence foods study are essential and non-essential elements and polycyclic aromatic hydrocarbons (PAHs) associated with present day O&G activities. Selected elements include arsenic (As), barium (Ba), cadmium (Cd), copper (Cu), mercury (Hg), lead (Pb), nickel (Ni), selenium (Se), vanadium (V), and zinc (Zn). Targeted PAHs include the standard list of 27 analytes regulated by the Alaska Department of Environmental Conservation (ADEC), although some measured PAHs are not solely O&G related.

Following consultations with government agencies, Nuiqsut residents, including the Qaaqtaq and Tuttu Panels, and other stakeholders, three subsistence-use species were selected for study: broad whitefish (*Coregonus nasus*), Arctic cisco (*Coregonus autumnalis*), and caribou (*Rangifer tarandus*).

In summer and fall of 2014 and 2015, ERM biologists collected and analyzed a total of 50 broad whitefish, liver tissue from nine caribou, and tenderloin muscle tissue from eight of the nine caribou harvested by Nuiqsut. Alaska Biological Research, Inc. biologists collected 60 Arctic cisco during the 2014 – 2015 field seasons, results of which are included in this study and report.

As expected, several of the essential elements were detected at or above the method detection level in all 110 fish samples. Elements were detected in fish studied at a frequency greater than 50 percent (%), which allowed the study team to provide useful statistics for all elements considered. Mean, median, and ranges of concentrations for total As, Ba, Cd, Cu, Hg, Pb, Ni, Se, V, and Zn in both fish species, broad whitefish and Arctic cisco, are reported herein.

For caribou liver tissue, element concentrations were detected in all samples, with the exception of As (not detected in 2014; detected in three samples in 2015) and V (detected in one sample in 2014; detected in two samples in 2015). As a result, As and V statistical calculations are of greater uncertainty, but are valuable for data comparisons. In caribou muscle tissue, all elements were detected at high enough frequencies (*i.e.*, ≥50% of samples) for mean and median to be calculated, with the exception of V, which was detected in one sample in 2014. Average age of caribou in 2014 was 2.4 years compared to an average of 8.2 years in 2015. As a result of differences in age of caribou, the annual data sets are considered different cohorts and are reported separately, as well as in a pooled data set.

Sixteen PAH analytes were detected in one or more samples of broad whitefish, and 24 PAH analytes were detected in Arctic cisco, indicating there are background concentrations of some PAHs in these species. However, PAH analytes were not detected at frequencies of ≥50%, so statistical summaries are less conclusive. Higher than anticipated detection limits in the laboratory may have contributed to less conclusive statistical evaluation; but in summary, the majority of PAH analytes were not detected above the analytical detection limit in caribou muscle or liver tissue sampled, and none were determined to be at or above the method reporting limit.

As a frame of reference, COPC concentrations resulting from this study are comparable to Alaska-based monitoring programs, as well as concentrations reported in circumpolar scientific literature. The ADEC Fish Tissue Monitoring Program analyzes important subsistence fish species, among other species, collected throughout the state for select trace elements and persistent organic pollutants. The North Slope Borough Department of Wildlife Management has initiated a health assessment program for subsistence resources, including fish and caribou, documenting contaminant levels in various tissues.

Chemical concentrations of COPCs presented in this report help establish data for the monitoring of subsistence foods required by BMP A-11, and forms a basis for further development of field programs for monitoring COPC levels in fish and caribou in the region.

ACKNOWLEDGMENTS

ERM Alaska, Inc. would like to thank the community of Nuiqsut and the hunters and fishers who graciously contributed their harvests, logistical support and insights to the study. We would like to thank the Qaaqtaq and Tuttu Panels for their valuable input in the development of the sampling and analysis plan and help in identifying active hunters and fishers to participate in the study. The 2014-2015 Subsistence Foods Study was funded by ConocoPhillips Alaska, Inc., and we are grateful for their support. Invaluable technical support was provided by the University of Alaska Fairbanks, Veterinary Environmental Toxicology Services, who assisted in study design, data review, reporting, and village outreach. Alaska Biological Research, Inc. shared knowledge gained from the Colville River Fish Studies, as well as assisted in sample collection of Arctic cisco. We would like to thank the Alaska Department of Environmental Conservation; Office of the State Veterinarian, for providing data on fish collected from the Colville River and the several scientists whose data we used for comparisons in this report.

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1. INTRODUCTION

The National Petroleum Reserve-Alaska (NPR-A), approximately 23 million acres of land on Alaska's North Slope, is managed by the Bureau of Land Management (BLM), with the exception of Native Corporation land. BLM's administration of the reserve includes the mandate to protect natural resources while providing for development of oil and gas (O&G) resources. The NPR-A Final Integrated Activity Plan (IAP)/Environmental Impact Statement, dated November 2012, described a range of management options for all federally managed lands and O&G resources within the NPR-A (BLM 2013). The Preferred Alternative, Alternative B-2, included lease stipulations and Best Management Practices (BMPs) to balance the development of oil and gas resources with the protection of subsistence resources. Subsistence resources and activities in northern Alaska are recognized to be very important to individuals, communities, and the region with respect to maintaining culture, health and wellbeing and the needed resilience for adapting (Martin 2015; Thornton 1998).

In February 2013, BLM issued the Final NPR-A IAP Record of Decision (ROD) reflecting the Preferred Alternative and formally adopting the BMPs, which apply to O&G activities within federally managed portions of NPR-A (BLM 2013). The BMP A-11, included in the NPR-A IAP ROD, states that a lessee proposing permanent oil and gas development on BLM-managed lands in the NPR-A…"*Shall design and implement a monitoring study of contaminants in locally-used subsistence foods.*"

ConocoPhillips Alaska, Inc. (CPAI) development actions include the Greater Moose's Tooth 1 (GMT-1), GMT-2, and future project proposals within the NPR-A. To comply with BMP A-11, CPAI retained ERM Alaska, Inc. (ERM) to implement a monitoring study of contaminants of potential concern (COPCs) that can be associated with the proposed developments. ERM subcontracted, Veterinary Environmental Toxicology Services (VETS), to assist in study design, data review and reporting, and outreach.

The goal of the study was specified by the NPR-A lease stipulation: "*the study shall identify the level of contaminants in subsistence foods prior to proposed permanent oil and gas development.*" The COPCs that may be associated with typical oilfield infrastructure include polycyclic aromatic hydrocarbons (PAHs) and essential and non-essential elements. It's important to note that many of these chemicals occur naturally and many are known to, or may, occur in locally harvested subsistence and store-bought foods.

This document contains results and general interpretation of element and PAH concentrations measured in subsistence foods collected during 2014 and 2015 in areas near Nuiqsut. Chemical concentrations presented in this report are intended for use in the monitoring of COPC concentrations throughout operation and abandonment phases of the GMT-1, GMT-2 and future proposed projects within NPR-A. Tissues and species selected and the contaminant analyses selected for this subsistence foods study are not suitable for specific oil source determination ("finger printing") or adverse effects assessment (including risk assessments).

1.1. Study Objectives and Scope

The objectives of this study are presented below:

- Engage with and incorporate guidance from Nuiqsut residents including active fishers and hunters, the Tuttu and Qaaqtaq Panels, and the Kuukpik Subsistence Oversight Panel in the study design and collection of samples from subsistence-harvested animals;
- Establish the detectability using standard analytical methods, and concentrations if detected, of select oil industry related COPCs prior to development that may persist in subsistence-used animal foods.

1.2. Selection of COPCs

Development of the target analytes list was based on reviews of pertinent literature of contaminants in the Arctic and other comparable studies with regional and circumpolar information. Contaminants documented in the Arctic are elements such as mercury (Hg) and cadmium (Cd), some of the relatively persistent chemicals of the non-halogenated organic class of PAHs, and the halogenated persistent organic pollutants (POP) such as the organochlorines (*e.g.*, "polychlorinated biphenyls" or "dichloro-diphenyl-trichloroethane"). Some of the POP chemicals are considered "legacy" contaminants and are not studied as part of this monitoring program because they are not associated with modern O&G activities occurring in Alaska. Circumpolar monitoring of heavy metals, POPs and emerging contaminants in the Arctic is reported by the Arctic Councils' Arctic Monitoring and Assessment Programme (AMAP) (AMAP 2016). Environmental monitoring of PAH and elements associated with the Chukchi and Beaufort seas ecosystems is ongoing by the Bureau of Ocean Energy Management. Contemporaneous studies of contaminants in caribou and fish in the region are being conducted by the North Slope Borough (NSB), Department of Wildlife Management (DWM) and the Alaska Department of Environmental Conservation (ADEC) (NSB 2016; ADEC 2016a).

There is no regulatory guidance or drivers for this study other than BMP A-11, which states "*The monitoring study shall examine subsistence foods for all contaminants that could be associated with the proposed development*." Some of the PAH class chemicals are the most likely contaminants of interest related to current O&G industry operations. Based on typical oilfield development, predicted chemical use and byproducts associated with the GMT-1, GMT-2, and future proposed projects include PAHs and essential and non-essential elements.

It is important to note that detectable concentrations of these PAHs and elements are known to occur in biota from the targeted region. Some hydrocarbons derived from various sources, fossil fuels, peat and petrogenic are detectable as elevated levels of saturated and aromatic hydrocarbon concentrations in the Colville River sediment and in the Harrison Bay sediment (Boehm *et al*. 1987). Additional pyrogenic PAH compounds are present in tundra soils and form a depositional record of atmospheric fallout from tundra fires (BLM 2005).

Elements also occur naturally in the ecosystem with varying amounts and chemical forms that can be attributed to human activities and natural processes (*e.g.*, fires, erosion). These include arsenic (As), Cd, copper (Cu), Hg, lead (Pb) and selenium (Se). Some of these elements are deemed essential (Cu and Se) as they are required for maintenance of many life functions and are expected to be of easily measurable quantities. Cu is a nutrient known to be deficient in some animals of this area and has resulted in concerns of poor adult health, poor calf recruitment and possibly other problems (*e.g.*, O'Hara *et al.* 2001).

The following analytes were selected for this monitoring effort as they pertain to meeting the objective of BMP A-11:

- The 27 PAHs presented in the Sampling and Analysis Plan, some regulated by the ADEC (Title 18 Alaska Administrative Code Chapter 75) and some included in the United State Environmental Protection Agency (USEPA) guidance for contaminant monitoring in fish (USEPA 2000) (see Sampling and Analysis Plan, Appendix A; Contaminants Table).
- Total elemental concentrations of the following essential and non-essential elements ("total" indicates that all chemical forms of the element present in a sample will be measured and reported as a single concentration):
  - Barium (Ba), present in naturally occurring barite soils at high concentrations at Umiat and across the North Slope and is present in drilling mud (Kelly 2008). Long-term oral exposure of soluble Ba compounds may result in kidney damage (Agency for Toxic Substances and Disease Registry [ATSDR] 2007);
  - Mercury (Hg) (includes methylated forms), biomagnifying in fish-based food-webs. At high levels, Hg may damage the brain, kidneys, and developing fetus (ATSDR 1999);
  - Arsenic (As), biomagnifies in fish-based food-webs for well-known organic forms, which are less harmful compared to inorganic As commonly monitored in drinking water (ATSDR 2007);
  - Cadmium (Cd), biomagnifying in invertebrate and plant-based food webs (herbivory) with consumption advisories in some Canadian cervids (hepatic and renal tissues); eating food with high Cd levels can cause stomach irritation and long-term exposure leads to kidney and bone damage (ATSDR 2012);
  - Copper (Cu), nutrient that is deficient in some animals, but highly toxic to some fish when dissolved in water (lethal and sub lethal effects on olfaction, migration, and immune response) (Scannell 2009) ;

- Lead (Pb), a confounder in hunted species (Pb ammunition) and element of general concern from numerous sources. Lead can damage the nervous system, kidneys, and reproductive system (ATSDR 2007);
- Selenium (Se), a nutrient, toxic at some levels, which is known to have seafood and plant pathways of exposure. At high levels, can adversely affect reproduction (ATSDR 2003);
- Vanadium (V), naturally occurring and associated with the burning of fuel oils. At high levels, animals ingesting V may experience decreased red blood cells, increased blood pressure and mild neurological effects (ATSDR 2012);
- Nickel (Ni), associated with road dust and a known carcinogen, endocrine and fetal development disruption, impacts vital organ (ATSDR 2005); and
- Zinc (Zn), a nutrient and a toxicant known to cause neural damage and fetal development disruption.

As a frame of reference, COPC concentrations from this study are compared to Alaska-based monitoring programs, as well as circumpolar studies reported in the scientific literature. These comparisons are detailed in Section 4.

1.3. Study Timeline

Following the NPR-A IAP ROD issued in February 2013, CPAI filed applications for permits for the GMT-1, GMT-2 and future proposed projects within the NPR-A and began the planning and design phase of the subsistence foods study. A desktop analysis of contaminants and caribou in the Arctic was performed, and included consultations with Nuiqsut stakeholders, CPAI contractors, and agency personnel familiar with the project area. A draft sampling and chemical analysis plan was then prepared for BLM review.

Implementation of the lease stipulation began with a meeting of representatives from CPAI, ERM, BLM, United States Fish and Wildlife Service, and the Alaska Department of Fish and Game (ADFG) in Fairbanks on 25 November 2013. The draft sampling and analysis plan was presented, followed by discussions of monitoring rationales, sampling and analysis methodologies, and village outreach goals. BLM staff requested that caribou forage be sampled, but later deemed that forage analysis did not fit with the stipulation this project addresses (BMP A-11).

Engagement with the subsistence groups in Nuiqsut, the Nuiqsut Tuttu and Qaaqtaq Panels, began on 13 February 2014. The study's draft sampling and analysis plan was presented, and input was received regarding subsistence species to target for the study (see Appendix B).

Prompted by a fish disease outbreak (fungus infestation, *Saprolignia*) in the lower Colville River subsistence fishery in summer/fall 2013, CPAI requested ERM and VETS to prepare "Common Diseases of Fish" and "Common Diseases of Caribou" workshops for presentation in Nuiqsut. The 3-day workshop was held in Nuiqsut (20 through 22 May 2014) and included presentations on environmental contaminants, fish and caribou health, and a subsistence food study project update. The workshops also provided an opportunity for community engagement, to solicit advice and input on the sampling plan, and to encourage hunter/fisher participation in the study.

Options discussed at agency and village meetings were used to develop a revised draft sampling and analysis plan that was circulated in June 2014 for review. With the consent of the BLM's 2014 Authorized Officer, Lon Kelly, sampling was immediately initiated in an effort to coincide with annual subsistence activities.

Monitoring began in summer and fall of 2014 with the collection of broad whitefish (*Coregonus nasus*), Arctic cisco (*Coregonus autumnalis*), and caribou (*Rangifer tarandus*) samples (see Appendix C).

Nuiqsut outreach continued with participation in the Nuiqsut Science Fair held 7 November 2014, where ERM presented information on biomagnification of contaminants in the food chain.

BLM's 2015 Authorized Officer, Stacie McIntosh, issued approval of the final sampling and analysis plan on 15 May 2015, contingent upon the addition of Arctic grayling (*Thymallus arcticus*) to the target species list. However, after consultation with the area fish biologist, BLM accepted the draft sampling and analysis plan without the inclusion of Arctic grayling with the caveat "*should any notable contaminant be detected in broad whitefish as a result of the GMT-1 monitoring, then Arctic grayling must also be sampled in the subsequent year*" (BLM letter dated 29 May 2015).

The second year of sampling occurred in August and November of 2015, and included the same target species as in 2014 (broad whitefish, Arctic cisco, and caribou). Details of sampling methodology are discussed in Section 2 of this report.

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2. METHODS

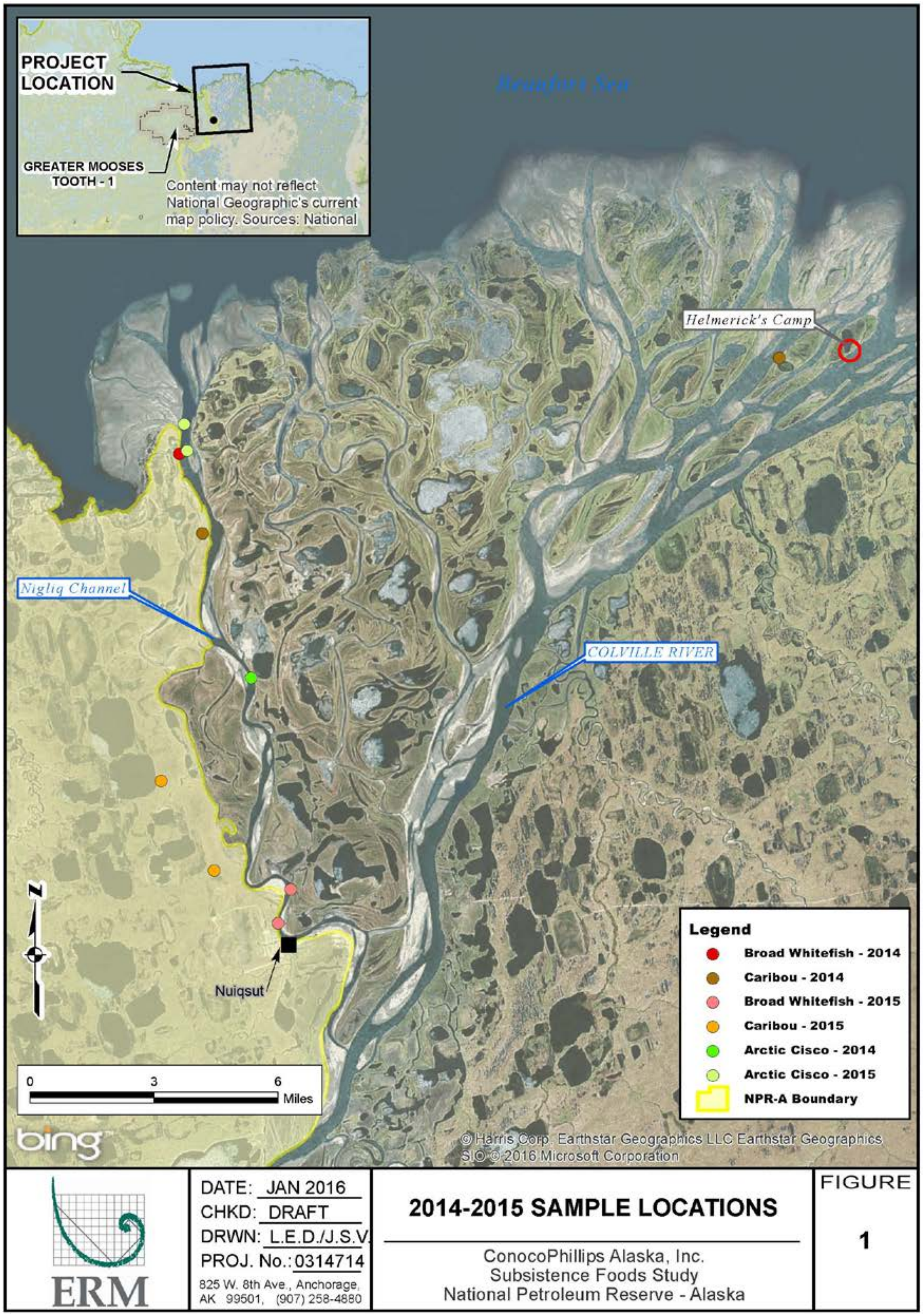
2.1. Study Area

The 2014-2015 Subsistence Foods Study was conducted in the vicinity of the project's proposed infrastructure on the North Slope of Alaska and the village of Nuiqsut, along the Colville River delta (Figure 1).

Residents of Nuiqsut depend on fish and caribou over a large area, demonstrating the complexities and variabilities in their harvest activities and strategies. Stephen R. Braund and Associates (SRB&A) reports the most consistent use is along the Colville River, including the Nigliq Channel and East Channel, and as far upriver as Umiat, as well as, the lower portion of Itkillik River, Fish Creek, and in overland areas between the community, Fish Creek, and Ocean Point (SRB&A 2015). Thus, while the scope of this monitoring study includes the proposed pads for GMT-1, GMT-2 and future proposed developments in the NPR-A and all supporting infrastructure, the broader study area includes the traditional hunting and fishing areas both within and outside of the NPR-A boundary.

Infrastructure recently added within the study area includes the Nuiqsut Spur Road, a 9.5 kilometers (5.8 miles) gravel road built by Kuukpik Corporation in winter 2013-2014 to connect Nuiqsut to the CD5 access road (Figure 1).

Figure 1: 2014- 2015 Subsistence Foods Study Sample Locations



2.2. Study Design

Subsistence foods selected for the study were based on discussions with the Nuiqsut community, reviews of SRB&A subsistence harvest reports and subsistence mapping (SRB&A 2010; SRB&A 2013), and Alaska Biological Research, Inc. (ABR) subsistence fishery monitoring on the Colville River (ABR 2013; 2014), as well as, borough, state and federal agency consultations. The study was designed to sample raw tissues from select commonly harvested subsistence-use animals through standardized scientific methods (*i.e.*, Rangifer Health and Body Condition Monitoring Manual-Level 1 [CircumArctic Rangifer Monitoring and Assessment Network 2008]) and analyze the samples for concentrations of COPCs.

With guidance from regulatory agencies, NSB, and Nuiqsut representatives, three subsistence foods species were targeted during the 2014-2015 field sampling events: 1) broad whitefish, 2) Arctic cisco, and 3) caribou. CPAI was made aware that the NSB Department of Wildlife Management was conducting a comparable study analyzing burbot (*Lota lota*) in the region for potential contaminants; therefore, burbot samples were not included in this study design.

This study was opportunistic in that sample collection was dependent on hunter selection and success, and available target species in the areas during sampling. Weather/climate, community engagement and participation, local access (land owner permission), safety and security, and logistical support were also important factors in the study. In addition, depending on the degree and location of trauma, carcasses may not have been suitable for sampling.

A target sample size of 30 individuals for each species per year was based on statistical study design considerations and not based on normal subsistence practices or reasonable logistic constraints. Previous studies of environmental contaminants in Alaskan subsistence-use foods are based on relatively few samples with larger sample sizes obtained when the food is readily available (*e.g.*, fish harvests [Evans *et al.* 2005; Wetzel *et al.* 2012]). For example, in O'Hara *et al.* (2003), sample population ranged from 6 to 15 caribou when relying on subsistence hunters, with more robust sample numbers achieved as a result of a mortality event in 1995, likely involving starvation.

Sample collection timing, location, and success were expectedly influenced by the village resident participants with emphasis on traditional ecological knowledge. ERM paid a participation honorarium to fishers who were willing to donate fish from their harvest ($20/broad whitefish; $10/Arctic cisco). Gas vouchers were provided for hunters willing to donate caribou tissue from their harvests or who otherwise assisted in sampling efforts.

The COPCs identified for this study tend to concentrate in fat, internal organs (*e.g.*, liver and kidney) and/or muscle tissues of animals. Common human consumption practices were taken into consideration. During the community workshops, Nuiqsut residents indicated that most parts of Arctic cisco and broad whitefish are part of the local diet.

Therefore, Arctic cisco and broad whitefish were analyzed as homogenized whole fish with stomach and intestines (and their contents) removed. From caribou, liver and muscle tissues were collected and analyzed as these tissues are consumed as subsistence foods and representative of a "muscle" and an "internal organ" known for filtering blood directly from the gut. Sampling procedures for each target species are presented in Section 2.3.

2.3. Sample Collection

The subsistence foods study field team always included two scientists from ERM and at least one Nuiqsut resident. Two scientists are needed in the field to properly collect samples under stringent chain-of-custody (COC) procedures, as well as for worker safety reasons. Hunters and fishers participating in the study were assigned unique identifications to maintain confidentiality. Sampling events were dependent on seasonality, weather conditions, and availability of subsistence foods. Specific dates for sampling events are shown in Table 1. The August 2014 sampling event was unsuccessful as a result of poor weather conditions, limiting field activities. Collection of Arctic cisco occurred in November 2014 and 2015 in conjunction with the Subsistence Fishery Monitoring on the Colville River Study conducted by ABR on behalf of CPAI.

Table 1: Sampling Events Summary, 2014-2015

Date	Species Collected (Sample Number (n), Sample Type)	Locations
11 – 18 July 2014	Broad whitefish (n=20); Caribou (n=5, liver and muscle)	Nigliq Channel, East Colville Channel
11 – 17 August 2014	None	Nuiqsut; Nigliq Channel
13 and 16 November 2014	Arctic cisco (n=30)	Nigliq Channel
10 – 20 August 2015	Broad whitefish (n=30); Caribou (n=4, liver; n=3, muscle)	Nigliq Channel, Nuiqsut Spur Road
2 and 6 November 2015	Arctic cisco (n=30)	Nigliq Channel

2.3.1. Broad Whitefish Collection

Collection of broad whitefish occurred 13 July 2014 and 11-15 August 2015. In 2014, 20 broad whitefish were collected by ERM biologists in cooperation with a fisher identified as F-01 from gillnets set in the Nigliq Channel near "Nigliq camp" (Figure 1). In 2015, a total of 30 broad whitefish were collected by ERM biologist with the participation of two Nuiqsut fishers, F-02 and F-03. One broad whitefish was collected on 11 August 2015 from F-02's gillnet, located approximately 0.5 mile downriver of Nuiqsut on the Nigliq Channel. Twenty-nine broad whitefish samples were collected 13-15 August 2015 from F-03's gill net set on the Nigliq Channel, across from Nuiqsut.

In both years, fish were collected directly from the gillnet, killed with a blow to the head, wrapped in ultra-clean Aluminum foil (VWR® Premium Aluminum Foil; VWR

International, LLC) and placed in large Ziploc® bags. All samples were labeled with unique sample ID, date (mm/dd/yyyy), and time of collection (military time). Digital photographs of each fish were taken (with a unique sample ID in the image) and the Global Positioning System (GPS) location of the sample site recorded. An aluminum foil field blank was collected at the sampling site and accompanied the fish samples from the field to the laboratory. In this case, the *field blank* ensured the sampling and storage materials used were handled in the same manner for collection, without introduction of an actual specimen.

COC procedures were followed as outlined in the *Subsistence Foods Study Sampling and Analysis Plan* (ERM 2015). Fish were kept frozen (-20 degrees Celsius [°C]) in a secure freezer (pad-locked freezer in a locked office) while in Nuiqsut, and then shipped by air under the custody of ERM personnel to the ERM Fairbanks office. Broad whitefish samples were shipped on 18 July 2014. During the 2015 sampling event, fish were shipped on 17 August and 20 August 2015.

All samples were individually identified and tracked by the use of COC forms. Samples were stored frozen (-20°C) at the ERM Fairbanks office (locked office) until shipment to the contract laboratory for processing on 29 July 2014 and 17 November 2015, respectively.

2.3.2. *Arctic Cisco Collection*

During both 2014 and 2015, ERM coordinated with ABR to collect Arctic cisco in conjunction with the Subsistence Fishery Monitoring for the Colville River Study. ABR biologist followed sampling protocols identical to the above-mentioned broad whitefish collection methods. Fifteen Arctic cisco samples were collected in cooperation with F-04 on 13 November 2014 from a gillnet set in the Nigliq Channel (Figure 1). On 16 November 2014, an additional 15 Arctic cisco samples were collected from the same location. In 2015, 15 samples were collected from F-04's gillnets on 2 November and 15 samples were collected from F-03's gillnet on 6 November.

All COC procedures were followed as outlined in the *Subsistence Foods Study Sampling and Analysis Plan* (ERM 2015). Fish were kept frozen (-20°C) in a secure freezer (pad-locked freezer in a locked office) while in Nuiqsut then shipped via Ravn Alaska to the ERM Fairbanks office on 17 November 2014 and 13 November 2015, respectively. All samples were individually identified and tracked by the use of COC forms. Samples were stored frozen (-20°C) at the ERM Fairbanks office (locked office) until shipment to the contract laboratory for processing on 8 December 2014 and 17 November 2015, respectively.

2.3.3. *Caribou Tissue Sampling*

ERM biologists collected liver and muscle (lumbus, also known as "tenderloin") tissue samples from five caribou harvested by Nuiqsut residents at two separate harvest locations in 2014. On 14 July 2014, two caribou were harvested by a hunting party consisting of hunters identified as H-01, H-02, and H-03 on the Colville River Delta southeast of Helmerick's Camp (Figure 1). Three caribou were harvested and sampled on 15 July 2014 on the west side of the Nigliq Channel by a hunting party of H-04, H-05, and H-06 (Figure 1).

In 2015, four caribou liver samples and three caribou muscle (tenderloin) samples were collected during the sampling event. An opportunistic sample of liver tissue was collected on 13 August 2015 when the field team encountered two hunters, H-07 and H-08, which had just shot and partially butchered a caribou. ERM took a primary and duplicate sample of the liver, collecting only internal tissue (external surface area was cut away) to avoid any potential external contamination on the surface of the organ. ERM did not collect a sample of the tenderloin as the carcass was already quartered and tied to the all-terrain vehicle (ATV). ERM noted all potential contaminants in the area, including close proximity to ATV exhaust fumes, road dust, and contact with rumen contents. On 17 August 2015, three caribou were harvested by H-05, H-09, and H-03, and then sampled by ERM biologists.

Aside from the noted exception above, the caribou tissue sampling protocols described herein were followed by ERM biologists. Prior to collecting tissue samples, external and internal examinations of each caribou were made to document the condition of the animal and to ensure sampled tissues were not likely to be overtly influenced by bullet fragments or other sources of contamination. Digital photographs were taken of each caribou (with unique sample ID in the image) as well as GPS coordinates of harvest sites. Approximately 40 to 70 grams of liver tissue and muscle tissue were collected for each sample.

Duplicate tissue samples were collected from each animal (designated with "a" or "b" suffix to unique sample ID). Tissue samples were double bagged into lab-certified clean Fluoro Ethylene Propylene bags (NASA JPG 5322.1 LVL 100; KNF Clean Room Products) and placed in an outer WhirlPac® bag as tertiary containment. Sample bags were immediately placed in a clean cooler and transported directly to a freezer in Nuiqsut. All samples were labeled with a unique sample ID, date (mm/dd/yyyy), and time of collection (military time). After soft tissue sampling the metatarsus bone and incisor bar were collected using lopping shears. Rump fat thickness was also measured.

Caribou tissue samples were kept frozen (-20°C) in a secure freezer (pad-locked freezer in a locked office) while in Nuiqsut, and were then shipped under the custody of ERM personnel to the ERM Fairbanks office on 18 July 2014 and 20 August 2015, respectively.

Samples were stored frozen (-20°C) at the ERM Fairbanks office (locked office) until shipment to the laboratory for processing. All samples were individually identified and tracked by the use of COC forms. Tissue samples for chemical analysis were shipped to the laboratory on 29 July 2014 and 17 November 2015, respectively. Caribou incisor samples were shipped to Matson's Laboratory, LLC in Millton, Montana on 2 September 2014 and 23 November 2015 for age determination.

2.4. Laboratory Analysis

Tissue samples were shipped frozen (-20°C) to ALS Environmental, Inc. (ALS) in Kelso, Washington for chemical analysis. All COC procedures were followed as outlined in the *Subsistence Foods Study Sampling and Analysis Plan* (ERM 2015).

All subsistence foods samples were analyzed for the following COPCs:

- Total elemental concentrations of As, Ba, Cd, Cu, Ni, Pb, V, and Zn by USEPA Method SW6020A;
- Total Se by USEPA Method SW7742;
- Total Hg by USEPA Method SW7471B; and
- PAHs by USEPA Method 8270D SIM.

Method 8270D SIM PAH analyses were performed in accordance with the Sampling and Analysis Plan specifications for broad whitefish and caribou samples collected in 2014; however, only 18 of 27 PAHs were analyzed due to a laboratory oversight. Additionally, PAH detection limits during 2014 and 2015 did not meet the project data quality objectives presented in the Sampling and Analysis Plan (ERM 2015; Appendix A). Detailed quality assurance reports (QARs) for all tissue results are provided in Appendix D.

2.5. Data Analysis

This report considers non-detect (ND) results as an analytical outcome that is below the method detection level (MDL). It is important for users of environmental laboratory data to have a clear understanding of the difference between an MDL and the method reporting limit (MRL). The MDL is an index of analytical low-level precision and accuracy, while the MRL is an index of the reliability of the concentration value reported. Values (concentrations) above the MDL, but below the MRL are considered estimated and labeled with qualifiers "J" or "B". The ALS laboratory defines the MDL as the minimum concentration that can be measured and reported with 99 percent (%) confidence that the concentration is greater than zero, but the exact concentration cannot be reliably quantified below the MRL. For instance, if the true concentration of an analyte in a sample is equal to the MDL, there is a 50% chance that the analyte will be detected. The MRL is the lowest amount of an analyte in a sample that can be quantitatively determined with stated, acceptable precision and accuracy under stated analytical conditions (*i.e.*, the lower limit of quantitation). Therefore, analyses are calibrated to the MRL, or lower. To take into account daily fluctuations in instrument sensitivity, analyst performance, and other factors, the MRL is established at three times the MDL (or greater). The goal of this project is to estimate COPCs "*detectability using standard analytical methods, and concentration if detected*"; therefore, results are reported to the MDL.

The ND result does not indicate that the chemical was absent, but rather that it was not found at or above the test equipment's detection limit. The ND results may be an effect of the variability and complexity of environmental systems (*e.g.*, sample heterogeneity, temporal fluctuation, chemical properties, fate and transport, elevated reporting limits, etc.), and can be used in statistical procedures (ADEC 2012; USEPA 2013). Statistics of interest were calculated using USEPA's ProUCL 5.0 software for data sets with ND results.

Nonparametric tests[1] have good test performance for a wide variety of distributions, and are not unduly affected by NDs and outliers. The Kaplan-Meier (KM) method was used to calculate the (cumulative) probability distribution and for estimating means and variances with ND data. A Tarone-Ware (TW) test (comparable to the Wilcoxon-Mann-Whitney test) was used to investigate differences in analyte concentrations between years. The TW test handles data sets with NDs and multiple MDLs and assumes comparable shapes and variability (USEPA 2013). Because the TW test depends on ranks, it is recommended that estimated concentrations (*i.e.*, sample measurements assigned unique magnitudes but labeled with qualifiers "J" [>MDL but <MRL]) be treated as detections for the purpose of computing the TW statistic. These estimated concentrations provide valuable statistical information about the relative ranking of each ND sample, even if they possess larger measurement uncertainty than fully quantified values (USEPA 2009). If concentrations of each analyte were found to be comparable between years, data sets were combined for statistical purposes. However, the caribou sample size was very low; thus, statistical power[2] was likely too limited to indicate a difference, if one existed. Groups that had no or few samples were dealt with on an individual basis. It should be noted that statistical significance[3] does not imply biological relevance.

Summary statistics are reported for each species or tissue type for which the analyte concentration was above the MDL in ≥50% of samples of that group. When >50%, but <100%, of samples were above the MDL, the KM method was used to replace ND results with values generated to match the distribution of the rest of the data set (for example, in Results and Tables this will be designated as "KM mean"). It should be noted that when all results are >MRL, the KM mean is equivalent to a reported arithmetic mean. Historically, the substitution method was used to replace ND results with a set value, typically one-half the MDL. However, the current best practice is to use statistical methods to handle ND results in data sets (ADEC 2012; USEPA 2013).

[1] A nonparametric test is a hypothesis test that does not require the population's distribution to be characterized by certain parameters, such as a normal distribution.

[2] Statistical power is the likelihood that a study will distinguish an effect of a certain size (Reinhart 2015).

[3] Significance is a statistical term that tells how sure you are that a difference or relationship exists (StatPac, Inc. 2016).

For situations where >50% of samples are ND, the mean and median were not determined and symbolized as "-" due to high uncertainty in the statistical estimates. The range of detected concentrations is reported for all analytes.

In some samples, matrix interference caused elevated detection limits, most notably for PAHs in 2014 Arctic cisco, 2015 broad whitefish, and 2015 caribou tissues. For samples with elevated MDLs in which the analytes were ND, the elevated MDL values were used by ProUCL to generate statistically derived ND values. Therefore, statistically derived means may be biased high. Potential bias due to matrix interference for affected samples is discussed in the QARs included as Appendix D.

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3. RESULTS AND DISCUSSION

Summary statistics for analytes detected are presented in Tables 2 through 4 below. Statistical test for differences between years require similar sample sizes and detection frequencies (*e.g.*, ≥50 % above MDL). However, analytes, detection frequencies, and sample size varied by species and year, so statistical comparisons were not always available. This is especially the case for the low sample sizes achieved for caribou. Element concentrations in tissues are reported on a milligrams per kilogram (mg/kg) wet weight (ww) basis, analogous to parts per million (ppm) ww. The PAH concentrations in tissues are reported as micrograms per kilogram (µg/kg) ww, analogous to parts per billion (ppb). Individual sample results and lab reports are provided in Appendix A. Field notes and data sheets are presented in Appendix C.

The MDLs and MRLs varied by sample and are reported in Appendix A. The range of detection limits is provided for each analyte in the summary tables below. Detection frequencies (# detect samples/total samples analyzed) per the MDL and MRL are also shown.

PAH detection limits did not meet the project data quality objectives presented in the Sampling and Analysis Plan (ERM 2015; Appendix A). Individual tissue samples with matrix interference are discussed in the QARs (Appendix D).

3.1. Broad Whitefish

3.1.1. Elements

Table 2a summarizes the results of total element concentrations detected in broad whitefish samples (eviscerated whole). All analytes were detected above the MDL in 100% of the samples. There were significant[4] differences ($\alpha \leq 0.05$) between 2014 and 2015 total concentrations of Cu (TW = 6.423, $p<0.0001$), Ni (TW= 4.122, $p<0.0001$), Se (TW=3.738, $p<0.0001$), and Zn (TW=-2.178, $p<0.05$), precluding pooling of the annual data sets. Concentrations of these analytes were greater in 2014 than 2015, with the exception of Zn, which was greater in 2015. As and Ni were detected above MRLs in 6 of 50 samples analyzed for As, and 4 of 50 samples analyzed for Ni; thus, conclusions derived using these data are of less certainty, but provide valuable information for detection comparisons (for As, 44 results >MDL, but <MRL; and for Ni, 46 results >MDL, but <MRL).

[4] The significance level, also denoted as alpha or α, is the probability of rejecting the null hypothesis (no difference) when it is true. For example, a significance level of 0.05 indicates a 5% risk of concluding that a difference exists when there is no actual difference (Frost 2015).

3.1.2. PAHs

The PAH summary results are presented in Table 2b for BDWF. Eighteen of the 27 PAHs were reported for 2014 data. The following nine PAHs were not reported:

- 1-methylphenanthrene
- 2,3,5-trimethylnaphthalene
- 2,6-dimethylnaphthalene
- 2-methylnaphthalene
- benzo(e)pyrene
- biphenyl
- carbazole
- dibenzothiophene
- perylene

At least 16 analytes were measured above the MDL in one or more samples of broad whitefish, indicating some PAHs are present in this species. We emphasize none of the PAH compounds were detected (>MDL) in 100% of the samples, and in most cases, detected chemicals were noted in 50% or less of the samples. Only six analytes were detected at high enough frequencies for mean and median calculations (Table 2b):

Statistical comparisons between years were not applicable to PAH analytes detected in broad whitefish for several reasons: 1) the same analytes were not analyzed in both years; 2) widely varying MDL and MRL values; and/or 3) <50% of samples reported results above MDL (which varied) for both years. Analytes with 0% detection frequencies in both years were reported as pooled data sets.

Table 2a: Summary of Element Concentrations (mg/kg ww) Detected above MDLs in Broad Whitefish (whole body)

Chemical	Year (n)	% Detection Frequency		MDL	MRL	Mean Concentration (±SD) (mg/kg ww)	Median	Range
		≥MDL	≥MRL					
Arsenic	2014 (20)	100%	20%	0.004 - 0.007	0.109 - 0.183	0.0926 (0.0659)	0.072	0.03 – 0.258
	2015 (30)	100%	6%	0.004 - 0.006	0.095 - 0.143	0.0631 (0.0445)	0.058	0.026 – 0.246
	2014-2015 (50)	100%	12%	0.004 - 0.007	0.095 - 0.183	0.075 (0.055)	0.062	0.026 -0.258
Barium	2014 (20)	100%	96%	0.0011 - 0.0018	0.0109 - 0.0183	2.004 (0.994)	1.95	0.63 - 3.9
	2015 (30)	100%	96%	0.0010 - 0.0014	0.0095 - 0.0143	2.633 (1.587)	2.0	0.622 - 6.2
	2014-2015 (50)	100%	96%	0.0010 - 0.0018	0.0095 - 0.0183	2.4 (1.4)	2.0	0.622 - 6.2
Cadmium	2014 (20)	100%	60%	0.0004 – 0.0007	0.0044 - 0.0073	0.0069 (0.0028)	0.0071	0.0023 - 0.0113
	2015 (30)	100%	50%	0.0008 - 0.0011	0.0038 - 0.0057	0.0059 (0.0031)	0.0051	0.0024 - 0.0147
	2014-2015 (50)	100%	54%	0.0004 - 0.0011	0.0038 - 0.0073	0.0063 (0.0030)	0.0054	0.0023 -0.0147
Copper	2014 (20)	100%	100%	0.004 - 0.007	0.022 - 0.037	0.76 (0.55)	0.58	0.419 - 2.8
	2015 (30)	100%	100%	0.004 - 0.006	0.019 - 0.029	0.378 (0.123)	0.362	0.258 -0.954
Lead	2014 (20)	100%	75%	0.00011 - 0.00018	0.0044 - 0.0073	0.0089 (0.0043)	0.0082	0.0037 - 0.0209
	2015 (30)	100%	40%	0.00010 - 0.00014	0.0038 - 0.0057	0.0095 (0.0037)	0.0094	0.0039 - 0.0199
	2014-2015 (50)	100%	54%	0.00010 - 0.00018	0.0038 - 0.0073	0 0.0092 (0.0039)	0.009	0.0037 - 0.0209
Mercury	2014 (20)	100%	96%	0.001	0.004 - 0.007	0.0245 (0.0099)	0.023	0.007 - 0.042
	2015 (30)	100%	100%	0.0008 - 0.0012	0.0040 - 0.0059	0.0277 (0.0156)	0.023	0.0122 - 0.081
	2014-2015 (50)	100%	98%	0.0008 - 0.0012	0.0040 - 0.007	0.026 (0.014)	0.023	0.007 - 0.081
Nickel	2014 (20)	100%	5%	0.004 - 0.007	0.044 - 0.073	0.038 (0.013)	0.037	0.021 - 0.061
	2015 (30)	100%	3%	0.004 - 0.006	0.038 - 0.057	0.025 (0.011)	0.021	0.013 - 0.059
Selenium	2014 (20)	100%	100%	0.011 -0.018	0.044 - 0.073	0.45 (0.147)	0.424	0.273 - 0.78
	2015 (30)	100%	100%	0.010 - 0.014	0.019 - 0.029	0.322 (0.092)	0.295	0.209 - 0.633
Vanadium	2014 (20)	100%	80%	0.002 - 0.003	0.044 - 0.073	0.128 (0.072)	0.102	0.04 - 0.28
	2015 (30)	100%	96%	0.001 - 0.002	0.038 - 0.057	0.122 (0.0453)	0.118	0.032 - 0.22
	2014-2015 (50)	100%	90%	0.001 - 0.003	0.038 - 0.073	0.12 (0.06)	0.11	0.032 - 0.28
Zinc	2014 (20)	100%	100%	0.013 – 0.022	0.109 - 0.183	18.3 (5.07)	17.1	10.8 - 33.6
	2015 (30)	100%	100%	0.011 – 0.017	0.095 - 0.143	20.2 (3.66)	20.3	13.8 - 28.4

MDL - Method Detection Limit
mg/kg - milligram per kilogram
MRL - Method Reporting Limit
SD - Standard Deviation
ww - wet weight

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Table 2b: Summary of PAH Concentrations (μg/kg ww) Detected in Broad Whitefish (whole body)

Chemical	Year (n)	% Detection Frequency		MDL	MRL	KM Mean Concentration (±SD) (μg/kg ww)	Median	Range
		≥MDL	≥MRL					
1-Methylnaphthalene	2015 (30)	16%	0%	0.11	0.5 - 5	-	-	<MDL - 1.1
1-Methylphenanthrene	2015 (30)	0%	0%	2.6 - 1800	2.6 - 1800	-	-	<MDL
2,3,5-Trimethylnaphthalene	2015 (30)	3%	0%	0.05 - 0.53	0.50 - 5	-	-	<MDL - 0.11
2,6-Dimethylnapthalene	2015 (30)	67%	10%	0.05 - 0.46	0.50 - 5	1.87 (3.05)	1.5	<MDL - 16
2-Methylnaphthalene	2014 (20)	0%	0%	1.2 - 1.2	4.7 - 5.	-	-	<MDL
	2015 (30)	23%	0%	0.12 - 1.2	0.99 - 10	-	-	<MDL - 1.2
Acenaphthene	2014 (20)	5%	0%	0.44 - 0.55	4.7 - 5	-	-	<MDL - 0.5
	2015 (30)	47%	0%	0.24	0.50 - 5	-	-	<MDL - 0.87
Acenaphthylene	2014 (20)	10%	0%	0.43 - 0.53	4.7 - 5	-	-	<MDL - 1.2
	2015 (30)	3%	0%	0.05 - 0.47	0.50 - 5	-	-	<MDL - 0.10
Anthracene	2014 (20)	0%	0%	0.36 - 0.38	4.7 - 5	-	-	<MDL
	2015 (30)	20%	10%	0.04 -0.38	0.50 - 5	-	-	<MDL - 9.8
Benzo(a)anthracene	2014 (20)	50%	0%	0.36 - 0.38	4.7 - 5	0.45 (0.12)	0.540	<MDL- 0.8
	2015 (30)	0%	0%	0.09 -11	0.50 - 11	-	-	<MDL
Benzo(a)pyrene	2014 - 2015 (50)	0%	0%	0.07 - 3.70	0.50 - 25	-	-	<MDL
Benzo(b)fluoranthene	2014 - 2015 (50)	0%	0%	0.07 - 3.30	0.50 - 25	-	-	<MDL
Benzo(e)pyrene	2015 (30)	0%	0%	0.05 - 2.5	0.50 - 25	-	-	<MDL
Benzo(g,h,i)perylene	2014 - 2015 (50)	0%	0%	0.01 - 4.80	0.50 - 25	-	-	<MDL
Benzo(k)fluoranthene	2014 - 2015 (50)	0%	0%	0.06 - 2.9	0.50 - 25	-	-	<MDL
Biphenyl	2015 (30)	23%	0%	0.09 - 0.87	0.50 - 5	-	-	<MDL - 1.5
Carbazole	2015 (30)	70%	6%	0.21 - 0.54	0.50 - 5	8.02 (8.57)	8.0	<MDL - 30
Chrysene	2014 - 2015 (50)	0%	0%	0.06 - 14	0.50 - 14	-	-	<MDL
Dibenzo(a,h)anthracene	2014 - 2015 (50)	0%	0%	0.09 - 4.3	0.50 - 25	-	-	<MDL
Dibenzofuran	2014 (20)	90%	0%	0.42 - 0.45	4.7 - 5	0.88 (0.41)	0.84	<MDL - 1.9
	2015 (30)	16%	0%	0.05 - 0.45	0.5 - 5	-	-	<MDL - 0.94
Dibenzothiophene	2015 (30)	3%	0%	0.09 - 0.86	0.5 - 5	-	-	<MDL - 0.81

Chemical	Year (n)	% Detection Frequency		MDL	MRL	KM Mean Concentration (±SD) (µg/kg ww)	Median	Range
		≥MDL	≥MRL					
Fluoranthene	2014 - 2015 (50)	0%	0%	0.14 - 0.49	0.5 - 5	-	-	<MDL
Fluorene	2014 (20)	40%	0%	0.49 - 0.52	4.7 - 5.0	-	-	<MDL - 0.71
	2015 (30)	16%	0%	0.05 - 0.52	0.5 - 5	-	-	<MDL - 1.1
Indeno(1,2,3-cd)pyrene	2014 - 2015 (50)	0%	0%	0.10 - 4.8	0.50 - 25	-	-	<MDL
Naphthalene	2014 (20)	0%	0%	1.4 - 1.5	4.7 - 5.0	-	-	<MDL
	2015 (30)	60%	3%	0.15 - 1.5	0.99 - 10	1.59 (1.17)	2	<MDL - 5
Perylene	2014 - 2015 (50)	0%	0%	0.12 - 6	0.50 - 25	-	-	<MDL
Phenanthrene	2014 (20)	70%	0%	0.62 - 0.66	4.7 - 5	0.81 (0.18)	0.870	<MDL - 1.3
	2015 (30)	10%	0%	0.07 - 0.66	0.50 - 5	-	-	<MDL - 0.83
Pyrene	2014 (20)	15%	0%	0.47 - 0.61	4.7 - 5.0	-	-	<MDL - 2
	2015 (30)	0%	0%	0.05 - 2.6	0.50 - 5	-	-	<MDL

MDL - Method Detection Limit

MRL - Method Reporting Limit

SD - Standard Deviation

µg/kg - microgram per kilogram

ww - wet weight

If more than ½ the results for a species were <MDL, the mean and median values were listed as "-", due to the uncertainty of estimating the concentrations.
KM = Kaplan-Meier; When >50% but <100% of samples were above the MDL, the Kaplan-Meier method was used to replace ND results with statistically derived values. When all results are ≥MDL, KM mean is equivalent to arithmetic mean.

3.2. Arctic Cisco

3.2.1. Elements

Table 3a presents a summary of total element concentrations detected in whole Arctic cisco samples. All analytes were detected above the MDL in 100% of the samples with the exception of Cd (57% detection frequency). No statistical differences ($\alpha = 0.05$) were noted by year for Ba ($TW = -1.549$, $p = 0.121$) and Se ($TW = 0.329$, $p = 0.743$), thus datasets for each of these analytes were pooled for statistical summaries. Pb, Cd, and V were only detected above MRLs in <50% of all samples and consequently are values with the greatest uncertainty.

3.2.2. PAHs

Results of PAH concentrations in Arctic Cisco are presented in Table 3b. Overall, 24 of the 27 PAH analytes were measured above the MDL in one or more of the Arctic cisco samples, indicating that some PAHs are present in this species. Concentrations of 1-methylphenanthrene, benzo(e)pyrene, and perylene were ND in Arctic cisco sampled in 2014 and 2015. Benzo(a)anthracene was found to be comparable ($TW = -0.735$, $p = 0.463$) between years and was pooled for statistical summaries. Other analytes meeting the requirements for statistical comparisons (>50% above MDL in both years) but found to have significantly different concentrations between years were 2,6-dimethylnaphthalene ($TW = 5.968$, $p < 0.0001$), dibenzofuran ($TW = 4.816$, $p < 0.0001$), naphthalene ($TW = 4.853$, $p < 0.0001$), and phenanthrene ($TW = 2.158$, $p < 0.05$). Differences in detection frequency between years may be a result of lower detection limits (MDL) in 2015 reported for 1-methylnaphthalene, 2-methylnaphthalene, biphenyl, fluorene, and naphthalene.

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Table 3a: Summary of Element Concentrations (mg/kg ww) Detected above MDLs in Arctic Cisco (whole body)

Chemical	Year (n)	% Detection Frequency		MDL	MRL	KM Mean Concentration (±SD) (mg/kg ww)	Median	Range
		≥MDL	≥MRL					
Arsenic	2014 (30)	100%	100%	0.005 - 0.007	0.135 - 0.175	1.3 (0.3)	1.25	0.787 - 2.2
	2015 (30)	100%	100%	0.005 - 0.008	0.125 - 0.191	1.53 (0.344)	1.46	0.822 - 2.68
Barium	2014-2015 (60)	100%	98%	0.0013 - 0.0019	0.0125 - 0.0191	0.289 (0.073)	0.308	0.113 - 0.428
Cadmium	2014 (30)	57%	3%	0.0011 - 0.0014	0.0054 - 0.007	0.0022 (0.0016)	0.0033	<MDL - 0.0072
	2015 (30)	100%	33%	0.0005 - 0.0008	0.0050 - 0.0076	0.00547 (0.00219)	0.0054	0.0024 - 0.0126
Copper	2014 (30)	100%	100%	0.005 - 0.007	0.027 - 0.035	0.455 (0.032)	0.452	0.406 - 0.522
	2015 (30)	100%	100%	0.005 - 0.008	0.025 - 0.038	0.495 (0.045)	0.493	0.416 - 0.614
Lead	2014 (30)	100%	3%	0.00014 - 0.00018	0.0054 - 0.007	0.0034 (0.0011)	0.00315	0.0019 - 0.0063
	2015 (30)	100%	3%	0.00013 - 0.00019	0.0050 - 0.0077	0.0029 (0.0012)	0.0026	0.0014 - 0.0075
Mercury	2014 (30)	100%	100%	0.001 - 0.003	0.005 - 0.014	0.011 (0.003)	0.011	0.006 - 0.023
	2015 (30)	100%	76%	0.0011 - 0.0016	0.0057 - 0.0078	0.0087 (0.0030)	0.0086	0.0043 - 0.0156
Nickel	2014 (30)	100%	43%	0.005 - 0.007	0.054 - 0.070	0.064 (0.029)	0.059	0.019 - 0.161
	2015 (30)	100%	83%	0.005 - 0.008	0.05 -0.076	0.097 (0.056)	0.079	0.041 - 0.306
Selenium	2014-2015 (60)	100%	100%	0.013 - 0.019	0.025 - 0.038	0.426 (0.064)	0.421	0.282 - 0.553
Vanadium	2014 (30)	100%	0%	0.002	0.054 - 0.07	0.022 (0.010)	0.02	0.008 - 0.057
	2015 (30)	100%	0%	0.002 - 0.003	0.050 - 0.076	0.03 (0.01)	0.03	0.012 - 0.05
Zinc	2014 (30)	100%	100%	0.016 - 0.021	0.135 - 0.175	10.5 (1.1)	10.5	8.7 - 13
	2015 (30)	100%	100%	0.015 - 0.023	0.125 - 0.191	12.0 (1.6)	12.0	8.5 - 16.3

MDL - Method Detection Limit
MRL - Method Reporting Limit
mg/kg - milligram per kilogram
SD - Standard Deviation
ww - wet weight
KM = Kaplan-Meier; mean calculated using statistically derived ND values. When all results are ≥MRL, KM mean is equivalent to arithmetic mean.

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Table 3b: Summary of PAH Concentrations (µg/kg ww) Detected above MDLs in Arctic Cisco (whole body)

Chemical	Year (n)	% Detection Frequency		MDL	MRL	KM Mean Concentration (±SD) (µg/kg ww)	Median	Range
		≥MDL	≥MRL					
1-Methylnaphthalene	2014 (30)	0%	0%	1.1 - 2.2	5.0 - 10	-	-	<MDL
	2015 (30)	100%	0%	0.32	4.6 - 5	0.54 (0.09)	0.54	0.38 - 0.74
1-Methylphenanthrene	2014–2015 (60)	0%	0%	0.28 - 0.78	4.6 - 10	-	-	<MDL
2,3,5-Trimethylnaphthalene	2014 (30)	0%	0%	0.53 - 1.1	5.0 - 10	-	-	<MDL
	2015 (30)	10%	0%	0.36	4.6 - 5	-	-	<MDL - 0.49
2,6-Dimethylnaphthalene	2014 (30)	90%	0%	0.46 - 0.92	5.0 - 10	1.27 (0.72)	1	<MDL - 3.4
	2015 (30)	63%	0%	0.37	4.6 - 5	0.46 (0.14)	0.46	<MDL - 1.0
2-Methylnaphthalene	2014 (30)	3%	0%	1.2 - 2.4	5.0 - 10	-	-	<MDL - 1.7
	2015 (30)	100%	0%	0.38	4.6 - 5	0.67 (0.10)	0.680	0.48 - 0.90
Acenaphthene	2014 (30)	33%	0%	0.47 - 0.94	5.0 - 10	-	-	<MDL - 1.7
	2015 (30)	6%	0%	0.51	4.6 - 5	-	-	<MDL - 0.53
Acenaphthylene	2014 (30)	20%	0%	0.46 - 0.92	5.0 - 10	-	-	<MDL - 1.4
	2015 (30)	0%	0%	0.28	4.6 - 5	-	-	<MDL
Anthracene	2014 (30)	50%	7%	0.38 - 18	5.0 - 18	1.93 (1.88)	2.5	<MDL - 7.7
	2015 (30)	3%	0%	0.18	4.6 - 5	-	-	<MDL - 0.52
Benzo(a)anthracene	2014 (30)	46%	13%	0.38 – 0.76	5.0 - 10			<MDL - 27
	2015 (30)	90%	0%	0.30 – 0.94	4.6 - 5	0.727 (0.162)	0.74	<MDL – 1.1
	2014 – 2015 (60)	68%	6%	0.38 - 0.76	5.0 - 10	3.54 (6.13)	0.82	<MDL - 27
Benzo(a)pyrene	2014 (30)	10%	3%	0.73 - 1.5	5.0 - 10	-	-	<MDL - 7.6
	2015 (30)	3%	0%	0.40	4.6 - 5	-	-	<MDL - 1
Benzo(b)fluoranthene	2014 (30)	23%	3%	0.66 - 1.4	5.0 - 10	-	-	<MDL - 8.4
	2015 (30)	3%	0%	0.36	4.6 - 5	-	-	<MDL - 0.53
Benzo(e)pyrene	2014 – 2015 (60)	0%	0%	0.37 - 2.2	4.6 - 10	-	-	<MDL
Benzo(g,h,i)perylene	2014 (30)	17%	3%	0.95 - 1.9	5.0 - 10	-	-	<MDL - 6.2
	2015 (30)	0%	0%	0.48	4.6 - 5	-	-	<MDL
Benzo(k)fluoranthene	2014 (30)	10%	3%	0.57 - 2.7	5.0 - 10	-	-	<MDL - 6.0
	2015 (30)	3%	0%	0.24	4.6 - 5	-	-	<MDL - 0.31
Biphenyl	2014 (30)	37%	0%	0.87 - 1.8	5.0 - 10	-	-	<MDL - 2.5
	2015 (30)	83%	0%	0.32	4.6 - 5	0.42 (0.10)	0.41	<MDL - 0.73

Chemical	Year (n)	% Detection Frequency		MDL	MRL	KM Mean Concentration (±SD) (µg/kg ww)	Median	Range
		≥MDL	≥MRL					
Carbazole	2014 (30)	20%	7%	0.54 - 1.8	5.0 - 10	-	-	<MDL - 8.2
	2015 (30)	0%	0%	0.38	4.6 - 5	-	-	<MDL
Chrysene	2014 (30)	33%	10%	0.55 - 1.1	5.0 - 10	-	-	<MDL - 24
	2015 (30)	3%	0%	0.25	4.6 - 5	-	-	<MDL - 0.43
Dibenzo(a,h)anthracene	2014 (30)	47%	3%	0.86 - 1.8	5.0 - 10	-	-	<MDL - 6.7
	2015 (30)	0%	0%	0.47	4.6 - 5	-	-	<MDL
Dibenzofuran	2014 (30)	90%	0%	0.45 - 0.9	5.0 - 10	0.83 (0.37)	0.84	<MDL - 2.3
	2015 (30)	100%	0%	0.45	4.6 - 5	0.50 (0.07)	0.49	0.35 - 0.66
Dibenzothiophene	2014 (30)	0%	0%	0.86 - 1.8	5.0 - 10	-	-	<MDL
	2015 (30)	6%	0%	0.20	4.6 - 5	-	-	<MDL - 0.22
Fluoranthene	2014 (30)	23%	3%	0.49 - 0.98	5.0 - 10	-	-	<MDL - 7.5
	2015 (30)	20%	0%	0.32	4.6 - 5	-	-	<MLD - 1.4
Fluorene	2014 (30)	47%	0%	0.52 - 1.8	5.0 - 10	-	-	<MDL - 4.7
	2015 (30)	100%	0%	0.29	4.6 - 5	1.19 (0.25)	1.150	0.88 - 1.9
Indeno(1,2,3-cd)pyrene	2014 (30)	20%	7%	0.96 - 2	5.0 - 10	-	-	<MDL - 8.8
	2015 (30)	0%	0%	0.48	4.6 - 5	-	-	<MDL
Naphthalene	2014 (30)	57%	3%	1.5 - 3	5.0 - 10	2.33 (1.0)	2.6	<MDL - 5.3
	2015 (30)	100%	0%	0.23	4.6 - 5	0.91 (0.12)	0.94	0.67 - 1.1
Perylene	2014 – 2015 (60)	0%	0%	0.37 - 2.4	4.6 - 10	-	-	<MDL
Phenanthrene	2014 (30)	90%	3%	0.66 - 1.5	5.0 - 10	1.6 (1.09)	1.4	<MDL - 6.1
	2015 (30)	100%	0%	0.12	4.6 - 5	1.09 (0.24)	1.1	0.77 - 2.0
Pyrene	2014 (30)	13%	3%	0.5 - 1	5.0 - 10	-	-	<MDL - 5.5
	2015 (30)	20%	0%	0.17	4.6 - 5	-	-	<MDL - 0.95

MDL - Method Detection Limit
MRL - Method Reporting Limit
SD - Standard Deviation
µg/kg - microgram per kilogram
ww - wet weight
If more than ½ the results for a species were <MDL, the mean and median values were listed as "-", due to the uncertainty of estimating the concentrations.
KM = Kaplan-Meier; When >50% but <100% of samples were above the MDL, the Kaplan-Meier method was used to replace ND results with statistically derived values. When all results are ≥MDL, KM mean is equivalent to arithmetic mean.

3.3. Caribou

3.3.1. *Elements*

Table 4a presents element concentrations found in caribou liver and muscle tissue. Caribou sampled in 2014 ranged in age from 5 to 10 years. In 2015, caribou ranged in age from 1 to 5 years. Average age of caribou in 2014 was 2.4 compared to an average of 8.2 in 2015. As a result of differences in age of caribou, these annual data sets are considered different cohorts and are reported separately as well as pooled when meeting the data standards (>50% of samples reported results above MDL for both years).

For liver tissue, all element concentrations were detected at or above the MDL in 100% of samples, with the exception of As and V, values for which are of greater uncertainty, but valuable for data comparisons. Only three elements did not have 100% of the samples above the MRL (As, Ni, and V), thus elements analyses for liver in most cases provides reliable data. No differences between years were found for Ba, Cu, Pd, Ni, and Zn, thus data sets were pooled for statistical summaries. Significant differences ($\alpha \leq 0.05$) in concentrations of elements Cd (TW = 2.704, $p < 0.01$), Hg (TW = -2.506, $p < 0.05$), and Se (TW = -2.921, $p < 0.01$) between years were observed, precluding pooling of annual data sets. Higher concentrations of Cd in 2014 liver tissues compared to 2015 may be a result of age differences of caribou sampled. Again, average age of caribou in 2014 was 2.4 compared to an average of 8.2 in 2015. However, Hg and Se concentrations were greater in 2015 than 2014.

In muscle tissue, all elements were detected at high enough frequencies for mean and median to be calculated, with the exception of V, As in 2014, and Hg in 2015. Vanadium was detected in only one sample at a concentration of 0.003 mg/kg ww. However, we do caution element concentrations were detected above the MDL, but not the MRL for any sample for As, Cd, Pb, Hg in 2015, and V; therefore, conclusions are more uncertain. Barium, Cu, Ni, Se, and Zn concentrations were comparable between years and data sets were pooled for statistical summaries.

3.3.2. *PAHs*

Summaries of PAH concentrations in caribou liver and muscle tissues are presented in Table 4b. As with broad whitefish, only 18 of the 27 PAHs listed in the Sampling and Analysis Plan were reported for 2014 results. The following nine PAHs were not reported:

- 1-methylphenanthrene
- 2,3,5-trimethylnaphthalene
- 2,6-dimethylnaphthalene
- 2-methylnaphthalene
- benzo(e)pyrene

- biphenyl
- carbazole
- dibenzothiophene,
- perylene.

The majority of PAH analytes were not detected above MDLs in all caribou samples and are therefore excluded from Table 4b. Only those analytes demonstrating a detected concentration are shown. A complete list of PAH analytes is included in Appendix A. None of the analytes were determined to be present at or above the MRL for either muscle or liver.

Benzo(a)anthracene was measured above the MDL in all 2014 liver and muscle samples, but was not detected in tissue samples collected in 2015. This is likely the result of the shift in the MDL and MRL from 0.35 to 0.76 and 5 to 10, respectively.

Carbazole was detected in half of the samples collected in 2015; while other analytes were detected less frequently, if at all. Table 4b provides summary statistics for benzo(a)anthracene and carbazole concentrations (liver only). All results for PAHs in the 2015 caribou tissues reported elevated detection levels by the lab with the exception of one sample, RANG-2015-04-Ma, resulting in the 1/3 detection frequency observed for several PAH analytes in muscle tissue.

Table 4a: Summary of Element Concentrations (mg/kg ww) Detected above MDLs in Caribou Liver and Muscle Tissue

Chemical	Year (n)	% Detection Frequency		MDL	MRL	KM Mean Concentration (±SD) mg/kg ww	Median	Range
		≥MDL	≥MRL					
Liver Tissue								
Arsenic	2014 (5)	0%	0%	0.006	0.142 - 0.158	-	-	<MDL
	2015 (4)	75%	0%	0.005 - 0.006	0.127 - 0.147	0.010 (0.002)	0.011	<MDL - 0.012
Barium	2014 (5)	100%	100%	0.0014 - 0.0016	0.0142 - 0.0158	0.0447 (0.0062)	0.0449	0.0358 - 0.0515
	2015 (4)	100%	100%	0.0013 - 0.0015	0.0127 - 0.0147	0.0612 (0.0199)	0.0567	0.0424 - 0.0889
	2014-2015 (9)	100%	100%	0.0013 - 0.0016	0.0127 - 0.0158	0.052 (0.0156)	0.0494	0.0358 - 0.0889
Cadmium	2014 (5)	100%	100%	0.0006	0.0057 - 0.0063	0.699 (0.224)	0.705	0.345 - 0.930
	2015 (4)	100%	100%	0.0010 - 0.0012	0.0051 - 0.0059	0.236 (0.095)	0.260	0.102 - 0.321
Copper	2014 (5)	100%	100%	0.006	0.028 - 0.032	10.18 (4.04)	10.7	3.7 - 14
	2015 (4)	100%	100%	0.005 – 0.006	0.025 - 0.029	7.95 (4.74)	6.31	4.28 - 14.9
	2014-2015 (9)	100%	100%	0.005 - 0.006	0.025 - 0.032	9.19 (4.24)	9.5	3.7 - 14.9
Lead	2014 (5)	100%	100%	0.00014 - 0.00016	0.0057 - 0.0063	0.0159 (0.0032)	0.0156	0.0124 - 0.0203
	2015 (4)	100%	100%	0.00013 - 0.00015	0.0051 - 0.0059	0.0197 (0.0161)	0.0138	0.0084 - 0.043
	2014-2015 (9)	100%	100%	0.00013 - 0.00016	0.0051 - 0.0063	0.018 (0.010)	0.0156	0.0084 - 0.043
Mercury	2014 (5)	100%	100%	0.001	0.006	0.020 (0.01)	0.02	0.01 - 0.03
	2015 (4)	100%	100%	0.0011 - 0.0012	0.0055 - 0.0061	0.044 (0.0156)	0.0481	0.0225 - 0.0574
Nickel	2014 (5)	100%	100%	0.006	0.057 - 0.063	0.148 (0.051)	0.17	0.087 - 0.209
	2015 (4)	100%	50%	0.005 – 0.006	0.051 - 0.059	0.318 (0.448)	0.14	0.021 - 0.971
	2014-2015 (9)	100%	78%	0.005 - 0.006	0.051 - 0.063	0.224 (0.291)	0.17	0.021 - 0.971
Selenium	2014 (5)	100%	100%	0.014 - 0.016	0.057 - 0.063	0.181 (0.046)	0.173	0.143 - 0.255
	2015 (4)	100%	100%	0.013 - 0.015	0.025 - 0.029	0.383 (0.042)	0.385	0.34 - 0.423
Vanadium	2014 (5)	20%	0%	0.002	0.057 - 0.063	-	-	<MDL - 0.002
	2015 (4)	50%	0%	0.002	0.051 - 0.059	0.0025 (0.0008)	0.003	<MDL - 0.004
Zinc	2014 (5)	100%	100%	0.017 - 0.019	0.142 - 0.158	30.36 (2.25)	30.5	28 - 33.3
	2015 (4)	100%	100%	0.015 - 0.018	0.127 - 0.147	30.03 (9.01)	26	24.6 - 43.5
	2014-2015 (9)	100%	100%	0.015 - 0.019	0.127 - 0.158	30.21 (5.746)	28.3	24.6 - 43.5
Muscle Tissue								
Arsenic	2014 (5)	20%	0%	0.005	0.128 - 0.132	-	-	<MDL - 0.006
	2015 (3)	100%	0%	0.005	0.118 - 0.120	0.009 (0.003)	0.009	0.006 - 0.012

Chemical	Year (n)	% Detection Frequency		MDL	MRL	KM Mean Concentration (±SD) mg/kg ww	Median	Range
		≥MDL	≥MRL					
Barium	2014 (5)	100%	100%	0.0013	0.0128 - 0.0132	0.0243 (0.0017)	0.0241	0.0224 - 0.0263
	2015 (3)	100%	100%	0.0012	0.0118 - 0.0120	0.0281 (0.0040)	0.0259	0.0258 - 0.0327
	2014-2015 (8)	100%	100%	0.0012 - 0.0013	0.0118 - 0.0132	0.0257 (0.0032)	0.0258	0.0224 - 0.0327
Cadmium	2014 (5)	100%	0%	0.0005	0.0051 - 0.0053	0.0030 (0.0008)	0.0027	0.0022 - 0.0044
	2015 (3)	100%	0%	0.0009 - 0.0010	0.0047 - 0.0048	0.0012 (0.0003)	0.001	0.001 - 0.0016
Copper	2014 (5)	100%	100%	0.005	0.026	2.9 (0.37)	2.8	2.5 – 3.5
	2015 (3)	100%	100%	0.005	0.024	3.05 (0.42)	3.1	2.63 - 3.46
	2014-2015 (8)	100%	100%	0.005	0.024 - 0.026	3.0 (0.36)	2.9	2.5 - 3.5
Lead	2014 (5)	100%	0%	0.00013	0.0051 - 0.0053	0.0012 (0.0004)	0.001	0.0004 - 0.0015
	2015 (3)	100%	0%	0.00012	0.0047 - 0.0048	0.002 (0.0004)	0.002	0.0016 - 0.0024
Mercury	2014 (5)	80%	20%	0.001	0.005	0.005 (0.006)	0.002	<MDL - 0.017
	2015 (3)	0%	0%	0.0010	0.0049 - 0.0052	-	-	<MDL
Nickel	2014 (5)	100%	100%	0.005	0.051 - 0.053	0.146 (0.033)	0.145	0.098 - 0.19
	2015 (3)	100%	100%	0.005	0.047 - 0.048	0.218 (0.115)	0.2	0.113 - 0.341
	2014-2015 (8)	100%	100%	0.005	0.047 - 0.053	0.173 (0.076)	0.152	0.098 - 0.341
Selenium	2014 (5)	100%	100%	0.013	0.051 - 0.053	0.103 (0.018)	0.102	0.083 - 0.123
	2015 (3)	100%	100%	0.012	0.024	0.12 (0.018)	0.119	0.103 - 0.138
	2014-2015 (8)	100%	100%	0.012 - 0.013	0.024 - 0.053	0.109 (0.018)	0.111	0.083 - 0.138
Vanadium	2014 (5)	20%	0%	0.002	0.051 - 0.053	-	-	<MDL - 0.003
	2015 (3)	0%	0%	0.002	0.047 - 0.048	-	-	<MDL
Zinc	2014 (5)	100%	100%	0.015 – 0.016	0.128 - 0.132	24.22 (0.698)	24.3	23.3 - 25.2
	2015 (3)	100%	100%	0.014	0.118 - 0.120	25.6 (3.02)	25.2	22.8 - 28.8
	2014-2015 (8)	100%	100%	0.014 - 0.016	0.118 - 0.132	24.74 (1.842)	24.35	22.8 - 28.8

MDL - Method Detection Limit

mg/kg - milligram per kilogram

MRL - Method Reporting Limit

SD - Standard Deviation

ww - wet weight

If over ½ the results for a species were <MDL, the mean and median values were listed as "-", due to the uncertainty of estimating the concentrations.
KM = Kaplan-Meier; When >50% but <100% of samples were above the MDL, the Kaplan-Meier method was used to replace ND results with statistically derived values. When all results are ≥MDL, KM mean is equivalent to arithmetic mean.

Table 4b: Summary of PAH Concentrations (µg/kg ww) in Caribou Liver and Muscle

Chemical	Year (n)	% Detection Frequency n=5		MDL	MRL	KM Mean Concentration (±SD) (µg/kg ww)	Median	Range
		≥MDL	≥MRL					
Liver Tissue								
Anthracene	2015 (4)	25%	0%	0.76	9.6 - 10	-	-	<MDL - 19
Benzo(a)anthracene	2014 (5)	100%	0%	0.35 - 0.38	4.6 - 5	0.47 (0.09)	0.43	0.40 - 0.62
	2015 (4)	0%	0%	0.76	9.6 - 10	-	-	<MDL
Fluorene	2014 (5)	40%	0%	0.48 - 0.52	4.6 - 5	-	-	<MDL - 0.92
	2015 (4)	0%	0%	1.1	9.6 - 10	-	-	<MDL
Carbazole	2015 (4)	50%	0%	1.1	9.6 - 10	17.60 (17.40)	34	<MDL - 42
Muscle Tissue								
1-Methylnaphthalene	2015 (3)	33%	0%	0.13 - 0.55	0.55 - 2.5	-	-	<MDL - 0.19
2,6-Dimethylnaphthalene	2015 (3)	33%	0%	0.051 - 0.23	0.55- 2.5	-	-	<MDL - 0.066
2-Methylnaphthalene	2015 (3)	33%	0%	0.14 - 0.60	1.1 - 5.0	-	-	<MDL - 0.25
Acenaphthene	2015 (3)	33%	0%	0.052 - 0.24	0.55 - 2.5	-	-	<MDL - 0.12
Anthracene	2015 (3)	33%	0%	0.042 - 2.5	0.55 - 2.5	-	-	<MDL - 0.048
Benzo(a)anthracene	2014 (5)	100%	0%	0.37 - 0.38	4.8 - 5	0.62 (0.22)	0.55	0.470 - 1.0
	2015 (3)	0%	0%	0.042 – 0.19	0.55 - 2.5	-	-	<MDL
Biphenyl	2015 (3)	33%	0%	0.096 - 0.44	0.55 - 2.5	-	-	<MDL - 0.32
Chrysene	2014 (5)	20%	0%	0.53 - 0.55	4.8 - 5	-	-	<MDL - 0.68
	2015 (3)	0%	0%	0.061 – 0.28	0.55 - 2.4			<MDL
Dibenzofuran	2015 (3)	33%	0%	0.050 - 0.23	0.55 - 2.5	-	-	<MDL – 0.23
Fluoranthene	2014 (5)	20%	0%	0.47 - 0.49	4.8 - 5	-	-	<MDL - 0.50
	2015 (3)	0%	0%	0.15 – 0.25	0.55 – 2.5			<MDL
Fluorene	2014 (5)	40%	0%	0.5 - 0.52	4.8 - 5	-	-	<MDL - 0.58
	2015 (3)	33%	0%	0.057 - 0.26	0.55 - 2.5	-	-	<MDL - 0.22
Naphthalene	2014 (5)	0%	0%	1.5	4.8 – 5.0			<MDL
	2015 (3)	33%	0%	0.17 - 0.75	1.1 - 5.0	-	-	<MDL - 0.42
Phenanthrene	2014 (5)	20%	0%	0.64 - 0.66	4.8 - 5	-	-	<MDL - 1.1
	2015 (3)	33%	0%	0.073 - 0.33	0.55 - 2.5	-	-	<MDL - 0.14
Pyrene	2014 (5)	20%	0%	0.48 - 0.5	4.8 - 5	-	-	<MDL - 0.72
	2015 (3)	0%	0%	0.055 – 0.25	0.55 – 2.5			<MDL

MDL - Method Detection Limit
MRL - Method Reporting Limit
PAHs not detected across both years listed in Appendix A
SD - standard deviation
µg/kg - micrograms per kilogram
ww - wet weight
If more than ½ the results for a species were <MDL, the mean and median values were listed as "-", due to the uncertainty of estimating the concentrations.
KM = Kaplan-Meier; When >50% but <100% of samples were above the MDL, the Kaplan-Meier method was used to replace ND results with statistically derived values. When all results are ≥MDL, KM mean is equivalent to arithmetic mean.

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4. DATA COMPARISONS WITH LITERATURE VALUES

As a frame of reference, COPC concentrations from this study are compared to Alaska-based monitoring programs, as well as circumpolar concentrations reported in the scientific literature. Some monitoring programs, such as the ADEC Fish Tissue Monitoring Program (FTMP), provide web-accessible data, rather than published reports. These data are generally most relevant to this monitoring effort and are included in comparisons.

With respect to fish data, we focused our comparison of data to information from the ADEC and the NSB, allowing for the most regional and taxonomic relevance, when possible. Specifically, data on Cd, Pd, Ni, Se, and Hg concentrations from Arctic cisco fillets, least cisco fillets, and humpback whitefish fillets collected from the Colville River are used for comparisons to the fish sampled in 2014-2015 (Howard Teas, pers. comm., 21 March 2014). These data, along with other FTMP data from Alaska were graciously provided by the ADEC Office of the State Veterinarian and/or provided via their FTMP website: http://dec.alaska.gov/eh/vet/fish.htm.

In many cases, we have not included comparisons to other studies of "contaminants in fish" because; 1) the fish species are different, 2) a form of whole fish were not utilized (matrix mismatch), 3) studies were not from North America, 4) studies were not from the region of interest within the North Slope or more specifically the Colville River, 5) some studies lumped fish species together; and, 6) other reasons that require numerous caveats to be considered. Thus, when we do make comparisons we are careful to describe associated caveats. Appendix E provides a summary of publications that address important contaminants issues in fish, but are less directly relevant to the Nuiqsut study.

For assessing chemical concentrations in caribou, there was emphasis placed on manuscripts from the scientific literature from Alaska and across the Arctic as these sources of information were readily available and directly relevant to the species, herds, regions, chemicals studied, and tissues used.

It is important to note, when comparing concentration data, that analytical methods, units of measurements, reporting limits and tissue types can vary by study. The units of measure included herein for comparisons are presented in the same manner as reported by the studies. This study reports element concentrations in mg/kg ww and PAH concentrations in µg/kg ww. For comparisons, mg/kg = ppm = microgram per gram (µg/g); and µg/kg = ppb = nanogram per gram (ng/g) are analogous. Noted throughout, a few studies report in dry weight (dw) and we report in ww; thus, values are not directly comparable. The initial contaminant concentration measured by the laboratory is considered an "as-is" or "wet weight" basis result because no calculations have been made to compensate for the moisture content of the tissue. Contaminant concentrations reported on a dw basis are higher than the same result on an ww basis.

Biological tissue samples are typically reported on a ww basis. The dry weight results can be calculated as follows: concentration (dw) = concentration (ww)/ (100 * percent solids). Percent solids results for this study are reported in Appendix A.

The reporting limit values were sometimes different between studies due to different analytical instruments and methods. In these instances, a direct comparison could not be made for ND results.

4.1. Broad Whitefish

For broad whitefish samples, reliable comparisons for Cu, Hg, Se and Zn are possible as these represent consistently detected elements above MRLs in many studies. For some of the analytes detected in broad whitefish, there is a range of values for these results, which includes not being detected or not being reportable (unreliable estimate of concentration due to relatively low concentration, <MRL). For Cd and Pb, only 54% of the samples contained elements above the MDL, thus limiting use of those data. The least helpful are for those analytes not detected in 50% or more of the samples provided, such as for As and Ni.

4.1.1. Elements

4.1.1.1. Barium

Barium was reported above MRLs in our study; however, comparison is difficult due to the limited published data for this element as compared to the other elements in this study. Our efforts may be in effect, establishing background concentrations for this specific element (Ba) in fish near Nuiqsut. We do note that Guay and Falkner (1998) indicated that the Mackenzie River Ba concentrations (138 to 574 nanomole [nmol] per liter [L]) were clearly much higher than those measured in samples associated with any of the Eurasian Arctic rivers (12 to 175 nmol/L), indicating this region (Beaufort Sea) may be high in background Ba concentrations.

Barium was detected in broad whitefish at 2.0 mg/kg ww (mean) over a range of 0.63 - 3.9 for fish sampled near Nuiqsut in 2014 and 2015. These concentrations vary in comparison (*i.e.*, relatively higher or lower) to concentrations reported in the literature (not all literature cited were Arctic studies). Yilmaz *et al*. (2010) reported mean concentrations (micrograms per gram [µg/g] ww) and associated standard deviations (means ± SD) of Ba in muscle of three demersal[5] fish (from Iskenderun Bay, Turkey) as 6.96 ± 0.11 (*Triglia lucerna*), 3.44 ± 0.97 (*Lophius budegassa*) 5.18 ± 2.28 (*Solea lascaris*), clearly higher than those from Nuiqsut. These authors also noted that the Ba concentrations were higher in muscle than in the other tissues analyzed for in *T. lucerna*. Jadeen *et al*. (2012) and reported mean Ba concentrations in herbivore and carnivore fish (in Pakistan) as 0.11 and 0.17 µg/g, which are lower than detected concentrations in broad whitefish. For sterlet (also known as sturgeon) in Serbia (Danube River), Jaric *et al*.

[5] Demersal fish live and feed on or near the bottom of a body of water.

(2010) reports Ba concentrations (mean ± SD; range in parentheses) as dw at 3.631 ± 2.350 (1.250 - 13.542). Since this is reported in dw, it is not directly comparable to the broad whitefish concentrations of Ba. Visnjic-Jeftic *et al*. (2010) reports a mean concentration of Ba in muscle (µg/g dw) of the Pontic shad (Danube River) as 0.355 ± 0.155, which is lower than for the broad whitefish.

4.1.1.2. Copper

The mean ± SD (range) in ppm ww of Cu reported by the ADEC for round whitefish fillet is 0.27 ± 0.08 (ND - 0.48), for whole humpback whitefish is 1.2 ± 0.58 (0.31 - 2.4), for broad whitefish fillet is 0.28 ± 0.17 (ND - 0.48), and for least cisco fillet is 0.26 ± 0.06 (0.19 - 0.35) (ADEC 2016b). These values are mostly within the range for broad whitefish sampled in 2014 and 2015 near Nuiqsut, and the mean concentrations of 0.76 mg/kg ww (2014) and 0.38 mg/kg ww (2015), and maximum values of 2.8 mg/kg ww (2014) and 0.95 mg/kg ww (2015), compare well to whole humpback whitefish reported by the ADEC. Higher concentrations are expected in fish analyzed as whole fish, versus fillets, as liver is well known for storing elements such as Cu. We have already noted that there is a statistically significant difference in mean concentrations by year. The biological significance of the higher mean and maximum concentration of Cu in 2014 is unclear. We did not sample and analyze liver; therefore, we cannot make a more complete assessment for this element.

4.1.1.3. Mercury

For Hg, Arctic cisco, least cisco, and humpback whitefish collected from the Colville River had mean concentrations (range) of 0.019 (0.015 - 0.025), 0.042 (0.026 - 0.063), and 0.044 (0.028 - 0.074) ppm ww, respectively (Howard Teas, pers. comm., 21 March 2014). For broad whitefish fillet analyzed by the ADEC, the mean Hg concentration was 0.065 ppm ww (ND - 0.21) (ADEC 2016c). This compares well to mean Hg concentrations in the broad whitefish sampled near Nuiqsut in 2014-2015 of 0.026 (0.007 - 0.081) mg/kg ww. This consistency in Hg concentrations for the whitefish species is not surprising as these fish are from the same region and have relatively similar feeding ecologies. Species that tend to be at higher trophic levels (*e.g.*, lake trout) will have much higher Hg concentrations (Evans *et al*. 2005).

4.1.1.4. Selenium

Fillets of Alaskan broad whitefish and Colville River humpback whitefish analyzed by the ADEC had mean Se concentrations (range) of 0.39 (0.19 - 2.3) and 0.49 (0.39 - 0.74) ppm ww, respectively (ADEC 2016d; Howard Teas, pers. comm., 21 March 2014). These data compare well to mean Se concentrations in broad whitefish sampled near Nuiqsut in 2014 of 0.45 mg/kg ww and in 2015 of 0.32 mg/kg ww, and are consistent with Se concentration findings for other Alaskan whitefish (ADEC 2016d). This is expected for an essential element under homeostatic control (physiologic), such as Se. As previously mentioned, Se concentrations were significantly different by year.

4.1.1.5. Zinc

As noted above, the ADEC FTMP does not monitor for Zn; therefore, published reports of similar taxonomic species are used to compare Zn concentration in broad whitefish.

Zinc is an essential element that was determined to be at a mean concentration of 18.3 mg/kg ww (range; 10.8 - 33.6) in 2014 and 20.2 mg/kg ww (range; 13.8 – 28.4) in 2015 in broad whitefish sampled near Nuiqsut. Zinc concentrations were determined to be statistically different by year, but is likely not biologically significant with a 1.9 mg/kg ww difference (a difference of approximately 10%). Yilmaz *et al*. (2010) reported mean Zn concentrations (µg/g ww) and associated standard deviations (means ± SD) in muscle tissue from three demersal fish as 28.2 ± 9.39 (*Triglia lucerna*), 20.8 ± 11.3 (*Lophius budegassa*) 27.5 ± 5.22 (*Solea lascaris*), which are slightly higher as compared to the broad whitefish results. Jadeen *et al*. (2012) reported mean Zn concentrations in herbivore and carnivore fish as 29.60 and 48.47 µg/g, which are higher than detected concentrations in broad whitefish. However, Uysal *et al*. (2008) determined mean ± SD Zn content (mg/kg ww) in muscle for six species (*L. mormyrus, L. aurata, C. labrasus, M. cephalus, S. aurata,* and *L. ramada*) as 5.83 ± 0.5, 4.27 ± 0.3, 7.24 ± 0.9, 5.52 ± 0.6, 7.09 ± 0.6, 12.28 ± 0.5, respectively, which are lower than Zn concentrations detected in broad whitefish from Nuiqsut. The Zn concentrations in broad whitefish from Nuiqsut are within the expected range.

4.1.1.6. Arsenic

The ADEC's data on Arctic cisco, least cisco, and humpback whitefish from the Colville River report mean concentrations (ranges) of 0.78 (0.57 - 1.2), 0.89 (0.59 - 1.8), and 0.70 (0.48 - 1.1) ppm ww, respectively (Howard Teas, pers. comm., 21 March 2014). This compares to a maximum As concentration in broad whitefish near Nuiqsut of 0.258 kg/mg ww, which is lower. However, the ADEC determine a mean As concentration for broad whitefish fillet to be 0.05 (ND – 0.065) ppm ww (26 of the 34 samples were ND, which is lower compared to the range for our data) (ADEC 2016e).

4.1.1.7. Cadmium

Arctic cisco, least cisco, and humpback whitefish from the Colville River had mean Cd concentrations below detection (MRL = 0.01 mg/kg ww) according to data provided by the ADEC (Howard Teas, pers. comm., 21 March 2014). This compares to a mean Cd concentration in broad whitefish of 0.0063 mg/kg ww, representing 27 fish with concentrations high enough to report (54% >MRL), but still suggesting very low concentrations of Cd in fish near Nuiqsut. Thirty-four broad whitefish analyzed by the ADEC for Cd did not contain detectable amounts (MRL = 0.05 mg/kg ww) of Cd (ADEC 2016f). Concentrations of Cd are very low in whitefish muscle.

4.1.1.8. Lead

Arctic cisco, least cisco, and humpback whitefish from the Colville River had mean Pb concentrations below detection (MRL = 0.03 mg/kg ww) according to data provided by the ADEC (Howard Teas, pers. comm., 21 March 2014). This compares to mean Pb concentrations in broad whitefish sampled near Nuiqsut in 2014 and 2015 of 0.009 mg/kg ww. We do note that one least cisco from the Colville River had a concentration of 0.035 ppm ww (Howard Teas, pers. comm., 21 March 2014). Thirty-four broad whitefish analyzed by the ADEC for Pb did not contain detectable (MRL = 0.05 mg/kg ww) amounts of Pb (ADEC 2016g).

4.1.1.9. Nickel

For Ni, Arctic cisco, least cisco, and humpback whitefish had mean concentrations below detection (MRL = 0.05 mg/kg ww) according to data provided by the ADEC (Howard Teas, pers. comm., 21 March 2014). However, the ADEC did report maximum values of 0.092, 0.14, and 0.088 ppm ww, respectively. Comparing mean Ni concentrations in broad whitefish of 0.038 and 0.025 mg/kg ww in 2014 and 2015, respectively, indicates a statistical difference by year, though only two samples reported Ni concentrations above the MRL (0.038-0.073 mg/kg ww). The maximum values in 2014 and 2015 were 0.061 and 0.059 mg/kg ww, which are similar to maximums reported by the ADEC for Colville River fish (Howard Teas, pers. comm., 21 March 2014).

4.1.1.10. Vanadium

The ADEC FTMP does not monitor concentrations of V in Alaskan fish and there is limited published data on V in muscle or whole body fish.

Concentrations of V were measured in samples from six fish species collected during 1997 and 1998 along the coast of the Adriatic Sea. Vanadium concentrations (μg/kg fresh weight) were 45.3–74.4 (anchovy), <4.0–4.8 (angler), <4.0 (hake), 6.7–29.8 (mackerel), 11.8–32.4 (red mullet), and <4.0–2.9 (sole) (Sepe *et al*. 2003). Thus, an extensive concentration range from this one study alone can be noted: <4.0 to 74.4 μg/kg fresh weight (or about <0.004 to 0.074 mg/kg ww). Therefore, V at 0.074 mg/kg ww from the Adriatic Sea study is more than half the mean concentration found in broad whitefish sampled in 2014-2015 near Nuiqsut (0.12 mg/kg ww, range of 0.032 - 0.28).

4.1.2. PAHs

Based on the analytical results, we do not provide a compound-by-compound summary and comparison to other studies as no PAH analytes were measured above the MRL in more than 10% of the samples for any specific analyte. In other words, in 90 to 100% of the submitted broad whitefish samples, no reportable concentrations were provided for each of the PAH analytes. In fact, 23 (85.2%) of the analytes had no samples (0%) reporting PAHs at or above the MRL. Thus, concentration estimates are not as reliable as measures made above the MRL. The four analytes found in at least one sample above their respective MRL are 2,6-dimethylnaphthalene, anthracene, carbazole, and naphthalene (Table 2b).

Sixteen analytes were measured above the MDL in one or more samples of broad whitefish. Again, we note none of the PAH compounds measured were detected

(>MDL) in 100% of the samples, and in most cases detected chemicals were noted in 50% or less of the samples. This does not allow for appropriate generation of summary statistics for rigorous comparison to other studies. This dilemma is further compounded in that analytical methods vary among studies; thus, any comparisons need to consider these inconsistencies. Analytes measured above the MDL in greater than half the samples offer an opportunity to compare data with other studies relative to detected or not detected in broad whitefish; however, we do not consider comparisons of concentrations to be appropriate at this time, especially when other reports do not provide summary statistics.

The NSB (NSB 2016) reports that overall PAH levels are very low or non-detectable for fish (seven species) in general, and from the Nuiqsut area (their summary was based on Wetzel *et al*. 2012). These studies were conducted during 2004, 2005, 2008 and 2010 for the Teshekpuk Lake Area and the Colville, Ikpikpuk, Meade and Kuk rivers. Generally, their findings agree with data reported here if one considers that concentrations detected above the MRL are not achieved for most samples. They conclude this is likely because fish metabolize and eliminate most PAH chemicals, and fish would likely only have measurable concentrations when present in a contaminated area and/or recently exposed to the chemicals. Ackerman *et al*. (2008) also made this claim, "…*likely due to low ambient concentrations and rapid transformation and/or elimination from fish (Baussant et al. 2001).*" We should also consider trophic dilution processes for PAH chemicals as described in Wan *et al*. (2007), which involves aspects of metabolism and elimination.

Wetzel *et al*. (2012) reports total PAH concentrations that are very low; similar to our study. Further, they report broad whitefish muscle samples had very low levels of detectable PAHs present (total PAH concentrations ranged from not detected to 0.07 µg/g dw). Liver had average levels of PAHs ranging from undetected to 0.27 µg/g dw. Please note, they are reporting in dw and we report in ww; thus, values are not directly comparable[6]. Generally, a few homologs of the naphthalene series were found in either the liver or the muscle of broad whitefish; however, some of the liver samples had low levels of some of the higher molecular weight PAHs. The presence of some of these analytes is consistent with findings in our study representing samples from 2014 and 2015 (*e.g*., dimethylnaphthalene, benzo(a)anthracene, carbazole, dibenzofuran, naphthalene, and phenanthrene) as compared to Appendix 2 of Wetzel *et al*. (2012) for broad whitefish.

4.2. Arctic Cisco

4.2.1. Elements

For some of the elements measured in Arctic cisco, there is a range of values for these results that includes not being detected (<MDL) or not being reportable (<MRL),

[6] Wet weight concentration can be converted to dry weight concentration using the percent solids result. Dry weight concentration (ppm) = wet weight concentration (ppm)/(percent solids x 100).

including Ba, Cd, V, Pb, Ni, and Hg (Table 3a). The most reliable concentration estimates are those >MRL for all samples (100% above MRL), as reported for As, Cu, Se, and Zn.

4.2.1.1. Barium

Mean Ba concentration in Arctic cisco is 0.289 mg/kg ww over a range of 0.113 – 0. 428 for fish sampled near Nuiqsut in 2014-2015. These data are typically lower relative to concentrations reported in the literature (not all literature cited were Arctic studies). As summarized above, Yilmaz *et al.* (2010) reported mean concentrations (means ± SD µg/g ww) of Ba in muscle of three demersal fish as 6.96 ± 0.11 (*Triglia lucerna*), 3.44 ± 0.97 (*Lophius budegassa*) 5.18 ± 2.28 (*Solea lascaris*), clearly higher than the Arctic cisco from Nuiqsut. Jadeen *et al.* (2012) reported mean Ba concentrations in herbivore and carnivore fish as 0.11 and 0.17 µg/g, which are slightly lower than measured concentrations in Arctic cisco. Visnjic-Jeftic *et al.* (2010) reports a mean concentration of Ba in muscle (µg/g dw) of Pontic shad (Danube River) as 0.355 ± 0.155, which is in the range of concentrations for the Arctic cisco, but is reported in dw and not directly comparable.

4.2.1.2. Copper

As stated above, the mean ± SD (range) in ppm ww of Cu reported by the ADEC for round whitefish fillet is 0.27 ± 0.08 (ND - 0.48), for whole humpback whitefish is 1.2 ± 0.58 (0.31 - 2.4), for broad whitefish fillet is 0.28 ± 0.17 (ND - 0.48), and least cisco fillet is 0.26 ± 0.06 (0.19 - 0.35) (ADEC 2016b). These values are within the range of Cu found in Arctic cisco sampled in 2014 (mean concentration of 0.455 mg/kg ww and maximum value of 0.522 mg/kg ww) and 2015 (mean concentration of 0.495 mg/kg ww and maximum value of 0.614 mg/kg ww) near Nuiqsut. These concentrations are slightly higher than those reported by the ADEC for whitefish muscle, but the differences may be attributable to comparing muscle to whole body measures. We also note that Cu concentrations were significantly different by year; however, the biological significance of a concentration difference of 0.040 mg/kg ww (10%) is difficult to interpret. We did not sample and analyze liver; therefore, we cannot make a more complete assessment for this element.

4.2.1.3. Mercury

For Hg, Arctic cisco, least cisco, and humpback whitefish from the Colville River contained mean concentrations (range) of 0.019 (0.015 - 0.025), 0.042 (0.026 - 0.063), and 0.044 (0.028 - 0.074) ppm ww, respectively (Howard Teas, pers. comm., 21 March 2014). This compares well to mean Hg concentrations in the Arctic cisco sampled near Nuiqsut in 2014 (0.011 mg/kg ww) and in 2015 (0.0087 mg/kg ww). Again, Hg concentrations were determined to be statistically lower in 2015. This consistency in Hg concentrations for the whitefish species is expected as these fish are from the same region and have relatively similar feeding ecologies. Species that tend to be at higher trophic levels (*e.g.*, lake trout) will have much higher Hg concentrations (Evans *et al.* 2005).

4.2.1.4. Selenium

For Se, Arctic cisco and least cisco in the Colville River drainage had mean concentrations (range) of 0.36 (0.31 - 0.48) and 0.36 (0.30 - 0.51) ppm ww, respectively (Howard Teas, pers. comm., 21 March 2014). These data compare well to Se concentrations in Arctic cisco sampled near Nuiqsut in 2014-2015 (0.426 mg/kg ww), and are consistent with Se concentration findings for other Alaskan whitefish (ADEC 2016d). As stated above, this is expected for an essential element under homeostatic control.

4.2.1.5. Zinc

Zinc is an essential element that was determined to be in Arctic cisco at a mean concentration of 10.5 mg/kg ww (range; 8.7 - 13.0) in 2014, and a mean concentration of 12.0 mg/kg ww (range; 8.5 - 16.3) in 2015. While mean concentration difference by year is small, there was a statistical difference noted. As described above, Yilmaz *et al.* (2010) and Jadeen *et al.* (2012) reported mean Zn concentrations (μg/g ww), which are higher than measured concentrations in Arctic cisco. However, Uysal *et al.* (2008) determined mean ± SD Zn content (mg/kg ww) in muscle for six species (*L. mormyrus, L. aurata, C. labrasus, M. cephalus, S. aurata,* and *L. ramada*) at 5.83 ± 0.5, 4.27 ± 0.3, 7.24 ± 0.9, 5.52 ± 0.6, 7.09 ± 0.6, 12.28 ± 0.5, respectively, which are lower than or similar to the Arctic cisco from Nuiqsut. The Arctic cisco values appear to be in the expected range for Zn concentrations.

4.2.1.6. Arsenic

The ADEC's As data on Arctic cisco/least cisco from the Colville River were reported at mean concentrations (range) of 0.78 (0.57 - 1.2) and 0.89 (0.59 - 1.8) ppm ww, respectively (Howard Teas, pers. comm., 21 March 2014). The As concentrations in Arctic cisco averaged 1.30 mg/kg ww in 2014 and 1.53 mg/kg ww in 2015 for the Nuiqsut area fish, which are slightly higher compared to those reported by ADEC. We do note there was a statistical difference noted, despite the small concentration difference of 0.23 mg/kg ww.

4.2.1.7. Cadmium

Cadmium concentrations in Arctic cisco, least cisco, and humpback whitefish from the Colville River were below detection (MRL = 0.01 mg/kg ww) for data provided by the ADEC (Howard Teas, pers. comm., 21 March 2014). This compares to a mean Cd concentration in Arctic cisco of about 0.0022 mg/kg ww in 2014, representing 17 of 30 fish (57%) with concentrations of Cd above the MDL; and 0.0055 mg/kg ww in 2015, representing all fish (100%) with concentrations of Cd above the MDL (Table 3a). However, this is likely not solely due to an increase in Cd concentration in the fish, as we note the MDL dropped from 0.0011 to 0.0005 mg/kg ww from 2014 to 2015. Fillets of Arctic cisco analyzed by the ADEC reported a Cd mean concentration (range) of 0.78 (0.57- 1.2) ppm ww, clearly higher than fish sampled in our study (ADEC 2016f). The collection location of these fish is unclear. Concentration of Cd is apparently very low in Arctic cisco collected in our study area.

4.2.1.8. Lead

Lead in Arctic cisco, least cisco, and humpback whitefish collected from the Colville River was not detected (MRL = 0.03 mg/kg ww) according to data provided by the ADEC (Howard Teas, pers. comm., 21 March 2014). This compares to Pb concentrations in Arctic cisco of about 0.0034 mg/kg ww in 2014 and 0.0029 mg/kg ww in 2015. Despite the very small difference in mean concentrations, there was a statistical difference by year. We do note that one least cisco sampled by the ADEC contained a concentration of 0.035 ppm ww. Concentrations of Pb in Alaskan fish are very low (ADEC 2016g).

4.2.1.9. Nickel

Nickel in Arctic cisco, least cisco, and humpback whitefish collected from the Colville River was not present above detection limits (MRL = 0.05 mg/kg ww) according to data provided by the ADEC (Howard Teas, pers. comm., 21 March 2014). However, they did report maximum values of 0.092, 0.14, and 0.088 ppm ww, respectively. This compares to mean Ni concentrations in Arctic cisco from Nuiqsut of about 0.064 mg/kg ww in 2014 and 0.097 mg/kg ww in 2015, which are statistically different by year. These concentrations are similar to the maximum values of the range of concentrations reported by the ADEC. One whole least cisco analyzed by the ADEC for Ni contained a concentration of 0.26 ppm ww (ADEC 2016h).

4.2.1.10. Vanadium

As stated above, the ADEC FTMP does not monitor concentrations of V in Alaskan fish and there is limited published data on V in muscle or whole body fish.

Concentrations of V were measured in samples of six fish species collected during 1997 and 1998 along the coast of the Adriatic Sea. Vanadium concentrations (µg/kg fresh weight) were 45.3–74.4 (anchovy), <4.0–4.8 (angler), <4.0 (hake), 6.7–29.8 (mackerel), 11.8–32.4 (red mullet), and <4.0–2.9 (sole) (Sepe *et al.* 2003). Thus, an extensive concentration range from this one study alone can be noted: <4.0 to 74.4 µg/kg fresh weight (or about <0.004 to 0.074 mg/kg ww). A concentration of 0.074 mg/kg ww represents a little more than triple of what the mean concentration is in the 30 Arctic cisco sampled in 2014 (0.022 mg/kg ww, range of 0.008 - 0.057) and in 2015 (0.03 mg/kg ww, range of 0.012 - 0.05) near Nuiqsut.

4.2.2. PAHs

As for broad whitefish, PAH analyses results are very limited for comparison to previous studies. Results of PAH concentrations in Arctic Cisco are presented in Table 3a. Analytical results are not provided on a compound-by-compound summary basis as no PAH analytes were measured above the MRL in more than 10% of the samples for any specific analyte for either year (similar to broad whitefish). In other words (for broad whitefish), in 90 to 100% of the submitted Arctic cisco samples, no reportable concentrations were provided for each of the PAH analytes in either year. In fact, 14 of 27 (51.8%) analytes were not detected above the MRL. Chrysene contained the highest percent of reportable concentrations above the MRL (three out of 60 [5%] Arctic cisco samples). This does not allow for calculation of reliable summary statistics for these PAH analytes for comparison to other studies.

Overall, 24 of the 27 PAH analytes were measured above the MDL in one or more Arctic cisco samples. However, this varied widely by year and was very likely driven by differences in the MDL and MRL values by year. Thus, comparison by year and pooling of data is not straightforward and has many caveats to consider. This also complicates comparisons to published values. Examples are provided to make this point (analyte, MDL 2014 and MDL 2015 as μg/kg ww): 1-methylnapthylene, 1.1-2.2 and 0.32; anthracene, 0.38-18 and 0.18, and benzo(k)fluoranthene, 0.57-2.7 and 0.24. We also note the upper level MDL of 10 μg/kg ww or greater for many analytes in 2014; and 18 μg/kg ww for anthracene in 2014. The MDLs for 2015 were typically well below 10 μg/kg ww.

Analytes meeting the requirements for statistical comparisons (>50% above MDL in both years) but found to have significantly different concentrations between years were 2,6-dimethylnaphthalene (TW = 5.968, $p < 0.0001$), dibenzofuran (TW = 4.816, $p < 0.0001$), naphthalene (TW = 4.853, $p < 0.0001$), and phenanthrene (TW = 2.158, $p < 0.05$). Differences in detection frequency between years are likely a result of lower MDLs reported for 1-methylnaphthalene, 2-methylnaphthalene, biphenyl, fluorene, and naphthalene in 2015. Thus, we are unable to determine which PAH analytes are occurring at reliable detectable concentrations.

A few analytes (2,6-dimethylnaphthalene, dibenzofuran, naphthalene, and phenanthrene) offer an opportunity to compare results with other studies relative to detected or not in Arctic cisco. ABR (2013) report detection of only two PAHs (anthracene and naphthalene) in five Arctic cisco muscle fillet samples collected from fishers as part of the Subsistence Fishery Monitoring on the Colville River Study. We do not consider comparisons of concentrations to be appropriate at this time. Our findings are very similar to the broad whitefish for Arctic cisco and therefore are not repeated here. We reviewed a multiyear study by the NSB for broad whitefish as this species were included with their study whereas Arctic cisco was not.

It would appear our study agrees with Wetzel *et al.* (2012) as they stated, "*Overall, the body burdens of PAH contamination were very low and the main PAHs found in tissues (with measurable levels) were from the highly soluble naphthalenes... There were no PAHs detected in the 2005 fish samples*...". This is relevant to findings for both broad whitefish and Arctic cisco. We reiterate what was stated for broad whitefish; that metabolism, elimination and trophic dilution processes can cause low concentrations of many PAH chemicals along with low concentrations in the environment (*e.g.*, sediments).

4.3. Caribou

4.3.1. Elements

Bernhoft *et al.* (1999) reported the median (range) element concentrations (µg/g ww) determined in liver samples from 40 reindeer with even sex ratio and representation from different age classes (NW Russia area). Some of these findings are used for comparison below. Hassan *et al.* (2012a) measured levels of elements (ng/g ww) in liver of semi-domesticated reindeer, and Hassan *et al.* (2012b) measured mean mineral concentrations per 100 grams of edible raw tissue (human consumption perspective). For O'Hara *et al.* (2003), Alaska Arctic caribou were sampled from a mortality event and hunter killed samples, reported as ppm ww. One must take care in use of units between these papers and the work in this report, as well as the sampling procedures and sources of the tissues (*e.g.*, found dead, hunter killed).

4.3.1.1. Liver

For caribou liver, there was a clear demarcation of determining element concentrations based on the MRL (*e.g.*, ranges were above or below MRL, see Table 4a) for several of the analytes. All liver samples contained Ba, Cd, Cu, Pb, Hg, Se, and Zn above the MRL. Nickel was above MRL in 78% of liver samples. Arsenic and V were not above MRL in any caribou liver samples. Thus, we cannot comment on these analytes in any detail as the concentrations are essentially unknown.

4.3.1.1.1. Arsenic

Arsenic concentrations are reported in O'Hara *et al.* (2003) as arithmetic means by location (sites across northern Alaska) that vary from 0.02 to 0.32 ppm ww. Thus, considering the As MRLs for this study are 0.127 – 0.158 (mg/kg ww), it is not unexpected that no samples contained As above the MRL. However, three samples were above the MDL, while the remaining six were not. This allowed for an estimated mean concentration in 2015 of 0.010 mg/kg ww. Bernhoft *et al.* (1999) reports similar As concentrations in reindeer as 0.035 (0.017-0.048) µg/g ww as in O'Hara *et al.* (2003). Hassan *et al.* (2012a) measured levels of elements (ng/g ww) in liver of semi-domesticated reindeer and for As a mean of 24 (0.6-157) (ng/g ww), or 0.024 ppm ww, which compares well with the above data.

4.3.1.1.2. Barium

Reports of Ba in other species indicate that measured mean hepatic Ba concentrations amounted to 230 (107–427) µg/kg ww (or 0.23 mg/kg ww) in horses (PaBlack *et al.*, 2014), which is slightly more than in caribou in this study (mean 0.052 mg/kg ww). This study in Nuiqsut may be the only available source of information and could be used to establish the background Ba concentration in caribou liver. Considering all samples have been >MRL, these data are reliable.

4.3.1.1.3. Cadmium

The mean Cd concentrations reported here for 2014 (0.699 mg/kg ww) and 2015 (0.236 mg/kg ww) for liver are in the low range of means reported by O'Hara *et al.* (2003), which varied from 0.4 to 1.9 ppm ww. Thus, these concentrations of Cd in liver are within the expected range. These concentrations likely vary by the age of the animal and could easily explain the observed statistical difference noted by year as age was noted to be different by year as well. It is well known that Cd accumulates in the liver with age. Bernhoft *et al.* (1999) reports similar Cd concentrations in reindeer as 0.34 (0.15-1.2) µg/g ww as in O'Hara *et al.* (2003). Erickson *et al.* (1990) reports a range of Cd concentrations of 0.05 to 1.89 mg/kg ww with mean concentrations by location varying from 0.05 to 0.39 mg/kg ww in reindeer, which are dependent on the age of the animal. Hassan *et al.* (2012a) reports Cd concentrations as a mean of 654 (175-2200) ng/g ww, or approximately 0.66 µg/g ww (same as mg/kg ww), which compares well with the above.

4.3.1.1.4. Copper

Copper is an essential element and the mean 9.19 mg/kg ww reported here is in the very low range of means as reported by O'Hara *et al.* (2003). In fact, these are likely marginal Cu concentrations from a health perspective; and based on some standards, would be "low." Marginal Cu concentrations and outright Cu deficiencies have been debated in this region for a number of ungulates. We cover the issue of deficient and marginal Cu concentrations of some animals in this region in Section 4.3.2. Bernhoft *et al.* (1999) reports Cu concentrations in reindeer as 98 (29-220) µg/g ww, which is much higher (10-fold) as in O'Hara *et al.* (2003) for some caribou sampled in locations outside the Teshekpuk Lake area. Erickson *et al.* (1990) reports a range of Cu concentrations of 3 to 131 mg/kg ww with mean concentrations by location varying from 21 to 29 in reindeer, higher than for the caribou sampled near Nuiqsut in 2014-2015.

4.3.1.1.5. Mercury

Mean Hg concentrations found in caribou of 0.020 mg/kg ww in 2014 and 0.044 mg/kg ww in 2015 are very low with respect to what is observed in other fish and wildlife of the Arctic. These concentrations were statistically different by year. As for reindeer, Bernhoft *et al.* (1999) reports Hg 0.16 (0.08-0.31) µg/g ww, which is slightly higher than what we observed in the caribou sampled near Nuiqsut in 2014 and 2015. Erickson *et al.* (1990) reports a range of Hg concentrations of 0.02 to 0.19 mg/kg ww with mean concentrations by location varying from 0.05 to 0.07 in reindeer.

4.3.1.1.6. Lead

Mean Pb concentrations were very low (0.018 mg/kg ww) in caribou samples collected in 2014-2015, and represent approximately 10% of the mean concentrations reported in O'Hara *et al.* (2003), but are within the range of what they reported. Thus, it is low and an expected finding. Use of Pb projectiles is always a potential confounder when using hunter-killed animals. One must take caution when interpreting Pb values in this context. In addition, one must consider differences in analytical methods used among these projects so direct comparisons must be done carefully. Bernhoft *et al.* (1999) reports similar Pb concentrations in reindeer as 0.56 (0.23-1.0) µg/g ww as in O'Hara *et al.* (2003). Erickson *et al.* (1990) reports a range of Pb concentrations of 0 to 1.66 mg/kg ww with mean concentrations by location varying from 0.26 to 0.81 in reindeer. Hassan *et al.* (2012a) measured concentrations of Pb and reported a mean of 272 (range 145-523) ng/g ww, or 0.27 ppm ww of Pb, which compares well with the findings above.

4.3.1.1.7. Nickel

The mean Ni concentration reported here (0.244 mg/kg ww) is slightly higher compared to what Bernhoft *et al.* (1999) reports in reindeer (0.027 (<0.020-0.13) µg/g ww). Hassan *et al.* (2012a) indicates a mean concentration of Ni at 51 (range 20-186) ng/g ww, or 0.051 ppm ww. Nickel values ranged widely (0.021 to 0.971) with a median of 0.17 mg/kg ww for the Nuiqsut caribou. This complicates comparison to other studies at this time with less than 10 caribou represented in this study.

4.3.1.1.8. Selenium

Selenium is a key essential element and the mean liver concentration of 0.181 mg/kg ww in 2014 and 0.383 mg/kg ww in 2015 compares poorly to the levels Bernhoft *et al.* (1999) published for reindeer (mean of 0.88 (range, 0.56 - 1.3) µg/g ww). This could indicate the possibility of marginal concentrations of Se for caribou in the Nuiqsut area or variations due to other biological factors (*e.g.*, age, sex, forage, time of year, body condition). In fact, the Se concentrations in Nuiqsut caribou were different by year, and some of these variables noted were different (*e.g.*, age, time of year). Hassan *et al.* (2012b) determined mean Se concentrations per 100 g of edible raw tissue at 48.7 ± 48.9 µg per 100 g, which is approximately 487 µg/kg ww or 0.5 mg/kg ww and is more than double that in caribou sampled near Nuiqsut in 2014, and slightly higher than the 2015 value, further indicating Se may be low in the liver of Nuiqsut caribou.

4.3.1.1.9. Zinc

The mean Zn concentration of 30.21 kg/mg ww is in the low, but expected, range as compared to mean concentrations reported in O'Hara *et al.* (2003). Zn is a critical nutrient for caribou. The concentrations are low as compared to reindeer as well (Zn mean concentration of 37 [range, 24-105] µg/g wet weight as reported by Bernhoft *et al.* [1999]). Erickson *et al.* (1990) reports a range of Zn concentrations of 15 to 51 mg/kg ww, with mean concentrations by location varying from 27 to 32 in reindeer. Hassan *et al.* (2012b) determined mean concentrations for Zn was 3.5 ± 1.7 mg per 100 g of edible raw tissue, or approximately 35 mg/kg ww, comparing well with the above.

4.3.1.2. Muscle

Muscle tends to have lower concentrations of many elements as compared to liver. Thus, it is expected to find more elements below the MRLs (As, Cd, Pb, Hg, and V), exhibiting less reliable estimates of concentration. As essential elements, we expect to have measurable concentrations of Cu, Zn, and Se in muscle. These elements, along with Ba and Ni, were detected above MRLs in all samples.

4.3.1.2.1. Arsenic

Arsenic was detected above MDL in the 3 caribou sampled in 2015. Using these limited data, we reported a mean (range) for As of 0.009 (0.006 – 0.012) mg/kg ww, analogous to 9 (6 - 12) ng/g ww. Our data is within the range of that reported by Hassan *et al.* (2012a) for As concentrations (mean [range] of 19.7 [1.3 - 82.6] ng/g ww).

4.3.1.2.2. Barium

Barium was measured in all muscle samples at relatively low concentrations (mean = 0.0257 mg/kg ww). There are no published data available for Ba in muscle that we could access. It may be that this study will establish Ba concentrations in muscle of *Rangifer* in northern Alaska.

4.3.1.2.3. Cadmium

Hassan *et al.* (2012a) reported detectable concentrations for Cd, 1.9 (0.6 - 7.1) ng/g ww, analogous to 0.0019 (0.0006 - 0.0071) mg/kg. We detected Cd concentrations above MDLs of 0.003 (0.002 - 0.0044) mg/kg ww (2014) and 0.0012 (0.001 - 0.00016) mg/kg ww (2015). Differences by year were noted for Cd, but at these low concentrations, the biological significance is difficult to interpret, especially with the low sample size.

4.3.1.2.4. Copper

In O'Hara *et al.* (2003), mean Cu concentrations in muscle ranged from 2 to 14 ppm ww. This study's mean Cu concentration (3.0 mg/kg ww) is in the lower range (as it was for liver tissue) for the recently sampled caribou near Nuiqsut in 2014-2015.

4.3.1.2.5. Mercury

As caribou are unlikely to consume fish and other aquatic organisms that may have relatively high Hg concentrations, it is expected that most of the animals had no reportable (>MRL) Hg concentrations in muscle. Mercury was detected above MDLs in four caribou sampled in 2015 with a calculated mean (range) of 0.005 (ND – 0.017) mg/kg ww. This is similar to reported mean Hg levels in Greenland *Rangifer* muscle, which ranged from 0.003 to 0.043 µg/g ww (Aastrup *et al.* 2002).

4.3.1.2.6. Lead

In O'Hara *et al.* (2003), mean Pb concentrations in muscle ranged from 0.03-0.78 ppm ww. Lead results from this study are below the lower mean of this previous study. Lead was detected above MDLs in (2014) 0.0011 (0.0004 - 0.0015) mg/kg ww; and in (2015) 0.002 (0.0016 - 0.0024) mg/kg ww. The low Pb concentrations and low sample population make it difficult to interpret biological significance between 2014 and 2015.

4.3.1.2.7. Zinc

In O'Hara *et al.* (2003), mean Zn concentrations ranged from 29 to 51 ppm ww. Thus, the mean Zn concentration (24.74 mg/kg ww) of caribou sampled in 2014-2015 appears to be lower than that observed by O'Hara *et al.* (2003). Hassan *et al.* (2012B) determined Zn concentrations per 100 g of edible raw tissue in muscle to be 6.8 ± 0.2 mg (about 7mg/100g or 70 ppm ww), which is also higher than found in Nuiqsut caribou sampled in 2014-2015.

4.3.1.2.8. Selenium

Selenium is an important essential element and was determined to be at a concentration of 0.109 (mean) mg/kg ww for caribou sampled near Nuiqsut in 2014-2015. Hassan *et al.* (2012b) determined Se to be 3.0 ± 3.2 µg per 100 g (30 µg/kg, or about 30 ppb or0.03 ppm ww), which is about one third lower than the same for Nuiqsut animals.

These findings support the case of marginal mineral levels in caribou near Nuiqsut for Cu and Zn, as measured for animals sampled in 2014-2015, which is consistent with our findings for liver noted above.

4.3.1.2.9. Nickel

Nickel was present as a mean concentration of 0.173 mg/kg ww in caribou muscle for animals sampled near Nuiqsut in 2014-2015. Hassan *et al.* (2012a) measured levels of Ni ranging from 20-102 (ng/g ww) (mean could not be calculated because <50% of samples were reportable), or about 0.02 to 0.10 ppm ww. That compares well with our data for caribou sampled in 2014 and 2015.

4.3.2. *Mineral Deficiency Considerations*

In O'Hara *et al.* (2003) and other reports (O'Hara *et al.* 2001), there is evidence of low essential elements in Arctic ungulates in the Teshekpuk Lake and Colville River drainage regions, especially Cu. It is important to recognize the elemental interactions in that some marginal concentrations for essential elements can occur for multiple elements at one time and that the forms of some elements (valence, organic forms or not) are important. In O'Hara *et al.* (2003) there was a wide range of mean concentrations of Cu across the North Slope as measured in caribou by location sampled. The overall mean concentration (ppm ww) for the 64 caribou sampled was determined to be nutritionally adequate; 62.5 (55.8), with non-Teshekpuk sites showing mean concentrations of 29.2 (13.1), 66.0 (37.7), 68.8 (47.0), 85.5 (22.5), and 100.4 (76.5), but with the Teshekpuk Lake group indicating 6.35 (4.43). We also note that the second lowest concentration of 29.2 ppm ww represents caribou sampled near Anaktuvuk Pass. The approximately 10.2 mg/kg ww average for Nuiqsut caribou is well below what is considered marginal or deficient for livestock and other wild cervids (*e.g.*, Puls, 1994). For moose in the region, Cu deficiency may have played a role in poor recruitment and adult mortality (O'Hara *et al.*, 2001). Please note that multiple minerals may have been involved. Considering the comparable studies discussed above, it appears other *Rangifer* can achieve much higher hepatic Cu concentrations, which may provide adequate nutrition, and not just marginal as indicated for caribou around Nuiqsut.

4.3.3. PAHs

As expected for a mammal not recently exposed to a major source of PAH chemicals, there is very little evidence of PAH residues in caribou liver and muscle. Mammals are well known to biotransform (metabolize) and eliminate these parent PAH compounds analyzed for here. The caribou as a ruminant has the additional microbial capacity in the stomach (rumen) to degrade petroleum-based chemicals along with other mammalian processes (*e.g.*, intestinal, hepatic) or for vertebrates in general as described above for fish. Mean concentrations for PAH analytes could only be estimated for two chemicals in liver and one chemical in muscle (Table 4b). The majority of PAH analytes were <MDL in all caribou samples; especially liver. This in part reflects the MRLs ranging from 4.6 to 10 μg/g ww for the chemicals reported in Table 4b for liver. Benzo(a)anthracene was measured above the MDL in all 2014 liver and muscle samples, but was not detected in tissue samples collected in 2015.

For muscle, a single caribou in each year resulted in a >MDL result for some analytes. This did not allow for estimation of concentrations and does not justify comparison to published results as a single animal. However, benzo(a)anthracene was detected in 100% of the samples in 2014 (with all <MRL) with an estimated concentration of 0.62 μg/g ww. This still represents a very low estimated concentration. As in this study, Danielsson *et al.* (2008) showed PAH chemicals were prominently occurring below levels of detection and reporting limits (based on their studies of Swedish reindeer tissues).

5. DEVIATIONS FROM THE SAMPLING AND ANALYSIS PLAN

Method 8270D SIM PAH analysis was not performed in accordance with the Sampling and Analysis Plan specifications for the caribou and broad whitefish tissue samples collected in July 2014. Due to a laboratory oversight, only 18 of the 27 PAHs listed in the Sampling and Analysis Plan were analyzed and reported. In addition, the laboratory did not initially perform the low level PAH method, therefore the expected MDLs and MRLs for PAHs were not achieved. As corrective action, re-analysis of the July tissue samples for PAHs was requested in December 2014. However, the high oil content of the tissues caused matrix interference when using the low-level extraction procedure. The re-analysis could not be completed due to instrument limitations, *e.g.*, the chromatographic column was not able to handle the viscous extracts without degradation and failure of quality control samples. This situation had not been anticipated when the low level PAH reporting limits were proposed for the Sampling and Analysis Plan.

Sample RANG-2015-01-La was an opportunistic liver sample (not explicitly called for within the Sampling and Analysis Plan) and protocols for the evaluation of body condition and sampling of muscle tissue were not explicitly defined. ERM collected a primary and duplicate sample of the liver, collecting only internal tissue (external surface area was cut away) to avoid any potential external contamination on the surface of the organ. Analytical results for this sample are comparable to other liver tissue sample collected for this study and were not overtly influenced by the deviation in protocols.

Sample RANG-2015-04-Ma was incorrectly identified on the COC as RANG-2014-04-Ma. The correct sample ID (RANG-2015-04-Ma) was input to the EarthSoft Environmental Quality Information System database and listed in the results tables. It should be noted that the ALS laboratory report #K1510418 still reports the 2015 sample as RANG-2014-04-Ma.

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6. QUALITY ASSURANCE REVIEW SUMMARY

A completeness check and data review was performed by an ERM project chemist for each sampling event. All data were reviewed for completeness in accordance with USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA 2008), USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (USEPA 2010). These data reviews focus on criteria for quality assurance/quality control parameters and their effect on the quality of data and usability. A summary of 2014 and 2015 QAR reports is provided below. The details of these reviews and qualification of the data are included in Appendix D.

6.1. 2014 Data

In general, the overall quality of the results reported for the July 2014 caribou and broad whitefish data was acceptable. Data quality for element analysis met the data quality objectives established for this project and in many cases provided robust data. PAH results were not detected above the MRLs in the tissue samples analyzed by USEPA Method 8270D SIM. However, all samples required dilutions due to matrix interference, and the MRLs expected in the Sampling and Analysis Plan could not be achieved. In addition, the reported PAH target analyte list was incomplete, as discussed in section 5. The completeness (usable data divided by the total possible data) for data collected in July 2014 was 76%. The associated PAH sample results are of limited usability for the purpose of this tissue sampling event.

The quality of November 2014 Arctic cisco data was determined acceptable. Element results are considered usable for project objectives. PAH results were reported with MDLs and MRLs above the data objectives and may be of limited use. No results were rejected. The completeness for this project is 100%.

6.2. 2015 Data

The quality of data reported for August 2015 caribou and broad whitefish was found to be acceptable with 100% completeness. Data met most of the quality objectives established for this project, with the following exceptions. Equipment blanks were not evaluated for element contamination during this sampling event. However, previous sampling events using the same procedure did not show significant element contamination from equipment rinse blanks. The expected MDLs and MRLs were not achieved for all PAH samples and sensitivity requirements were not achieved due to matrix interference as discussed in Section 5. The associated PAH sample results are of limited usability.

In general, the quality of the November 2015 Arctic cisco data was acceptable and completeness for this data set was 100%. Data met most of the quality objectives established for this project, with the exception of PAH MDLs, MRLs and sensitivity requirements. The associated PAH sample results may be of limited use; however, valuable data were generated for selected elements.

7. CONCLUSIONS

The chemical analysis of elements in the subsistence food samples provided mostly usable data. As expected, several of the elements were present in all samples or with some elements detectable in a proportion of samples, which provide reasonable estimates of concentrations. This is mostly driven by the MDL and MRL of techniques used and the proportion of samples of a specific matrix that exceed these critical analytical benchmarks. This variation in what is detected is well known based on information from scientific literature. Data quality for element analysis met the data quality objectives, thus were able to provide useful statistics for all elements considered.

A known variable related to low-level detection and reporting concentrations is the issue in which in 1 year there is no detectable concentration; however, in the next year, there is. Arsenic and V concentrations in caribou liver and muscle tissue are a great case study for this variable. Considering the likely borderline detection of As (concentrations at or slightly above the MDL), it is possible in future efforts that concentrations could rise above the MDL with only a minor actual increase in concentration. Thus, As would then be reported as detected and/or above the MRL with a measurable concentration. This is an important point in that only a small proportional increase could cause the variable of going from not detected to detected concentrations. Reviewers of future monitoring results should be cognizant of this potential caveat.

Major shifts in the MDL and MRLs between years can also be complicated and misleading if changes in detection frequencies occur. As an example, benzo(a)anthracene was measured above the MDL in all 2014 caribou liver and muscle samples, but was not detected in caribou tissue samples collected in 2015. This statement concerning benzo(a)anthracene could be misinterpreted as a change in concentration in the biota by year. However, the likely reason is the change in MDL and MRL from 0.35 to 0.76 µg/kg ww and 5 to 10 µg/kg ww for liver, respectively.

Variation in MDL and MRL combined with changes in chemical concentrations can be misleading. For instance, the 2,6-dimethylnaphthalene KM mean was 276% higher in 2014 compared to 2015. The apparent decrease is very likely a combination of factors, including the generation of data for chemicals where 50% of samples are >MDL (*i.e.*, using the KM method or the ½ MDL substitution method to estimated means). If this situation was observed in a different chronology (*i.e.*, 2014<2015 or pre-production vs production) it could be interpreted as an increase in concentration. Thus caution should be taken when comparing data using statistically derived concentrations by year for a chemical clearly measured under the MRL.

Sixteen PAH analytes were measured above the MDL in one or more samples of broad whitefish, and 24 measured above the MDL in Arctic cisco; however, few PAH compounds measured were detected (>MDL) in greater than half of the samples. This does not allow for appropriate generation of summary statistics for rigorous comparison to other studies. However, these analytes offer an opportunity to compare with other studies relative to detection or not in broad whitefish and Arctic cisco. Detections varied widely by year and were very likely driven by differences in the MDL and MRL values by year. Thus, comparison by year and pooling of data is not straightforward and has many caveats to consider. This study agrees with the NSB DWM as they report overall PAH levels as very low or non-detectable for fish (seven species) in general and from the Nuiqsut area (their summary was based on Wetzel *et al.* 2012). This is relevant to findings for both broad whitefish and Arctic cisco. We reiterate that metabolism, elimination and trophic dilution processes can cause low concentrations of many PAH chemicals in wildlife, a fact compounded by the presence of naturally occurring concentrations of PAHs in the environment that can enter the food chain.

The majority of PAH analytes were <MDL in all caribou samples and none of the analytes were determine to be at or above the MRL for either muscle or liver. The fact the MRLs are relatively high and few analyte concentrations can be statistically summarized calls into question the value of this chemical analysis approach for caribou muscle and liver. The NSB DWM measured low concentrations of PAHs in liver extracts of 18 subsistence harvested caribou from the Teshekpuk Caribou Herd using novel analytical approaches. PAHs do not have a very long half-life in the liver as result of elimination and transformation to oxy-PAHs. The NSB DWM is working with Battelle Laboratory to develop assays to measure oxy-PAH concentration in caribou tissues; method development is still underway (Raphaela Stimmelmayr, pers. comm., 2015).

7.1. Representative

A total of nine caribou liver tissue and eight muscle tissues sampled over two calendar years indicates success via access and community engagement. However, basing potential industrial contamination on nine animals may not be appropriate for establishing concentrations, especially considering that the sample population is decreased further when considering age cohorts (*i.e.*, older animal sampled in 2015 [average age of caribou in 2014 was 2.4 years compared to an average of 8.2 years in 2015]). However, as a result of sampling constraints due to normal subsistence practices and logistics, several studies have reported chemical concentrations for a limited number of samples (*e.g.*, Exponent 2002: 10 caribou total, six and four when grouped by location; O'Hara *et al.* 2003: groups ranged 6 to 15 when "hunting"). To potentially increase caribou sample population size, CPAI could choose to re-engage with the NSB caribou study or ADFG biologist conducting spring herd health checks, which may offer additional sampling opportunities.

The migratory nature of caribou limits its efficacy as a sentinel species; however, it was selected based on its importance as a subsistence resource for Nuiqsut. The caribou sampled in 2014 are representative of harvest patterns reported in 2014, with the highest percentage of caribou harvests occurring in the Nigliq Channel area (SRB&A 2015). Caribou sampled in 2015 likely reflect harvest patterns; however, 2015 Nuiqsut harvest data is not yet available. Data collected for caribou in this study contributes to the greater knowledge of caribou health, useful screening information for ongoing evaluation by wildlife managers, and provides reassurance for Nuiqsut residents.

Several of the monitored chemicals in this study have natural sources with natural releases (*e.g.*, erosion, seeps) that are independent of human activities; while some natural sources become bioavailable due to human activities. Some COPCs are completely anthropogenic related to source and release. Several hydrocarbons measured in the environment are often from O&G reserves; intentional and unintentional combustion of organic materials (timber, fossil fuels); and emitted by natural sources such as oil seeps (AMAP 2016). For the measurements made and tissues sampled in this study we are not able to identify or propose source(s) for chemicals with both natural and human sources.

It is important to emphasize that the tissues and species selected for contaminant analyses for this subsistence foods study are not suitable for any source determination; especially petroleum source determination ("finger printing") or adverse effects assessment (including risk assessments). In part, this is because results may be confounded by contaminants deposited in the Arctic by long-range transport from other continents and industrialized nations, including military activities. The project was focused solely on assessing the current concentrations of select chemicals in select raw subsistence-use foods. The continued monitoring of the level of these contaminants throughout the operation and abandonment phases of the development is currently required, but may be modified (*i.e.*, analytical methods, target species).

In summary, this study addresses the BMP A-11 mandate in the NPR-A IAP ROD (BLM 2013) and interests of the subsistence hunters and fishers in the community of Nuiqsut. Results provide consumers of the studied foods reassurance and allow for knowledgeable consumption.

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APPENDIX A

Sample Results and Lab Reports

- Lab reports will be made available upon request -

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ERM DATA QUALIFIER DEFINITIONS

Acronym	Definition
B	Result may be biased high due to laboratory contamination
J	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample
LA	Animal Liver Tissue
MA	Animal Muscle Tissue
MDL	Method Detection Limit
mg/kg	Milligrams per Kilogram
ND	Not Detected
ng/L	Nanograms per Liter
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
MRL	Method Reporting Limit
ug/kg	Micrograms per Kilogram
ug/L	Micrograms per Liter
µg/sample	Micrograms per sample
UJ	The analyte was not detected at a level greater than or equal to the adjusted MDL. However, the reported adjusted MDL is approximate and may be inaccurate or imprecise.

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TABLE 1: ANALYTICAL RESULTS OF 2014 BROAD WHITEFISH SAMPLING

		Sample ID	BDWF-2014-01				BDWF-2014-02				BDWF-2014-03				BDWF-2014-04				BDWF-2014-05			
		Sample Date	7/13/2014				7/13/2014				7/13/2014				7/13/2014				7/13/2014			
Method	Compound	Units	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
SW6020	Arsenic	mg/kg	0.030	0.007	0.183	J	0.030	0.007	0.177	J	0.071	0.006	0.150	J	0.219	0.007	0.166		0.058	0.004	0.109	J
SW6020	Barium	mg/kg	0.630	0.0018	0.0183		2.6	0.0018	0.0177		2.7	0.0015	0.0150		0.842	0.0017	0.0166		2.5	0.0011	0.0109	
SW6020	Cadmium	mg/kg	0.0023	0.0007	0.0073	J	0.0048	0.0007	0.0071	J	0.0113	0.0006	0.0060		0.0038	0.0007	0.0066	J	0.0084	0.0004	0.0044	
SW6020	Copper	mg/kg	0.457	0.007	0.037		0.428	0.007	0.035		0.853	0.006	0.030		0.627	0.007	0.033		0.926	0.004	0.022	
SW6020	Lead	mg/kg	0.0037	0.00018	0.0073	J	0.0089	0.00018	0.0071		0.0074	0.00015	0.0060		0.0118	0.00017	0.0066		0.0075	0.00011	0.0044	
SW6020	Nickel	mg/kg	0.036	0.007	0.073	J	0.050	0.007	0.071	J	0.048	0.006	0.060	J	0.061	0.007	0.066	J	0.055	0.004	0.044	
SW6020	Vanadium	mg/kg	0.047	0.003	0.073	J	0.100	0.002	0.071		0.085	0.002	0.060		0.280	0.002	0.066		0.104	0.002	0.044	
SW6020	Zinc	mg/kg	10.8	0.022	0.183		14.7	0.021	0.177		17.0	0.018	0.150		18.8	0.020	0.166		13.7	0.013	0.109	
SW7471B	Mercury	mg/kg	0.007	0.001	0.007	J	0.012	0.001	0.007		0.019	0.001	0.006		0.017	0.001	0.007		0.027	0.001	0.004	
SW7742	Selenium	mg/kg	0.630	0.018	0.073		0.780	0.018	0.071		0.421	0.015	0.060		0.621	0.017	0.066		0.496	0.011	0.044	
SW8270D-SIM	2-Methylnaphthalene	ug/kg	ND	1.2	4.8		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	4.9		ND	1.2	4.8	
SW8270D-SIM	Acenaphthene	ug/kg	ND	0.45	4.8		ND	0.47	5.0		ND	0.47	5.0		ND	0.46	4.9		0.50	0.45	4.8	J
SW8270D-SIM	Acenaphthylene	ug/kg	ND	0.53	4.8	UJ	ND	0.46	5.0		ND	0.46	5.0		ND	0.45	4.9		ND	0.44	4.8	
SW8270D-SIM	Anthracene	ug/kg	ND	0.36	4.8		ND	0.38	5.0		ND	0.38	5.0		ND	0.37	4.9		ND	0.37	4.8	
SW8270D-SIM	Benzo(a)anthracene	ug/kg	0.80	0.36	4.8	J	0.60	0.38	5.0	J	0.64	0.38	5.0	J	0.54	0.37	4.9	J	0.53	0.37	4.8	J
SW8270D-SIM	Benzo(a)pyrene	ug/kg	ND	0.94	4.8	UJ	ND	1.8	5.0	UJ	ND	0.73	5.0		ND	2.0	4.9	UJ	ND	2.0	4.8	UJ
SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	ND	0.63	4.8		ND	0.66	5.0		ND	0.66	5.0		ND	0.64	4.9		ND	0.63	4.8	
SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	ND	0.90	4.8		ND	0.95	5.0		ND	0.94	5.0		ND	0.92	4.9		ND	0.91	4.8	
SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	ND	0.54	4.8		ND	0.57	5.0		ND	0.57	5.0		ND	0.56	4.9		ND	0.55	4.8	
SW8270D-SIM	Chrysene	ug/kg	ND	0.53	4.8		ND	0.55	5.0		ND	0.55	5.0		ND	0.54	4.9		ND	0.53	4.8	
SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	ND	0.82	4.8		ND	0.86	5.0		ND	0.85	5.0		ND	0.84	4.9		ND	0.82	4.8	
SW8270D-SIM	Dibenzofuran	ug/kg	1.9	0.43	4.8	J	1.5	0.45	5.0	J	0.74	0.45	5.0	J	0.93	0.44	4.9	J	ND	0.43	4.8	
SW8270D-SIM	Fluoranthene	ug/kg	ND	0.47	4.8		ND	0.49	5.0		ND	0.49	5.0		ND	0.48	4.9		ND	0.47	4.8	
SW8270D-SIM	Fluorene	ug/kg	0.71	0.50	4.8	J	0.65	0.52	5.0	J	ND	0.52	5.0		0.69	0.51	4.9	J	0.63	0.50	4.8	J
SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	ND	0.91	4.8		ND	0.96	5.0		ND	0.95	5.0		ND	0.93	4.9		ND	0.91	4.8	
SW8270D-SIM	Naphthalene	ug/kg	ND	1.5	4.8		ND	1.5	5.0		ND	1.5	5.0		ND	1.5	4.9		ND	1.5	4.8	
SW8270D-SIM	Phenanthrene	ug/kg	1.3	0.63	4.8	J	1.0	0.66	5.0	J	ND	0.66	5.0		0.92	0.64	4.9	J	ND	0.63	4.8	
SW8270D-SIM	Pyrene	ug/kg	ND	0.48	4.8		ND	0.50	5.0		ND	0.50	5.0		ND	0.49	4.9		ND	0.48	4.8	
ZFZDRY	Total solids	percent	37.2				35.4				30.6				33.6				22.0			

TABLE 1: ANALYTICAL RESULTS OF 2014 BROAD WHITEFISH SAMPLING

		Sample ID	BDWF-2014-06				BDWF-2014-07				BDWF-2014-08				BDWF-2014-09				BDWF-2014-10			
		Sample Date	7/13/2014				7/13/2014				7/13/2014				7/13/2014				7/13/2014			
Method	Compound	Units	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
SW6020	Arsenic	mg/kg	0.041	0.006	0.160	J	0.057	0.006	0.146	J	0.258	0.006	0.153		0.030	0.007	0.172	J	0.082	0.006	0.156	J
SW6020	Barium	mg/kg	3.9	0.0016	0.0160		1.4	0.0015	0.0146		0.706	0.0015	0.0153		3.5	0.0017	0.0172		1.9	0.0016	0.0156	
SW6020	Cadmium	mg/kg	0.0080	0.0006	0.0064		0.0035	0.0006	0.0059	J	0.0042	0.0006	0.0061	J	0.0107	0.0007	0.0069		0.0054	0.0006	0.0062	J
SW6020	Copper	mg/kg	0.578	0.006	0.032		0.605	0.006	0.029		0.425	0.006	0.031		0.450	0.007	0.034		0.812	0.006	0.031	
SW6020	Lead	mg/kg	0.0088	0.00016	0.0064		0.0122	0.00015	0.0059		0.0149	0.00015	0.0061		0.0209	0.00017	0.0069		0.0069	0.00016	0.0062	
SW6020	Nickel	mg/kg	0.043	0.006	0.064	J	0.038	0.006	0.059	J	0.041	0.006	0.061	J	0.052	0.007	0.069	J	0.033	0.006	0.062	J
SW6020	Vanadium	mg/kg	0.137	0.002	0.064		0.206	0.002	0.059		0.180	0.002	0.061		0.192	0.002	0.069		0.114	0.002	0.062	
SW6020	Zinc	mg/kg	18.9	0.019	0.160		14.5	0.018	0.146		17.0	0.018	0.153		33.6	0.021	0.172		20.8	0.019	0.156	
SW7471B	Mercury	mg/kg	0.018	0.001	0.006		0.023	0.001	0.006		0.019	0.001	0.006		0.042	0.001	0.007		0.035	0.001	0.006	
SW7742	Selenium	mg/kg	0.384	0.016	0.064		0.445	0.015	0.059		0.665	0.015	0.061		0.427	0.017	0.069		0.359	0.016	0.062	
SW8270D-SIM	2-Methylnaphthalene	ug/kg	ND	1.2	4.8		ND	1.2	4.7		ND	1.2	4.9		ND	1.2	4.7		ND	1.2	5.0	
SW8270D-SIM	Acenaphthene	ug/kg	ND	0.45	4.8		ND	0.44	4.7		ND	0.46	4.9		ND	0.44	4.7		ND	0.55	5.0	UJ
SW8270D-SIM	Acenaphthylene	ug/kg	ND	0.44	4.8		ND	0.43	4.7		ND	0.45	4.9		ND	0.43	4.7		ND	0.46	5.0	
SW8270D-SIM	Anthracene	ug/kg	ND	0.37	4.8		ND	0.36	4.7		ND	0.38	4.9		ND	0.36	4.7		ND	0.38	5.0	
SW8270D-SIM	Benzo(a)anthracene	ug/kg	0.42	0.37	4.8	J	0.42	0.36	4.7	J	0.39	0.38	4.9	J	0.54	0.36	4.7	J	0.51	0.38	5.0	J
SW8270D-SIM	Benzo(a)pyrene	ug/kg	ND	1.7	4.8	UJ	ND	1.7	4.7	UJ	ND	1.7	4.9	UJ	ND	0.68	4.7		ND	1.7	5.0	UJ
SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	ND	0.63	4.8		ND	0.62	4.7		ND	0.65	4.9		ND	0.62	4.7		ND	0.65	5.0	
SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	ND	0.91	4.8		ND	0.89	4.7		ND	0.93	4.9		ND	0.89	4.7		ND	0.94	5.0	
SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	ND	0.55	4.8		ND	0.54	4.7		ND	0.56	4.9		ND	0.53	4.7		ND	0.56	5.0	
SW8270D-SIM	Chrysene	ug/kg	ND	0.53	4.8		ND	0.52	4.7		ND	0.54	4.9		ND	0.52	4.7		ND	0.54	5.0	
SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	ND	0.82	4.8		ND	0.81	4.7		ND	0.84	4.9		ND	0.80	4.7		ND	0.85	5.0	
SW8270D-SIM	Dibenzofuran	ug/kg	0.86	0.43	4.8	J	0.53	0.42	4.7	J	0.66	0.44	4.9	J	0.91	0.42	4.7	J	0.78	0.45	5.0	J
SW8270D-SIM	Fluoranthene	ug/kg	ND	0.47	4.8		ND	0.46	4.7		ND	0.48	4.9		ND	0.46	4.7		ND	0.49	5.0	
SW8270D-SIM	Fluorene	ug/kg	ND	0.50	4.8		ND	0.49	4.7		0.58	0.51	4.9	J	0.51	0.49	4.7	J	0.56	0.52	5.0	J
SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	ND	0.92	4.8		ND	0.90	4.7		ND	0.94	4.9		ND	0.90	4.7		ND	0.95	5.0	
SW8270D-SIM	Naphthalene	ug/kg	ND	1.5	4.8		ND	1.4	4.7		ND	1.5	4.9		ND	1.4	4.7		ND	1.5	5.0	
SW8270D-SIM	Phenanthrene	ug/kg	0.64	0.63	4.8	J	0.93	0.62	4.7	J	1.0	0.65	4.9	J	0.72	0.62	4.7	J	0.87	0.65	5.0	J
SW8270D-SIM	Pyrene	ug/kg	ND	0.61	4.8	UJ	ND	0.47	4.7		ND	0.49	4.9		ND	0.47	4.7		ND	0.52	5.0	UJ
ZFZDRY	Total solids	percent	32.4				29.3				30.9				34.6				31.4			

TABLE 1: ANALYTICAL RESULTS OF 2014 BROAD WHITEFISH SAMPLING

		Sample ID	BDWF-2014-11				BDWF-2014-12				BDWF-2014-13				BDWF-2014-14				BDWF-2014-15			
		Sample Date	7/13/2014				7/13/2014				7/13/2014				7/13/2014				7/13/2014			
Method	Compound	Units	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
SW6020	Arsenic	mg/kg	0.080	0.006	0.154	J	0.076	0.006	0.146	J	0.133	0.006	0.144	J	0.095	0.007	0.171	J	0.073	0.007	0.168	J
SW6020	Barium	mg/kg	1.1	0.0015	0.0154	J	1.1	0.0015	0.0146		3.0	0.0014	0.0144		1.6	0.0017	0.0171		2.1	0.0017	0.0168	
SW6020	Cadmium	mg/kg	0.0108	0.0006	0.0062		0.0037	0.0006	0.0058	J	0.0093	0.0006	0.0057		0.0072	0.0007	0.0068		0.0070	0.0007	0.0067	
SW6020	Copper	mg/kg	0.572	0.006	0.031		0.554	0.006	0.029		2.8	0.006	0.029		0.535	0.007	0.034		1.4	0.007	0.034	
SW6020	Lead	mg/kg	0.0046	0.00015	0.0062	J	0.0120	0.00015	0.0058		0.0069	0.00014	0.0057		0.0040	0.00017	0.0068	J	0.0044	0.00017	0.0067	J
SW6020	Nickel	mg/kg	0.061	0.006	0.062	J	0.039	0.006	0.058	J	0.029	0.006	0.057	J	0.028	0.007	0.068	J	0.024	0.007	0.067	J
SW6020	Vanadium	mg/kg	0.075	0.002	0.062		0.245	0.002	0.058		0.092	0.002	0.057		0.040	0.002	0.068	J	0.041	0.002	0.067	J
SW6020	Zinc	mg/kg	25.0	0.018	0.154		18.0	0.018	0.146		16.1	0.017	0.144		23.3	0.021	0.171		15.5	0.020	0.168	
SW7471B	Mercury	mg/kg	0.031	0.001	0.006		0.025	0.001	0.006		0.028	0.001	0.006		0.040	0.001	0.007		0.016	0.001	0.007	
SW7742	Selenium	mg/kg	0.273	0.015	0.062		0.488	0.015	0.058		0.316	0.014	0.057		0.343	0.017	0.068		0.436	0.017	0.067	
SW8270D-SIM	2-Methylnaphthalene	ug/kg	ND	1.2	4.8		ND	1.2	5.0		ND	1.2	4.9		ND	1.2	5.0		ND	1.2	5.0	
SW8270D-SIM	Acenaphthene	ug/kg	ND	0.45	4.8		ND	0.47	5.0		ND	0.46	4.9		ND	0.47	5.0		ND	0.47	5.0	
SW8270D-SIM	Acenaphthylene	ug/kg	ND	0.44	4.8		ND	0.46	5.0		ND	0.45	4.9		ND	0.46	5.0		0.67	0.46	5.0	J
SW8270D-SIM	Anthracene	ug/kg	ND	0.36	4.8		ND	0.38	5.0		ND	0.38	4.9		ND	0.38	5.0		ND	0.38	5.0	
SW8270D-SIM	Benzo(a)anthracene	ug/kg	ND	0.36	4.8		ND	0.38	5.0		ND	0.38	4.9		ND	0.38	5.0		ND	0.38	5.0	
SW8270D-SIM	Benzo(a)pyrene	ug/kg	ND	0.70	4.8		ND	0.73	5.0		ND	0.74	4.9	UJ	ND	0.72	5.0		ND	0.73	5.0	
SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	ND	0.63	4.8		ND	0.66	5.0		ND	0.65	4.9		ND	0.66	5.0		ND	0.66	5.0	
SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	ND	0.90	4.8		ND	0.94	5.0		ND	0.93	4.9		ND	0.94	5.0		ND	0.95	5.0	
SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	ND	0.54	4.8		ND	0.57	5.0		ND	0.56	4.9		ND	0.57	5.0		ND	0.57	5.0	
SW8270D-SIM	Chrysene	ug/kg	ND	0.53	4.8		ND	0.55	5.0		ND	0.54	4.9		ND	0.55	5.0		ND	0.55	5.0	
SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	ND	0.82	4.8		ND	0.85	5.0		ND	0.85	4.9		ND	0.85	5.0		ND	0.86	5.0	
SW8270D-SIM	Dibenzofuran	ug/kg	1.1	0.43	4.8	J	0.92	0.45	5.0	J	0.52	0.44	4.9	J	1.8	0.45	5.0	J	0.46	0.45	5.0	J
SW8270D-SIM	Fluoranthene	ug/kg	ND	0.47	4.8		ND	0.49	5.0		ND	0.48	4.9		ND	0.49	5.0		ND	0.49	5.0	
SW8270D-SIM	Fluorene	ug/kg	0.51	0.50	4.8	J	ND	0.52	5.0		ND	0.51	4.9		ND	0.52	5.0		ND	0.52	5.0	
SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	ND	0.91	4.8		ND	0.95	5.0		ND	0.94	4.9		ND	0.95	5.0		ND	0.96	5.0	
SW8270D-SIM	Naphthalene	ug/kg	ND	1.5	4.8		ND	1.5	5.0		ND	1.5	4.9		ND	1.5	5.0		ND	1.5	5.0	
SW8270D-SIM	Phenanthrene	ug/kg	1.0	0.63	4.8	J	ND	0.66	5.0		ND	0.65	4.9		0.82	0.66	5.0	J	0.80	0.66	5.0	J
SW8270D-SIM	Pyrene	ug/kg	2.0	0.48	4.8	J	ND	0.50	5.0		ND	0.49	4.9		0.91	0.50	5.0	J	ND	0.50	5.0	
ZFZDRY	Total solids	percent	31.0				29.3				29.1				34.4				33.6			

TABLE 1: ANALYTICAL RESULTS OF 2014 BROAD WHITEFISH SAMPLING

		Sample ID	BDWF-2014-16				BDWF-2014-17				BDWF-2014-18				BDWF-2014-19				BDWF-2014-20			
		Sample Date	7/13/2014				7/13/2014				7/13/2014				7/13/2014				7/13/2014			
Method	Compound	Units	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
SW6020	Arsenic	mg/kg	0.062	0.006	0.158	J	0.163	0.006	0.149		0.062	0.006	0.156	J	0.191	0.006	0.138		0.041	0.005	0.126	J
SW6020	Barium	mg/kg	3.7	0.0016	0.0158		2.1	0.0015	0.0149		1.4	0.0016	0.0156		1.3	0.0014	0.0138		2.0	0.0013	0.0126	
SW6020	Cadmium	mg/kg	0.0072	0.0006	0.0063		0.0113	0.0006	0.0059		0.0077	0.0006	0.0062		0.0053	0.0006	0.0055	J	0.0051	0.0005	0.0051	
SW6020	Copper	mg/kg	0.419	0.006	0.032		1.2	0.006	0.030		0.715	0.006	0.031		0.422	0.006	0.028		0.508	0.005	0.025	
SW6020	Lead	mg/kg	0.0093	0.00016	0.0063		0.0043	0.00015	0.0059	J	0.0065	0.00016	0.0062		0.0122	0.00014	0.0055		0.0110	0.00013	0.0051	
SW6020	Nickel	mg/kg	0.027	0.006	0.063	J	0.025	0.006	0.059	J	0.024	0.006	0.062	J	0.024	0.006	0.055	J	0.021	0.005	0.051	J
SW6020	Vanadium	mg/kg	0.099	0.002	0.063		0.042	0.002	0.059	J	0.092	0.002	0.062		0.219	0.002	0.055		0.167	0.002	0.051	
SW6020	Zinc	mg/kg	17.7	0.019	0.158		12.7	0.018	0.149		17.1	0.019	0.156		23.0	0.017	0.138		17.0	0.015	0.126	
SW7471B	Mercury	mg/kg	0.014	0.001	0.006		0.041	0.001	0.006		0.031	0.001	0.006		0.021	0.001	0.006		0.023	0.001	0.005	
SW7742	Selenium	mg/kg	0.332	0.016	0.063		0.340	0.015	0.059		0.287	0.016	0.062		0.652	0.014	0.055		0.302	0.013	0.051	
SW8270D-SIM	2-Methylnaphthalene	ug/kg	ND	1.2	4.8		ND	1.2	4.8		ND	1.2	4.9		ND	1.2	4.8		ND	1.2	4.8	
SW8270D-SIM	Acenaphthene	ug/kg	ND	0.46	4.8		ND	0.45	4.8		ND	0.46	4.9		ND	0.45	4.8		ND	0.45	4.8	
SW8270D-SIM	Acenaphthylene	ug/kg	ND	0.45	4.8		ND	0.44	4.8		1.2	0.45	4.9	J	ND	0.44	4.8		ND	0.44	4.8	
SW8270D-SIM	Anthracene	ug/kg	ND	0.37	4.8		ND	0.37	4.8		ND	0.37	4.9		ND	0.37	4.8		ND	0.37	4.8	
SW8270D-SIM	Benzo(a)anthracene	ug/kg	ND	0.37	4.8		ND	0.37	4.8		ND	0.37	4.9		ND	0.37	4.8		ND	0.37	4.8	
SW8270D-SIM	Benzo(a)pyrene	ug/kg	ND	0.71	4.8		ND	0.70	4.8		ND	0.71	4.9		ND	0.70	4.8		ND	0.70	4.8	
SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	ND	0.64	4.8		ND	0.63	4.8		ND	0.64	4.9		ND	0.63	4.8		ND	0.63	4.8	
SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	ND	0.92	4.8		ND	0.91	4.8		ND	0.92	4.9		ND	0.91	4.8		ND	0.91	4.8	
SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	ND	0.55	4.8		ND	0.55	4.8		ND	0.56	4.9		ND	0.55	4.8		ND	0.55	4.8	
SW8270D-SIM	Chrysene	ug/kg	ND	0.53	4.8		ND	0.53	4.8		ND	0.54	4.9		ND	0.53	4.8		ND	0.53	4.8	
SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	ND	0.83	4.8		ND	0.82	4.8		ND	0.84	4.9		ND	0.82	4.8		ND	0.82	4.8	
SW8270D-SIM	Dibenzofuran	ug/kg	0.99	0.44	4.8	J	0.66	0.43	4.8	J	ND	0.44	4.9		0.59	0.43	4.8	J	0.81	0.43	4.8	J
SW8270D-SIM	Fluoranthene	ug/kg	ND	0.48	4.8		ND	0.47	4.8		ND	0.48	4.9		ND	0.47	4.8		ND	0.47	4.8	
SW8270D-SIM	Fluorene	ug/kg	ND	0.50	4.8		ND	0.50	4.8		ND	0.51	4.9		ND	0.50	4.8		ND	0.50	4.8	
SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	ND	0.93	4.8		ND	0.92	4.8		ND	0.93	4.9		ND	0.92	4.8		ND	0.92	4.8	
SW8270D-SIM	Naphthalene	ug/kg	ND	1.5	4.8		ND	1.5	4.8		ND	1.5	4.9		ND	1.5	4.8		ND	1.5	4.8	
SW8270D-SIM	Phenanthrene	ug/kg	ND	0.64	4.8		0.77	0.63	4.8	J	ND	0.64	4.9		0.87	0.63	4.8	J	0.70	0.63	4.8	J
SW8270D-SIM	Pyrene	ug/kg	ND	0.48	4.8		ND	0.48	4.8		0.75	0.49	4.9	J	ND	0.48	4.8		ND	0.48	4.8	
ZFZDRY	Total solids	percent	31.8				29.7				31.4				27.7				25.7			

TABLE 2: ANALYTICAL RESULTS OF 2015 BROAD WHITEFISH SAMPLING

				Sample ID	BDWF-2015-01				BDWF-2015-02				BDWF-2015-03				BDWF-2015-04				BDWF-2015-05			
				Sample Date	8/11/2015				8/13/2015				8/13/2015				8/13/2015				8/13/2015			
Basis (Wet / Dry)	Method	Compound	Units	% Detectable	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
Wet	SW6020A	Arsenic	mg/kg	100.0%	0.040	0.004	0.095	J	0.060	0.005	0.131	J	0.031	0.005	0.116	J	0.053	0.005	0.133	J	0.034	0.005	0.132	J
Wet	SW6020A	Barium	mg/kg	100.0%	0.860	0.0010	0.0095		5.9	0.0013	0.0131	J	2.9	0.0012	0.0116		2.3	0.0013	0.0133		1.1	0.0013	0.0132	
Wet	SW6020A	Cadmium	mg/kg	100.0%	0.0049	0.0008	0.0038		0.0059	0.0010	0.0052		0.0046	0.0009	0.0046	J	0.0034	0.0011	0.0053	J	0.0042	0.0011	0.0053	J
Wet	SW6020A	Copper	mg/kg	100.0%	0.376	0.004	0.019		0.274	0.005	0.026		0.307	0.005	0.023		0.364	0.005	0.027		0.362	0.005	0.026	
Wet	SW6020A	Lead	mg/kg	100.0%	0.0039	0.00010	0.0038	B	0.0056	0.00013	0.0052		0.0154	0.00012	0.0047	B	0.0061	0.00013	0.0053	B	0.0124	0.00013	0.0053	B
Wet	SW6020A	Nickel	mg/kg	100.0%	0.020	0.004	0.038	J	0.018	0.005	0.052	J	0.041	0.005	0.046	J	0.034	0.005	0.053	J	0.021	0.005	0.053	J
Wet	SW6020A	Vanadium	mg/kg	100.0%	0.032	0.001	0.038	J	0.056	0.002	0.052		0.178	0.002	0.046		0.099	0.002	0.053		0.139	0.002	0.053	
Wet	SW6020A	Zinc	mg/kg	100.0%	16.4	0.011	0.095		21.0	0.016	0.131		22.3	0.014	0.116		19.6	0.016	0.133		16.6	0.016	0.132	
Wet	SW7471	Mercury	mg/kg	100.0%	0.0383	0.0008	0.0040		0.0225	0.0010	0.0052		0.0197	0.0010	0.0048		0.0220	0.0011	0.0054		0.0194	0.0011	0.0057	
Wet	SW7742	Selenium	mg/kg	100.0%	0.215	0.010	0.019		0.242	0.013	0.026		0.368	0.012	0.023		0.278	0.013	0.027		0.406	0.013	0.026	
Wet	SW8270D-SIM	1-Methylnaphthalene	ug/kg	16.7%	0.55	0.55	2.4	J	ND	1.1	4.7		ND	1.1	4.8		ND	1.1	4.7		ND	1.1	4.8	
Wet	SW8270D-SIM	1-Methylphenanthrene	ug/kg	0.0%	ND	430	430	UJ	ND	1400	1400	UJ	ND	1200	1200	UJ	ND	770	770	UJ	ND	1400	1400	UJ
Wet	SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	3.3%	ND	0.27	2.4		ND	0.53	4.7		ND	0.53	4.8		ND	0.53	4.7		ND	0.53	4.8	
Wet	SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	66.7%	1.2	0.23	2.4	J	3.1	0.46	4.7	J	ND	0.46	4.8		ND	0.46	4.7		2.4	0.46	4.8	J
Wet	SW8270D-SIM	2-Methylnaphthalene	ug/kg	23.3%	0.80	0.60	4.8	J	ND	1.2	9.3		ND	1.2	9.6		ND	1.2	9.3		ND	1.2	9.5	
Wet	SW8270D-SIM	Acenaphthene	ug/kg	46.7%	ND	0.24	2.4		0.63	0.47	4.7	J	0.65	0.47	4.8	J	0.56	0.47	4.7	J	ND	0.47	4.8	
Wet	SW8270D-SIM	Acenaphthylene	ug/kg	3.3%	ND	0.23	2.4		ND	0.46	4.7		ND	0.46	4.8		ND	0.46	4.7		ND	0.46	4.8	
Wet	SW8270D-SIM	Anthracene	ug/kg	20.0%	ND	0.19	2.4		1.2	0.38	4.7	J	6.0	0.38	4.8		ND	0.38	4.7		ND	0.38	4.8	
Wet	SW8270D-SIM	Benzo(a)anthracene	ug/kg	0.0%	ND	0.19	2.4		ND	0.38	4.7		ND	11	11	UJ	ND	0.38	4.7		ND	0.38	4.8	
Wet	SW8270D-SIM	Benzo(a)pyrene	ug/kg	0.0%	ND	3.7	24		ND	0.73	4.7		ND	0.73	4.8		ND	0.73	4.7		ND	3.7	24	
Wet	SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	0.0%	ND	3.3	24		ND	0.66	4.7		ND	0.66	4.8		ND	0.66	4.7		ND	3.3	24	
Wet	SW8270D-SIM	Benzo(e)pyrene	ug/kg	0.0%	ND	2.5	24		ND	0.50	4.7		ND	0.50	4.8		ND	0.50	4.7		ND	2.5	24	
Wet	SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	0.0%	ND	4.8	24		ND	0.95	4.7		ND	0.95	4.8		ND	0.95	4.7		ND	4.8	24	
Wet	SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	0.0%	ND	2.9	24		ND	0.57	4.7		ND	0.57	4.8		ND	0.57	4.7		ND	2.9	24	
Wet	SW8270D-SIM	Biphenyl	ug/kg	23.3%	0.50	0.44	2.4	J	ND	0.87	4.7		ND	0.87	4.8		ND	0.87	4.7		ND	0.87	4.8	
Wet	SW8270D-SIM	Carbazole	ug/kg	70.0%	8.0	0.27	2.4	J	ND	0.54	4.7		3.7	0.54	4.8	J	30	0.54	4.7		9.9	0.54	4.8	J
Wet	SW8270D-SIM	Chrysene	ug/kg	0.0%	ND	8.3	8.3	UJ	ND	0.55	4.7		ND	0.62	4.8	UJ	ND	6.9	6.9	UJ	ND	14	14	UJ
Wet	SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	0.0%	ND	4.3	24		ND	0.86	4.7		ND	0.86	4.8		ND	0.86	4.7		ND	4.3	24	
Wet	SW8270D-SIM	Dibenzofuran	ug/kg	16.7%	ND	0.23	2.4		ND	0.45	4.7		ND	0.45	4.8		ND	0.45	4.7		ND	0.45	4.8	
Wet	SW8270D-SIM	Dibenzothiophene	ug/kg	3.3%	ND	0.43	2.4		ND	0.86	4.7		ND	0.86	4.8		ND	0.86	4.7		ND	0.86	4.8	
Wet	SW8270D-SIM	Fluoranthene	ug/kg	0.0%	ND	0.25	2.4		ND	0.49	4.7		ND	0.49	4.8		ND	0.49	4.7		ND	0.49	4.8	
Wet	SW8270D-SIM	Fluorene	ug/kg	16.7%	ND	0.26	2.4		ND	0.52	4.7		ND	0.52	4.8		ND	0.52	4.7		ND	0.52	4.8	
Wet	SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	0.0%	ND	4.8	24		ND	0.96	4.7		ND	0.96	4.8		ND	0.96	4.7		ND	4.8	24	
Wet	SW8270D-SIM	Naphthalene	ug/kg	60.0%	2.1	0.75	4.8	J	1.6	1.5	9.3	J	1.7	1.5	9.6	J	ND	1.5	9.3		ND	1.5	9.5	
Wet	SW8270D-SIM	Perylene	ug/kg	0.0%	ND	6.0	24		ND	1.2	4.7		ND	1.2	4.8		ND	1.2	4.7		ND	6.0	24	
Wet	SW8270D-SIM	Phenanthrene	ug/kg	10.0%	ND	0.33	2.4		ND	0.66	4.7		0.72	0.66	4.8	J	ND	0.66	4.7		ND	0.66	4.8	
Wet	SW8270D-SIM	Pyrene	ug/kg	0.0%	ND	0.25	2.4		ND	0.50	4.7		ND	0.50	4.8		ND	1.6	4.7	UJ	ND	0.50	4.8	
Wet	ZFZDRY	Total solids	percent	100.0%	20.3				26.2				24.0				27.1				28.8			

TABLE 2: ANALYTICAL RESULTS OF 2015 BROAD WHITEFISH SAMPLING

				Sample ID	BDWF-2015-06				BDWF-2015-07				BDWF-2015-08				BDWF-2015-09				BDWF-2015-10			
				Sample Date	8/13/2015				8/13/2015				8/13/2015				8/13/2015				8/13/2015			
Basis (Wet / Dry)	Method	Compound	Units	% Detectable	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
Wet	SW6020A	Arsenic	mg/kg	100.0%	0.073	0.006	0.142	J	0.056	0.005	0.135	J	0.065	0.005	0.125	J	0.048	0.006	0.139	J	0.061	0.005	0.123	J
Wet	SW6020A	Barium	mg/kg	100.0%	1.7	0.0014	0.0142		2.0	0.0013	0.0135		4.4	0.0013	0.0125		1.4	0.0014	0.0139		4.1	0.0012	0.0123	
Wet	SW6020A	Cadmium	mg/kg	100.0%	0.0036	0.0011	0.0057	J	0.0031	0.0011	0.0054	J	0.0073	0.0010	0.0050		0.0033	0.0011	0.0056	J	0.0054	0.0010	0.0049	
Wet	SW6020A	Copper	mg/kg	100.0%	0.348	0.006	0.028		0.467	0.005	0.027		0.954	0.005	0.025		0.448	0.006	0.028		0.258	0.005	0.025	
Wet	SW6020A	Lead	mg/kg	100.0%	0.0100	0.00014	0.0057	B	0.0050	0.00013	0.0054	J	0.0095	0.00013	0.0050	B	0.0076	0.00014	0.0056	B	0.0068	0.00012	0.0049	B
Wet	SW6020A	Nickel	mg/kg	100.0%	0.015	0.006	0.057	J	0.018	0.005	0.054	J	0.020	0.005	0.050	J	0.034	0.006	0.056	J	0.015	0.005	0.049	J
Wet	SW6020A	Vanadium	mg/kg	100.0%	0.134	0.002	0.057		0.084	0.002	0.054		0.118	0.002	0.050		0.068	0.002	0.056		0.121	0.002	0.049	
Wet	SW6020A	Zinc	mg/kg	100.0%	23.1	0.017	0.142		25.1	0.016	0.135		23.5	0.015	0.125		18.8	0.017	0.139		18.5	0.015	0.123	
Wet	SW7471	Mercury	mg/kg	100.0%	0.0122	0.0012	0.0058		0.0242	0.0011	0.0054		0.0279	0.0010	0.0052		0.0131	0.0011	0.0057		0.0352	0.0010	0.0052	
Wet	SW7742	Selenium	mg/kg	100.0%	0.364	0.014	0.028		0.234	0.013	0.027		0.292	0.013	0.025		0.327	0.014	0.028		0.236	0.012	0.025	
Wet	SW8270D-SIM	1-Methylnaphthalene	ug/kg	16.7%	ND	1.1	4.7		ND	1.1	4.7		ND	1.1	4.9		ND	1.1	4.7		1.0	0.55	2.3	J
Wet	SW8270D-SIM	1-Methylphenanthrene	ug/kg	0.0%	ND	1100	1100	UJ	ND	1100	1100	UJ	ND	1100	1100	UJ	ND	1200	1200	UJ	ND	580	580	UJ
Wet	SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	3.3%	ND	0.53	4.7		ND	0.53	4.7		ND	0.53	4.9		ND	0.53	4.7		ND	0.27	2.3	
Wet	SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	66.7%	1.0	0.46	4.7	J	ND	0.46	4.7		ND	0.46	4.9		1.2	0.46	4.7	J	6.8	0.23	2.3	
Wet	SW8270D-SIM	2-Methylnaphthalene	ug/kg	23.3%	ND	1.2	9.3		ND	1.2	9.4		ND	1.2	9.8		ND	1.2	9.3		1.2	0.60	4.6	J
Wet	SW8270D-SIM	Acenaphthene	ug/kg	46.7%	0.51	0.47	4.7	J	ND	0.47	4.7		0.74	0.47	4.9	J	ND	0.47	4.7		0.47	0.24	2.3	J
Wet	SW8270D-SIM	Acenaphthylene	ug/kg	3.3%	ND	0.46	4.7		ND	0.46	4.7		ND	0.46	4.9		ND	0.46	4.7		ND	0.23	2.3	
Wet	SW8270D-SIM	Anthracene	ug/kg	20.0%	ND	0.38	4.7		ND	0.38	4.7		2.0	0.38	4.9	J	9.8	0.38	4.7		ND	0.19	2.3	
Wet	SW8270D-SIM	Benzo(a)anthracene	ug/kg	0.0%	ND	0.38	4.7		ND	0.38	4.7		ND	0.38	4.9		ND	0.38	4.7		ND	0.19	2.3	
Wet	SW8270D-SIM	Benzo(a)pyrene	ug/kg	0.0%	ND	0.73	4.7		ND	0.73	4.7		ND	0.73	4.9		ND	0.73	4.7		ND	0.37	2.3	
Wet	SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	0.0%	ND	0.66	4.7		ND	0.66	4.7		ND	0.66	4.9		ND	0.66	4.7		ND	0.33	2.3	
Wet	SW8270D-SIM	Benzo(e)pyrene	ug/kg	0.0%	ND	0.50	4.7		ND	0.50	4.7		ND	0.50	4.9		ND	0.50	4.7		ND	0.25	2.3	
Wet	SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	0.0%	ND	0.95	4.7		ND	0.95	4.7		ND	0.95	4.9		ND	0.95	4.7		ND	0.48	2.3	
Wet	SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	0.0%	ND	0.57	4.7		ND	0.57	4.7		ND	0.57	4.9		ND	0.57	4.7		ND	0.29	2.3	
Wet	SW8270D-SIM	Biphenyl	ug/kg	23.3%	ND	0.87	4.7		ND	0.87	4.7		ND	0.87	4.9		1.5	0.87	4.7	J	0.55	0.44	2.3	J
Wet	SW8270D-SIM	Carbazole	ug/kg	70.0%	11	0.54	4.7	J	11	0.54	4.7	J	26	0.54	4.9		8.2	0.54	4.7	J	6.1	0.27	2.3	J
Wet	SW8270D-SIM	Chrysene	ug/kg	0.0%	ND	0.55	4.7		ND	7.1	7.1	UJ	ND	11	11	UJ	ND	8.5	8.5	UJ	ND	3.7	3.7	UJ
Wet	SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	0.0%	ND	0.86	4.7		ND	0.86	4.7		ND	0.86	4.9		ND	0.86	4.7		ND	0.43	2.3	
Wet	SW8270D-SIM	Dibenzofuran	ug/kg	16.7%	ND	0.45	4.7		ND	0.45	4.7		ND	0.45	4.9		ND	0.45	4.7		0.71	0.23	2.3	J
Wet	SW8270D-SIM	Dibenzothiophene	ug/kg	3.3%	ND	0.86	4.7		ND	0.86	4.7		ND	0.86	4.9		ND	0.86	4.7		ND	0.43	2.3	
Wet	SW8270D-SIM	Fluoranthene	ug/kg	0.0%	ND	0.49	4.7		ND	0.49	4.7		ND	0.49	4.9		ND	0.49	4.7		ND	0.25	2.3	
Wet	SW8270D-SIM	Fluorene	ug/kg	16.7%	ND	0.52	4.7		ND	0.52	4.7		0.73	0.52	4.9	J	ND	0.52	4.7		0.35	0.26	2.3	J
Wet	SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	0.0%	ND	0.96	4.7		ND	0.96	4.7		ND	0.96	4.9		ND	0.96	4.7		ND	0.48	2.3	
Wet	SW8270D-SIM	Naphthalene	ug/kg	60.0%	1.6	1.5	9.3	J	1.8	1.5	9.4	J	1.6	1.5	9.8	J	4.7	1.5	9.3	J	5.0	0.75	4.6	
Wet	SW8270D-SIM	Perylene	ug/kg	0.0%	ND	1.2	4.7		ND	1.2	4.7		ND	1.2	4.9		ND	1.2	4.7		ND	0.60	2.3	
Wet	SW8270D-SIM	Phenanthrene	ug/kg	10.0%	ND	0.66	4.7		ND	0.66	4.7		ND	0.66	4.9		ND	0.66	4.7		ND	0.33	2.3	
Wet	SW8270D-SIM	Pyrene	ug/kg	0.0%	ND	2.6	4.7	UJ	ND	0.50	4.7		ND	0.50	4.9		ND	2.6	4.7	UJ	ND	1.7	2.3	UJ
Wet	ZFZDRY	Total solids	percent	100.0%	29.2				26.9				26.0				28.4				25.9			

TABLE 2: ANALYTICAL RESULTS OF 2015 BROAD WHITEFISH SAMPLING

				Sample ID	BDWF-2015-11				BDWF-2015-12				BDWF-2015-13				BDWF-2015-14				BDWF-2015-15			
				Sample Date	8/14/2015				8/14/2015				8/14/2015				8/14/2015				8/14/2015			
Basis (Wet / Dry)	Method	Compound	Units	% Detectable	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
Wet	SW6020A	Arsenic	mg/kg	100.0%	0.038	0.005	0.126	J	0.091	0.005	0.134	J	0.027	0.004	0.112	J	0.073	0.005	0.126	J	0.246	0.005	0.113	
Wet	SW6020A	Barium	mg/kg	100.0%	4.2	0.0013	0.0126		1.6	0.0013	0.0134		2.2	0.0011	0.0112		3.8	0.0013	0.0126		6.2	0.0011	0.0113	
Wet	SW6020A	Cadmium	mg/kg	100.0%	0.0077	0.0010	0.0050		0.0044	0.0011	0.0053	J	0.0147	0.0009	0.0045		0.0147	0.0010	0.0050		0.0066	0.0009	0.0045	
Wet	SW6020A	Copper	mg/kg	100.0%	0.272	0.005	0.025		0.367	0.005	0.027		0.298	0.004	0.022		0.428	0.005	0.025		0.343	0.005	0.023	
Wet	SW6020A	Lead	mg/kg	100.0%	0.0053	0.00013	0.0050		0.0053	0.00013	0.0053	J	0.0126	0.00011	0.0045	B	0.0104	0.00013	0.0050	B	0.0091	0.00011	0.0045	
Wet	SW6020A	Nickel	mg/kg	100.0%	0.027	0.005	0.050	J	0.018	0.005	0.053	J	0.036	0.004	0.045	J	0.022	0.005	0.050	J	0.044	0.005	0.045	J
Wet	SW6020A	Vanadium	mg/kg	100.0%	0.106	0.002	0.050		0.095	0.002	0.053		0.141	0.002	0.045		0.111	0.002	0.050		0.147	0.002	0.045	
Wet	SW6020A	Zinc	mg/kg	100.0%	15.0	0.015	0.126		17.1	0.016	0.134		13.8	0.013	0.112		20.6	0.015	0.126		16.1	0.014	0.113	
Wet	SW7471	Mercury	mg/kg	100.0%	0.0170	0.0011	0.0055		0.0159	0.0011	0.0053		0.0276	0.0010	0.0049		0.0256	0.0010	0.0052		0.0515	0.0009	0.0045	
Wet	SW7742	Selenium	mg/kg	100.0%	0.367	0.013	0.025		0.249	0.013	0.027		0.445	0.011	0.022		0.250	0.013	0.025		0.384	0.011	0.023	
Wet	SW8270D-SIM	1-Methylnaphthalene	ug/kg	16.7%	ND	1.1	4.9		ND	1.1	4.8		ND	1.1	4.7		ND	0.55	2.5		0.30	0.11	0.50	J
Wet	SW8270D-SIM	1-Methylphenanthrene	ug/kg	0.0%	ND	1200	1200	UJ	ND	1500	1500	UJ	ND	1500	1500	UJ	ND	580	580	UJ	ND	2.6	2.6	UJ
Wet	SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	3.3%	ND	0.53	4.9		ND	0.53	4.8		ND	0.53	4.7		ND	0.27	2.5		0.11	0.053	0.50	J
Wet	SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	66.7%	1.6	0.46	4.9	J	5.2	0.46	4.8		3.9	0.46	4.7	J	ND	0.23	2.5		0.19	0.046	0.50	J
Wet	SW8270D-SIM	2-Methylnaphthalene	ug/kg	23.3%	ND	1.2	9.8		ND	1.2	9.6		ND	1.2	9.3		ND	0.60	5.0		0.40	0.12	0.99	J
Wet	SW8270D-SIM	Acenaphthene	ug/kg	46.7%	ND	0.47	4.9		ND	0.47	4.8		ND	0.47	4.7		ND	0.24	2.5		0.34	0.047	0.50	J
Wet	SW8270D-SIM	Acenaphthylene	ug/kg	3.3%	ND	0.46	4.9		ND	0.46	4.8		ND	0.46	4.7		ND	0.23	2.5		0.095	0.046	0.50	J
Wet	SW8270D-SIM	Anthracene	ug/kg	20.0%	ND	0.38	4.9		ND	0.38	4.8		ND	0.38	4.7		ND	0.19	2.5		ND	0.038	0.50	
Wet	SW8270D-SIM	Benzo(a)anthracene	ug/kg	0.0%	ND	0.38	4.9		ND	0.38	4.8		ND	0.38	4.7		ND	1.5	2.5	UJ	ND	0.089	0.50	UJ
Wet	SW8270D-SIM	Benzo(a)pyrene	ug/kg	0.0%	ND	0.73	4.9		ND	0.73	4.8		ND	3.7	24		ND	3.7	25		ND	0.073	0.50	
Wet	SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	0.0%	ND	0.66	4.9		ND	0.66	4.8		ND	3.3	24		ND	3.3	25		ND	0.066	0.50	
Wet	SW8270D-SIM	Benzo(e)pyrene	ug/kg	0.0%	ND	0.50	4.9		ND	0.50	4.8		ND	2.5	24		ND	2.5	25		ND	0.050	0.50	
Wet	SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	0.0%	ND	0.95	4.9		ND	0.95	4.8		ND	4.8	24		ND	4.8	25		ND	0.095	0.50	
Wet	SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	0.0%	ND	0.57	4.9		ND	0.57	4.8		ND	2.9	24		ND	2.9	25		ND	0.057	0.50	
Wet	SW8270D-SIM	Biphenyl	ug/kg	23.3%	ND	0.87	4.9		ND	0.87	4.8		ND	0.87	4.7		ND	0.44	2.5		0.33	0.087	0.50	J
Wet	SW8270D-SIM	Carbazole	ug/kg	70.0%	ND	0.54	4.9		ND	0.54	4.8		7.1	0.54	4.7	J	2.9	0.27	2.5	J	ND	0.21	0.50	UJ
Wet	SW8270D-SIM	Chrysene	ug/kg	0.0%	ND	0.55	4.9		ND	0.55	4.8		ND	13	13	UJ	ND	12	12	UJ	ND	0.055	0.50	
Wet	SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	0.0%	ND	0.86	4.9		ND	0.86	4.8		ND	4.3	24		ND	4.3	25		ND	0.086	0.50	
Wet	SW8270D-SIM	Dibenzofuran	ug/kg	16.7%	ND	0.45	4.9		ND	0.45	4.8		ND	0.45	4.7		ND	0.23	2.5		0.18	0.045	0.50	J
Wet	SW8270D-SIM	Dibenzothiophene	ug/kg	3.3%	ND	0.86	4.9		ND	0.86	4.8		ND	0.86	4.7		ND	0.43	2.5		ND	0.086	0.50	
Wet	SW8270D-SIM	Fluoranthene	ug/kg	0.0%	ND	0.49	4.9		ND	0.49	4.8		ND	0.49	4.7		ND	0.25	2.5		ND	0.14	0.50	UJ
Wet	SW8270D-SIM	Fluorene	ug/kg	16.7%	ND	0.52	4.9		ND	0.52	4.8		ND	0.52	4.7		ND	0.26	2.5		0.40	0.052	0.50	J
Wet	SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	0.0%	ND	0.96	4.9		ND	0.96	4.8		ND	4.8	24		ND	4.8	25		ND	0.096	0.50	
Wet	SW8270D-SIM	Naphthalene	ug/kg	60.0%	ND	1.5	9.8		1.9	1.5	9.6	J	ND	1.5	9.3		2.2	0.75	5.0	J	0.52	0.15	0.99	J
Wet	SW8270D-SIM	Perylene	ug/kg	0.0%	ND	1.2	4.9		ND	1.2	4.8		ND	6.0	24		ND	6.0	25		ND	0.12	0.50	
Wet	SW8270D-SIM	Phenanthrene	ug/kg	10.0%	ND	0.66	4.9		ND	0.66	4.8		ND	0.66	4.7		ND	0.33	2.5		0.22	0.066	0.50	J
Wet	SW8270D-SIM	Pyrene	ug/kg	0.0%	ND	0.50	4.9		ND	0.50	4.8		ND	0.50	4.7		ND	0.25	2.5		ND	0.050	0.50	
Wet	ZFZDRY	Total solids	percent	100.0%	27.4				26.9				24.6				26.1				22.5			

TABLE 2: ANALYTICAL RESULTS OF 2015 BROAD WHITEFISH SAMPLING

				Sample ID	BDWF-2015-16				BDWF-2015-17				BDWF-2015-18				BDWF-2015-19				BDWF-2015-20			
				Sample Date	8/14/2015				8/14/2015				8/14/2015				8/14/2015				8/14/2015			
Basis (Wet / Dry)	Method	Compound	Units	% Detectable	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
Wet	SW6020A	Arsenic	mg/kg	100.0%	0.026	0.005	0.132	J	0.061	0.005	0.136	J	0.031	0.005	0.114	J	0.034	0.005	0.126	J	0.063	0.005	0.129	J
Wet	SW6020A	Barium	mg/kg	100.0%	1.4	0.0013	0.0132		1.7	0.0014	0.0136		2.3	0.0011	0.0114		5.0	0.0013	0.0126		2.0	0.0013	0.0129	
Wet	SW6020A	Cadmium	mg/kg	100.0%	0.0094	0.0011	0.0053		0.0036	0.0011	0.0054	J	0.0094	0.0009	0.0046		0.0053	0.0010	0.0050		0.0055	0.0010	0.0052	
Wet	SW6020A	Copper	mg/kg	100.0%	0.412	0.005	0.026		0.415	0.005	0.027		0.359	0.005	0.023		0.362	0.005	0.025		0.445	0.005	0.026	
Wet	SW6020A	Lead	mg/kg	100.0%	0.0098	0.00013	0.0053		0.0141	0.00014	0.0054	B	0.0114	0.00011	0.0046		0.0199	0.00013	0.0050		0.0053	0.00013	0.0052	B
Wet	SW6020A	Nickel	mg/kg	100.0%	0.027	0.005	0.053	J	0.017	0.005	0.054	J	0.015	0.005	0.046	J	0.043	0.005	0.050	J	0.013	0.005	0.052	J
Wet	SW6020A	Vanadium	mg/kg	100.0%	0.147	0.002	0.053		0.196	0.002	0.054		0.078	0.002	0.046		0.189	0.002	0.050		0.090	0.002	0.052	
Wet	SW6020A	Zinc	mg/kg	100.0%	15.2	0.016	0.132		25.0	0.016	0.136		20.7	0.014	0.114		26.5	0.015	0.126		20.4	0.015	0.129	
Wet	SW7471	Mercury	mg/kg	100.0%	0.0148	0.0011	0.0053		0.0123	0.0012	0.0059		0.0230	0.0010	0.0049		0.0148	0.0011	0.0055		0.0427	0.0011	0.0053	
Wet	SW7742	Selenium	mg/kg	100.0%	0.633	0.013	0.026		0.361	0.014	0.027		0.412	0.011	0.023		0.369	0.013	0.025		0.264	0.013	0.026	
Wet	SW8270D-SIM	1-Methylnaphthalene	ug/kg	16.7%	ND	1.1	4.7		ND	1.1	4.8		ND	0.55	2.5		1.1	0.55	2.3	J	ND	0.55	2.4	
Wet	SW8270D-SIM	1-Methylphenanthrene	ug/kg	0.0%	ND	1300	1300	UJ	ND	1300	1300	UJ	ND	780	780	UJ	ND	760	760	UJ	ND	450	450	UJ
Wet	SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	3.3%	ND	0.53	4.7		ND	0.53	4.8		ND	0.27	2.5		ND	0.27	2.3		ND	0.27	2.4	
Wet	SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	66.7%	1.2	0.46	4.7	J	ND	0.46	4.8		0.89	0.23	2.5	J	16	0.23	2.3		0.46	0.23	2.4	J
Wet	SW8270D-SIM	2-Methylnaphthalene	ug/kg	23.3%	ND	1.2	9.4		ND	1.2	9.6		ND	0.60	4.9		0.79	0.60	4.6	J	0.70	0.60	4.7	J
Wet	SW8270D-SIM	Acenaphthene	ug/kg	46.7%	ND	0.47	4.7		0.52	0.47	4.8	J	0.87	0.24	2.5	J	ND	0.24	2.3		0.38	0.24	2.4	J
Wet	SW8270D-SIM	Acenaphthylene	ug/kg	3.3%	ND	0.46	4.7		ND	0.46	4.8		ND	0.23	2.5		ND	0.23	2.3		ND	0.23	2.4	
Wet	SW8270D-SIM	Anthracene	ug/kg	20.0%	2.3	0.38	4.7	J	ND	0.38	4.8		ND	0.19	2.5		ND	0.19	2.3		ND	0.19	2.4	
Wet	SW8270D-SIM	Benzo(a)anthracene	ug/kg	0.0%	ND	0.38	4.7		ND	0.38	4.8		ND	0.19	2.5		ND	0.19	2.3		ND	0.19	2.4	
Wet	SW8270D-SIM	Benzo(a)pyrene	ug/kg	0.0%	ND	0.73	4.7		ND	0.73	4.8		ND	0.37	2.5		ND	3.7	23		ND	3.7	24	
Wet	SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	0.0%	ND	0.66	4.7		ND	0.66	4.8		ND	0.33	2.5		ND	3.3	23		ND	3.3	24	
Wet	SW8270D-SIM	Benzo(e)pyrene	ug/kg	0.0%	ND	0.50	4.7		ND	0.50	4.8		ND	0.25	2.5		ND	2.5	23		ND	2.5	24	
Wet	SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	0.0%	ND	0.95	4.7		ND	0.95	4.8		ND	0.48	2.5		ND	4.8	23		ND	4.8	24	
Wet	SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	0.0%	ND	0.57	4.7		ND	0.57	4.8		ND	0.29	2.5		ND	2.9	23		ND	2.9	24	
Wet	SW8270D-SIM	Biphenyl	ug/kg	23.3%	ND	0.87	4.7		ND	0.87	4.8		ND	0.44	2.5		ND	0.44	2.3		0.57	0.44	2.4	J
Wet	SW8270D-SIM	Carbazole	ug/kg	70.0%	ND	0.54	4.7		7.6	0.54	4.8	J	ND	0.27	2.5		ND	0.27	2.3		3.7	0.27	2.4	J
Wet	SW8270D-SIM	Chrysene	ug/kg	0.0%	ND	0.55	4.7		ND	4.7	4.8	UJ	ND	0.28	2.5		ND	7.2	7.2	UJ	ND	6.1	6.1	UJ
Wet	SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	0.0%	ND	0.86	4.7		ND	0.86	4.8		ND	0.43	2.5		ND	4.3	23		ND	4.3	24	
Wet	SW8270D-SIM	Dibenzofuran	ug/kg	16.7%	ND	0.45	4.7		ND	0.45	4.8		0.43	0.23	2.5	J	ND	0.23	2.3		0.72	0.23	2.4	J
Wet	SW8270D-SIM	Dibenzothiophene	ug/kg	3.3%	ND	0.86	4.7		ND	0.86	4.8		ND	0.43	2.5		ND	0.43	2.3		ND	0.43	2.4	
Wet	SW8270D-SIM	Fluoranthene	ug/kg	0.0%	ND	0.49	4.7		ND	0.49	4.8		ND	0.25	2.5		ND	0.25	2.3		ND	0.25	2.4	
Wet	SW8270D-SIM	Fluorene	ug/kg	16.7%	ND	0.52	4.7		ND	0.52	4.8		0.35	0.26	2.5	J	ND	0.26	2.3		1.1	0.26	2.4	J
Wet	SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	0.0%	ND	0.96	4.7		ND	0.96	4.8		ND	0.48	2.5		ND	4.8	23		ND	4.8	24	
Wet	SW8270D-SIM	Naphthalene	ug/kg	60.0%	ND	1.5	9.4		3.0	1.5	9.6	J	0.93	0.75	4.9	J	3.0	0.75	4.6	J	2.2	0.75	4.7	J
Wet	SW8270D-SIM	Perylene	ug/kg	0.0%	ND	1.2	4.7		ND	1.2	4.8		ND	0.60	2.5		ND	6.0	23		ND	6.0	24	
Wet	SW8270D-SIM	Phenanthrene	ug/kg	10.0%	0.83	0.66	4.7	J	ND	0.66	4.8		ND	0.33	2.5		ND	0.33	2.3		ND	0.33	2.4	
Wet	SW8270D-SIM	Pyrene	ug/kg	0.0%	ND	0.50	4.7		ND	1.6	4.8	UJ	ND	0.25	2.5		ND	0.25	2.3		ND	0.39	2.4	UJ
Wet	ZFZDRY	Total solids	percent	100.0%	26.7				29.3				24.7				27.5				26.7			

TABLE 2: ANALYTICAL RESULTS OF 2015 BROAD WHITEFISH SAMPLING

				Sample ID	BDWF-2015-21				BDWF-2015-22				BDWF-2015-23				BDWF-2015-24				BDWF-2015-25			
				Sample Date	8/14/2015				8/14/2015				8/15/2015				8/15/2015				8/15/2015			
Basis (Wet / Dry)	Method	Compound	Units	% Detectable	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
Wet	SW6020A	Arsenic	mg/kg	100.0%	0.067	0.006	0.143	J	0.054	0.005	0.117	J	0.041	0.005	0.135	J	0.175	0.005	0.113		0.062	0.005	0.134	J
Wet	SW6020A	Barium	mg/kg	100.0%	2.5	0.0014	0.0143		1.8	0.0012	0.0117		3.9	0.0013	0.0135		0.622	0.0011	0.0113		1.8	0.0013	0.0134	
Wet	SW6020A	Cadmium	mg/kg	100.0%	0.0087	0.0011	0.0057		0.0045	0.0009	0.0047	J	0.0030	0.0011	0.0054	J	0.0024	0.0009	0.0045	J	0.0041	0.0011	0.0054	J
Wet	SW6020A	Copper	mg/kg	100.0%	0.377	0.006	0.029		0.393	0.005	0.023		0.296	0.005	0.027		0.313	0.005	0.023		0.316	0.005	0.027	
Wet	SW6020A	Lead	mg/kg	100.0%	0.0082	0.00014	0.0057		0.0124	0.00012	0.0047		0.0092	0.00013	0.0054		0.0112	0.00011	0.0045		0.0083	0.00013	0.0054	
Wet	SW6020A	Nickel	mg/kg	100.0%	0.019	0.006	0.057	J	0.025	0.005	0.047	J	0.021	0.005	0.054	J	0.017	0.005	0.045	J	0.024	0.005	0.054	J
Wet	SW6020A	Vanadium	mg/kg	100.0%	0.202	0.002	0.057		0.220	0.002	0.047		0.063	0.002	0.054		0.118	0.002	0.045		0.101	0.002	0.054	
Wet	SW6020A	Zinc	mg/kg	100.0%	19.8	0.017	0.143		28.4	0.014	0.117		23.2	0.016	0.135		20.1	0.014	0.113		23.1	0.016	0.134	
Wet	SW7471	Mercury	mg/kg	100.0%	0.0318	0.0012	0.0059		0.0212	0.0010	0.0049		0.0186	0.0011	0.0055		0.0173	0.0010	0.0049		0.0317	0.0011	0.0057	
Wet	SW7742	Selenium	mg/kg	100.0%	0.287	0.014	0.029		0.298	0.012	0.023		0.251	0.013	0.027		0.468	0.011	0.023		0.209	0.013	0.027	
Wet	SW8270D-SIM	1-Methylnaphthalene	ug/kg	16.7%	ND	1.1	5.0		ND	1.1	4.7		ND	1.1	4.6		ND	0.55	2.4		ND	1.1	4.7	
Wet	SW8270D-SIM	1-Methylphenanthrene	ug/kg	0.0%	ND	730	730	UJ	ND	1800	1800	UJ	ND	1400	1400	UJ	ND	870	870	UJ	ND	1500	1500	UJ
Wet	SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	3.3%	ND	0.53	5.0		ND	0.53	4.7		ND	0.53	4.6		ND	0.27	2.4		ND	0.53	4.7	
Wet	SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	66.7%	1.7	0.46	5.0	J	ND	0.46	4.7		2.3	0.46	4.6	J	1.4	0.23	2.4	J	0.97	0.46	4.7	J
Wet	SW8270D-SIM	2-Methylnaphthalene	ug/kg	23.3%	ND	1.2	9.9		ND	1.2	9.3		ND	1.2	9.2		ND	0.60	4.8		ND	1.2	9.4	
Wet	SW8270D-SIM	Acenaphthene	ug/kg	46.7%	ND	0.47	5.0		0.63	0.47	4.7	J	ND	0.47	4.6		0.32	0.24	2.4	J	ND	0.47	4.7	
Wet	SW8270D-SIM	Acenaphthylene	ug/kg	3.3%	ND	0.46	5.0		ND	0.46	4.7		ND	0.46	4.6		ND	0.23	2.4		ND	0.46	4.7	
Wet	SW8270D-SIM	Anthracene	ug/kg	20.0%	0.58	0.38	5.0	J	ND	0.38	4.7		ND	0.38	4.6		ND	0.19	2.4		ND	0.38	4.7	
Wet	SW8270D-SIM	Benzo(a)anthracene	ug/kg	0.0%	ND	0.38	5.0		ND	0.38	4.7		ND	0.38	4.6		ND	0.19	2.4		ND	0.38	4.7	
Wet	SW8270D-SIM	Benzo(a)pyrene	ug/kg	0.0%	ND	0.73	5.0		ND	0.73	4.7		ND	0.73	4.6		ND	0.37	2.4		ND	0.73	4.7	
Wet	SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	0.0%	ND	0.66	5.0		ND	0.66	4.7		ND	0.66	4.6		ND	0.33	2.4		ND	0.66	4.7	
Wet	SW8270D-SIM	Benzo(e)pyrene	ug/kg	0.0%	ND	0.50	5.0		ND	0.50	4.7		ND	0.50	4.6		ND	0.25	2.4		ND	0.50	4.7	
Wet	SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	0.0%	ND	0.95	5.0		ND	0.95	4.7		ND	0.95	4.6		ND	0.48	2.4		ND	0.95	4.7	
Wet	SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	0.0%	ND	0.57	5.0		ND	0.57	4.7		ND	0.57	4.6		ND	0.29	2.4		ND	0.57	4.7	
Wet	SW8270D-SIM	Biphenyl	ug/kg	23.3%	ND	0.87	5.0		ND	0.87	4.7		ND	0.87	4.6		ND	0.44	2.4		ND	0.87	4.7	
Wet	SW8270D-SIM	Carbazole	ug/kg	70.0%	17	0.54	5.0	J	ND	0.54	4.7		19	0.54	4.6	J	ND	0.27	2.4		19	0.54	4.7	J
Wet	SW8270D-SIM	Chrysene	ug/kg	0.0%	ND	0.55	5.0		ND	0.55	4.7		ND	0.55	4.6		ND	2.4	2.4	UJ	ND	0.55	4.7	
Wet	SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	0.0%	ND	0.86	5.0		ND	0.86	4.7		ND	0.86	4.6		ND	0.43	2.4		ND	0.86	4.7	
Wet	SW8270D-SIM	Dibenzofuran	ug/kg	16.7%	ND	0.45	5.0		ND	0.45	4.7		ND	0.45	4.6		ND	0.23	2.4		ND	0.45	4.7	
Wet	SW8270D-SIM	Dibenzothiophene	ug/kg	3.3%	ND	0.86	5.0		ND	0.86	4.7		ND	0.86	4.6		ND	0.43	2.4		ND	0.86	4.7	
Wet	SW8270D-SIM	Fluoranthene	ug/kg	0.0%	ND	0.49	5.0		ND	0.49	4.7		ND	0.49	4.6		ND	0.25	2.4		ND	0.49	4.7	
Wet	SW8270D-SIM	Fluorene	ug/kg	16.7%	ND	0.52	5.0		ND	0.52	4.7		ND	0.52	4.6		ND	0.26	2.4		ND	0.52	4.7	
Wet	SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	0.0%	ND	0.96	5.0		ND	0.96	4.7		ND	0.96	4.6		ND	0.48	2.4		ND	0.96	4.7	
Wet	SW8270D-SIM	Naphthalene	ug/kg	60.0%	ND	1.5	9.9		ND	1.5	9.3		ND	1.5	9.2		ND	0.75	4.8		ND	1.5	9.4	
Wet	SW8270D-SIM	Perylene	ug/kg	0.0%	ND	1.2	5.0		ND	1.2	4.7		ND	1.2	4.6		ND	0.60	2.4		ND	1.2	4.7	
Wet	SW8270D-SIM	Phenanthrene	ug/kg	10.0%	ND	0.66	5.0		ND	0.66	4.7		ND	0.66	4.6		ND	0.33	2.4		ND	0.66	4.7	
Wet	SW8270D-SIM	Pyrene	ug/kg	0.0%	ND	0.50	5.0		ND	0.50	4.7		ND	0.50	4.6		ND	0.25	2.4		ND	0.50	4.7	
Wet	ZFZDRY	Total solids	percent	100.0%	29.6				24.7				27.4				24.7				28.5			

TABLE 2: ANALYTICAL RESULTS OF 2015 BROAD WHITEFISH SAMPLING

				Sample ID	BDWF-2015-26				BDWF-2015-27				BDWF-2015-28				BDWF-2015-29				BDWF-2015-30			
				Sample Date	8/15/2015				8/15/2015				8/15/2015				8/15/2015				8/15/2015			
Basis (Wet / Dry)	Method	Compound	Units	% Detectable	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
Wet	SW6020A	Arsenic	mg/kg	100.0%	0.030	0.005	0.124	J	0.074	0.005	0.134	J	0.062	0.006	0.142	J	0.074	0.005	0.128	J	0.042	0.005	0.121	J
Wet	SW6020A	Barium	mg/kg	100.0%	0.718	0.0012	0.0124		1.7	0.0013	0.0134		1.7	0.0014	0.0142		5.6	0.0013	0.0128		1.6	0.0012	0.0121	
Wet	SW6020A	Cadmium	mg/kg	100.0%	0.0071	0.0010	0.0050		0.0052	0.0011	0.0053	J	0.0048	0.0011	0.0057	J	0.0062	0.0010	0.0051		0.0041	0.0010	0.0048	J
Wet	SW6020A	Copper	mg/kg	100.0%	0.318	0.005	0.025		0.342	0.005	0.027		0.439	0.006	0.028		0.274	0.005	0.026		0.411	0.005	0.024	
Wet	SW6020A	Lead	mg/kg	100.0%	0.0103	0.00012	0.0050	B	0.0114	0.00013	0.0054	B	0.0060	0.00014	0.0057	B	0.0149	0.00013	0.0051		0.0060	0.00012	0.0048	B
Wet	SW6020A	Nickel	mg/kg	100.0%	0.018	0.005	0.050	J	0.015	0.005	0.053	J	0.044	0.006	0.057	J	0.020	0.005	0.051	J	0.059	0.005	0.048	
Wet	SW6020A	Vanadium	mg/kg	100.0%	0.129	0.002	0.050		0.152	0.002	0.053		0.103	0.002	0.057		0.141	0.002	0.051		0.087	0.002	0.048	
Wet	SW6020A	Zinc	mg/kg	100.0%	15.3	0.015	0.124		23.6	0.016	0.134		20.4	0.017	0.142		19.4	0.015	0.128		18.2	0.015	0.121	
Wet	SW7471	Mercury	mg/kg	100.0%	0.0271	0.0010	0.0052		0.0445	0.0011	0.0057		0.0810	0.0012	0.0058		0.0180	0.0011	0.0056		0.0606	0.0010	0.0049	
Wet	SW7742	Selenium	mg/kg	100.0%	0.355	0.012	0.025		0.252	0.013	0.027		0.282	0.014	0.028		0.248	0.013	0.026		0.307	0.012	0.024	
Wet	SW8270D-SIM	1-Methylnaphthalene	ug/kg	16.7%	0.64	0.55	2.3	J	ND	1.1	5.0		ND	0.55	2.4		ND	1.1	4.7		ND	0.55	2.5	
Wet	SW8270D-SIM	1-Methylphenanthrene	ug/kg	0.0%	ND	670	670	UJ	ND	1300	1300	UJ	ND	590	590	UJ	ND	1800	1800	UJ	ND	59	59	UJ
Wet	SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	3.3%	ND	0.27	2.3		ND	0.53	5.0		ND	0.27	2.4		ND	0.53	4.7		ND	0.27	2.5	
Wet	SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	66.7%	1.6	0.23	2.3	J	ND	0.46	5.0		1.1	0.23	2.4	J	ND	0.46	4.7		ND	0.23	2.5	
Wet	SW8270D-SIM	2-Methylnaphthalene	ug/kg	23.3%	0.89	0.60	4.6	J	ND	1.2	10		0.71	0.60	4.8	J	ND	1.2	9.4		ND	0.60	4.9	
Wet	SW8270D-SIM	Acenaphthene	ug/kg	46.7%	ND	0.24	2.3		0.57	0.47	5.0	J	ND	0.24	2.4		ND	0.47	4.7		0.30	0.24	2.5	J
Wet	SW8270D-SIM	Acenaphthylene	ug/kg	3.3%	ND	0.23	2.3		ND	0.46	5.0		ND	0.23	2.4		ND	0.46	4.7		ND	0.23	2.5	
Wet	SW8270D-SIM	Anthracene	ug/kg	20.0%	ND	0.19	2.3		ND	0.38	5.0		ND	0.19	2.4		ND	0.38	4.7		ND	0.19	2.5	
Wet	SW8270D-SIM	Benzo(a)anthracene	ug/kg	0.0%	ND	0.19	2.3		ND	0.38	5.0		ND	0.19	2.4		ND	0.38	4.7		ND	0.37	2.5	UJ
Wet	SW8270D-SIM	Benzo(a)pyrene	ug/kg	0.0%	ND	3.7	23		ND	3.7	25		ND	3.7	24		ND	0.73	4.7		ND	0.37	2.5	
Wet	SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	0.0%	ND	3.3	23		ND	3.3	25		ND	3.3	24		ND	0.66	4.7		ND	0.33	2.5	
Wet	SW8270D-SIM	Benzo(e)pyrene	ug/kg	0.0%	ND	2.5	23		ND	2.5	25		ND	2.5	24		ND	0.50	4.7		ND	0.25	2.5	
Wet	SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	0.0%	ND	4.8	23		ND	4.8	25		ND	4.8	24		ND	0.95	4.7		ND	0.48	2.5	
Wet	SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	0.0%	ND	2.9	23		ND	2.9	25		ND	2.9	24		ND	0.57	4.7		ND	0.29	2.5	
Wet	SW8270D-SIM	Biphenyl	ug/kg	23.3%	0.51	0.44	2.3	J	ND	0.87	5.0		0.74	0.44	2.4	J	ND	0.87	4.7		ND	0.44	2.5	
Wet	SW8270D-SIM	Carbazole	ug/kg	70.0%	4.3	0.27	2.3	J	28	0.54	5.0	J	5.0	0.27	2.4	J	4.7	0.54	4.7	J	6.6	0.27	2.5	
Wet	SW8270D-SIM	Chrysene	ug/kg	0.0%	ND	7.3	7.3	UJ	ND	5.9	5.9	UJ	ND	14	14	UJ	ND	0.55	4.7		ND	0.37	2.5	UJ
Wet	SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	0.0%	ND	4.3	23		ND	4.3	25		ND	4.3	24		ND	0.86	4.7		ND	0.43	2.5	
Wet	SW8270D-SIM	Dibenzofuran	ug/kg	16.7%	ND	0.23	2.3		0.94	0.45	5.0	J	ND	0.23	2.4		ND	0.45	4.7		ND	0.23	2.5	
Wet	SW8270D-SIM	Dibenzothiophene	ug/kg	3.3%	0.81	0.43	2.3	J	ND	0.86	5.0		ND	0.43	2.4		ND	0.86	4.7		ND	0.43	2.5	
Wet	SW8270D-SIM	Fluoranthene	ug/kg	0.0%	ND	0.25	2.3		ND	0.49	5.0		ND	0.25	2.4		ND	0.49	4.7		ND	0.25	2.5	
Wet	SW8270D-SIM	Fluorene	ug/kg	16.7%	ND	0.26	2.3		ND	0.52	5.0		ND	0.26	2.4		ND	0.52	4.7		ND	0.26	2.5	
Wet	SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	0.0%	ND	4.8	23		ND	4.8	25		ND	4.8	24		ND	0.96	4.7		ND	0.48	2.5	
Wet	SW8270D-SIM	Naphthalene	ug/kg	60.0%	1.8	0.75	4.6	J	2.6	1.5	10	J	2.1	0.75	4.8	J	ND	1.5	9.4		ND	0.75	4.9	
Wet	SW8270D-SIM	Perylene	ug/kg	0.0%	ND	6.0	23		ND	6.0	25		ND	6.0	24		ND	1.2	4.7		ND	0.60	2.5	
Wet	SW8270D-SIM	Phenanthrene	ug/kg	10.0%	ND	0.33	2.3		ND	0.66	5.0		ND	0.33	2.4		ND	0.66	4.7		ND	0.33	2.5	
Wet	SW8270D-SIM	Pyrene	ug/kg	0.0%	ND	0.25	2.3		ND	0.50	5.0		ND	0.25	2.4		ND	0.50	4.7		ND	1.1	2.5	UJ
Wet	ZFZDRY	Total solids	percent	100.0%	26.1				28.6				29.2				28.3				24.7			

TABLE 3: ANALYTICAL RESULTS OF 2014 ARCTIC CISCO SAMPLING.

		Sample ID	ACIS-2014-001				ACIS-2014-002				ACIS-2014-003				ACIS-2014-004				ACIS-2014-005			
		Sample Date	11/13/2014				11/13/2014				11/13/2014				11/13/2014				11/13/2014			
Method	Compound	Units	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
SW6020	Arsenic	mg/kg	0.993	0.006	0.149		1.3	0.006	0.162		1.2	0.006	0.153		1.6	0.006	0.151		0.933	0.006	0.144	
SW6020	Barium	mg/kg	0.273	0.0015	0.0149		0.367	0.0016	0.0162		0.314	0.0015	0.0153		0.244	0.0015	0.0151		0.220	0.0014	0.0144	
SW6020	Cadmium	mg/kg	ND	0.0012	0.0059		ND	0.0013	0.0065		0.0014	0.0012	0.0061	J	ND	0.0012	0.0060		0.0012	0.0012	0.0058	J
SW6020	Copper	mg/kg	0.426	0.006	0.030		0.429	0.006	0.032		0.467	0.006	0.031		0.411	0.006	0.030		0.485	0.006	0.029	
SW6020	Lead	mg/kg	0.0045	0.00015	0.0059	J	0.0030	0.00016	0.0065	J	0.0026	0.00015	0.0061	J	0.0063	0.00015	0.0060		0.0046	0.00014	0.0058	J
SW6020	Nickel	mg/kg	0.074	0.006	0.059		0.161	0.006	0.065		0.091	0.006	0.061		0.111	0.006	0.060		0.099	0.006	0.058	
SW6020	Vanadium	mg/kg	0.025	0.002	0.059	J	0.017	0.002	0.065	J	0.020	0.002	0.061	J	0.025	0.002	0.060	J	0.018	0.002	0.058	J
SW6020	Zinc	mg/kg	13.0	0.018	0.149		11.6	0.019	0.162		10.2	0.018	0.153		10.5	0.018	0.151		9.6	0.017	0.144	
SW7471B	Mercury	mg/kg	0.006	0.001	0.006		0.009	0.001	0.007		0.010	0.001	0.006		0.011	0.001	0.006		0.013	0.001	0.006	
SW7742	Selenium	mg/kg	0.399	0.015	0.030		0.426	0.016	0.032		0.394	0.015	0.031		0.458	0.015	0.030		0.441	0.014	0.029	
SW8270D-SIM	1-Methylnaphthalene	ug/kg	ND	1.1	5.0		ND	1.1	5.0		ND	1.1	5.0		ND	1.1	5.0		ND	1.1	5.0	
SW8270D-SIM	1-Methylphenanthrene	ug/kg	ND	0.39	5.0	UJ	ND	0.39	5.0		ND	0.39	5.0		ND	0.39	5.0		ND	0.39	5.0	
SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	ND	0.53	5.0		ND	0.53	5.0		ND	0.53	5.0		ND	0.53	5.0		ND	0.53	5.0	
SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	ND	0.46	5.0		0.89	0.46	5.0	J	0.86	0.46	5.0	J	0.73	0.46	5.0	J	0.50	0.46	5.0	J
SW8270D-SIM	2-Methylnaphthalene	ug/kg	1.7	1.2	5.0	J	ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0	
SW8270D-SIM	Acenaphthene	ug/kg	1.0	0.47	5.0	J	1.7	0.47	5.0	J	0.68	0.47	5.0	J	0.90	0.47	5.0	J	0.53	0.47	5.0	J
SW8270D-SIM	Acenaphthylene	ug/kg	0.64	0.46	5.0	J	1.1	0.46	5.0	J	0.63	0.46	5.0	J	0.73	0.46	5.0	J	ND	0.46	5.0	
SW8270D-SIM	Anthracene	ug/kg	1.3	0.38	5.0	J	6.5	0.38	5.0		2.1	0.38	5.0	J	4.0	0.38	5.0	J	1.5	0.38	5.0	J
SW8270D-SIM	Benzo(a)anthracene	ug/kg	22	0.38	5.0	NJ	12	0.38	5.0		15	0.38	5.0	NJ	19	0.38	5.0	NJ	10	0.38	5.0	NJ
SW8270D-SIM	Benzo(a)pyrene	ug/kg	ND	0.99	5.0	UJ	7.6	0.73	5.0		1.9	0.73	5.0	J	3.0	0.73	5.0	J	ND	0.73	5.0	
SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	0.81	0.66	5.0	J	8.4	0.66	5.0		1.5	0.66	5.0	J	8.4	0.66	5.0	NJ	2.0	0.66	5.0	NJ
SW8270D-SIM	Benzo(e)pyrene	ug/kg	ND	0.50	5.0		ND	0.50	5.0		ND	0.50	5.0		ND	1.6	5.0	UJ	ND	0.50	5.0	
SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	ND	0.95	5.0	UJ	6.2	0.95	5.0		2.0	0.95	5.0	J	3.8	0.95	5.0	J	ND	0.95	5.0	
SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	0.66	0.57	5.0	J	6.0	0.57	5.0		2.8	0.57	5.0	J	ND	0.57	5.0	UJ	ND	0.57	5.0	UJ
SW8270D-SIM	Biphenyl	ug/kg	ND	0.87	5.0		0.95	0.87	5.0	J	0.87	0.87	5.0	J	ND	0.87	5.0		ND	0.87	5.0	
SW8270D-SIM	Carbazole	ug/kg	ND	1.6	5.0	UJ	8.2	0.54	5.0		2.8	0.54	5.0	J	5.4	0.54	5.0		0.90	0.54	5.0	J
SW8270D-SIM	Chrysene	ug/kg	ND	0.55	5.0	UJ	22	0.55	5.0		ND	0.55	5.0	UJ	ND	0.55	5.0	UJ	ND	0.55	5.0	UJ
SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	ND	0.86	5.0		6.7	0.86	5.0		2.0	0.86	5.0	J	4.2	0.86	5.0	J	ND	0.86	5.0	
SW8270D-SIM	Dibenzofuran	ug/kg	0.97	0.45	5.0	J	2.3	0.45	5.0	J	1.0	0.45	5.0	J	1.3	0.45	5.0	J	0.89	0.45	5.0	J
SW8270D-SIM	Dibenzothiophene	ug/kg	ND	0.86	5.0		ND	0.86	5.0		ND	0.86	5.0		ND	0.86	5.0		ND	0.86	5.0	
SW8270D-SIM	Fluoranthene	ug/kg	0.84	0.49	5.0	J	7.5	0.49	5.0		2.2	0.49	5.0	J	4.5	0.49	5.0	J	1.2	0.49	5.0	J
SW8270D-SIM	Fluorene	ug/kg	1.8	0.52	5.0	J	4.7	0.52	5.0	J	1.0	0.52	5.0	J	1.9	0.52	5.0	J	0.76	0.52	5.0	J
SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	ND	0.96	5.0		8.8	0.96	5.0		2.5	0.96	5.0	J	5.4	0.96	5.0		ND	0.96	5.0	
SW8270D-SIM	Naphthalene	ug/kg	ND	1.5	5.0		ND	1.5	5.0		ND	1.5	5.0		1.8	1.5	5.0	J	ND	1.5	5.0	
SW8270D-SIM	Perylene	ug/kg	ND	1.2	5.0	UJ	ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0	
SW8270D-SIM	Phenanthrene	ug/kg	1.3	0.66	5.0	J	6.1	0.66	5.0		2.3	0.66	5.0	J	4.1	0.66	5.0	J	1.7	0.66	5.0	J
SW8270D-SIM	Pyrene	ug/kg	0.68	0.50	5.0	J	3.5	0.50	5.0	J	1.2	0.50	5.0	J	5.5	0.50	5.0		ND	0.50	5.0	
ZFZDRY	Total solids	percent	31.1				32.9				31.6				31.7				30.1			

TABLE 3: ANALYTICAL RESULTS OF 2014 ARCTIC CISCO SAMPLING.

		Sample ID	ACIS-2014-006				ACIS-2014-007				ACIS-2014-008				ACIS-2014-009				ACIS-2014-010			
		Sample Date	11/13/2014				11/13/2014				11/13/2014				11/13/2014				11/13/2014			
Method	Compound	Units	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
SW6020	Arsenic	mg/kg	1.2	0.006	0.152		0.998	0.006	0.138		1.7	0.006	0.157		1.6	0.006	0.149		1.5	0.007	0.175	
SW6020	Barium	mg/kg	0.343	0.0015	0.0152		0.259	0.0014	0.0138		0.202	0.0016	0.0157		0.349	0.0015	0.0149		0.261	0.0018	0.0175	
SW6020	Cadmium	mg/kg	ND	0.0012	0.0061		0.0012	0.0011	0.0055	J	ND	0.0013	0.0063		ND	0.0012	0.0059		ND	0.0014	0.0070	
SW6020	Copper	mg/kg	0.470	0.006	0.030		0.413	0.006	0.028		0.428	0.006	0.031		0.449	0.006	0.030		0.481	0.007	0.035	
SW6020	Lead	mg/kg	0.0035	0.00015	0.0061	J	0.0034	0.00014	0.0055	J	0.0023	0.00016	0.0063	J	0.0040	0.00015	0.0059	J	0.0043	0.00018	0.0070	J
SW6020	Nickel	mg/kg	0.050	0.006	0.061	J	0.062	0.006	0.055		0.091	0.006	0.063		0.074	0.006	0.059		0.056	0.007	0.070	J
SW6020	Vanadium	mg/kg	0.021	0.002	0.061	J	0.019	0.002	0.055	J	0.014	0.002	0.063	J	0.057	0.002	0.059	J	0.041	0.002	0.070	J
SW6020	Zinc	mg/kg	12.6	0.018	0.152		11.1	0.017	0.138		8.8	0.019	0.157		10.8	0.018	0.149		9.8	0.021	0.175	
SW7471B	Mercury	mg/kg	0.011	0.001	0.006		0.010	0.001	0.006		0.010	0.001	0.007		0.015	0.001	0.006		0.012	0.001	0.007	
SW7742	Selenium	mg/kg	0.516	0.015	0.030		0.525	0.014	0.028		0.457	0.016	0.031		0.553	0.015	0.030		0.475	0.018	0.035	
SW8270D-SIM	1-Methylnaphthalene	ug/kg	ND	1.1	5.0		ND	1.1	5.0		ND	1.1	5.0		ND	1.1	5.0		ND	2.2	9.9	
SW8270D-SIM	1-Methylphenanthrene	ug/kg	ND	0.39	5.0		ND	0.39	5.0		ND	0.39	5.0		ND	0.39	5.0		ND	0.78	9.9	
SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	ND	0.53	5.0		ND	0.53	5.0		ND	0.53	5.0		ND	0.53	5.0		ND	1.1	9.9	
SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	0.87	0.46	5.0	J	0.95	0.46	5.0	J	1.3	0.46	5.0	J	ND	0.46	5.0		2.4	0.92	9.9	J
SW8270D-SIM	2-Methylnaphthalene	ug/kg	ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	2.4	9.9	
SW8270D-SIM	Acenaphthene	ug/kg	0.75	0.47	5.0	J	0.61	0.47	5.0	J	ND	0.47	5.0		ND	0.47	5.0		ND	0.94	9.9	
SW8270D-SIM	Acenaphthylene	ug/kg	ND	0.46	5.0		ND	0.46	5.0		ND	0.46	5.0		ND	0.46	5.0		ND	0.92	9.9	
SW8270D-SIM	Anthracene	ug/kg	1.0	0.38	5.0	J	0.78	0.38	5.0	J	ND	0.38	5.0		ND	0.38	5.0		ND	0.76	9.9	
SW8270D-SIM	Benzo(a)anthracene	ug/kg	14	0.38	5.0	NJ	ND	0.38	5.0		12	0.38	5.0		27	0.38	5.0	NJ	ND	0.76	9.9	
SW8270D-SIM	Benzo(a)pyrene	ug/kg	ND	0.73	5.0		ND	0.73	5.0	UJ	ND	0.73	5.0	UJ	ND	0.73	5.0	UJ	ND	1.5	9.9	UJ
SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	3.0	0.66	5.0	NJ	ND	0.66	5.0	UJ	5.4	0.66	5.0	NJ	ND	0.66	5.0	UJ	ND	1.4	9.9	UJ
SW8270D-SIM	Benzo(e)pyrene	ug/kg	ND	0.50	5.0		ND	0.50	5.0	UJ	ND	0.50	5.0	UJ	ND	0.50	5.0	UJ	ND	0.99	9.9	UJ
SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	ND	0.95	5.0		ND	0.95	5.0	UJ	ND	0.95	5.0	UJ	ND	0.95	5.0	UJ	ND	1.9	9.9	UJ
SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	ND	0.57	5.0	UJ	ND	0.57	5.0	UJ	ND	0.57	5.0	UJ	ND	0.57	5.0	UJ	ND	1.2	9.9	UJ
SW8270D-SIM	Biphenyl	ug/kg	1.1	0.87	5.0	J	ND	0.87	5.0		ND	0.87	5.0		ND	0.87	5.0		ND	1.8	9.9	
SW8270D-SIM	Carbazole	ug/kg	1.6	0.54	5.0	J	ND	0.54	5.0		ND	0.54	5.0		ND	0.54	5.0		ND	1.1	9.9	
SW8270D-SIM	Chrysene	ug/kg	ND	0.55	5.0	UJ	ND	0.55	5.0		24	0.55	5.0		ND	0.55	5.0	UJ	7.0	1.1	9.9	J
SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	ND	0.86	5.0		ND	0.86	5.0	UJ	ND	0.86	5.0	UJ	ND	0.86	5.0	UJ	ND	1.8	9.9	UJ
SW8270D-SIM	Dibenzofuran	ug/kg	1.0	0.45	5.0	J	0.55	0.45	5.0	J	0.84	0.45	5.0	J	0.56	0.45	5.0	J	1.1	0.90	9.9	J
SW8270D-SIM	Dibenzothiophene	ug/kg	ND	0.86	5.0		ND	0.86	5.0		ND	0.86	5.0		ND	0.86	5.0		ND	1.8	9.9	
SW8270D-SIM	Fluoranthene	ug/kg	1.4	0.49	5.0	J	ND	0.49	5.0		ND	0.49	5.0		ND	0.49	5.0		ND	0.98	9.9	
SW8270D-SIM	Fluorene	ug/kg	0.96	0.52	5.0	J	ND	0.52	5.0		1.9	0.52	5.0	J	ND	1.8	5.0	UJ	ND	1.1	9.9	
SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	ND	0.96	5.0		ND	0.96	5.0	UJ	ND	0.96	5.0	UJ	ND	0.96	5.0	UJ	ND	2.0	9.9	UJ
SW8270D-SIM	Naphthalene	ug/kg	2.0	1.5	5.0	J	ND	1.5	5.0		4.0	1.5	5.0	J	ND	1.5	5.0		3.6	3.0	9.9	J
SW8270D-SIM	Perylene	ug/kg	ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	2.4	9.9	
SW8270D-SIM	Phenanthrene	ug/kg	1.8	0.66	5.0	J	0.98	0.66	5.0	J	ND	0.66	5.0		0.68	0.66	5.0	J	1.5	1.4	9.9	J
SW8270D-SIM	Pyrene	ug/kg	ND	0.50	5.0		ND	0.50	5.0		ND	0.50	5.0		ND	0.50	5.0		ND	0.99	9.9	
ZFZDRY	Total solids	percent	31.9				28.4				32.7				30.9				35.6			

TABLE 3: ANALYTICAL RESULTS OF 2014 ARCTIC CISCO SAMPLING.

		Sample ID	ACIS-2014-011				ACIS-2014-012				ACIS-2014-013				ACIS-2014-014				ACIS-2014-015			
		Sample Date	11/13/2014				11/13/2014				11/13/2014				11/13/2014				11/13/2014			
Method	Compound	Units	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
SW6020	Arsenic	mg/kg	1.2	0.007	0.173		1.2	0.006	0.156		1.3	0.005	0.135		1.8	0.006	0.141		2.2	0.006	0.149	
SW6020	Barium	mg/kg	0.389	0.0017	0.0173		0.306	0.0016	0.0156		0.177	0.0014	0.0135		0.280	0.0014	0.0141		0.211	0.0015	0.0149	
SW6020	Cadmium	mg/kg	0.0016	0.0014	0.0069	J	ND	0.0013	0.0063		ND	0.0011	0.0054		0.0016	0.0011	0.0057	J	0.0012	0.0012	0.0060	J
SW6020	Copper	mg/kg	0.492	0.007	0.035		0.460	0.006	0.031		0.415	0.005	0.027		0.443	0.006	0.028		0.489	0.006	0.030	
SW6020	Lead	mg/kg	0.0045	0.00017	0.0069	J	0.0046	0.00016	0.0063	J	0.0024	0.00014	0.0054	J	0.0038	0.00014	0.0057	J	0.0051	0.00015	0.0060	J
SW6020	Nickel	mg/kg	0.053	0.007	0.069	J	0.049	0.006	0.063	J	0.042	0.005	0.054	J	0.056	0.006	0.057	J	0.074	0.006	0.060	
SW6020	Vanadium	mg/kg	0.025	0.002	0.069	J	0.026	0.002	0.063	J	0.012	0.002	0.054	J	0.021	0.002	0.057	J	0.011	0.002	0.060	J
SW6020	Zinc	mg/kg	11.2	0.021	0.173		11.1	0.019	0.156		9.0	0.016	0.135		11.3	0.017	0.141		10.2	0.018	0.149	
SW7471B	Mercury	mg/kg	0.012	0.001	0.007		0.014	0.001	0.006		0.012	0.001	0.006		0.009	0.001	0.006		0.010	0.001	0.006	
SW7742	Selenium	mg/kg	0.435	0.017	0.035		0.477	0.016	0.031		0.409	0.014	0.027		0.425	0.014	0.028		0.379	0.015	0.030	
SW8270D-SIM	1-Methylnaphthalene	ug/kg	ND	2.2	10		ND	1.1	5.0		ND	1.1	5.0		ND	1.1	5.0		ND	1.1	5.0	
SW8270D-SIM	1-Methylphenanthrene	ug/kg	ND	0.78	10		ND	0.39	5.0		ND	0.39	5.0		ND	0.39	5.0		ND	0.39	5.0	
SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	ND	1.1	10		ND	0.53	5.0		ND	0.53	5.0		ND	0.53	5.0		ND	0.53	5.0	
SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	1.3	0.92	10	J	0.80	0.46	5.0	J	ND	0.46	5.0		0.98	0.46	5.0	J	0.88	0.46	5.0	J
SW8270D-SIM	2-Methylnaphthalene	ug/kg	ND	2.4	10		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0	
SW8270D-SIM	Acenaphthene	ug/kg	ND	0.94	10		0.52	0.47	5.0	J	ND	0.47	5.0		ND	0.47	5.0		ND	0.47	5.0	
SW8270D-SIM	Acenaphthylene	ug/kg	ND	0.92	10		ND	0.46	5.0		ND	0.46	5.0		ND	0.46	5.0		ND	0.46	5.0	
SW8270D-SIM	Anthracene	ug/kg	1.6	0.76	10	J	ND	0.38	5.0		7.7	0.38	5.0		3.7	0.38	5.0	J	ND	18	18	UJ
SW8270D-SIM	Benzo(a)anthracene	ug/kg	ND	0.76	10		15	0.38	5.0	NJ	7.4	0.38	5.0		12	0.38	5.0	NJ	5.7	0.38	5.0	
SW8270D-SIM	Benzo(a)pyrene	ug/kg	ND	1.5	10	UJ	ND	0.73	5.0	UJ	ND	0.73	5.0	UJ	ND	1.2	5.0	UJ	ND	0.73	5.0	UJ
SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	ND	1.4	10	UJ	ND	0.66	5.0	UJ	ND	0.66	5.0	UJ	ND	0.66	5.0	UJ	ND	0.66	5.0	UJ
SW8270D-SIM	Benzo(e)pyrene	ug/kg	ND	1.0	10	UJ	ND	0.50	5.0	UJ	ND	0.50	5.0	UJ	ND	2.2	5.0	UJ	ND	0.50	5.0	UJ
SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	ND	1.9	10	UJ	ND	0.95	5.0	UJ	ND	0.95	5.0	UJ	ND	0.95	5.0	UJ	1.1	0.95	5.0	J
SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	ND	1.2	10	UJ	ND	0.57	5.0	UJ	ND	0.57	5.0	UJ	ND	2.5	5.0	UJ	ND	2.7	5.0	UJ
SW8270D-SIM	Biphenyl	ug/kg	ND	1.8	10		0.92	0.87	5.0	J	ND	0.87	5.0		ND	0.87	5.0		ND	0.87	5.0	
SW8270D-SIM	Carbazole	ug/kg	ND	1.8	10	UJ	ND	0.54	5.0		ND	0.54	5.0		ND	0.54	5.0		ND	0.54	5.0	
SW8270D-SIM	Chrysene	ug/kg	ND	1.1	10		ND	0.55	5.0	UJ	5.7	0.55	5.0		ND	0.55	5.0	UJ	2.0	0.55	5.0	J
SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	ND	1.8	10	UJ	ND	0.86	5.0	UJ	ND	0.86	5.0	UJ	ND	0.86	5.0	UJ	1.2	0.86	5.0	J
SW8270D-SIM	Dibenzofuran	ug/kg	1.2	0.90	10	J	0.76	0.45	5.0	J	ND	0.45	5.0		0.65	0.45	5.0	J	0.59	0.45	5.0	J
SW8270D-SIM	Dibenzothiophene	ug/kg	ND	1.8	10		ND	0.86	5.0		ND	0.86	5.0		ND	0.86	5.0		ND	0.86	5.0	
SW8270D-SIM	Fluoranthene	ug/kg	ND	0.98	10		ND	0.49	5.0		ND	0.49	5.0		ND	0.49	5.0		ND	0.49	5.0	
SW8270D-SIM	Fluorene	ug/kg	1.4	1.1	10	J	0.74	0.52	5.0	J	ND	0.52	5.0		ND	0.52	5.0		0.62	0.52	5.0	J
SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	ND	2.0	10	UJ	ND	0.96	5.0	UJ	ND	0.96	5.0	UJ	ND	0.96	5.0	UJ	1.4	0.96	5.0	J
SW8270D-SIM	Naphthalene	ug/kg	3.0	3.0	10	J	2.6	1.5	5.0	J	1.8	1.5	5.0	J	2.3	1.5	5.0	J	ND	1.5	5.0	
SW8270D-SIM	Perylene	ug/kg	ND	2.4	10		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	1.5	5.0	UJ
SW8270D-SIM	Phenanthrene	ug/kg	2.0	1.4	10	J	1.1	0.66	5.0	J	ND	0.66	5.0		1.1	0.66	5.0	J	1.4	0.66	5.0	J
SW8270D-SIM	Pyrene	ug/kg	ND	1.0	10		ND	0.50	5.0		ND	0.50	5.0		ND	0.50	5.0		ND	0.50	5.0	
ZFZDRY	Total solids	percent	34.9				31.3				28.4				29.2				31.3			

TABLE 3: ANALYTICAL RESULTS OF 2014 ARCTIC CISCO SAMPLING.

		Sample ID	ACIS-2014-016				ACIS-2014-017				ACIS-2014-018				ACIS-2014-019				ACIS-2014-020			
		Sample Date	11/16/2014				11/16/2014				11/16/2014				11/16/2014				11/16/2014			
Method	Compound	Units	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
SW6020	Arsenic	mg/kg	1.3	0.006	0.152		0.787	0.006	0.138		0.915	0.005	0.135		0.941	0.006	0.146		1.6	0.006	0.146	
SW6020	Barium	mg/kg	0.265	0.0015	0.0152		0.252	0.0014	0.0138		0.152	0.0014	0.0135		0.286	0.0015	0.0146		0.245	0.0015	0.0146	
SW6020	Cadmium	mg/kg	ND	0.0012	0.0061		ND	0.0011	0.0055		ND	0.0011	0.0054		ND	0.0012	0.0058		0.0020	0.0012	0.0058	J
SW6020	Copper	mg/kg	0.454	0.006	0.030		0.440	0.006	0.028		0.406	0.005	0.027		0.414	0.006	0.029		0.443	0.006	0.029	
SW6020	Lead	mg/kg	0.0031	0.00015	0.0061	J	0.0021	0.00014	0.0055	J	0.0041	0.00014	0.0054	J	0.0020	0.00015	0.0058	J	0.0026	0.00015	0.0058	J
SW6020	Nickel	mg/kg	0.061	0.006	0.061		0.041	0.006	0.055	J	0.039	0.005	0.054	J	0.019	0.006	0.058	J	0.092	0.006	0.058	
SW6020	Vanadium	mg/kg	0.025	0.002	0.061	J	0.019	0.002	0.055	J	0.025	0.002	0.054	J	0.012	0.002	0.058	J	0.017	0.002	0.058	J
SW6020	Zinc	mg/kg	11.6	0.018	0.152		11.2	0.017	0.138		9.3	0.016	0.135		10.6	0.017	0.146		9.7	0.018	0.146	
SW7471B	Mercury	mg/kg	0.012	0.001	0.006		0.009	0.001	0.006		0.007	0.001	0.005		0.006	0.001	0.006		0.011	0.001	0.006	
SW7742	Selenium	mg/kg	0.300	0.015	0.030		0.404	0.014	0.028		0.282	0.014	0.027		0.350	0.015	0.029		0.349	0.015	0.029	
SW8270D-SIM	1-Methylnaphthalene	ug/kg	ND	1.1	5.0		ND	1.1	5.0		ND	1.1	5.0		ND	1.1	5.0		ND	1.1	5.0	
SW8270D-SIM	1-Methylphenanthrene	ug/kg	ND	0.39	5.0		ND	0.39	5.0		ND	0.39	5.0		ND	0.39	5.0		ND	0.39	5.0	
SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	ND	0.53	5.0		ND	0.53	5.0		ND	0.53	5.0		ND	0.53	5.0		ND	0.53	5.0	
SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	0.89	0.46	5.0	J	0.98	0.46	5.0	J	1.3	0.46	5.0	J	0.76	0.46	5.0	J	0.89	0.46	5.0	J
SW8270D-SIM	2-Methylnaphthalene	ug/kg	ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0	
SW8270D-SIM	Acenaphthene	ug/kg	ND	0.47	5.0		ND	0.47	5.0		ND	0.47	5.0		ND	0.47	5.0		0.53	0.47	5.0	J
SW8270D-SIM	Acenaphthylene	ug/kg	ND	0.46	5.0		ND	0.46	5.0		ND	0.46	5.0		ND	0.46	5.0		ND	0.46	5.0	
SW8270D-SIM	Anthracene	ug/kg	4.9	0.38	5.0	J	1.2	0.38	5.0	J	2.4	0.38	5.0	J	0.67	0.38	5.0	J	2.5	0.38	5.0	J
SW8270D-SIM	Benzo(a)anthracene	ug/kg	12	0.38	5.0	NJ	ND	0.38	5.0		ND	0.38	5.0		ND	0.38	5.0		2.5	0.38	5.0	J
SW8270D-SIM	Benzo(a)pyrene	ug/kg	ND	0.73	5.0	UJ	ND	0.73	5.0	UJ	ND	0.73	5.0	UJ	ND	0.73	5.0	UJ	ND	0.73	5.0	UJ
SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	ND	0.66	5.0	UJ	ND	0.66	5.0	UJ	ND	0.66	5.0	UJ	ND	0.66	5.0	UJ	ND	0.66	5.0	UJ
SW8270D-SIM	Benzo(e)pyrene	ug/kg	ND	0.50	5.0	UJ	ND	0.50	5.0	UJ	ND	0.50	5.0	UJ	ND	0.50	5.0	UJ	ND	0.50	5.0	UJ
SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	ND	0.95	5.0	UJ	ND	0.95	5.0	UJ	ND	0.95	5.0	UJ	ND	0.95	5.0	UJ	ND	0.95	5.0	UJ
SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	ND	0.57	5.0	UJ	ND	0.57	5.0	UJ	ND	0.57	5.0	UJ	ND	0.57	5.0	UJ	ND	0.57	5.0	UJ
SW8270D-SIM	Biphenyl	ug/kg	ND	0.87	5.0		ND	0.87	5.0		ND	0.87	5.0		ND	0.87	5.0		ND	0.87	5.0	
SW8270D-SIM	Carbazole	ug/kg	ND	0.54	5.0		ND	0.54	5.0		ND	0.54	5.0		ND	0.54	5.0		1.0	0.54	5.0	J
SW8270D-SIM	Chrysene	ug/kg	ND	0.55	5.0	UJ	ND	0.55	5.0		ND	0.55	5.0		ND	0.55	5.0		1.8	0.55	5.0	J
SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	ND	0.86	5.0	UJ	ND	0.86	5.0	UJ	ND	0.86	5.0	UJ	1.2	0.86	5.0	J	ND	0.86	5.0	UJ
SW8270D-SIM	Dibenzofuran	ug/kg	0.86	0.45	5.0	J	ND	0.45	5.0		0.61	0.45	5.0	J	0.51	0.45	5.0	J	0.65	0.45	5.0	J
SW8270D-SIM	Dibenzothiophene	ug/kg	ND	0.86	5.0		ND	0.86	5.0		ND	0.86	5.0		ND	0.86	5.0		ND	0.86	5.0	
SW8270D-SIM	Fluoranthene	ug/kg	ND	0.49	5.0		ND	0.49	5.0		ND	0.49	5.0		ND	0.49	5.0		0.99	0.49	5.0	J
SW8270D-SIM	Fluorene	ug/kg	0.63	0.52	5.0	J	ND	0.52	5.0		ND	0.52	5.0		ND	0.52	5.0		ND	0.52	5.0	
SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	ND	0.96	5.0	UJ	ND	0.96	5.0	UJ	ND	0.96	5.0	UJ	ND	0.96	5.0	UJ	ND	0.96	5.0	UJ
SW8270D-SIM	Naphthalene	ug/kg	ND	1.5	5.0		ND	1.5	5.0		2.1	1.5	5.0	J	ND	1.5	5.0		ND	1.5	5.0	
SW8270D-SIM	Perylene	ug/kg	ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0	
SW8270D-SIM	Phenanthrene	ug/kg	1.0	0.66	5.0	J	1.0	0.66	5.0	J	1.1	0.66	5.0	J	1.2	0.66	5.0	J	1.1	0.66	5.0	J
SW8270D-SIM	Pyrene	ug/kg	ND	0.50	5.0		ND	0.50	5.0		ND	0.50	5.0		ND	0.50	5.0		ND	0.50	5.0	
ZFZDRY	Total solids	percent	31.4				29.0				27.5				30.4				30.1			

TABLE 3: ANALYTICAL RESULTS OF 2014 ARCTIC CISCO SAMPLING.

		Sample ID	ACIS-2014-021				ACIS-2014-022				ACIS-2014-023				ACIS-2014-024				ACIS-2014-025			
		Sample Date	11/16/2014				11/16/2014				11/16/2014				11/16/2014				11/16/2014			
Method	Compound	Units	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
SW6020	Arsenic	mg/kg	1.1	0.006	0.158		1.5	0.007	0.165		1.3	0.006	0.161		1.2	0.006	0.155		2.0	0.006	0.140	
SW6020	Barium	mg/kg	0.232	0.0016	0.0158		0.320	0.0016	0.0165		0.317	0.0016	0.0161		0.166	0.0016	0.0155		0.243	0.0014	0.0140	
SW6020	Cadmium	mg/kg	0.0054	0.0013	0.0063	J	0.0072	0.0013	0.0066		0.0036	0.0013	0.0064	J	0.0030	0.0012	0.0062	J	0.0033	0.0011	0.0056	J
SW6020	Copper	mg/kg	0.522	0.006	0.032		0.522	0.007	0.033		0.435	0.006	0.032		0.474	0.006	0.031		0.470	0.006	0.028	
SW6020	Lead	mg/kg	0.0032	0.00016	0.0063	J	0.0031	0.00016	0.0066	J	0.0024	0.00016	0.0064	J	0.0019	0.00016	0.0062	J	0.0032	0.00014	0.0056	J
SW6020	Nickel	mg/kg	0.061	0.006	0.063	J	0.054	0.007	0.066	J	0.066	0.006	0.064		0.024	0.006	0.062	J	0.052	0.006	0.056	J
SW6020	Vanadium	mg/kg	0.018	0.002	0.063	J	0.022	0.002	0.066	J	0.023	0.002	0.064	J	0.012	0.002	0.062	J	0.015	0.002	0.056	J
SW6020	Zinc	mg/kg	9.9	0.019	0.158		12.4	0.020	0.165		9.8	0.019	0.161		8.7	0.019	0.155		9.7	0.017	0.140	
SW7471B	Mercury	mg/kg	0.015	0.001	0.006		0.011	0.001	0.007		0.011	0.001	0.007		0.017	0.001	0.006		0.011	0.001	0.006	
SW7742	Selenium	mg/kg	0.470	0.016	0.032		0.524	0.016	0.033		0.315	0.016	0.032		0.369	0.016	0.031		0.463	0.014	0.028	
SW8270D-SIM	1-Methylnaphthalene	ug/kg	ND	1.1	5.0		ND	1.1	5.0		ND	2.2	10		ND	1.1	5.0		ND	1.1	5.0	
SW8270D-SIM	1-Methylphenanthrene	ug/kg	ND	0.39	5.0		ND	0.39	5.0		ND	0.78	10		ND	0.39	5.0		ND	0.39	5.0	
SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	ND	0.53	5.0		ND	0.53	5.0		ND	1.1	10		ND	0.53	5.0		ND	0.53	5.0	
SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	1.1	0.46	5.0	J	1.0	0.46	5.0	J	1.6	0.92	10	J	3.4	0.46	5.0	J	1.5	0.46	5.0	J
SW8270D-SIM	2-Methylnaphthalene	ug/kg	ND	1.2	5.0		ND	1.2	5.0		ND	2.4	10		ND	1.2	5.0		ND	1.2	5.0	
SW8270D-SIM	Acenaphthene	ug/kg	0.80	0.47	5.0	J	ND	0.47	5.0		ND	0.94	10		ND	0.47	5.0		ND	0.47	5.0	
SW8270D-SIM	Acenaphthylene	ug/kg	ND	0.46	5.0		1.2	0.46	5.0	J	ND	0.92	10		1.4	0.46	5.0	J	ND	0.46	5.0	
SW8270D-SIM	Anthracene	ug/kg	ND	0.38	5.0		ND	5.7	5.7	UJ	ND	5.0	10	UJ	ND	6.6	6.6	UJ	ND	1.9	5.0	UJ
SW8270D-SIM	Benzo(a)anthracene	ug/kg	ND	0.38	5.0		ND	0.38	5.0		ND	0.76	10		ND	0.38	5.0		ND	0.38	5.0	
SW8270D-SIM	Benzo(a)pyrene	ug/kg	ND	0.73	5.0		ND	0.73	5.0		ND	1.5	10		ND	0.73	5.0		ND	0.73	5.0	
SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	ND	0.66	5.0	UJ	ND	0.66	5.0		ND	1.4	10		ND	0.66	5.0		ND	0.66	5.0	
SW8270D-SIM	Benzo(e)pyrene	ug/kg	ND	0.50	5.0		ND	0.50	5.0		ND	1.0	10		ND	0.50	5.0		ND	0.50	5.0	
SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	ND	0.95	5.0	UJ	ND	0.95	5.0	UJ	ND	1.9	10	UJ	ND	0.95	5.0	UJ	ND	0.95	5.0	UJ
SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	ND	0.57	5.0		ND	0.57	5.0		ND	1.2	10		ND	0.57	5.0		ND	0.57	5.0	
SW8270D-SIM	Biphenyl	ug/kg	1.5	0.87	5.0	J	1.5	0.87	5.0	J	2.5	1.8	10	J	1.6	0.87	5.0	J	ND	0.87	5.0	
SW8270D-SIM	Carbazole	ug/kg	ND	1.5	5.0	UJ	ND	0.54	5.0		ND	1.1	10		ND	0.54	5.0		ND	0.54	5.0	
SW8270D-SIM	Chrysene	ug/kg	ND	0.55	5.0		ND	0.55	5.0		ND	1.1	10		2.3	0.55	5.0	J	ND	0.55	5.0	
SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	ND	0.86	5.0	UJ	3.2	0.86	5.0	J	3.3	1.8	10	J	3.1	0.86	5.0	J	1.6	0.86	5.0	J
SW8270D-SIM	Dibenzofuran	ug/kg	0.93	0.45	5.0	J	0.86	0.45	5.0	J	1.3	0.90	10	J	0.89	0.45	5.0	J	0.63	0.45	5.0	J
SW8270D-SIM	Dibenzothiophene	ug/kg	ND	0.86	5.0		ND	0.86	5.0		ND	1.8	10		ND	0.86	5.0		ND	0.86	5.0	
SW8270D-SIM	Fluoranthene	ug/kg	ND	0.49	5.0		ND	0.49	5.0		ND	0.98	10		ND	0.49	5.0		ND	0.49	5.0	
SW8270D-SIM	Fluorene	ug/kg	0.67	0.52	5.0	J	0.72	0.52	5.0	J	ND	1.1	10		0.73	0.52	5.0	J	ND	0.52	5.0	
SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	ND	0.96	5.0	UJ	ND	0.96	5.0	UJ	ND	2.0	10	UJ	ND	0.96	5.0	UJ	ND	0.96	5.0	UJ
SW8270D-SIM	Naphthalene	ug/kg	2.6	1.5	5.0	J	2.3	1.5	5.0	J	3.9	3.0	10	J	5.3	1.5	5.0		ND	1.5	5.0	
SW8270D-SIM	Perylene	ug/kg	ND	1.2	5.0		ND	1.2	5.0		ND	2.4	10		ND	1.2	5.0		ND	1.2	5.0	
SW8270D-SIM	Phenanthrene	ug/kg	1.4	0.66	5.0	J	0.94	0.66	5.0	J	2.1	1.4	10	J	2.9	0.66	5.0	J	1.2	0.66	5.0	J
SW8270D-SIM	Pyrene	ug/kg	ND	0.50	5.0		ND	0.50	5.0		ND	1.0	10		ND	0.50	5.0		ND	0.50	5.0	
ZFZDRY	Total solids	percent	31.8				33.7				33.6				32.1				29.4			

TABLE 3: ANALYTICAL RESULTS OF 2014 ARCTIC CISCO SAMPLING.

		Sample ID	ACIS-2014-026				ACIS-2014-027				ACIS-2014-028				ACIS-2014-029				ACIS-2014-030			
		Sample Date	11/16/2014				11/16/2014				11/16/2014				11/16/2014				11/16/2014			
Method	Compound	Units	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
SW6020	Arsenic	mg/kg	1.1	0.006	0.155		1.2	0.006	0.157		1.0	0.007	0.171		1.4	0.006	0.152		1.3	0.006	0.139	
SW6020	Barium	mg/kg	0.312	0.0016	0.0155		0.348	0.0016	0.0157		0.335	0.0017	0.0171		0.374	0.0015	0.0152		0.175	0.0014	0.0139	
SW6020	Cadmium	mg/kg	0.0034	0.0012	0.0062	J	0.0043	0.0013	0.0063	J	0.0040	0.0014	0.0069	J	0.0050	0.0012	0.0061	J	0.0035	0.0011	0.0055	J
SW6020	Copper	mg/kg	0.429	0.006	0.031		0.489	0.006	0.031		0.479	0.007	0.034		0.480	0.006	0.030		0.430	0.006	0.028	
SW6020	Lead	mg/kg	0.0021	0.00016	0.0062	J	0.0043	0.00016	0.0063	J	0.0028	0.00017	0.0069	J	0.0030	0.00015	0.0061	J	0.0021	0.00014	0.0055	J
SW6020	Nickel	mg/kg	0.028	0.006	0.062	J	0.047	0.006	0.063	J	0.065	0.007	0.069	J	0.040	0.006	0.061	J	0.074	0.006	0.055	
SW6020	Vanadium	mg/kg	0.017	0.002	0.062	J	0.020	0.002	0.063	J	0.035	0.002	0.069	J	0.043	0.002	0.061	J	0.008	0.002	0.055	J
SW6020	Zinc	mg/kg	10.4	0.019	0.155		9.5	0.019	0.157		11.8	0.021	0.171		11.0	0.018	0.152		8.9	0.017	0.139	
SW7471B	Mercury	mg/kg	0.009	0.001	0.006		0.011	0.001	0.006		0.011	0.001	0.007		0.013	0.001	0.006		0.023	0.003	0.014	
SW7742	Selenium	mg/kg	0.550	0.016	0.031		0.543	0.016	0.031		0.423	0.017	0.034		0.385	0.015	0.030		0.419	0.014	0.028	
SW8270D-SIM	1-Methylnaphthalene	ug/kg	ND	1.1	5.0		ND	1.1	5.0		ND	1.1	5.0		ND	1.1	5.0		ND	1.1	5.0	
SW8270D-SIM	1-Methylphenanthrene	ug/kg	ND	0.39	5.0		ND	0.39	5.0		ND	0.39	5.0		ND	0.39	5.0		ND	0.39	5.0	
SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	ND	0.53	5.0		ND	0.53	5.0		ND	0.53	5.0		ND	0.53	5.0		ND	0.53	5.0	
SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	1.5	0.46	5.0	J	2.9	0.46	5.0	J	2.0	0.46	5.0	J	2.3	0.46	5.0	J	2.1	0.46	5.0	J
SW8270D-SIM	2-Methylnaphthalene	ug/kg	ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0	
SW8270D-SIM	Acenaphthene	ug/kg	ND	0.47	5.0		ND	0.47	5.0		ND	0.47	5.0		ND	0.47	5.0		ND	0.47	5.0	
SW8270D-SIM	Acenaphthylene	ug/kg	ND	0.46	5.0		ND	0.46	5.0		ND	0.46	5.0		ND	0.46	5.0		ND	0.46	5.0	
SW8270D-SIM	Anthracene	ug/kg	ND	4.4	5.0	UJ	ND	6.4	6.4	UJ	ND	4.3	5.0	UJ	ND	3.0	5.0	UJ	ND	3.0	5.0	UJ
SW8270D-SIM	Benzo(a)anthracene	ug/kg	ND	0.38	5.0		ND	0.38	5.0		ND	0.38	5.0		ND	0.38	5.0		ND	0.38	5.0	
SW8270D-SIM	Benzo(a)pyrene	ug/kg	ND	0.73	5.0	UJ	ND	0.73	5.0	UJ	ND	0.73	5.0	UJ	ND	0.73	5.0	UJ	ND	0.73	5.0	UJ
SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	ND	0.66	5.0	UJ	ND	0.66	5.0	UJ	ND	0.66	5.0	UJ	ND	0.66	5.0	UJ	ND	0.66	5.0	UJ
SW8270D-SIM	Benzo(e)pyrene	ug/kg	ND	0.50	5.0	UJ	ND	0.50	5.0	UJ	ND	0.50	5.0	UJ	ND	0.50	5.0	UJ	ND	0.50	5.0	UJ
SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	5.8	0.95	5.0	J	ND	0.95	5.0	UJ	ND	0.95	5.0	UJ	ND	0.95	5.0	UJ	ND	0.95	5.0	UJ
SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	ND	0.57	5.0	UJ	ND	0.57	5.0	UJ	ND	0.57	5.0	UJ	ND	0.57	5.0	UJ	ND	0.57	5.0	UJ
SW8270D-SIM	Biphenyl	ug/kg	0.96	0.87	5.0	J	1.0	0.87	5.0	J	ND	0.87	5.0		ND	0.87	5.0		0.93	0.87	5.0	J
SW8270D-SIM	Carbazole	ug/kg	ND	0.54	5.0		ND	0.54	5.0		ND	0.54	5.0		ND	0.54	5.0		ND	0.54	5.0	
SW8270D-SIM	Chrysene	ug/kg	1.4	0.55	5.0	J	1.4	0.55	5.0	J	1.2	0.55	5.0	J	ND	0.55	5.0		ND	0.55	5.0	
SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	5.7	0.86	5.0	J	4.5	0.86	5.0	J	5.3	0.86	5.0	J	2.2	0.86	5.0	J	4.0	0.86	5.0	J
SW8270D-SIM	Dibenzofuran	ug/kg	0.57	0.45	5.0	J	ND	0.45	5.0		0.65	0.45	5.0	J	0.65	0.45	5.0	J	0.59	0.45	5.0	J
SW8270D-SIM	Dibenzothiophene	ug/kg	ND	0.86	5.0		ND	0.86	5.0		ND	0.86	5.0		ND	0.86	5.0		ND	0.86	5.0	
SW8270D-SIM	Fluoranthene	ug/kg	ND	0.49	5.0		ND	0.49	5.0		ND	0.49	5.0		ND	0.49	5.0		ND	0.49	5.0	
SW8270D-SIM	Fluorene	ug/kg	ND	0.52	5.0		ND	0.52	5.0		ND	0.52	5.0		ND	0.52	5.0		ND	0.52	5.0	
SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	ND	0.96	5.0	UJ	1.3	0.96	5.0	J	ND	0.96	5.0	UJ	1.4	0.96	5.0	J	ND	0.96	5.0	UJ
SW8270D-SIM	Naphthalene	ug/kg	3.9	1.5	5.0	J	3.4	1.5	5.0	J	ND	1.5	5.0		3.1	1.5	5.0	J	2.6	1.5	5.0	J
SW8270D-SIM	Perylene	ug/kg	ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0		ND	1.2	5.0	
SW8270D-SIM	Phenanthrene	ug/kg	1.2	0.66	5.0	J	1.4	0.66	5.0	J	1.5	0.66	5.0	J	1.4	0.66	5.0	J	ND	1.5	5.0	UJ
SW8270D-SIM	Pyrene	ug/kg	ND	0.50	5.0		ND	0.50	5.0		ND	0.50	5.0		ND	0.50	5.0		ND	0.50	5.0	
ZFZDRY	Total solids	percent	31.7				32.0				34.5				31.8				28.9			

TABLE 4: ANALYTICAL RESULTS OF 2015 ARCTIC CISCO SAMPLING

				Sample ID	ACIS-2015-01				ACIS-2015-02				ACIS-2015-03				ACIS-2015-04				ACIS-2015-05			
				Sample Date	11/2/2015				11/2/2015				11/2/2015				11/2/2015				11/2/2015			
Basis (Wet / Dry)	Method	Compound	Units	% Detectable	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
Wet	SW6020A	Arsenic	mg/kg	100.0%	1.540	0.006	0.141		1.140	0.006	0.152		1.650	0.006	0.155		1.260	0.007	0.178		1.400	0.007	0.163	
Wet	SW6020A	Barium	mg/kg	100.0%	0.113	0.0014	0.0141	J	0.328	0.0015	0.0152		0.206	0.0016	0.0155		0.207	0.0018	0.0178		0.215	0.0016	0.0163	
Wet	SW6020A	Cadmium	mg/kg	100.0%	0.0025	0.0006	0.0056	J	0.0066	0.0006	0.0061		0.0038	0.0006	0.0062	J	0.0036	0.0007	0.0071	J	0.0054	0.0007	0.0065	J
Wet	SW6020A	Copper	mg/kg	100.0%	0.526	0.006	0.028		0.499	0.006	0.030		0.467	0.006	0.031		0.416	0.007	0.036		0.416	0.007	0.033	
Wet	SW6020A	Lead	mg/kg	100.0%	0.0016	0.00014	0.0057	J	0.0025	0.00015	0.0061	J	0.0055	0.00016	0.0062	J	0.0023	0.00018	0.0071	J	0.0017	0.00016	0.0065	J
Wet	SW6020A	Nickel	mg/kg	100.0%	0.063	0.006	0.056		0.073	0.006	0.061		0.041	0.006	0.062	J	0.127	0.007	0.071		0.073	0.007	0.065	
Wet	SW6020A	Vanadium	mg/kg	100.0%	0.015	0.002	0.056	J	0.042	0.002	0.061	J	0.033	0.002	0.062	J	0.012	0.002	0.071	J	0.027	0.002	0.065	J
Wet	SW6020A	Zinc	mg/kg	100.0%	10.0	0.017	0.141		11.4	0.018	0.152		10.0	0.019	0.155		10.3	0.021	0.178		10.2	0.020	0.163	
Wet	SW7471	Mercury	mg/kg	100.0%	0.0114	0.0013	0.0063		0.0086	0.0012	0.0062		0.0127	0.0014	0.0070		0.0095	0.0015	0.0073		0.0049	0.0014	0.0070	J
Wet	SW7742	Selenium	mg/kg	100.0%	0.398	0.014	0.028		0.380	0.015	0.030		0.386	0.016	0.031		0.365	0.018	0.036		0.319	0.016	0.033	
Wet	SW8270D-SIM	1-Methylnaphthalene	ug/kg	100.0%	0.53	0.32	4.9	J	0.52	0.32	4.8	J	0.42	0.32	4.8	J	0.53	0.32	4.9	J	0.58	0.32	4.7	J
Wet	SW8270D-SIM	1-Methylphenanthrene	ug/kg	0.0%	ND	0.28	4.9		ND	0.28	4.8		ND	0.28	4.8		ND	0.28	4.9		ND	0.28	4.7	
Wet	SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	10.0%	ND	0.36	4.9		ND	0.36	4.8		ND	0.36	4.8		ND	0.36	4.9		ND	0.36	4.7	
Wet	SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	63.3%	ND	0.37	4.9		0.52	0.37	4.8	J	ND	0.37	4.8		0.64	0.37	4.9	J	0.52	0.37	4.7	J
Wet	SW8270D-SIM	2-Methylnaphthalene	ug/kg	100.0%	0.64	0.38	4.9	J	0.76	0.38	4.8	J	0.52	0.38	4.8	J	0.63	0.38	4.9	J	0.70	0.38	4.7	J
Wet	SW8270D-SIM	Acenaphthene	ug/kg	6.7%	ND	0.51	4.9		ND	0.51	4.8		ND	0.51	4.8		ND	0.51	4.9		ND	0.51	4.7	
Wet	SW8270D-SIM	Acenaphthylene	ug/kg	0.0%	ND	0.28	4.9		ND	0.28	4.8		ND	0.28	4.8		ND	0.28	4.9		ND	0.28	4.7	
Wet	SW8270D-SIM	Anthracene	ug/kg	3.3%	0.52	0.18	4.9	J	ND	0.18	4.8		ND	0.18	4.8		ND	0.18	4.9		ND	0.18	4.7	
Wet	SW8270D-SIM	Benzo(a)anthracene	ug/kg	90.0%	1.1	0.30	4.9	J	0.73	0.30	4.8	J	0.73	0.30	4.8	J	0.81	0.30	4.9	J	0.80	0.30	4.7	J
Wet	SW8270D-SIM	Benzo(a)pyrene	ug/kg	3.3%	ND	0.40	4.9		ND	0.40	4.8		ND	0.40	4.8		ND	0.40	4.9		ND	0.40	4.7	
Wet	SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	3.3%	0.53	0.36	4.9	J	ND	0.36	4.8		ND	0.36	4.8		ND	0.36	4.9		ND	0.36	4.7	
Wet	SW8270D-SIM	Benzo(e)pyrene	ug/kg	0.0%	ND	0.37	4.9		ND	0.37	4.8		ND	0.37	4.8		ND	0.37	4.9		ND	0.37	4.7	
Wet	SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	0.0%	ND	0.48	4.9		ND	0.48	4.8		ND	0.48	4.8		ND	0.48	4.9		ND	0.48	4.7	
Wet	SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	3.3%	0.31	0.24	4.9	J	ND	0.24	4.8		ND	0.24	4.8		ND	0.24	4.9		ND	0.24	4.7	
Wet	SW8270D-SIM	Biphenyl	ug/kg	83.3%	ND	0.32	4.9		0.44	0.32	4.8	J	ND	0.32	4.8		0.41	0.32	4.9	J	0.45	0.32	4.7	J
Wet	SW8270D-SIM	Carbazole	ug/kg	0.0%	ND	0.38	4.9		ND	0.38	4.8		ND	0.38	4.8		ND	0.38	4.9		ND	0.38	4.7	
Wet	SW8270D-SIM	Chrysene	ug/kg	3.3%	0.43	0.25	4.9	J	ND	0.25	4.8		ND	0.25	4.8		ND	0.25	4.9		ND	0.25	4.7	
Wet	SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	0.0%	ND	0.47	4.9		ND	0.47	4.8		ND	0.47	4.8		ND	0.47	4.9		ND	0.47	4.7	
Wet	SW8270D-SIM	Dibenzofuran	ug/kg	100.0%	0.57	0.24	4.9	J	0.49	0.24	4.8	J	0.45	0.24	4.8	J	0.55	0.24	4.9	J	0.51	0.24	4.7	J
Wet	SW8270D-SIM	Dibenzothiophene	ug/kg	6.7%	ND	0.20	4.9		ND	0.20	4.8		ND	0.20	4.8		ND	0.20	4.9		ND	0.20	4.7	
Wet	SW8270D-SIM	Fluoranthene	ug/kg	20.0%	1.4	0.32	4.9	J	0.51	0.32	4.8	J	ND	0.32	4.8		ND	0.32	4.9		0.35	0.32	4.7	J
Wet	SW8270D-SIM	Fluorene	ug/kg	100.0%	1.4	0.29	4.9	J	1.3	0.29	4.8	J	0.99	0.29	4.8	J	1.2	0.29	4.9	J	1.3	0.29	4.7	J
Wet	SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	0.0%	ND	0.48	4.9		ND	0.48	4.8		ND	0.48	4.8		ND	0.48	4.9		ND	0.48	4.7	
Wet	SW8270D-SIM	Naphthalene	ug/kg	100.0%	0.86	0.23	4.9	J	1.0	0.23	4.8	J	0.78	0.23	4.8	J	0.84	0.23	4.9	J	0.95	0.23	4.7	J
Wet	SW8270D-SIM	Perylene	ug/kg	0.0%	ND	0.37	4.9		ND	0.37	4.8		ND	0.37	4.8		ND	0.37	4.9		ND	0.37	4.7	
Wet	SW8270D-SIM	Phenanthrene	ug/kg	100.0%	2.0	0.12	4.9	J	1.1	0.12	4.8	J	1.1	0.12	4.8	J	1.2	0.12	4.9	J	1.2	0.12	4.7	J
Wet	SW8270D-SIM	Pyrene	ug/kg	20.0%	0.95	0.17	4.9	J	0.27	0.17	4.8	J	ND	0.17	4.8		ND	0.17	4.9		ND	0.17	4.7	
Wet	ZFZDRY	Total solids	percent	100.0%	31.9				31.1				35.6				36.4				34.9			

TABLE 4: ANALYTICAL RESULTS OF 2015 ARCTIC CISCO SAMPLING

				Sample ID	ACIS-2015-06				ACIS-2015-07				ACIS-2015-08				ACIS-2015-09				ACIS-2015-10			
				Sample Date	11/2/2015				11/2/2015				11/2/2015				11/2/2015				11/2/2015			
Basis (Wet / Dry)	Method	Compound	Units	% Detectable	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
Wet	SW6020A	Arsenic	mg/kg	100.0%	1.370	0.007	0.163		1.340	0.006	0.155		1.600	0.007	0.178		1.430	0.007	0.172		0.822	0.006	0.158	
Wet	SW6020A	Barium	mg/kg	100.0%	0.328	0.0016	0.0163		0.278	0.0016	0.0155		0.282	0.0018	0.0178		0.311	0.0017	0.0172		0.382	0.0016	0.0158	
Wet	SW6020A	Cadmium	mg/kg	100.0%	0.0045	0.0007	0.0065	J	0.0057	0.0006	0.0062	J	0.0063	0.0007	0.0071	J	0.0054	0.0007	0.0069	J	0.0024	0.0006	0.0063	J
Wet	SW6020A	Copper	mg/kg	100.0%	0.471	0.007	0.033		0.483	0.006	0.031		0.503	0.007	0.036		0.514	0.007	0.034		0.496	0.006	0.032	
Wet	SW6020A	Lead	mg/kg	100.0%	0.0030	0.00016	0.0065	J	0.0029	0.00016	0.0062	J	0.0030	0.00018	0.0071	J	0.0035	0.00017	0.0069	J	0.0023	0.00016	0.0063	J
Wet	SW6020A	Nickel	mg/kg	100.0%	0.110	0.007	0.065		0.067	0.006	0.062		0.047	0.007	0.071	J	0.098	0.007	0.069		0.057	0.006	0.063	J
Wet	SW6020A	Vanadium	mg/kg	100.0%	0.030	0.002	0.065	J	0.045	0.002	0.062	J	0.032	0.002	0.071	J	0.031	0.002	0.069	J	0.025	0.002	0.063	J
Wet	SW6020A	Zinc	mg/kg	100.0%	11.1	0.020	0.163		10.7	0.019	0.155		12.8	0.021	0.178		11.2	0.021	0.172		12.9	0.019	0.158	
Wet	SW7471	Mercury	mg/kg	100.0%	0.0092	0.0013	0.0066		0.0113	0.0013	0.0066		0.0113	0.0015	0.0076		0.0086	0.0014	0.0071		0.0057	0.0013	0.0063	J
Wet	SW7742	Selenium	mg/kg	100.0%	0.387	0.016	0.033		0.401	0.016	0.031		0.436	0.018	0.036		0.469	0.017	0.034		0.381	0.016	0.032	
Wet	SW8270D-SIM	1-Methylnaphthalene	ug/kg	100.0%	0.56	0.32	4.8	J	0.38	0.32	5.0	J	0.71	0.32	5.0	J	0.54	0.32	5.0	J	0.52	0.32	4.8	J
Wet	SW8270D-SIM	1-Methylphenanthrene	ug/kg	0.0%	ND	0.28	4.8		ND	0.28	5.0		ND	0.28	5.0		ND	0.28	5.0		ND	0.28	4.8	
Wet	SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	10.0%	ND	0.36	4.8		ND	0.36	5.0		0.49	0.36	5.0	J	ND	0.36	5.0		ND	0.36	4.8	
Wet	SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	63.3%	0.41	0.37	4.8	J	ND	0.37	5.0		0.79	0.37	5.0	J	0.41	0.37	5.0	J	ND	0.37	4.8	
Wet	SW8270D-SIM	2-Methylnaphthalene	ug/kg	100.0%	0.80	0.38	4.8	J	0.55	0.38	5.0	J	0.80	0.38	5.0	J	0.62	0.38	5.0	J	0.62	0.38	4.8	J
Wet	SW8270D-SIM	Acenaphthene	ug/kg	6.7%	ND	0.51	4.8		ND	0.51	5.0		0.53	0.51	5.0	J	ND	0.51	5.0		ND	0.51	4.8	
Wet	SW8270D-SIM	Acenaphthylene	ug/kg	0.0%	ND	0.28	4.8		ND	0.28	5.0		ND	0.28	5.0		ND	0.28	5.0		ND	0.28	4.8	
Wet	SW8270D-SIM	Anthracene	ug/kg	3.3%	ND	0.18	4.8		ND	0.18	5.0		ND	0.18	5.0		ND	0.18	5.0		ND	0.18	4.8	
Wet	SW8270D-SIM	Benzo(a)anthracene	ug/kg	90.0%	0.76	0.30	4.8	J	0.60	0.30	5.0	J	ND	0.30	5.0		1.0	0.30	5.0	J	0.66	0.30	4.8	J
Wet	SW8270D-SIM	Benzo(a)pyrene	ug/kg	3.3%	ND	0.40	4.8		ND	0.40	5.0		ND	0.40	5.0		ND	0.40	5.0		ND	0.40	4.8	
Wet	SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	3.3%	ND	0.36	4.8		ND	0.36	5.0		ND	0.36	5.0		ND	0.36	5.0		ND	0.36	4.8	
Wet	SW8270D-SIM	Benzo(e)pyrene	ug/kg	0.0%	ND	0.37	4.8		ND	0.37	5.0		ND	0.37	5.0		ND	0.37	5.0		ND	0.37	4.8	
Wet	SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	0.0%	ND	0.48	4.8		ND	0.48	5.0		ND	0.48	5.0		ND	0.48	5.0		ND	0.48	4.8	
Wet	SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	3.3%	ND	0.24	4.8		ND	0.24	5.0		ND	0.24	5.0		ND	0.24	5.0		ND	0.24	4.8	
Wet	SW8270D-SIM	Biphenyl	ug/kg	83.3%	0.35	0.32	4.8	J	ND	0.32	5.0		0.61	0.32	5.0	J	0.46	0.32	5.0	J	0.45	0.32	4.8	J
Wet	SW8270D-SIM	Carbazole	ug/kg	0.0%	ND	0.38	4.8		ND	0.38	5.0		ND	0.38	5.0		ND	0.38	5.0		ND	0.38	4.8	
Wet	SW8270D-SIM	Chrysene	ug/kg	3.3%	ND	0.25	4.8		ND	0.25	5.0		ND	0.25	5.0		ND	0.25	5.0		ND	0.25	4.8	
Wet	SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	0.0%	ND	0.47	4.8		ND	0.47	5.0		ND	0.47	5.0		ND	0.47	5.0		ND	0.47	4.8	
Wet	SW8270D-SIM	Dibenzofuran	ug/kg	100.0%	0.48	0.24	4.8	J	0.44	0.24	5.0	J	0.66	0.24	5.0	J	0.51	0.24	5.0	J	0.44	0.24	4.8	J
Wet	SW8270D-SIM	Dibenzothiophene	ug/kg	6.7%	ND	0.20	4.8		ND	0.20	5.0		0.22	0.20	5.0	J	ND	0.20	5.0		ND	0.20	4.8	
Wet	SW8270D-SIM	Fluoranthene	ug/kg	20.0%	ND	0.32	4.8		ND	0.32	5.0		ND	0.32	5.0		ND	0.32	5.0		ND	0.32	4.8	
Wet	SW8270D-SIM	Fluorene	ug/kg	100.0%	1.0	0.29	4.8	J	0.99	0.29	5.0	J	1.3	0.29	5.0	J	1.9	0.29	5.0	J	1.1	0.29	4.8	J
Wet	SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	0.0%	ND	0.48	4.8		ND	0.48	5.0		ND	0.48	5.0		ND	0.48	5.0		ND	0.48	4.8	
Wet	SW8270D-SIM	Naphthalene	ug/kg	100.0%	0.97	0.23	4.8	J	0.77	0.23	5.0	J	1.0	0.23	5.0	J	0.84	0.23	5.0	J	0.93	0.23	4.8	J
Wet	SW8270D-SIM	Perylene	ug/kg	0.0%	ND	0.37	4.8		ND	0.37	5.0		ND	0.37	5.0		ND	0.37	5.0		ND	0.37	4.8	
Wet	SW8270D-SIM	Phenanthrene	ug/kg	100.0%	1.1	0.12	4.8	J	0.77	0.12	5.0	J	1.2	0.12	5.0	J	1.2	0.12	5.0	J	0.84	0.12	4.8	J
Wet	SW8270D-SIM	Pyrene	ug/kg	20.0%	ND	0.17	4.8		ND	0.17	5.0		ND	0.17	5.0		ND	0.17	5.0		ND	0.17	4.8	
Wet	ZFZDRY	Total solids	percent	100.0%	33.3				33.7				38.0				35.7				31.8			

TABLE 4: ANALYTICAL RESULTS OF 2015 ARCTIC CISCO SAMPLING

				Sample ID	ACIS-2015-11				ACIS-2015-12				ACIS-2015-13				ACIS-2015-14				ACIS-2015-15			
				Sample Date	11/2/2015				11/2/2015				11/2/2015				11/2/2015				11/2/2015			
Basis (Wet / Dry)	Method	Compound	Units	% Detectable	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
Wet	SW6020A	Arsenic	mg/kg	100.0%	1.330	0.006	0.149		2.680	0.007	0.167		1.340	0.007	0.169		1.890	0.006	0.156		1.320	0.008	0.191	
Wet	SW6020A	Barium	mg/kg	100.0%	0.253	0.0015	0.0149		0.384	0.0017	0.0167		0.216	0.0017	0.0169		0.325	0.0016	0.0156		0.123	0.0019	0.0191	
Wet	SW6020A	Cadmium	mg/kg	100.0%	0.0058	0.0006	0.0059	J	0.0050	0.0007	0.0067	J	0.0029	0.0007	0.0068	J	0.0078	0.0006	0.0062		0.0058	0.0008	0.0076	J
Wet	SW6020A	Copper	mg/kg	100.0%	0.472	0.006	0.030		0.450	0.007	0.033		0.442	0.007	0.034		0.476	0.006	0.031		0.484	0.008	0.038	
Wet	SW6020A	Lead	mg/kg	100.0%	0.0020	0.00015	0.0059	J	0.0036	0.00017	0.0067	J	0.0014	0.00017	0.0068	J	0.0026	0.00016	0.0062	J	0.0017	0.00019	0.0077	J
Wet	SW6020A	Nickel	mg/kg	100.0%	0.068	0.006	0.059		0.083	0.007	0.067		0.056	0.007	0.068	J	0.080	0.006	0.062		0.065	0.008	0.076	J
Wet	SW6020A	Vanadium	mg/kg	100.0%	0.046	0.002	0.059	J	0.039	0.002	0.067	J	0.019	0.002	0.068	J	0.043	0.002	0.062	J	0.030	0.003	0.076	J
Wet	SW6020A	Zinc	mg/kg	100.0%	11.8	0.018	0.149		12.5	0.020	0.167		9.6	0.020	0.169		11.4	0.019	0.156		8.5	0.023	0.191	
Wet	SW7471	Mercury	mg/kg	100.0%	0.0043	0.0012	0.0061	J	0.0133	0.0014	0.0070		0.0054	0.0014	0.0068	J	0.0096	0.0014	0.0068		0.0156	0.0016	0.0078	
Wet	SW7742	Selenium	mg/kg	100.0%	0.468	0.015	0.030		0.481	0.017	0.033		0.391	0.017	0.034		0.416	0.016	0.031		0.351	0.019	0.038	
Wet	SW8270D-SIM	1-Methylnaphthalene	ug/kg	100.0%	0.43	0.32	4.7	J	0.67	0.32	4.9	J	0.62	0.32	5.0	J	0.43	0.32	4.7	J	0.74	0.32	5.0	J
Wet	SW8270D-SIM	1-Methylphenanthrene	ug/kg	0.0%	ND	0.28	4.7		ND	0.28	4.9		ND	0.28	5.0		ND	0.28	4.7		ND	0.28	5.0	
Wet	SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	10.0%	ND	0.36	4.7		ND	0.36	4.9		ND	0.36	5.0		ND	0.36	4.7		ND	0.36	5.0	
Wet	SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	63.3%	ND	0.37	4.7		0.54	0.37	4.9	J	0.44	0.37	5.0	J	0.46	0.37	4.7	J	1.0	0.37	5.0	J
Wet	SW8270D-SIM	2-Methylnaphthalene	ug/kg	100.0%	0.61	0.38	4.7	J	0.74	0.38	4.9	J	0.70	0.38	5.0	J	0.61	0.38	4.7	J	0.81	0.38	5.0	J
Wet	SW8270D-SIM	Acenaphthene	ug/kg	6.7%	ND	0.51	4.7		ND	0.51	4.9		ND	0.51	5.0		ND	0.51	4.7		ND	0.51	5.0	
Wet	SW8270D-SIM	Acenaphthylene	ug/kg	0.0%	ND	0.28	4.7		ND	0.28	4.9		ND	0.28	5.0		ND	0.28	4.7		ND	0.28	5.0	
Wet	SW8270D-SIM	Anthracene	ug/kg	3.3%	ND	0.18	4.7		ND	0.18	4.9		ND	0.18	5.0		ND	0.18	4.7		ND	0.18	5.0	
Wet	SW8270D-SIM	Benzo(a)anthracene	ug/kg	90.0%	0.76	0.30	4.7	J	0.69	0.30	4.9	J	0.97	0.30	5.0	J	0.72	0.30	4.7	J	ND	0.30	5.0	
Wet	SW8270D-SIM	Benzo(a)pyrene	ug/kg	3.3%	ND	0.40	4.7		ND	0.40	4.9		ND	0.40	5.0		ND	0.40	4.7		ND	0.40	5.0	
Wet	SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	3.3%	ND	0.36	4.7		ND	0.36	4.9		ND	0.36	5.0		ND	0.36	4.7		ND	0.36	5.0	
Wet	SW8270D-SIM	Benzo(e)pyrene	ug/kg	0.0%	ND	0.37	4.7		ND	0.37	4.9		ND	0.37	5.0		ND	0.37	4.7		ND	0.37	5.0	
Wet	SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	0.0%	ND	0.48	4.7		ND	0.48	4.9		ND	0.48	5.0		ND	0.48	4.7		ND	0.48	5.0	
Wet	SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	3.3%	ND	0.24	4.7		ND	0.24	4.9		ND	0.24	5.0		ND	0.24	4.7		ND	0.24	5.0	
Wet	SW8270D-SIM	Biphenyl	ug/kg	83.3%	0.33	0.32	4.7	J	0.39	0.32	4.9	J	0.46	0.32	5.0	J	0.38	0.32	4.7	J	0.73	0.32	5.0	J
Wet	SW8270D-SIM	Carbazole	ug/kg	0.0%	ND	0.38	4.7		ND	0.38	4.9		ND	0.38	5.0		ND	0.38	4.7		ND	0.38	5.0	
Wet	SW8270D-SIM	Chrysene	ug/kg	3.3%	ND	0.25	4.7		ND	0.25	4.9		ND	0.25	5.0		ND	0.25	4.7		ND	0.25	5.0	
Wet	SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	0.0%	ND	0.47	4.7		ND	0.47	4.9		ND	0.47	5.0		ND	0.47	4.7		ND	0.47	5.0	
Wet	SW8270D-SIM	Dibenzofuran	ug/kg	100.0%	0.39	0.24	4.7	J	0.59	0.24	4.9	J	0.49	0.24	5.0	J	0.48	0.24	4.7	J	0.64	0.24	5.0	J
Wet	SW8270D-SIM	Dibenzothiophene	ug/kg	6.7%	ND	0.20	4.7		ND	0.20	4.9		ND	0.20	5.0		ND	0.20	4.7		ND	0.20	5.0	
Wet	SW8270D-SIM	Fluoranthene	ug/kg	20.0%	ND	0.32	4.7		0.33	0.32	4.9	J	0.38	0.32	5.0	J	ND	0.32	4.7		ND	0.32	5.0	
Wet	SW8270D-SIM	Fluorene	ug/kg	100.0%	0.88	0.29	4.7	J	1.1	0.29	4.9	J	1.0	0.29	5.0	J	0.96	0.29	4.7	J	1.2	0.29	5.0	J
Wet	SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	0.0%	ND	0.48	4.7		ND	0.48	4.9		ND	0.48	5.0		ND	0.48	4.7		ND	0.48	5.0	
Wet	SW8270D-SIM	Naphthalene	ug/kg	100.0%	0.73	0.23	4.7	J	1.0	0.23	4.9	J	0.98	0.23	5.0	J	0.80	0.23	4.7	J	1.0	0.23	5.0	J
Wet	SW8270D-SIM	Perylene	ug/kg	0.0%	ND	0.37	4.7		ND	0.37	4.9		ND	0.37	5.0		ND	0.37	4.7		ND	0.37	5.0	
Wet	SW8270D-SIM	Phenanthrene	ug/kg	100.0%	0.79	0.12	4.7	J	1.1	0.12	4.9	J	1.3	0.12	5.0	J	1.0	0.12	4.7	J	1.3	0.12	5.0	J
Wet	SW8270D-SIM	Pyrene	ug/kg	20.0%	ND	0.17	4.7		ND	0.17	4.9		ND	0.17	5.0		ND	0.17	4.7		ND	0.17	5.0	
Wet	ZFZDRY	Total solids	percent	100.0%	30.6				35.1				34.1				34.4				39.0			

TABLE 4: ANALYTICAL RESULTS OF 2015 ARCTIC CISCO SAMPLING

				Sample ID	ACIS-2015-16				ACIS-2015-17				ACIS-2015-18				ACIS-2015-19				ACIS-2015-20			
				Sample Date	11/6/2015				11/6/2015				11/6/2015				11/6/2015				11/6/2015			
Basis (Wet / Dry)	Method	Compound	Units	% Detectable	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
Wet	SW6020A	Arsenic	mg/kg	100.0%	1.120	0.005	0.125		1.330	0.006	0.150		1.140	0.005	0.134		1.690	0.006	0.148		1.520	0.006	0.146	
Wet	SW6020A	Barium	mg/kg	100.0%	0.340	0.0013	0.0125		0.296	0.0015	0.0150		0.323	0.0013	0.0134		0.247	0.0015	0.0148		0.326	0.0015	0.0146	
Wet	SW6020A	Cadmium	mg/kg	100.0%	0.0051	0.0005	0.0050		0.0064	0.0006	0.0060		0.0066	0.0005	0.0053		0.0066	0.0006	0.0059		0.0086	0.0006	0.0058	
Wet	SW6020A	Copper	mg/kg	100.0%	0.500	0.005	0.025		0.451	0.006	0.030		0.482	0.005	0.027		0.496	0.006	0.030		0.614	0.006	0.029	
Wet	SW6020A	Lead	mg/kg	100.0%	0.0022	0.00013	0.0050	J	0.0075	0.00015	0.0060		0.0027	0.00013	0.0054	J	0.0022	0.00015	0.0059	J	0.0032	0.00015	0.0058	J
Wet	SW6020A	Nickel	mg/kg	100.0%	0.072	0.005	0.050		0.075	0.006	0.060		0.061	0.005	0.053		0.078	0.006	0.059		0.091	0.006	0.058	
Wet	SW6020A	Vanadium	mg/kg	100.0%	0.034	0.002	0.050	J	0.029	0.002	0.060	J	0.031	0.002	0.053	J	0.023	0.002	0.059	J	0.050	0.002	0.058	J
Wet	SW6020A	Zinc	mg/kg	100.0%	11.9	0.015	0.125		12.3	0.018	0.150		12.0	0.016	0.134		12.0	0.018	0.148		16.3	0.018	0.146	
Wet	SW7471	Mercury	mg/kg	100.0%	0.0115	0.0011	0.0057		0.0074	0.0012	0.0061		0.0122	0.0012	0.0061		0.0109	0.0012	0.0060		0.0129	0.0012	0.0059	
Wet	SW7742	Selenium	mg/kg	100.0%	0.359	0.013	0.025		0.370	0.015	0.030		0.385	0.013	0.027		0.377	0.015	0.030		0.439	0.015	0.029	
Wet	SW8270D-SIM	1-Methylnaphthalene	ug/kg	100.0%	0.45	0.32	4.8	J	0.54	0.32	4.7	J	0.43	0.32	4.9	J	0.46	0.32	4.7	J	0.42	0.32	4.6	J
Wet	SW8270D-SIM	1-Methylphenanthrene	ug/kg	0.0%	ND	0.28	4.8		ND	0.28	4.7		ND	0.28	4.9		ND	0.28	4.7		ND	0.28	4.6	
Wet	SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	10.0%	ND	0.36	4.8		ND	0.36	4.7		ND	0.36	4.9		ND	0.36	4.7		ND	0.36	4.6	
Wet	SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	63.3%	ND	0.37	4.8		ND	0.37	4.7		ND	0.37	4.9		0.37	0.37	4.7	J	ND	0.37	4.6	
Wet	SW8270D-SIM	2-Methylnaphthalene	ug/kg	100.0%	0.48	0.38	4.8	J	0.56	0.38	4.7	J	0.58	0.38	4.9	J	0.62	0.38	4.7	J	0.53	0.38	4.6	J
Wet	SW8270D-SIM	Acenaphthene	ug/kg	6.7%	ND	0.51	4.8		ND	0.51	4.7		ND	0.51	4.9		ND	0.51	4.7		ND	0.51	4.6	
Wet	SW8270D-SIM	Acenaphthylene	ug/kg	0.0%	ND	0.28	4.8		ND	0.28	4.7		ND	0.28	4.9		ND	0.28	4.7		ND	0.28	4.6	
Wet	SW8270D-SIM	Anthracene	ug/kg	3.3%	ND	0.18	4.8		ND	0.18	4.7		ND	0.18	4.9		ND	0.18	4.7		ND	0.18	4.6	
Wet	SW8270D-SIM	Benzo(a)anthracene	ug/kg	90.0%	0.84	0.30	4.8	J	0.65	0.30	4.7	J	0.75	0.30	4.9	J	0.84	0.30	4.7	J	0.61	0.30	4.6	J
Wet	SW8270D-SIM	Benzo(a)pyrene	ug/kg	3.3%	ND	0.40	4.8		ND	0.40	4.7		ND	0.40	4.9		ND	0.40	4.7		ND	0.40	4.6	
Wet	SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	3.3%	ND	0.36	4.8		ND	0.36	4.7		ND	0.36	4.9		ND	0.36	4.7		ND	0.36	4.6	
Wet	SW8270D-SIM	Benzo(e)pyrene	ug/kg	0.0%	ND	0.37	4.8		ND	0.37	4.7		ND	0.37	4.9		ND	0.37	4.7		ND	0.37	4.6	
Wet	SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	0.0%	ND	0.48	4.8		ND	0.48	4.7		ND	0.48	4.9		ND	0.48	4.7		ND	0.48	4.6	
Wet	SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	3.3%	ND	0.24	4.8		ND	0.24	4.7		ND	0.24	4.9		ND	0.24	4.7		ND	0.24	4.6	
Wet	SW8270D-SIM	Biphenyl	ug/kg	83.3%	ND	0.32	4.8		0.41	0.32	4.7	J	0.39	0.32	4.9	J	0.37	0.32	4.7	J	0.33	0.32	4.6	J
Wet	SW8270D-SIM	Carbazole	ug/kg	0.0%	ND	0.38	4.8		ND	0.38	4.7		ND	0.38	4.9		ND	0.38	4.7		ND	0.38	4.6	
Wet	SW8270D-SIM	Chrysene	ug/kg	3.3%	ND	0.25	4.8		ND	0.25	4.7		ND	0.25	4.9		ND	0.25	4.7		ND	0.25	4.6	
Wet	SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	0.0%	ND	0.47	4.8		ND	0.47	4.7		ND	0.47	4.9		ND	0.47	4.7		ND	0.47	4.6	
Wet	SW8270D-SIM	Dibenzofuran	ug/kg	100.0%	0.35	0.24	4.8	J	0.44	0.24	4.7	J	0.39	0.24	4.9	J	0.41	0.24	4.7	J	0.45	0.24	4.6	J
Wet	SW8270D-SIM	Dibenzothiophene	ug/kg	6.7%	ND	0.20	4.8		ND	0.20	4.7		ND	0.20	4.9		ND	0.20	4.7		ND	0.20	4.6	
Wet	SW8270D-SIM	Fluoranthene	ug/kg	20.0%	ND	0.32	4.8		ND	0.32	4.7		ND	0.32	4.9		ND	0.32	4.7		ND	0.32	4.6	
Wet	SW8270D-SIM	Fluorene	ug/kg	100.0%	1.3	0.29	4.8	J	0.99	0.29	4.7	J	0.88	0.29	4.9	J	1.1	0.29	4.7	J	1.5	0.29	4.6	J
Wet	SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	0.0%	ND	0.48	4.8		ND	0.48	4.7		ND	0.48	4.9		ND	0.48	4.7		ND	0.48	4.6	
Wet	SW8270D-SIM	Naphthalene	ug/kg	100.0%	0.67	0.23	4.8	J	0.83	0.23	4.7	J	0.88	0.23	4.9	J	0.81	0.23	4.7	J	0.70	0.23	4.6	J
Wet	SW8270D-SIM	Perylene	ug/kg	0.0%	ND	0.37	4.8		ND	0.37	4.7		ND	0.37	4.9		ND	0.37	4.7		ND	0.37	4.6	
Wet	SW8270D-SIM	Phenanthrene	ug/kg	100.0%	0.88	0.12	4.8	J	0.94	0.12	4.7	J	0.81	0.12	4.9	J	0.85	0.12	4.7	J	0.88	0.12	4.6	J
Wet	SW8270D-SIM	Pyrene	ug/kg	20.0%	ND	0.17	4.8		ND	0.17	4.7		ND	0.17	4.9		ND	0.17	4.7		ND	0.17	4.6	
Wet	ZFZDRY	Total solids	percent	100.0%	28.7				31.1				30.4				30.5				29.5			

TABLE 4: ANALYTICAL RESULTS OF 2015 ARCTIC CISCO SAMPLING

				Sample ID	ACIS-2015-21				ACIS-2015-22				ACIS-2015-23				ACIS-2015-24				ACIS-2015-25			
				Sample Date	11/6/2015				11/6/2015				11/6/2015				11/6/2015				11/6/2015			
Basis (Wet / Dry)	Method	Compound	Units	% Detectable	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
Wet	SW6020A	Arsenic	mg/kg	100.0%	1.600	0.006	0.155		1.760	0.007	0.175		1.820	0.006	0.149		1.410	0.006	0.141		1.700	0.006	0.139	
Wet	SW6020A	Barium	mg/kg	100.0%	0.370	0.0015	0.0155		0.339	0.0017	0.0175		0.428	0.0015	0.0149		0.401	0.0014	0.0141		0.355	0.0014	0.0139	
Wet	SW6020A	Cadmium	mg/kg	100.0%	0.0029	0.0006	0.0062	J	0.0126	0.0007	0.0070		0.0077	0.0006	0.0059		0.0085	0.0006	0.0056		0.0051	0.0006	0.0056	J
Wet	SW6020A	Copper	mg/kg	100.0%	0.509	0.006	0.031		0.614	0.007	0.035		0.464	0.006	0.030		0.494	0.006	0.028		0.552	0.006	0.028	
Wet	SW6020A	Lead	mg/kg	100.0%	0.0025	0.00015	0.0062	J	0.0026	0.00017	0.0070	J	0.0037	0.00015	0.0059	J	0.0029	0.00014	0.0056	J	0.0029	0.00014	0.0056	J
Wet	SW6020A	Nickel	mg/kg	100.0%	0.081	0.006	0.062		0.114	0.007	0.070		0.125	0.006	0.059		0.204	0.006	0.056		0.124	0.006	0.056	
Wet	SW6020A	Vanadium	mg/kg	100.0%	0.045	0.002	0.062	J	0.042	0.002	0.070	J	0.030	0.002	0.059	J	0.050	0.002	0.056	J	0.020	0.002	0.056	J
Wet	SW6020A	Zinc	mg/kg	100.0%	11.6	0.019	0.155		14.0	0.021	0.175		13.3	0.018	0.149		12.7	0.017	0.141		12.8	0.017	0.139	
Wet	SW7471	Mercury	mg/kg	100.0%	0.0091	0.0014	0.0070		0.0052	0.0015	0.0075	J	0.0068	0.0012	0.0062		0.0062	0.0012	0.0062		0.0067	0.0012	0.0061	
Wet	SW7742	Selenium	mg/kg	100.0%	0.462	0.015	0.031		0.525	0.017	0.035		0.514	0.015	0.030		0.522	0.014	0.028		0.492	0.014	0.028	
Wet	SW8270D-SIM	1-Methylnaphthalene	ug/kg	100.0%	0.68	0.32	4.6	J	0.58	0.32	4.8	J	0.58	0.32	4.7	J	0.65	0.32	4.9	J	0.56	0.32	4.6	J
Wet	SW8270D-SIM	1-Methylphenanthrene	ug/kg	0.0%	ND	0.28	4.6		ND	0.28	4.8		ND	0.28	4.7		ND	0.28	4.9		ND	0.28	4.6	
Wet	SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	10.0%	0.39	0.36	4.6	J	ND	0.36	4.8		ND	0.36	4.7		0.46	0.36	4.9	J	ND	0.36	4.6	
Wet	SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	63.3%	0.59	0.37	4.6	J	0.56	0.37	4.8	J	0.42	0.37	4.7	J	0.52	0.37	4.9	J	0.42	0.37	4.6	J
Wet	SW8270D-SIM	2-Methylnaphthalene	ug/kg	100.0%	0.76	0.38	4.6	J	0.77	0.38	4.8	J	0.70	0.38	4.7	J	0.90	0.38	4.9	J	0.71	0.38	4.6	J
Wet	SW8270D-SIM	Acenaphthene	ug/kg	6.7%	0.52	0.51	4.6	J	ND	0.51	4.8		ND	0.51	4.7		ND	0.51	4.9		ND	0.51	4.6	
Wet	SW8270D-SIM	Acenaphthylene	ug/kg	0.0%	ND	0.28	4.6		ND	0.28	4.8		ND	0.28	4.7		ND	0.28	4.9		ND	0.28	4.6	
Wet	SW8270D-SIM	Anthracene	ug/kg	3.3%	ND	0.18	4.6		ND	0.18	4.8		ND	0.18	4.7		ND	0.18	4.9		ND	0.18	4.6	
Wet	SW8270D-SIM	Benzo(a)anthracene	ug/kg	90.0%	0.83	0.30	4.6	J	ND	0.94	4.8	UJ	0.74	0.30	4.7	J	0.71	0.30	4.9	J	0.69	0.30	4.6	J
Wet	SW8270D-SIM	Benzo(a)pyrene	ug/kg	3.3%	ND	0.40	4.6		1.0	0.40	4.8	J	ND	0.40	4.7		ND	0.40	4.9		ND	0.40	4.6	
Wet	SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	3.3%	ND	0.36	4.6		ND	0.36	4.8		ND	0.36	4.7		ND	0.36	4.9		ND	0.36	4.6	
Wet	SW8270D-SIM	Benzo(e)pyrene	ug/kg	0.0%	ND	0.37	4.6		ND	0.37	4.8		ND	0.37	4.7		ND	0.37	4.9		ND	0.37	4.6	
Wet	SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	0.0%	ND	0.48	4.6		ND	0.48	4.8		ND	0.48	4.7		ND	0.48	4.9		ND	0.48	4.6	
Wet	SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	3.3%	ND	0.24	4.6		ND	0.24	4.8		ND	0.24	4.7		ND	0.24	4.9		ND	0.24	4.6	
Wet	SW8270D-SIM	Biphenyl	ug/kg	83.3%	0.56	0.32	4.6	J	0.50	0.32	4.8	J	0.36	0.32	4.7	J	0.53	0.32	4.9	J	0.36	0.32	4.6	J
Wet	SW8270D-SIM	Carbazole	ug/kg	0.0%	ND	0.38	4.6		ND	0.38	4.8		ND	0.38	4.7		ND	0.38	4.9		ND	0.38	4.6	
Wet	SW8270D-SIM	Chrysene	ug/kg	3.3%	ND	0.25	4.6		ND	0.25	4.8		ND	0.25	4.7		ND	0.25	4.9		ND	0.25	4.6	
Wet	SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	0.0%	ND	0.47	4.6		ND	0.47	4.8		ND	0.47	4.7		ND	0.47	4.9		ND	0.47	4.6	
Wet	SW8270D-SIM	Dibenzofuran	ug/kg	100.0%	0.60	0.24	4.6	J	0.56	0.24	4.8	J	0.51	0.24	4.7	J	0.54	0.24	4.9	J	0.46	0.24	4.6	J
Wet	SW8270D-SIM	Dibenzothiophene	ug/kg	6.7%	0.21	0.20	4.6	J	ND	0.20	4.8		ND	0.20	4.7		ND	0.20	4.9		ND	0.20	4.6	
Wet	SW8270D-SIM	Fluoranthene	ug/kg	20.0%	ND	0.32	4.6		ND	0.32	4.8		ND	0.32	4.7		ND	0.32	4.9		ND	0.32	4.6	
Wet	SW8270D-SIM	Fluorene	ug/kg	100.0%	1.5	0.29	4.6	J	1.4	0.29	4.8	J	1.1	0.29	4.7	J	1.2	0.29	4.9	J	1.8	0.29	4.6	J
Wet	SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	0.0%	ND	0.48	4.6		ND	0.48	4.8		ND	0.48	4.7		ND	0.48	4.9		ND	0.48	4.6	
Wet	SW8270D-SIM	Naphthalene	ug/kg	100.0%	1.1	0.23	4.6	J	1.1	0.23	4.8	J	0.91	0.23	4.7	J	1.0	0.23	4.9	J	0.99	0.23	4.6	J
Wet	SW8270D-SIM	Perylene	ug/kg	0.0%	ND	0.37	4.6		ND	0.37	4.8		ND	0.37	4.7		ND	0.37	4.9		ND	0.37	4.6	
Wet	SW8270D-SIM	Phenanthrene	ug/kg	100.0%	1.3	0.12	4.6	J	1.2	0.12	4.8	J	0.92	0.12	4.7	J	1.2	0.12	4.9	J	1.2	0.12	4.6	J
Wet	SW8270D-SIM	Pyrene	ug/kg	20.0%	ND	0.17	4.6		ND	0.17	4.8		ND	0.17	4.7		0.27	0.17	4.9	J	0.38	0.17	4.6	J
Wet	ZFZDRY	Total solids	percent	100.0%	34.9				34.4				31.0				31.3				30.3			

TABLE 4: ANALYTICAL RESULTS OF 2015 ARCTIC CISCO SAMPLING

				Sample ID	ACIS-2015-26				ACIS-2015-27				ACIS-2015-28				ACIS-2015-29				ACIS-2015-30			
				Sample Date	11/6/2015				11/6/2015				11/6/2015				11/6/2015				11/6/2015			
Basis (Wet / Dry)	Method	Compound	Units	% Detectable	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
Wet	SW6020A	Arsenic	mg/kg	100.0%	1.410	0.005	0.133		1.840	0.006	0.160		2.060	0.006	0.143		1.490	0.006	0.152		1.780	0.006	0.141	
Wet	SW6020A	Barium	mg/kg	100.0%	0.340	0.0013	0.0133		0.343	0.0016	0.0160		0.332	0.0014	0.0143		0.310	0.0015	0.0152		0.414	0.0014	0.0141	
Wet	SW6020A	Cadmium	mg/kg	100.0%	0.0048	0.0005	0.0053	J	0.0028	0.0006	0.0064	J	0.0035	0.0006	0.0057	J	0.0056	0.0006	0.0061	J	0.0039	0.0006	0.0056	J
Wet	SW6020A	Copper	mg/kg	100.0%	0.522	0.005	0.027		0.492	0.006	0.032		0.518	0.006	0.029		0.483	0.006	0.030		0.536	0.006	0.028	
Wet	SW6020A	Lead	mg/kg	100.0%	0.0020	0.00013	0.0053	J	0.0027	0.00016	0.0064	J	0.0046	0.00014	0.0057	J	0.0026	0.00015	0.0061	J	0.0019	0.00014	0.0056	J
Wet	SW6020A	Nickel	mg/kg	100.0%	0.063	0.005	0.053		0.086	0.006	0.064		0.306	0.006	0.057		0.109	0.006	0.061		0.220	0.006	0.056	
Wet	SW6020A	Vanadium	mg/kg	100.0%	0.032	0.002	0.053	J	0.041	0.002	0.064	J	0.041	0.002	0.057	J	0.023	0.002	0.061	J	0.039	0.002	0.056	J
Wet	SW6020A	Zinc	mg/kg	100.0%	12.5	0.016	0.133		12.1	0.019	0.160		13.2	0.017	0.143		13.6	0.018	0.152		13.8	0.017	0.141	
Wet	SW7471	Mercury	mg/kg	100.0%	0.0063	0.0011	0.0057		0.0068	0.0014	0.0068		0.0072	0.0012	0.0060		0.0051	0.0013	0.0063	J	0.0053	0.0012	0.0059	J
Wet	SW7742	Selenium	mg/kg	100.0%	0.466	0.013	0.027		0.445	0.016	0.032		0.470	0.014	0.029		0.386	0.015	0.030		0.402	0.014	0.028	
Wet	SW8270D-SIM	1-Methylnaphthalene	ug/kg	100.0%	0.49	0.32	4.8	J	0.52	0.32	4.9	J	0.55	0.32	5.0	J	0.63	0.32	4.9	J	0.60	0.32	4.8	J
Wet	SW8270D-SIM	1-Methylphenanthrene	ug/kg	0.0%	ND	0.28	4.8		ND	0.28	4.9		ND	0.28	5.0		ND	0.28	4.9		ND	0.28	4.8	
Wet	SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	10.0%	ND	0.36	4.8		ND	0.36	4.9		ND	0.36	5.0		ND	0.36	4.9		ND	0.36	4.8	
Wet	SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	63.3%	ND	0.37	4.8		0.41	0.37	4.9	J	ND	0.37	5.0		0.45	0.37	4.9	J	0.46	0.37	4.8	J
Wet	SW8270D-SIM	2-Methylnaphthalene	ug/kg	100.0%	0.64	0.38	4.8	J	0.69	0.38	4.9	J	0.66	0.38	5.0	J	0.79	0.38	4.9	J	0.74	0.38	4.8	J
Wet	SW8270D-SIM	Acenaphthene	ug/kg	6.7%	ND	0.51	4.8		ND	0.51	4.9		ND	0.51	5.0		ND	0.51	4.9		ND	0.51	4.8	
Wet	SW8270D-SIM	Acenaphthylene	ug/kg	0.0%	ND	0.28	4.8		ND	0.28	4.9		ND	0.28	5.0		ND	0.28	4.9		ND	0.28	4.8	
Wet	SW8270D-SIM	Anthracene	ug/kg	3.3%	ND	0.18	4.8		ND	0.18	4.9		ND	0.18	5.0		ND	0.18	4.9		ND	0.18	4.8	
Wet	SW8270D-SIM	Benzo(a)anthracene	ug/kg	90.0%	0.82	0.30	4.8	J	0.81	0.30	4.9	J	0.64	0.30	5.0	J	0.64	0.30	4.9	J	0.63	0.30	4.8	J
Wet	SW8270D-SIM	Benzo(a)pyrene	ug/kg	3.3%	ND	0.40	4.8		ND	0.40	4.9		ND	0.40	5.0		ND	0.40	4.9		ND	0.40	4.8	
Wet	SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	3.3%	ND	0.36	4.8		ND	0.36	4.9		ND	0.36	5.0		ND	0.36	4.9		ND	0.36	4.8	
Wet	SW8270D-SIM	Benzo(e)pyrene	ug/kg	0.0%	ND	0.37	4.8		ND	0.37	4.9		ND	0.37	5.0		ND	0.37	4.9		ND	0.37	4.8	
Wet	SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	0.0%	ND	0.48	4.8		ND	0.48	4.9		ND	0.48	5.0		ND	0.48	4.9		ND	0.48	4.8	
Wet	SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	3.3%	ND	0.24	4.8		ND	0.24	4.9		ND	0.24	5.0		ND	0.24	4.9		ND	0.24	4.8	
Wet	SW8270D-SIM	Biphenyl	ug/kg	83.3%	ND	0.32	4.8		0.38	0.32	4.9	J	0.33	0.32	5.0	J	0.53	0.32	4.9	J	0.52	0.32	4.8	J
Wet	SW8270D-SIM	Carbazole	ug/kg	0.0%	ND	0.38	4.8		ND	0.38	4.9		ND	0.38	5.0		ND	0.38	4.9		ND	0.38	4.8	
Wet	SW8270D-SIM	Chrysene	ug/kg	3.3%	ND	0.25	4.8		ND	0.25	4.9		ND	0.25	5.0		ND	0.25	4.9		ND	0.25	4.8	
Wet	SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	0.0%	ND	0.47	4.8		ND	0.47	4.9		ND	0.47	5.0		ND	0.47	4.9		ND	0.47	4.8	
Wet	SW8270D-SIM	Dibenzofuran	ug/kg	100.0%	0.45	0.24	4.8	J	0.47	0.24	4.9	J	0.46	0.24	5.0	J	0.57	0.24	4.9	J	0.52	0.24	4.8	J
Wet	SW8270D-SIM	Dibenzothiophene	ug/kg	6.7%	ND	0.20	4.8		ND	0.20	4.9		ND	0.20	5.0		ND	0.20	4.9		ND	0.20	4.8	
Wet	SW8270D-SIM	Fluoranthene	ug/kg	20.0%	0.41	0.32	4.8	J	ND	0.32	4.9		ND	0.32	5.0		ND	0.32	4.9		ND	0.32	4.8	
Wet	SW8270D-SIM	Fluorene	ug/kg	100.0%	1.0	0.29	4.8	J	1.3	0.29	4.9	J	0.95	0.29	5.0	J	0.98	0.29	4.9	J	1.2	0.29	4.8	J
Wet	SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	0.0%	ND	0.48	4.8		ND	0.48	4.9		ND	0.48	5.0		ND	0.48	4.9		ND	0.48	4.8	
Wet	SW8270D-SIM	Naphthalene	ug/kg	100.0%	0.88	0.23	4.8	J	0.98	0.23	4.9	J	0.94	0.23	5.0	J	1.1	0.23	4.9	J	1.0	0.23	4.8	J
Wet	SW8270D-SIM	Perylene	ug/kg	0.0%	ND	0.37	4.8		ND	0.37	4.9		ND	0.37	5.0		ND	0.37	4.9		ND	0.37	4.8	
Wet	SW8270D-SIM	Phenanthrene	ug/kg	100.0%	1.1	0.12	4.8	J	1.0	0.12	4.9	J	0.81	0.12	5.0	J	1.3	0.12	4.9	J	1.1	0.12	4.8	J
Wet	SW8270D-SIM	Pyrene	ug/kg	20.0%	0.29	0.17	4.8	J	ND	0.17	4.9		ND	0.17	5.0		ND	0.17	4.9		0.25	0.17	4.8	J
Wet	ZFZDRY	Total solids	percent	100.0%	29.1				33.9				30.2				31.9				29.4			

TABLE 5: ANALYTICAL RESULTS OF 2014 CARIBOU TISSUE SAMPLING

		Animal ID	RANG-2014-01								RANG-2014-02								RANG-2014-03							
		Sample ID	RANG-2014-01-LA				RANG-2014-01-MA				RANG-2014-02-LA				RANG-2014-02-MA				RANG-2014-03-LA				RANG-2014-03-MA			
		Sample Date	7/14/2014				7/14/2014				7/14/2014				7/14/2014				7/15/2014				7/15/2014			
		Age	9				9				9				9				8				8			
Method	Compound	Units	Result	MDL	MMRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
SW6020	Arsenic	mg/kg	ND	0.006	0.142		ND	0.005	0.131		ND	0.006	0.147		ND	0.005	0.128		ND	0.006	0.143		ND	0.005	0.130	
SW6020	Barium	mg/kg	0.0418	0.0014	0.0142		0.0224	0.0013	0.0131		0.0358	0.0015	0.0147		0.0228	0.0013	0.0128		0.0494	0.0014	0.0143		0.0263	0.0013	0.0130	
SW6020	Cadmium	mg/kg	0.705	0.0006	0.0057		0.0029	0.0005	0.0052	J	0.845	0.0006	0.0059		0.0022	0.0005	0.0051	J	0.345	0.0006	0.0057		0.0027	0.0005	0.0052	J
SW6020	Copper	mg/kg	9.5	0.006	0.028		3.5	0.005	0.026		10.7	0.006	0.029		2.5	0.005	0.026		3.7	0.006	0.029		2.8	0.005	0.026	
SW6020	Lead	mg/kg	0.0177	0.00014	0.0057		0.0015	0.00013	0.0052	J	0.0135	0.00015	0.0059		0.0013	0.00013	0.0051	J	0.0124	0.00014	0.0057		0.0012	0.00013	0.0052	J
SW6020	Nickel	mg/kg	0.172	0.006	0.057		0.159	0.005	0.052		0.209	0.006	0.059		0.098	0.005	0.051		0.087	0.006	0.057		0.145	0.005	0.052	
SW6020	Vanadium	mg/kg	ND	0.002	0.057		ND	0.002	0.052		ND	0.002	0.059		ND	0.002	0.051		ND	0.002	0.057		0.003	0.002	0.052	J
SW6020	Zinc	mg/kg	28.3	0.017	0.142		24.3	0.016	0.131		30.5	0.018	0.147		23.9	0.015	0.128		28.0	0.017	0.143		25.2	0.016	0.130	
SW7471B	Mercury	mg/kg	0.030	0.001	0.006		ND	0.001	0.005		0.015	0.001	0.006		0.002	0.001	0.005	J	0.021	0.001	0.006		0.002	0.001	0.005	J
SW7742	Selenium	mg/kg	0.144	0.014	0.057		0.119	0.013	0.052		0.192	0.015	0.059		0.088	0.013	0.051		0.173	0.014	0.057		0.083	0.013	0.052	
SW8270D-SIM	2-Methylnaphthalene	ug/kg	ND	1.2	4.9		ND	1.2	5.0		ND	1.1	4.6		ND	1.2	4.9		ND	1.2	5.0		ND	1.2	4.8	
SW8270D-SIM	Acenaphthene	ug/kg	ND	0.46	4.9		ND	0.47	5.0		ND	0.62	4.6	UJ	ND	0.46	4.9		ND	0.61	5.0	UJ	ND	0.46	4.8	
SW8270D-SIM	Acenaphthylene	ug/kg	ND	0.45	4.9		ND	0.46	5.0		ND	0.43	4.6		ND	0.45	4.9		ND	0.46	5.0		ND	0.45	4.8	
SW8270D-SIM	Anthracene	ug/kg	ND	0.37	4.9		ND	0.38	5.0		ND	0.35	4.6		ND	0.37	4.9		ND	0.38	5.0		ND	0.37	4.8	
SW8270D-SIM	Benzo(a)anthracene	ug/kg	0.42	0.37	4.9	J	1.0	0.38	5.0	J	0.49	0.35	4.6	J	0.57	0.37	4.9	J	0.43	0.38	5.0	J	0.47	0.37	4.8	J
SW8270D-SIM	Benzo(a)pyrene	ug/kg	ND	6.1	6.1	UJ	ND	1.4	5.0	UJ	ND	6.3	6.3	UJ	ND	1.4	4.9	UJ	ND	3.0	5.0	UJ	ND	1.4	4.8	UJ
SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	ND	0.64	4.9		ND	0.66	5.0		ND	0.61	4.6		ND	0.65	4.9		ND	0.66	5.0		ND	0.64	4.8	
SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	ND	0.92	4.9		ND	0.95	5.0		ND	0.88	4.6		ND	2.0	4.9	UJ	ND	0.94	5.0		ND	0.92	4.8	
SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	ND	0.55	4.9		ND	0.57	5.0		ND	0.53	4.6		ND	0.56	4.9		ND	0.57	5.0		ND	0.55	4.8	
SW8270D-SIM	Chrysene	ug/kg	ND	0.53	4.9		0.68	0.55	5.0	J	ND	0.51	4.6		ND	0.54	4.9		ND	0.55	5.0		ND	0.53	4.8	
SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	ND	0.83	4.9		ND	0.86	5.0		ND	0.79	4.6		ND	0.84	4.9		ND	0.86	5.0		ND	0.83	4.8	
SW8270D-SIM	Dibenzofuran	ug/kg	ND	0.44	4.9		ND	0.45	5.0		ND	0.42	4.6		ND	0.44	4.9		ND	0.45	5.0		ND	0.44	4.8	
SW8270D-SIM	Fluoranthene	ug/kg	ND	0.48	4.9		0.50	0.49	5.0	J	ND	1.4	4.6	UJ	ND	0.48	4.9		ND	0.49	5.0		ND	0.47	4.8	
SW8270D-SIM	Fluorene	ug/kg	ND	0.51	4.9		ND	0.52	5.0		0.92	0.48	4.6	J	ND	0.51	4.9		0.54	0.52	5.0	J	ND	0.50	4.8	
SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	ND	0.93	4.9		ND	0.96	5.0		ND	0.88	4.6		ND	0.94	4.9		ND	0.95	5.0		ND	0.93	4.8	
SW8270D-SIM	Naphthalene	ug/kg	ND	1.5	4.9		ND	1.5	5.0		ND	1.4	4.6		ND	1.5	4.9		ND	1.5	5.0		ND	1.5	4.8	
SW8270D-SIM	Phenanthrene	ug/kg	ND	0.64	4.9		1.1	0.66	5.0	J	ND	0.61	4.6		ND	0.65	4.9		ND	0.66	5.0		ND	0.64	4.8	
SW8270D-SIM	Pyrene	ug/kg	ND	0.49	4.9		0.72	0.50	5.0	J	ND	0.46	4.6		ND	0.49	4.9		ND	0.50	5.0		ND	0.48	4.8	
ZFZDRY	Total solids	percent	28.4				26.1				29.7				25.8				28.8				26.0			

TABLE 5: ANALYTICAL RESULTS OF 2014 CARIBOU TISSUE SAMPLING

		Animal ID	RANG-2014-04								RANG-2014-05							
		Sample ID	RANG-2014-04-LA				RANG-2014-04-MA				RANG-2014-05-LA				RANG-2014-05-MA			
		Sample Date	7/15/2014				7/15/2014				7/16/2014				7/16/2014			
		Age	10				10				5				5			
Method	Compound	Units	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
SW6020	Arsenic	mg/kg	ND	0.006	0.157		ND	0.005	0.130		ND	0.006	0.158		0.006	0.005	0.132	J
SW6020	Barium	mg/kg	0.0515	0.0016	0.0157		0.0258	0.0013	0.0130		0.0449	0.0016	0.0158		0.0241	0.0013	0.0132	
SW6020	Cadmium	mg/kg	0.930	0.0006	0.0063		0.0027	0.0005	0.0052	J	0.668	0.0006	0.0063		0.0044	0.0005	0.0053	J
SW6020	Copper	mg/kg	14.0	0.006	0.031		2.9	0.005	0.026		13.0	0.006	0.032		2.8	0.005	0.026	
SW6020	Lead	mg/kg	0.0203	0.00016	0.0063		0.00044	0.00013	0.0052	J	0.0156	0.00016	0.0063		0.0013	0.00013	0.0053	J
SW6020	Nickel	mg/kg	0.103	0.006	0.063		0.140	0.005	0.052		0.170	0.006	0.063		0.190	0.005	0.053	
SW6020	Vanadium	mg/kg	ND	0.002	0.063		ND	0.002	0.052		0.002	0.002	0.063	J	ND	0.002	0.053	
SW6020	Zinc	mg/kg	31.7	0.019	0.157		23.3	0.016	0.130		33.3	0.019	0.158		24.4	0.016	0.132	
SW7471B	Mercury	mg/kg	0.010	0.001	0.006		0.001	0.001	0.005	J	0.022	0.001	0.006		0.017	0.001	0.005	
SW7742	Selenium	mg/kg	0.255	0.016	0.063		0.123	0.013	0.052		0.143	0.016	0.063		0.102	0.013	0.053	
SW8270D-SIM	2-Methylnaphthalene	ug/kg	ND	1.2	4.8		ND	1.2	4.9		ND	1.2	4.9		ND	1.2	5.0	
SW8270D-SIM	Acenaphthene	ug/kg	ND	0.45	4.8		ND	0.46	4.9		ND	0.46	4.9		ND	0.47	5.0	
SW8270D-SIM	Acenaphthylene	ug/kg	ND	0.44	4.8		ND	0.45	4.9		ND	0.46	4.9		ND	0.46	5.0	
SW8270D-SIM	Anthracene	ug/kg	ND	0.37	4.8		ND	0.37	4.9		ND	0.38	4.9		ND	0.38	5.0	
SW8270D-SIM	Benzo(a)anthracene	ug/kg	0.40	0.37	4.8	J	0.55	0.37	4.9	J	0.62	0.38	4.9	J	0.51	0.38	5.0	J
SW8270D-SIM	Benzo(a)pyrene	ug/kg	ND	5.0	5.0	UJ	ND	2.0	4.9	UJ	ND	3.6	4.9	UJ	ND	2.1	5.0	UJ
SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	ND	0.63	4.8		ND	0.65	4.9		ND	0.65	4.9		ND	0.66	5.0	
SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	ND	0.91	4.8		ND	0.93	4.9		ND	0.93	4.9		ND	0.95	5.0	
SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	ND	0.55	4.8		ND	0.56	4.9		ND	0.56	4.9		ND	0.57	5.0	
SW8270D-SIM	Chrysene	ug/kg	ND	0.53	4.8		ND	0.54	4.9		ND	0.54	4.9		ND	0.55	5.0	
SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	ND	0.82	4.8		ND	0.84	4.9		ND	0.85	4.9		ND	0.86	5.0	
SW8270D-SIM	Dibenzofuran	ug/kg	ND	0.43	4.8		ND	0.44	4.9		ND	0.45	4.9		ND	0.45	5.0	
SW8270D-SIM	Fluoranthene	ug/kg	ND	0.47	4.8		ND	0.48	4.9		ND	0.48	4.9		ND	0.49	5.0	
SW8270D-SIM	Fluorene	ug/kg	ND	0.50	4.8		0.58	0.51	4.9	J	ND	0.51	4.9		0.55	0.52	5.0	J
SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	ND	0.92	4.8		ND	0.94	4.9		ND	0.94	4.9		ND	0.96	5.0	
SW8270D-SIM	Naphthalene	ug/kg	ND	1.5	4.8		ND	1.5	4.9		ND	1.5	4.9		ND	1.5	5.0	
SW8270D-SIM	Phenanthrene	ug/kg	ND	0.63	4.8		ND	0.65	4.9		ND	0.65	4.9		ND	0.66	5.0	
SW8270D-SIM	Pyrene	ug/kg	ND	0.48	4.8		ND	0.49	4.9		ND	0.49	4.9		ND	0.50	5.0	
ZFZDRY	Total solids	percent	31.8				26.2				31.9				26.4			

TABLE 6: ANALYTICAL RESULTS OF 2015 CARIBOU SAMPLING

				Animal ID	RANG-2015-01				RANG-2015-02								RANG-2015-03							
				Sample Date	8/13/2015				8/17/2015								8/17/2015							
				Age	3				1								1							
				Sample ID	RANG-2015-01-LA				RANG-2015-02-LA				RANG-2015-02-MA				RANG-2015-03-LA				RANG-2015-03-MA			
Basis (Wet / Dry)	Method	Compound	Units	% Detectable	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
Wet	SW6020A	Arsenic	mg/kg	83.3%	ND	0.006	0.147		0.012	0.006	0.147	J	0.012	0.005	0.119	J	0.011	0.006	0.142	J	0.006	0.005	0.118	J
Wet	SW6020A	Barium	mg/kg	100.0%	0.0424	0.0015	0.0147		0.0531	0.0015	0.0147		0.0259	0.0012	0.0119		0.0889	0.0014	0.0142		0.0258	0.0012	0.0118	
Wet	SW6020A	Cadmium	mg/kg	100.0%	0.243	0.0012	0.0059		0.102	0.0012	0.0059		0.0010	0.0010	0.0048	J	0.277	0.0011	0.0057		0.0011	0.0009	0.0047	J
Wet	SW6020A	Copper	mg/kg	100.0%	14.9	0.006	0.029		6.760	0.006	0.029		3.460	0.005	0.024		5.870	0.006	0.028		3.060	0.005	0.024	
Wet	SW6020A	Lead	mg/kg	100.0%	0.0181	0.00015	0.0059		0.0094	0.00015	0.0059		0.0020	0.00012	0.0048	J	0.0084	0.00014	0.0057		0.0024	0.00012	0.0047	J
Wet	SW6020A	Nickel	mg/kg	100.0%	0.252	0.006	0.059		0.971	0.006	0.059		0.113	0.005	0.048		0.028	0.006	0.057	J	0.341	0.005	0.047	
Wet	SW6020A	Vanadium	mg/kg	33.3%	ND	0.002	0.059		0.004	0.002	0.059	J	ND	0.002	0.048		0.002	0.002	0.057	J	ND	0.002	0.047	
Wet	SW6020A	Zinc	mg/kg	100.0%	26.3	0.018	0.147		24.6	0.018	0.147		28.8	0.014	0.119		43.5	0.017	0.142		22.8	0.014	0.118	
Wet	SW7471	Mercury	mg/kg	66.7%	0.0531	0.0012	0.0061		0.0574	0.0012	0.0060		ND	0.0010	0.0052		0.0430	0.0012	0.0061		ND	0.0010	0.0049	
Wet	SW7742	Selenium	mg/kg	100.0%	0.355	0.015	0.029		0.423	0.015	0.029		0.138	0.012	0.024		0.415	0.014	0.028		0.103	0.012	0.024	
Wet	SW8270D-SIM	1-Methylnaphthalene	ug/kg	0.0%	ND	2.2	10		ND	2.2	9.8		ND	0.55	2.5		ND	2.2	9.6		ND	0.55	2.4	
Wet	SW8270D-SIM	1-Methylphenanthrene	ug/kg	0.0%	ND	710	710	UJ	ND	720	720	UJ	ND	44	44	UJ	ND	620	620	UJ	ND	33	33	UJ
Wet	SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	0.0%	ND	1.1	10		ND	1.1	9.8		ND	0.27	2.5		ND	1.1	9.6		ND	0.27	2.4	
Wet	SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	0.0%	ND	0.92	10		ND	0.92	9.8		ND	0.23	2.5		ND	0.92	9.6		ND	0.23	2.4	
Wet	SW8270D-SIM	2-Methylnaphthalene	ug/kg	0.0%	ND	2.4	20		ND	2.4	20		ND	0.60	5.0		ND	2.4	20		ND	0.60	4.8	
Wet	SW8270D-SIM	Acenaphthene	ug/kg	0.0%	ND	0.94	10		ND	0.94	9.8		ND	0.24	2.5		ND	0.94	9.6		ND	0.24	2.4	
Wet	SW8270D-SIM	Acenaphthylene	ug/kg	0.0%	ND	0.92	10		ND	0.92	9.8		ND	0.23	2.5		ND	0.92	9.6		ND	0.23	2.4	
Wet	SW8270D-SIM	Anthracene	ug/kg	16.7%	ND	0.76	10		19	0.76	9.8	J	ND	0.19	2.5		ND	0.76	9.6		ND	0.19	2.4	
Wet	SW8270D-SIM	Benzo(a)anthracene	ug/kg	0.0%	ND	0.76	10		ND	0.76	9.8		ND	0.19	2.5		ND	0.76	9.6		ND	0.19	2.4	
Wet	SW8270D-SIM	Benzo(a)pyrene	ug/kg	0.0%	ND	1.5	10		ND	1.5	9.8		ND	0.37	2.5		ND	1.5	9.6		ND	0.37	2.4	
Wet	SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	0.0%	ND	1.4	10		ND	1.4	9.8		ND	0.33	2.5		ND	1.4	9.6		ND	0.33	2.4	
Wet	SW8270D-SIM	Benzo(e)pyrene	ug/kg	0.0%	ND	1.0	10		ND	1.0	9.8		ND	0.25	2.5		ND	1.0	9.6		ND	0.25	2.4	
Wet	SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	0.0%	ND	1.9	10		ND	1.9	9.8		ND	0.48	2.5		ND	1.9	9.6		ND	0.48	2.4	
Wet	SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	0.0%	ND	1.2	10		ND	1.2	9.8		ND	0.29	2.5		ND	1.2	9.6		ND	0.29	2.4	
Wet	SW8270D-SIM	Biphenyl	ug/kg	0.0%	ND	1.8	10		ND	1.8	9.8		ND	0.44	2.5		ND	1.8	9.6		ND	0.44	2.4	
Wet	SW8270D-SIM	Carbazole	ug/kg	33.3%	ND	1.1	10		42	1.1	9.8	J	ND	0.27	2.5		26	1.1	9.6	J	ND	0.27	2.4	
Wet	SW8270D-SIM	Chrysene	ug/kg	0.0%	ND	1.1	10		ND	1.1	9.8		ND	0.28	2.5		ND	1.1	9.6		ND	0.28	2.4	
Wet	SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	0.0%	ND	1.8	10		ND	1.8	9.8		ND	0.43	2.5		ND	1.8	9.6		ND	0.43	2.4	
Wet	SW8270D-SIM	Dibenzofuran	ug/kg	0.0%	ND	0.90	10		ND	0.90	9.8		ND	0.23	2.5		ND	0.90	9.6		ND	0.23	2.4	
Wet	SW8270D-SIM	Dibenzothiophene	ug/kg	0.0%	ND	1.8	10		ND	1.8	9.8		ND	0.43	2.5		ND	1.8	9.6		ND	0.43	2.4	
Wet	SW8270D-SIM	Fluoranthene	ug/kg	0.0%	ND	0.98	10		ND	0.98	9.8		ND	0.25	2.5		ND	0.98	9.6		ND	0.25	2.4	
Wet	SW8270D-SIM	Fluorene	ug/kg	0.0%	ND	1.1	10		ND	1.1	9.8		ND	0.26	2.5		ND	1.1	9.6		ND	0.26	2.4	
Wet	SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	0.0%	ND	2.0	10		ND	2.0	9.8		ND	0.48	2.5		ND	2.0	9.6		ND	0.48	2.4	
Wet	SW8270D-SIM	Naphthalene	ug/kg	0.0%	ND	3.0	20		ND	3.0	20		ND	0.75	5.0		ND	3.0	20		ND	0.75	4.8	
Wet	SW8270D-SIM	Perylene	ug/kg	0.0%	ND	2.4	10		ND	2.4	9.8		ND	0.60	2.5		ND	2.4	9.6		ND	0.60	2.4	
Wet	SW8270D-SIM	Phenanthrene	ug/kg	0.0%	ND	1.4	10		ND	1.4	9.8		ND	0.33	2.5		ND	1.4	9.6		ND	0.33	2.4	
Wet	SW8270D-SIM	Pyrene	ug/kg	0.0%	ND	1.0	10		ND	1.0	9.8		ND	0.25	2.5		ND	1.0	9.6		ND	0.25	2.4	
Wet	ZFZDRY	Total solids	percent	100.0%	30.7				30.2				26.3				30.8				24.7			

TABLE 6: ANALYTICAL RESULTS OF 2015 CARIBOU SAMPLING

				Animal ID	RANG-2015-04							
				Sample Date	8/17/2015							
				Age	5							
				Sample ID	RANG-2015-04-LA				RANG-2015-04-MA			
Basis (Wet / Dry)	Method	Compound	Units	% Detectable	Result	MDL	MRL	ERM Flag	Result	MDL	MRL	ERM Flag
Wet	SW6020A	Arsenic	mg/kg	83.3%	0.009	0.005	0.127	J	0.009	0.005	0.120	J
Wet	SW6020A	Barium	mg/kg	100.0%	0.0602	0.0013	0.0127		0.0327	0.0012	0.0120	
Wet	SW6020A	Cadmium	mg/kg	100.0%	0.321	0.0010	0.0051		0.0016	0.0010	0.0048	J
Wet	SW6020A	Copper	mg/kg	100.0%	4.280	0.005	0.025		2.630	0.005	0.024	
Wet	SW6020A	Lead	mg/kg	100.0%	0.0430	0.00013	0.0051		0.0016	0.00012	0.0048	J
Wet	SW6020A	Nickel	mg/kg	100.0%	0.021	0.005	0.051	J	0.200	0.005	0.048	
Wet	SW6020A	Vanadium	mg/kg	33.3%	ND	0.002	0.051		ND	0.002	0.048	
Wet	SW6020A	Zinc	mg/kg	100.0%	25.7	0.015	0.127		25.2	0.014	0.120	
Wet	SW7471	Mercury	mg/kg	66.7%	0.0225	0.0011	0.0055		ND	0.0010	0.0051	
Wet	SW7742	Selenium	mg/kg	100.0%	0.340	0.013	0.025		0.119	0.012	0.024	
Wet	SW8270D-SIM	1-Methylnaphthalene	ug/kg	0.0%	ND	2.2	9.9		0.19	0.13	0.55	J
Wet	SW8270D-SIM	1-Methylphenanthrene	ug/kg	0.0%	ND	1300	1300	UJ	ND	0.043	0.55	
Wet	SW8270D-SIM	2,3,5-Trimethylnaphthalene	ug/kg	0.0%	ND	1.1	9.9		ND	0.059	0.55	
Wet	SW8270D-SIM	2,6-Dimethylnapthalene	ug/kg	0.0%	ND	0.92	9.9		0.066	0.051	0.55	J
Wet	SW8270D-SIM	2-Methylnaphthalene	ug/kg	0.0%	ND	2.4	20		0.25	0.14	1.1	J
Wet	SW8270D-SIM	Acenaphthene	ug/kg	0.0%	ND	0.94	9.9		0.12	0.052	0.55	J
Wet	SW8270D-SIM	Acenaphthylene	ug/kg	0.0%	ND	0.92	9.9		ND	0.051	0.55	
Wet	SW8270D-SIM	Anthracene	ug/kg	16.7%	ND	0.76	9.9		0.048	0.042	0.55	J
Wet	SW8270D-SIM	Benzo(a)anthracene	ug/kg	0.0%	ND	0.76	9.9		ND	0.042	0.55	
Wet	SW8270D-SIM	Benzo(a)pyrene	ug/kg	0.0%	ND	1.5	9.9		ND	0.080	0.55	
Wet	SW8270D-SIM	Benzo(b)fluoranthene	ug/kg	0.0%	ND	1.4	9.9		ND	0.073	0.55	
Wet	SW8270D-SIM	Benzo(e)pyrene	ug/kg	0.0%	ND	1.0	9.9		ND	0.055	0.55	
Wet	SW8270D-SIM	Benzo(g,h,i)perylene	ug/kg	0.0%	ND	1.9	9.9		ND	0.11	0.55	
Wet	SW8270D-SIM	Benzo(k)fluoranthene	ug/kg	0.0%	ND	1.2	9.9		ND	0.063	0.55	
Wet	SW8270D-SIM	Biphenyl	ug/kg	0.0%	ND	1.8	9.9		0.32	0.096	0.55	J
Wet	SW8270D-SIM	Carbazole	ug/kg	33.3%	ND	1.1	9.9		ND	0.071	0.55	UJ
Wet	SW8270D-SIM	Chrysene	ug/kg	0.0%	ND	1.1	9.9		ND	0.061	0.55	
Wet	SW8270D-SIM	Dibenzo(a,h)anthracene	ug/kg	0.0%	ND	1.8	9.9		ND	0.095	0.55	
Wet	SW8270D-SIM	Dibenzofuran	ug/kg	0.0%	ND	0.90	9.9		0.053	0.050	0.55	J
Wet	SW8270D-SIM	Dibenzothiophene	ug/kg	0.0%	ND	1.8	9.9		ND	0.095	0.55	
Wet	SW8270D-SIM	Fluoranthene	ug/kg	0.0%	ND	0.98	9.9		ND	0.15	0.55	UJ
Wet	SW8270D-SIM	Fluorene	ug/kg	0.0%	ND	1.1	9.9		0.22	0.057	0.55	J
Wet	SW8270D-SIM	Indeno(1,2,3-cd)pyrene	ug/kg	0.0%	ND	2.0	9.9		ND	0.11	0.55	
Wet	SW8270D-SIM	Naphthalene	ug/kg	0.0%	ND	3.0	20		0.42	0.17	1.1	J
Wet	SW8270D-SIM	Perylene	ug/kg	0.0%	ND	2.4	9.9		ND	0.14	0.55	
Wet	SW8270D-SIM	Phenanthrene	ug/kg	0.0%	ND	1.4	9.9		0.14	0.073	0.55	J
Wet	SW8270D-SIM	Pyrene	ug/kg	0.0%	ND	1.0	9.9		ND	0.055	0.55	
Wet	ZFZDRY	Total solids	percent	100.0%	27.6				25.6			

APPENDIX B

Tuttu and Qaaqtaq Panel Meeting Notes

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Nuiqust Tuttu & Qaaktaq Panels/CPAI/ERM Meeting

Subsistence Foods Monitoring Study

February 13, 2014

Nuiqsut Community Center

In attendance:

Nuiqsut: See Sign-In Sheet (attached)

CPAI: Caryn Rea, Charlie Kovalsky

ERM: John O'Brien, Leslie Davis

Summary of main action items discussed:

George Sielab – Read "Silent Snow" and realized Arctic is not a pristine environment. He would like to see a breakdown of chemicals, where they come from, local/global sources. There are concerns that arctic haze is coming from Prudhoe Bay, local sources.

- ERM will include in workshop

Question was raised about chemicals associated with fracking. There are concerns about leaving those chemicals out.

- CPAI will talk with drilling operations to make sure no contaminants are left out that could be associated with drilling/fracking.

Concerns raised about air quality data.

- ERM/CPAI will obtain reports and include in discussions of reports.

Sam Kunaknana – Concerned about the QC/QA of just using one lab. Suggested using 2 labs.

Concerns raised to whether samples would actually be collected from the locations reported. Suggested having local observers during sample collection. Would like to see verification from locals that samples were collected where scientist say in addition to just photos.

- Include videos (for verification and training purposes) and possibly have a local observer sign and date field book/datasheet.

Plant sampling suggestions:

Recommendations from the audience on plants to collect include salmonberries and lichen (lichen because it's a caribou forage; not used as a subsistence food).

Caribou / animal sampling suggestions:

Audience requested that some sort of payment should be given for hunters involvement.

- O'Brien confirmed that a payment will be worked out by CPAI and hunters.

Audience requested that caribou sampling should be done on the hunter's terms (dates/locations)
- All parties agreed that this is the intention, however some samples need to be collected in certain units (Bear Tooth, for example)

Eli (can't read last name) suggested that the study includes animals that are year-round residents, like ptarmigan or ground squirrels.
- Caryn and John re-iterated that this is year 1 of a long term study, and changes can be incorporated as the study progresses. Ptarmigan was acknowledged as a good option.

Fish Sampling Suggestions:

Audience gave mixed comments as to what fish they would like to be sampled other than those presented. In the fall Arctic Char and Dolly Varden were suggested. Burbot in the Spring. No response when asked about Grayling or the large catch last fall.

Additional concerns:

Audience had concerns of not using data collected over the past decade from the Alpine area (areas east of Nuiqsut)
- Caryn stated that SEIS will be coming out in a few weeks and should include monitoring data, baselines and trends over the last 10 years.

Audience was concerned that study results will come out after 2015 exploration and development , CD-5 was referenced.
- Caryn re-iterated that this study is related to CD-1, not CD-5

Archie Ahkiviana and Edward Nukapigak mentioned that they helped bury and burn over 60 drums up a Colville tributary and other tributaries in 1978-1979. Worked with Arctic Seal /Husky One

SUBSISTENCE FOODS STUDY 2.13.14

SIGN-IN SHEET

NAME	AFFILIATION	CONTACT INFO
Martha Itta	Tribal Administrator	480-3010
Eli Nukapigak		
Sam Kagak		
Thomas M Nukapigak	NVN.	
Edward Nukapigak Jr		
Jonah Nukapigak		
Tony Cabinboy		
James Taalak	City of Nuiqsut	480 6727
Lottie M Ericksen	City of Nuiqsut	480-6727
FRANK OYAGAK		
Dwayne Hopson	KSOP	480-0287
Glenn Taalak		480-6029
George Sielak	NVN+Self	
[illegible]	Self	1 855 1680
James Kaveolook	NVN/self	480-0075

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APPENDIX C

Field Notes and Data Sheets

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SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : TRIP blANK – 2014 – 01
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ~~Broad~~ Broad Whitefish

* Renamed to EQUIPBLANK-2014-01 prior to sending to lab. (ED)

Date sampled: 7 – 13 – 2014

Sample Collectors: LD, JO

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: Nigliq Camp / ~~[illegible]~~

GPS Coordinates: See field notes

Name of Harvester: N/A

Approx Time of Harvest:

Harvest Method: ☐ Hook and Line ☑ Set Net ☐ Other *specify:*

Kill Method: N/A

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

N/A

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2014-01
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad white Fish

Date sampled: 7-13-2014

Sample Collectors: LD, JO

Time sampled: ~~1430~~ LD 1545

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig channel
b) River Mile and/or Camp: Niglig camp

GPS Coordinates: 70° 23' 15.888
151° 06' 05.410

Name of Harvester: [redacted]

Approx Time of Harvest: ~~1515~~ LD ~~1514~~ LD 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ________

Kill Method: blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm): ________ ________

Photo No. of Fish Specimen: ________

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF -2014-02
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7-13-2014

Sample Collectors: LD, JO

Time sampled: 1545

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Niglig Channel
b) River Mile and/or Camp: Niglig Camp

GPS Coordinates: SEE Logbook/Field NOTES

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2014-07
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7-13-2014

Sample Collectors: LD, JO

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig Channel
b) River Mile and/or Camp: Niglig Camp

GPS Coordinates: BDWF-2014-01 to BDWF-2014-20 All FROM SAME LOCATION (see Field notes)

Name of Harvester: [redacted]

Approx Time of Harvest: see datasheet of /ISIS

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: Blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2014-04
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7-13-2014

Sample Collectors: LD, JO

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq Channel

b) River Mile and/or Camp: " Camp

GPS Coordinates: See Field Notes

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: Blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y of N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF - 2014 - 05
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7 - 13 - 2014

Sample Collectors: LD , JO

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: " CAMP

GPS Coordinates: See Field notes

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: Blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF - 2014 - 06
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7 - 13 - 2014

Sample Collectors: LD, JO

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig Channel
b) River Mile and/or Camp: " Camp

GPS Coordinates: see Field Notes

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: Blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF - 2014 - 07

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7 - 13 - 2014

Sample Collectors: LD, JO

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: " Camp

GPS Coordinates: See Field Notes

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify: ______

Kill Method: Blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2014-08
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7-13-2014

Sample Collectors: LD, JO

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Niglig Channel

b) River Mile and/or Camp: " CAMP

GPS Coordinates: See Field Notes

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF - 2014 - 09

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7 - 13 - 2014

Sample Collectors: LD, JO

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq Channel

b) River Mile and/or Camp: " Camp

GPS Coordinates: See Field Notes

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: Blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good.

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF - 2014 - 10

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad Whitefish

Date sampled: 7 - 13 - 2014

Sample Collectors: LD, JO

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq Channel

b) River Mile and/or Camp: " CAMP

GPS Coordinates: See Field NOTES

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: Blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2014-11

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad Whitefish

Date sampled: 7 13 14

Sample Collectors: LD, JO

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:

a) Waterbody Name: Niglig Channel

b) River Mile and/or Camp: Niglig CAMP

GPS Coordinates: SEE Field NOTES

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

Fish slipped onto plastic wrap rather than remaining on foil

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2014-12
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7-13-2014

Sample Collectors: LD, JO

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: " Camp

GPS Coordinates: SEE Field Notes

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☑ Set Net ☐ Other *specify:*

Kill Method: blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2014-13

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7-13-2014

Sample Collectors: LD, Jo

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq Channel

b) River Mile and/or Camp: " Camp

GPS Coordinates: See field notes

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☑ Set Net ☐ Other *specify:*

Kill Method: Blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2014-14
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7-13-2014

Sample Collectors: LD, JO

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: " Camp

GPS Coordinates: See Field notes

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: Blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF - 2014-15

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7-13-2014

Sample Collectors: LD, JO

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: " CAMP

GPS Coordinates: See Field Notes

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: Blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2014-16

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7-13-2014

Sample Collectors: LD, JC

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:

a) Waterbody Name: Nigliq Channel

b) River Mile and/or Camp: " Camp

GPS Coordinates: See field Notes

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: Blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2014-17
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7-13-2014

Sample Collectors: LD , JC

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: " Camp

GPS Coordinates: See Field Notes

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: Blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2014-18
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7-13-2014

Sample Collectors: LD, JO

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: " CAmp

GPS Coordinates: See field notes

Name of Harvester: [redacted]

Approx Time of Harvest: 15:15

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: Blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2014-19

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad whitefish

Date sampled: 7-12-2014

Sample Collectors: LD, JC

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq Channel

b) River Mile and/or Camp: " Camp

GPS Coordinates: See Field notes

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: Blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF - 2014 - 20
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Broad Whitefish

Date sampled: 7-13-2014

Sample Collectors: LD, JO

Time sampled:

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: " CAMP

GPS Coordinates: See Field Notes

Name of Harvester: [redacted]

Approx Time of Harvest: 1515

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: Blow to head

If purchased, note how fish was handled prior to purchase:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Morphometrics

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Fork Length (mm):

Photo No. of Fish Specimen:

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-01
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad Whitefish

Date sampled: 8.11.15

Sample Collectors: LD CS

Time sampled: 1400

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Niglig Channel
b) River Mile and/or Camp:

GPS Coordinates: 70.236544 N 150.978361 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 1400

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: Head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

none

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID tag in photo

General condition of fish (external condition, tumors, lesions, etc.):

good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF 2015-02 Fish species (common name): Broad Whitefish

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Date sampled: 8.13.15 Sample Collectors: LD/CS

Time sampled: ~~15:25~~ 1325 *changed to match fish labels. Time of harvest still actually 1525.

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq Channel GPS Coordinates: 70.224678 N 150.990903 W

b) River Mile and/or Camp:

Name of Harvester: [redacted] 2 Approx Time of Harvest: ~~15:25~~ LD 15:25

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ________ Kill Method: ~~Blow~~ Head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: yes ID tag in photo

General condition of fish (external condition, tumors, lesions, etc.): ok

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain: No

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-03
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8.13.15

Sample Collectors: LD/CS

Time sampled: ~~15:25~~ 13:25 *see

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq Channel

b) River Mile and/or Camp: ——

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 15:25

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: Head Blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

none

Photo No. of harvest site/methods (if allowable): yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID on photo

General condition of fish (external condition, tumors, lesions, etc.): ok

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain: No

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF - 2015 - 04
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8.13.15

Sample Collectors: LD/CS

Time sampled: ~~15:25~~ 1325

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq Channel

b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 15:25

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify: ________

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

none

Photo No. of harvest site/methods (if allowable): yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): ok

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain: No

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-04
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8.13.15

Sample Collectors: LD/CS

Time sampled: ~~15:25~~ 1325*

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp:

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 15:25

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: Head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

none

Photo No. of harvest site/methods (if allowable): yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID on ~~tag~~ photo

General condition of fish (external condition, tumors, lesions, etc.): ok

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain: No

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-05
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad Whitefish

Date sampled: ~~8.15~~ 8.13.15

Sample Collectors: LD/CS

Time sampled: ~~15:25~~ 1325 *

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp:

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 15:25

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: Head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

none

Photo No. of harvest site/methods (if allowable): yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID on photo

General condition of fish (external condition, tumors, lesions, etc.): ok

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain: No

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-06
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broadwhitefish

Date sampled: 8/13/15

Sample Collectors: LD/CS

Time sampled: ~~15:25~~ 1325

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 15:25

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ____

Kill Method: Head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: Yes ID tag in photo

General condition of fish (external condition, tumors, lesions, etc.): OK

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain: NO

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-07
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broadwhitefish

Date sampled: 8/13/15

Sample Collectors: LD /CS

Time sampled: ~~15:25~~ 1325*

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 15:25

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: Head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: yes ID tag in photo

General condition of fish (external condition, tumors, lesions, etc.): ok

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

NO

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-08
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8/13/15

Sample Collectors: LD / CS

Time sampled: ~~15:25~~ 1325 *

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq channel
b) River Mile and/or Camp:

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 15:25

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: Head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: yes ID tag in photo

General condition of fish (external condition, tumors, lesions, etc.): ok

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

No

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-09
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8/13/15

Sample Collectors: LD / CS

Time sampled: ~~15:25~~ 1325 A

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig channel
b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 15:25

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*______

Kill Method: Head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: Yes ID tag in photo

General condition of fish (external condition, tumors, lesions, etc.):

ok

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

No

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-10
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8/13/15

Sample Collectors: LD / CS

Time sampled: ~~15:25~~ 1325 *

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig channel
b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 15:25

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ________

Kill Method: Head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: Yes ID tag in photo

General condition of fish (external condition, tumors, lesions, etc.):

ok

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

No

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : EQUIPBLANK-2015-01 Fish species (common name): N/A

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Date sampled: 8.11.15 Sample Collectors: LD / CS

Time sampled: /

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq Channel GPS Coordinates: 70.236544 N 150.978361 W

b) River Mile and/or Camp:

Name of Harvester: [redacted] 2 Approx Time of Harvest: N/A

Harvest Method: ☐ Hook and Line ☐ Set Net ☐ Other *specify:* Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

N/A

Photo No. of harvest site/methods (if allowable): N/A

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: N/A

General condition of fish (external condition, tumors, lesions, etc.): N/A

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

No –

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : EQUIP BLANK - 2015 - 02 Fish species (common name): ~~Bro~~ N/A
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Date sampled: 8.13.15 Sample Collectors: LD/CS

Time sampled: —

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq Channel GPS Coordinates: 70.224678 N 150.990903 W

b) River Mile and/or Camp: —

Name of Harvester: [redacted] 2 Approx Time of Harvest: N/A

Harvest Method: ☐ Hook and Line ☐ Set Net ☐ Other *specify:* ______ Kill Method: N/A

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

N/A

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: N/A

General condition of fish (external condition, tumors, lesions, etc.):

N/A

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

no

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF - 2015 - 11
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8/14/15

Sample Collectors: LD / CS

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Niglig channel

b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Fish jumped + dropped to bottom of boat - rinsed in water then continued w/ sampling protocol

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): ok

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF - 2015 - 12
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8/14/15

Sample Collectors: LD / CS

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig channel
b) River Mile and/or Camp: –

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify: ________

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): ok

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015 - 13
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8/14/15

Sample Collectors: LD / CS

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:

a) Waterbody Name: Niglig channel

b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*______

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

fish handled on deck bow to get at of net

Photo No. of harvest site/methods (if allowable): yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-14
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broadwhitefish

Date sampled: 8/14/15

Sample Collectors: LD / CS

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Niglig channel

b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ________

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015 -15
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8/14/15

Sample Collectors: LD / CS

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq channel

b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ________

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-16 Fish species (common name): Broad whitefish
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Date sampled: 8/14/15 Sample Collectors: LD / CS

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq channel GPS Coordinates: 70.224678 N 150.990903 W

b) River Mile and/or Camp: —

Name of Harvester: [redacted] 2 Approx Time of Harvest: 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*______ Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-17
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8/14/15

Sample Collectors: LD/CS

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Niglig channel

b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify: ________

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-18
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broadwhitefish

Date sampled: 8/14/15

Sample Collectors: LD /CS

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Niglig channel

b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ________

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-19
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad white fish

Date sampled: 8/14/15

Sample Collectors: LD / CS

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig channel
b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF - 2015 - 20
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8/14/15

Sample Collectors: LD / CS

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig channel
b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-21
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad white fish

Date sampled: 8/14/15

Sample Collectors: LD / CS

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Niglig channel

b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-22
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8/15/15

Sample Collectors: LD / CS

Time sampled: 16:45

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq channel
b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 16:45

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ________

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-23 Fish species (common name): Broadwhitefish
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Date sampled: 8/15/15 Sample Collectors: LD / CS

Time sampled: 16:45

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq channel GPS Coordinates: 70.224678 N 150.990903 W

b) River Mile and/or Camp: —

Name of Harvester: [redacted] 2 Approx Time of Harvest: 16:45

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ________ Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-24
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8/15/15

Sample Collectors: LD / CS

Time sampled: 16:45

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig channel
b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 16:45

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ________

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-25
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8/15/15

Sample Collectors: LD JCS

Time sampled: 16:45

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:

a) Waterbody Name: Nigliq channel

b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 16:45

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ________

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-26
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8/15/15

Sample Collectors: LD / CS

Time sampled: 16:45

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Niglig channel

b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 16:45

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF - 2015 - 27
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8/15/15

Sample Collectors: LD / CS

Time sampled: 16:45

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq channel
b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 16:45

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-78
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad white fish

Date sampled: 8/15/15

Sample Collectors: LD / CS

Time sampled: 16:45

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig channel
b) River Mile and/or Camp: –

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 16:45

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ________

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-29
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broadwhitefish

Date sampled: 8/15/15

Sample Collectors: LD / CS

Time sampled: 16:45

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq channel
b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 16:45

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify: ______

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : BDWF-2015-30
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Broad whitefish

Date sampled: 8/15/15

Sample Collectors: LD / CS

Time sampled: 16:45

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq channel
b) River Mile and/or Camp: —

GPS Coordinates: 70.224678 N 150.990903 W

Name of Harvester: [redacted] 2

Approx Time of Harvest: 16:45

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify: ________

Kill Method: head blow

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

None

Photo No. of harvest site/methods (if allowable): Yes

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ID in photo

General condition of fish (external condition, tumors, lesions, etc.): okay

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

Caribou/Tuttu Tissue Sampling - 2014 **Animal ID: RANG-2014-**01
(i.e., -01)

Date of Harvest (MM/DD/YY): 07-14-14

Time of Harvest (00:00): 1700

Harvest Location (common. name): Southeast of Helmricks

Lat: 70° 25' 27.486" **Long:** 150° 28' 44.808"

Herd name (CAH, TCH, UNK): Conflicting reports

Field Personnel: JO LD

Hunter(s) ID Number (##) (referenced in logbook): 01, 02, 03

Picture of caribou with ID label? Y / N Photo No. ______

Sex (circle): Male Female or ?

Lactating (circle): Yes No

Maturity class (circle): calf (<1yr) subadult adult

Antlered? (circle): Y / N **Antler** (circle): R +/or L **Velvet?** (circle): Y / N

SAMPLE IDENTIFICATION (complete sample labels)

Primary Liver ID (RANG–2014-##-L): RANG - 2014 - 01 - La

Time (00:00): ~~1530~~ LD 1930

Dup Liver Sample ID (RANG–2014-##-L): RANG - 2014 - 01 - Lb

Time (00:00): ~~1530~~ LD 1930

Primary Muscle Sample ID (RANG–2014-##-M): RANG - 2014 - 01 - Ma

Time (00:00): ~~1530~~ LD 1930

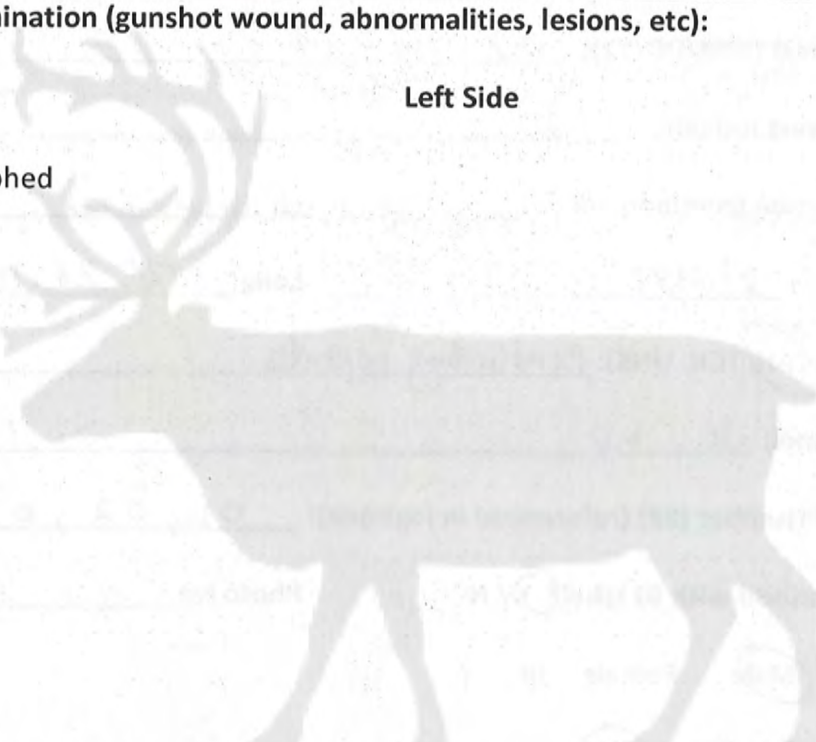
Duplicate Muscle Sample ID (RANG–2014-##-M): RANG - 2014 - 01 - Mb

Time (00:00): ~~1530~~ LD 1930

Gross External Examination (gunshot wound, abnormalities, lesions, etc):

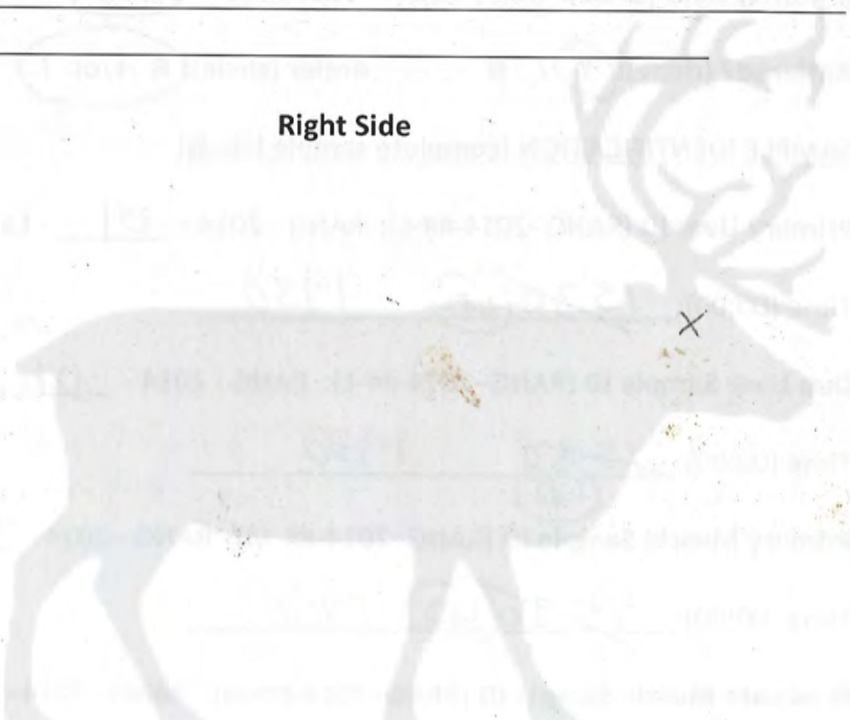
Symbols:
X =likely gunshot
O = lesion photographed
☐= lesion sampled

Left Side



Notes: No bullet hole left side

Right Side



Notes: Head shot

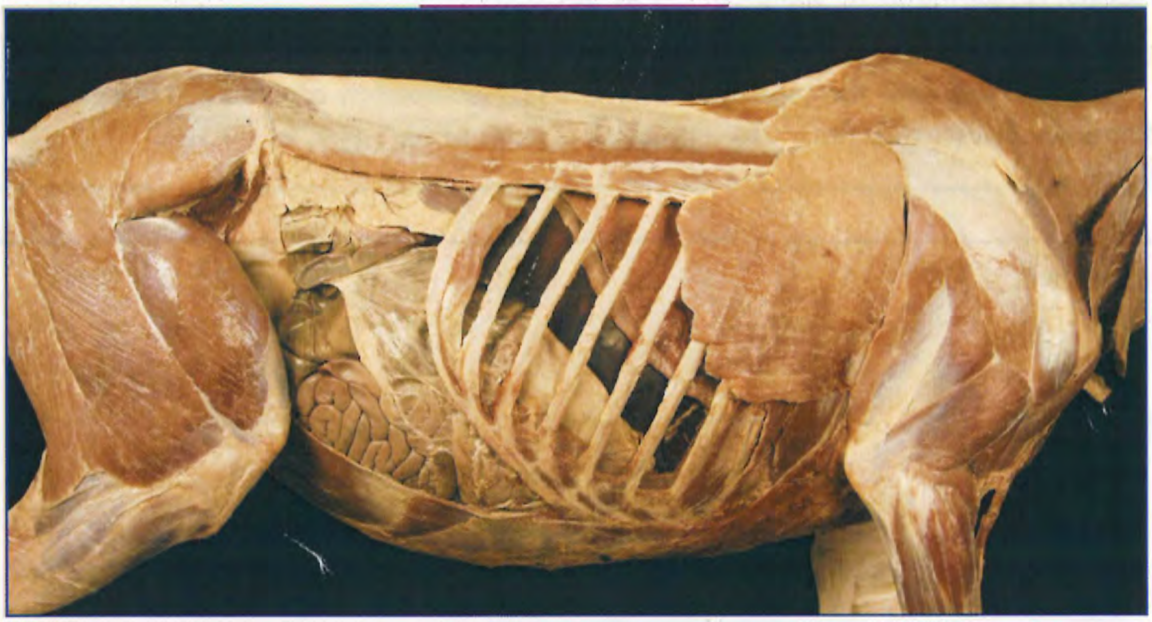
Gross Internal Examination (gunshot wound, abnormalities, lesions, etc) ***[RIGHT SIDE]*:**

gunshot threw head

Symbols:
X =likely gunshot
O = lesion photographed
☐= lesion sampled

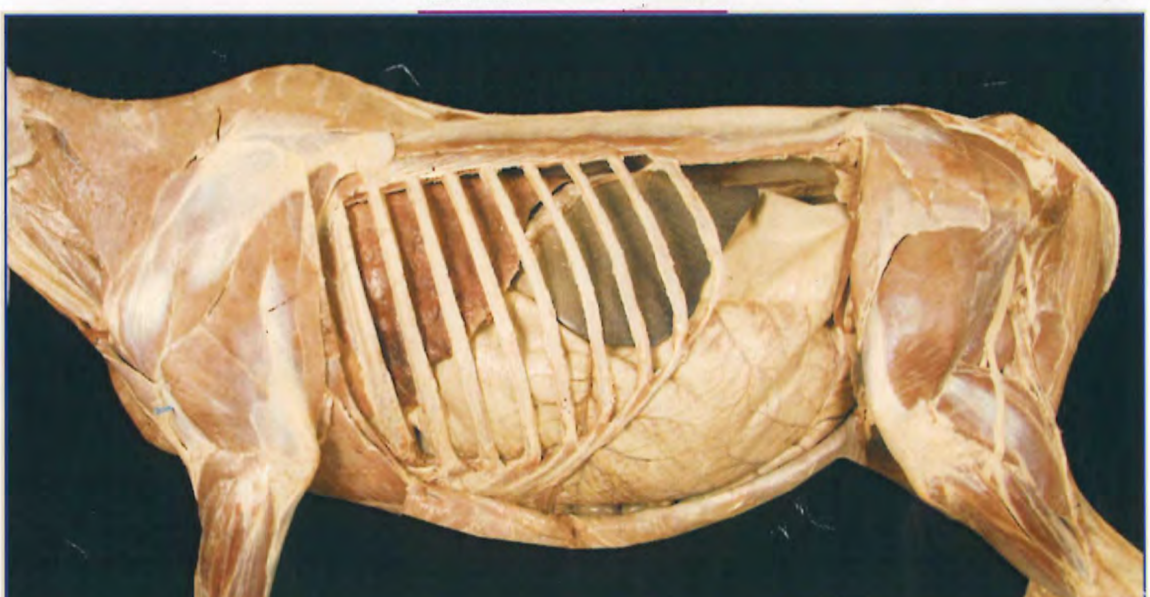
Right Side

good



Left Side

good



Notes on next page:

Notes:

- Gut contents remained w/in gastrointestinal system? Y or N see below notes on sample collection checklist
- Gunshot path **clear** of abdomen? Y or N
- Liver and muscle samples collected w/o obvious external/internal contamination? Yes
- Normal appearing tissue sampled? Yes
- **Left Kidney fat** *(loose on left side of body, NOT attached to the liver)* (circle):
  no fat very little fat visible through the fat completely covered and not visible
- **Fetus present** (circle): Yes No or NA
- Other:

Extra Notes:

SAMPLE COLLECTION CHECKLIST :

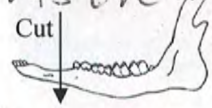
Tissues:

X **Primary liver sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Duplicate liver sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Primary muscle sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Duplicate muscle sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)

Notes: ~~Esa~~ (ID) A stomach contents in the esophagus small amount spilled into body cavity when removing stomach - No stomach contents on internal sirloin strip sampled.

Morphometric/Other

X **Incisor bar –** WhirlPack (label inside bag)



X **Metatarsus –** Ziplock (label inside bag) Right

At the proximal end (closest to body of the caribou) of the metatarsal, there is a joint that is not readily seen. As you run your hand away from the hoof up the metatarsus towards the ankle/"hock", it will start widening close to the ankle/"hock" (Figure 24). About ½ or ¾ of a centimeter along the widened section, with a sharp knife make a cut completely around the bone and as deep as you can through the tendons. If the cut is in the right spot, you can bend the joint over your knee and the joint will break cleanly. If you are a bit off the right spot, there are 3 small bones that may come off with the metatarsus. If they aren't attached too tightly, try to take them off in the field using a sharp knife. This is easier to do when the bone is fresh, but they can be removed in the lab.

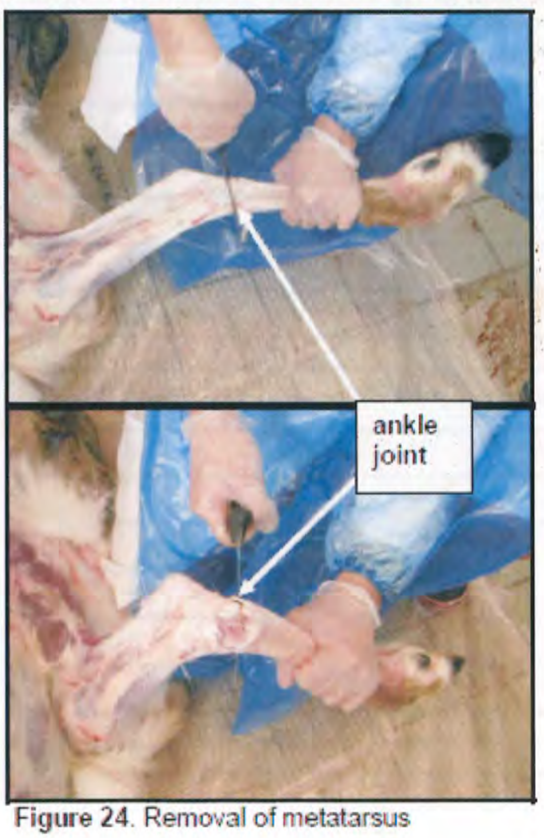


Figure 24. Removal of metatarsus

Figure 25. Removal of hoof

X **Metatarsus marrow fat:**
Good (yellow and/or firm) Poor (pink and/or semi-solid) Very Poor (red and/or runny)
Process in lab: **length:** ____ cm; **diameter:** ____ mm; **circumference:** ____ mm

X **Back fat depth:** 13 **mm**

Figure 16. Back fat depth. Left: knife showing cut angle from base of tail on skinned animal. Right: measuring depth of back fat.

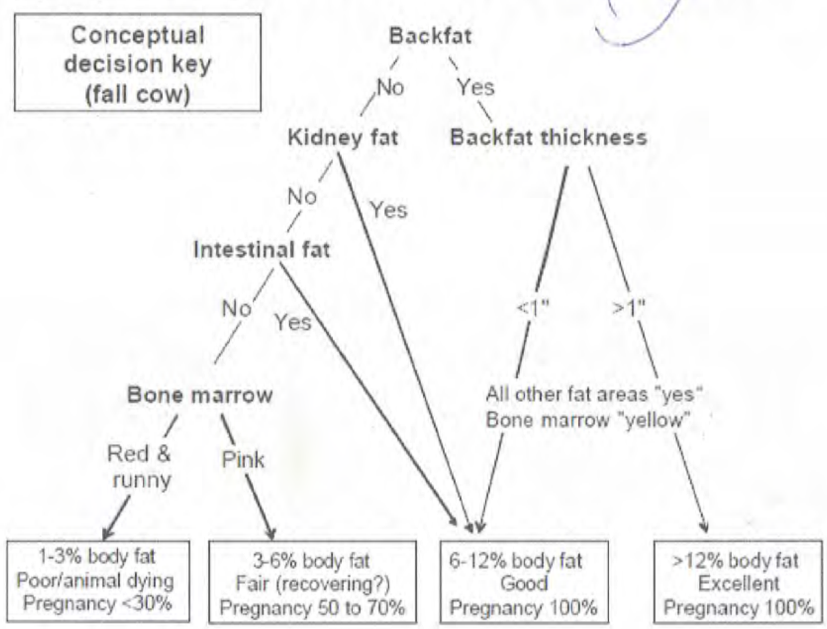
___ **Other collections (write-in):**

Notes:

Body condition (hunter assessment) (circle): poor, fair, good, excellent

- Poor (skinny) (no back fat, little or no gut or kidney fat, bone marrow red and runny)
- Fair (not too skinny) (little back fat, some gut or kidney fat, bone marrow pink and greasy)
- Good (fat) (nice layer back fat and pleny of gut or kidney fat, bone marrow a bit greasy and slightly pink)
- Excellent (very fat) (thick layer back fat all the way up the back and fat everywhere in gut and around kidney, bone marrow solid and cream colored)

Body condition (eye ball-a-metric) (circle): poor, fair, good, excellent



Notes:

This time of year - bomber - Paul K.

Caribou/Tuttu Tissue Sampling - 2014 **Animal ID: RANG-2014-** 02
(i.e., -01)

Date of Harvest (MM/DD/YY): 07 14 14

Time of Harvest (00:00): 1700

Harvest Location (common. name): SE of Helmrick;

Lat: 70° 25' 27.486" **Long:** 150° 28' 44.808"

Herd name (CAH, TCH, UNK): conflicting reports (some claim PH)

Field Personnel: JO LD

Hunter(s) ID Number (##) (referenced in logbook): 01, 02, 03

Picture of caribou with ID label? Y / N Photo No. ________

Sex (circle): Male Female or ?

Lactating (circle): Yes No

Maturity class (circle): calf (<1yr) subadult adult

Antlered? (circle): Y / N **Antler** (circle): R +/or L **Velvet?** (circle): Y / N

SAMPLE IDENTIFICATION (complete sample labels)

Primary Liver ID (RANG–2014-##-L): RANG - 2014 - 02 - La

Time (00:00): 1800

Dup Liver Sample ID (RANG–2014-##-L): RANG - 2014 - 02 - Lb

Time (00:00): 1800

Primary Muscle Sample ID (RANG–2014-##-M): RANG - 2014 - 02 - Ma

Time (00:00): 1800

Duplicate Muscle Sample ID (RANG–2014-##-M): RANG - 2014 - 02 - Mb

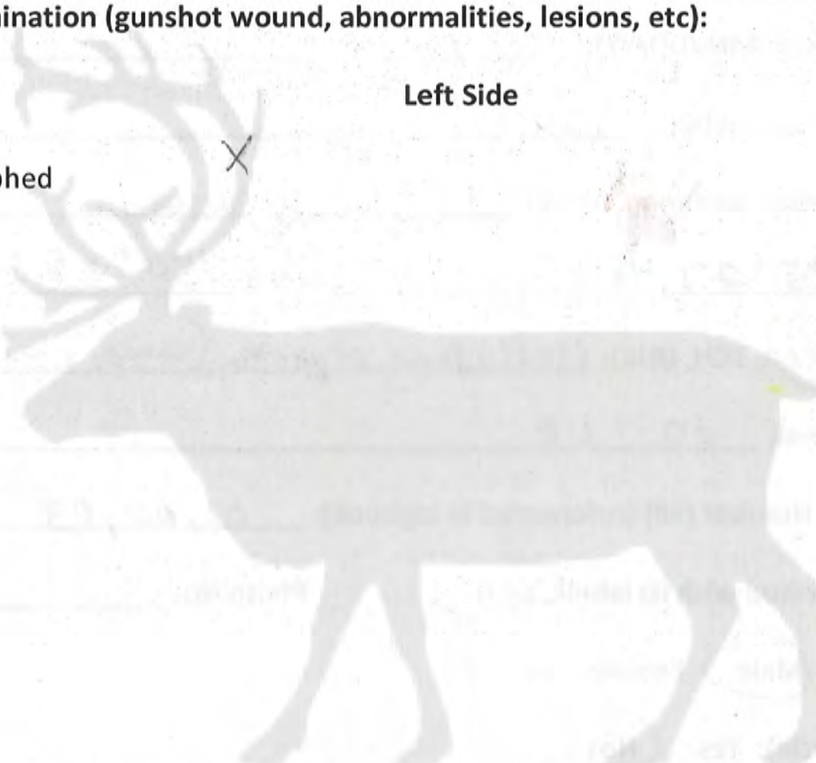
Time (00:00): 1800

Caribou/Tuttu Tissue Sampling - 2014 **Animal ID: RANG-2014-02**
(i.e., -01)

Gross External Examination (gunshot wound, abnormalities, lesions, etc):

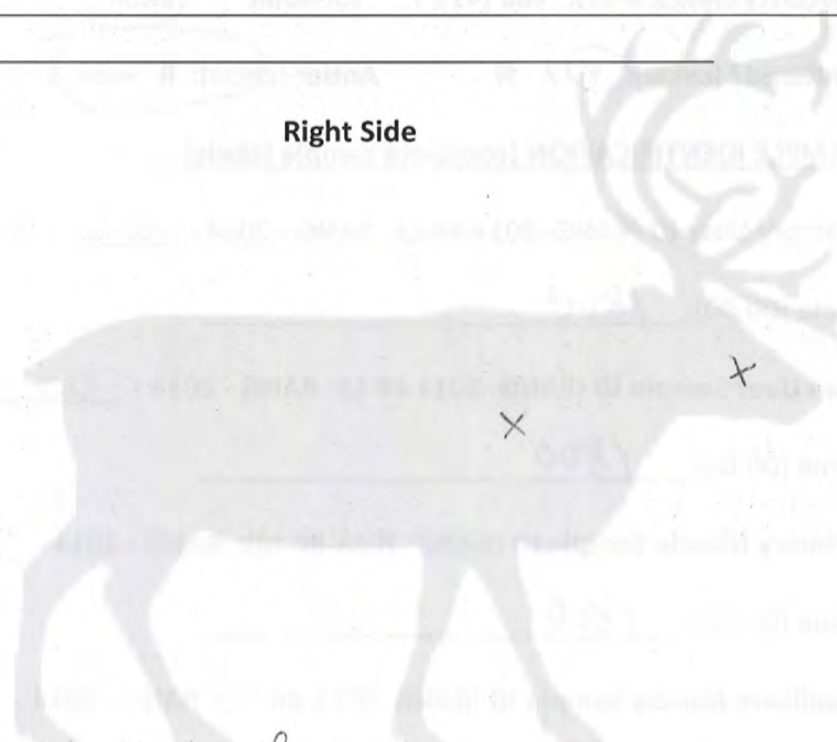
Symbols:
X =likely gunshot
O = lesion photographed
☐= lesion sampled

Left Side



Notes:

Right Side



Notes: Knife wound at back of neck
~~No other visible gunshots~~ DO 2nd gunshot
located on shoulder.

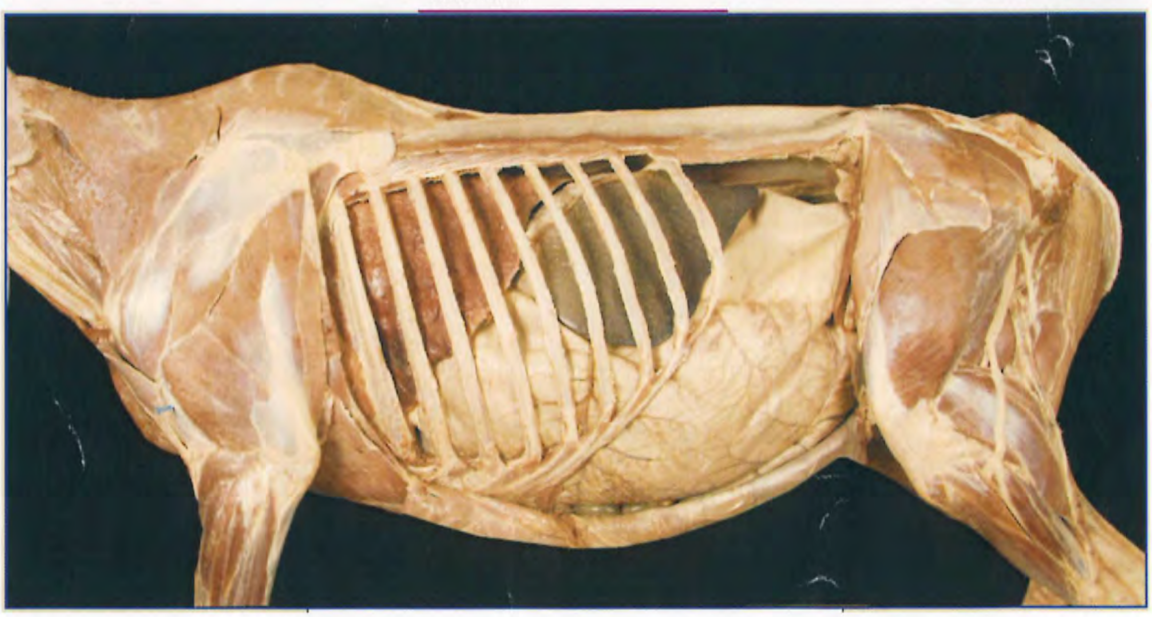
Gross Internal Examination (gunshot wound, abnormalities, lesions, etc) ***[RIGHT SIDE]*:**

Symbols:
X =likely gunshot
O = lesion photographed
☐= lesion sampled

shoulder shot

Right Side

Left Side



Notes on next page:

Notes:

- Gut contents remained w/in gastrointestinal system? Y or N
- Gunshot path **clear** of abdomen? Y or N
- Liver and muscle samples collected w/o obvious external/internal contamination? Yes
- Normal appearing tissue sampled? yes
- **Left Kidney fat** *(loose on left side of body, NOT attached to the liver)* (circle):
  no fat very little fat visible through the fat completely covered and not visible
- **Fetus present** (circle): Yes No or NA
- Other:

Extra Notes:

SAMPLE COLLECTION CHECKLIST :

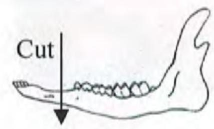
Tissues:

X **Primary liver sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Duplicate liver sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Primary muscle sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Duplicate muscle sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)

Notes: ______________________________

Morphometric/Other

X **Incisor bar –** WhirlPack (label inside bag)



X **Metatarsus –** Ziplock (label inside bag)

At the proximal end (closest to body of the caribou) of the metatarsal, there is a joint that is not readily seen. As you run your hand away from the hoof up the metatarsus towards the ankle/"hock", it will start widening close to the ankle/"hock" (Figure 24). About ½ or ¾ of a centimeter along the widened section, with a sharp knife make a cut completely around the bone and as deep as you can through the tendons. If the cut is in the right spot, you can bend the joint over your knee and the joint will break cleanly. If you are a bit off the right spot, there are 3 small bones that may come off with the metatarsus. If they aren't attached too tightly, try to take them off in the field using a sharp knife. This is easier to do when the bone is fresh, but they can be removed in the lab.

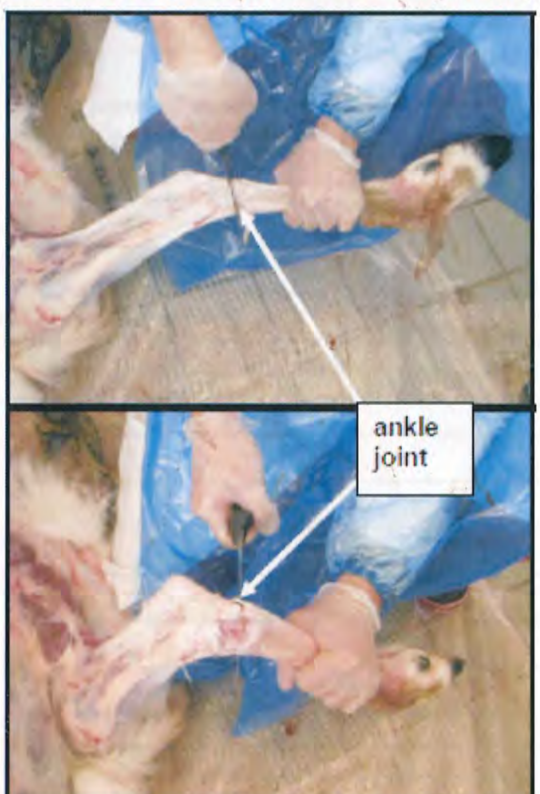


Figure 24. Removal of metatarsus


Figure 25. Removal of hoof

X **Metatarsus marrow fat:**

Good (yellow and/or firm) Poor (pink and/or semi-solid) Very Poor (red and/or runny)

Process in lab:* **length: _______ **cm; diameter:** _______ **mm; circumference:** _______ **mm**

X **Back fat depth:** 16 **mm** 1.6 cm

Figure 16. Back fat depth. Left: knife showing cut angle from base of tail on skinned animal. Right: measuring depth of back fat.

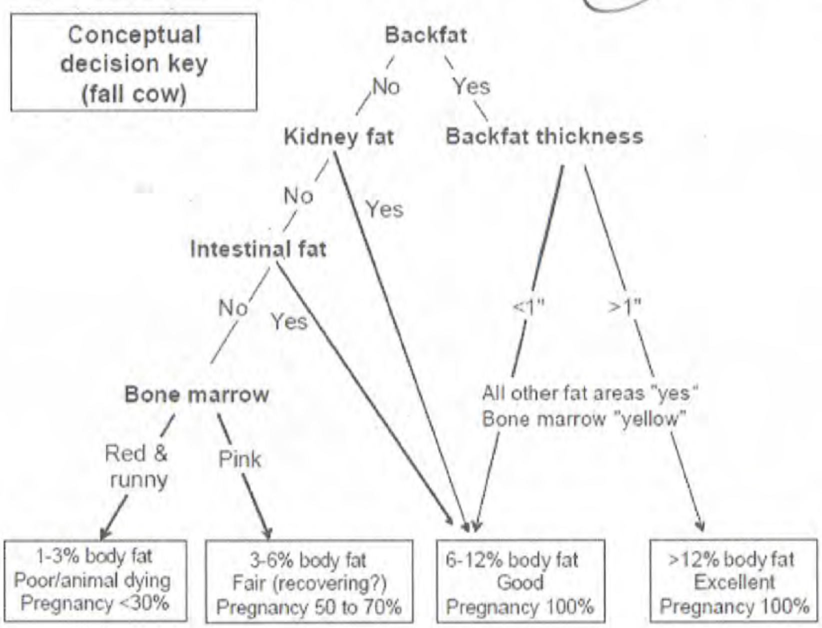
___ **Other collections (write-in):**

Notes:____

Body condition (hunter assessment) (circle): poor, fair, good, excellent

- Poor (skinny) (no back fat, little or no gut or kidney fat, bone marrow red and runny)
- Fair (not too skinny) (little back fat, some gut or kidney fat, bone marrow pink and greasy)
- Good (fat) (nice layer back fat and pleny of gut or kidney fat, bone marrow a bit greasy and slightly pink)
- Excellent (very fat) (thick layer back fat all the way up the back and fat everywhere in gut and around kidney, bone marrow solid and cream colored)

Body condition (eye ball-a-metric) (circle): poor, fair, good, excellent



Notes:

Bomber for this time of year -
P.N

Body condition [illegible]

- Poor (skinny like hide on a frame of bones; little or no fat, bone marrow red and runny)
- Fair (not too skinny; a little back fat, some fat around kidney, bone marrow somewhat pink/runny)
- Good (fat; thick back fat and plenty of fat on kidney, bone marrow white
  and slightly pink)
- Excellent (very fat; thick back fat all the way up the back and fat extends onto gut
  and around kidney; bone marrow solid and creamy white)

Body condition (circle one): poor, fair, good, excellent

Notes

[illegible]

Caribou/Tuttu Tissue Sampling - 2014 **Animal ID: RANG-2014-** 03
(i.e., -01)

Date of Harvest (MM/DD/YY): 07/15/14

Time of Harvest (00:00): ~~1400~~ 2200

Harvest Location (common. name): Upstream of Nigliq Camp

GPS R071521B

Lat: 70.360195 **Long:** -151.075888

Herd name (CAH, TCH, UNK): conflicting reports

Field Personnel: Davis, O'Brien

Hunter(s) ID Number (##) (referenced in logbook): 04, 05, 06

Picture of caribou with ID label? Y / N Photo No. ______

Sex (circle): Male Female or ?

Lactating (circle): Yes No

Maturity class (circle): calf (<1yr) subadult adult

Antlered? (circle): Y / N **Antler** (circle): R +/or L **Velvet?** (circle): Y / N

SAMPLE IDENTIFICATION (complete sample labels)

Primary Liver ID (RANG–2014-##-L): RANG - 2014 - 03 - La

Time (00:00): 2245

Dup Liver Sample ID (RANG–2014-##-L): RANG - 2014 - 03 - Lb

Time (00:00): 2245

Primary Muscle Sample ID (RANG–2014-##-M): RANG - 2014 - 03 - Ma

Time (00:00): 2245

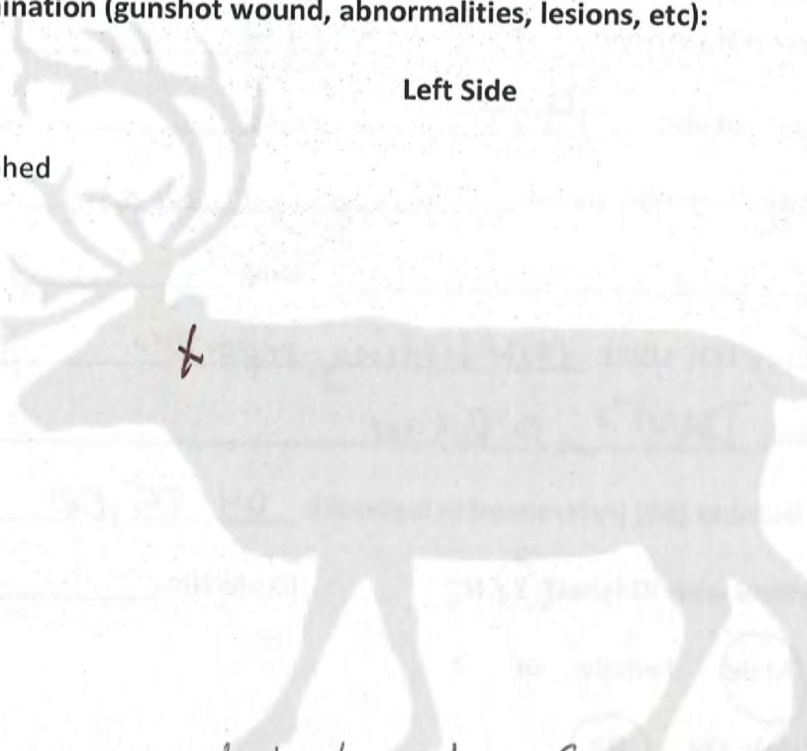
Duplicate Muscle Sample ID (RANG–2014-##-M): RANG - 2014 - 03 - Mb

Time (00:00): 2245

Gross External Examination (gunshot wound, abnormalities, lesions, etc):

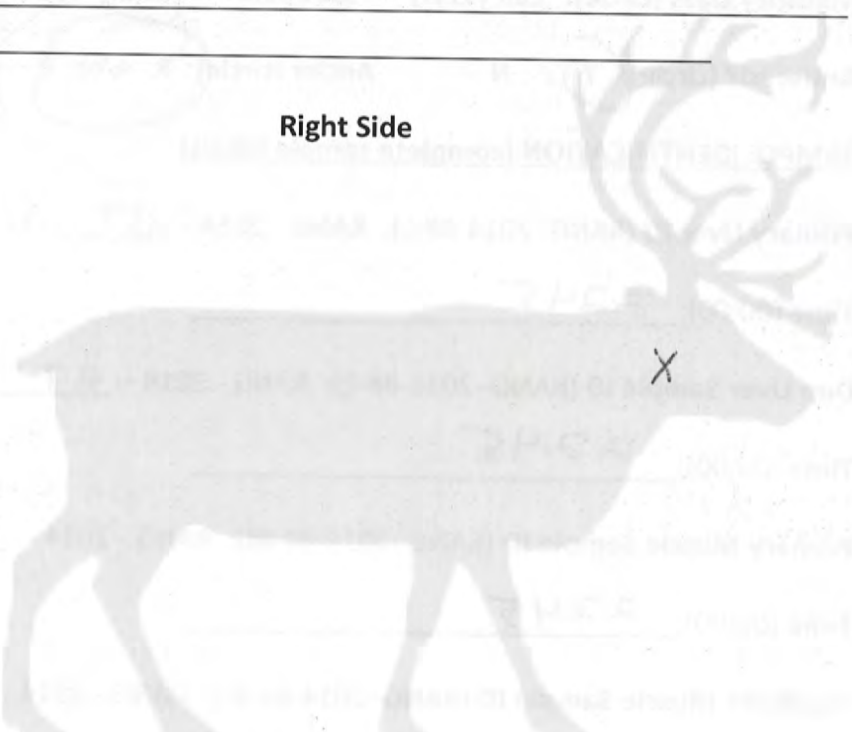
Symbols:
X =likely gunshot
O = lesion photographed
☐= lesion sampled

Left Side



Notes: Bullet penetrated both sides of upper neck

Right Side



Notes:

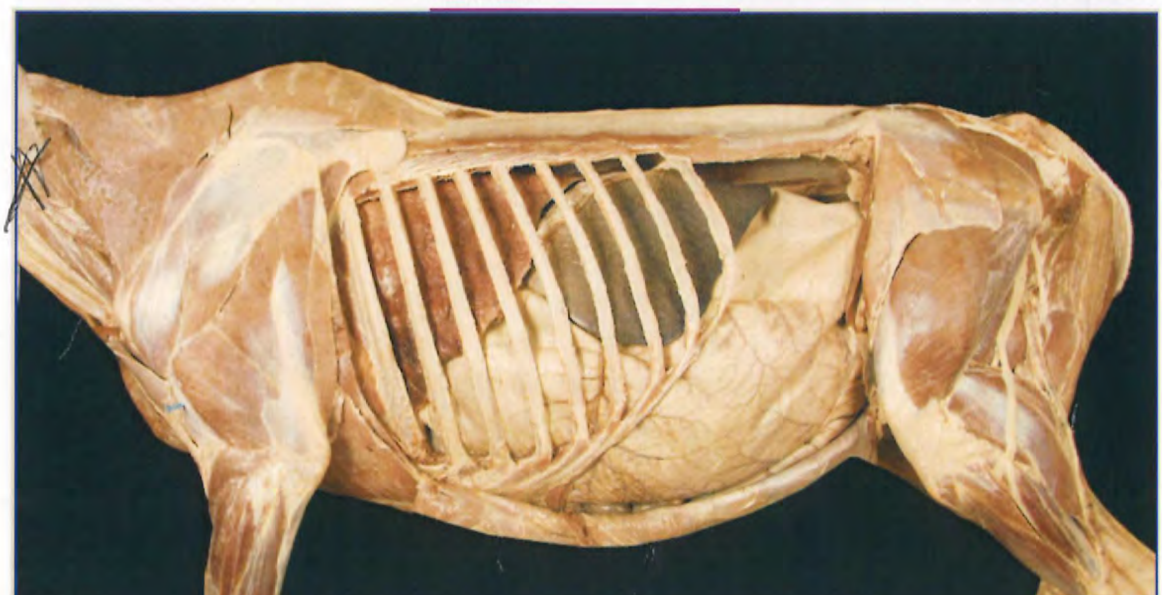
Gross Internal Examination (gunshot wound, abnormalities, lesions, etc) ***[RIGHT SIDE]***:

Symbols:
X =likely gunshot
O = lesion photographed
□= lesion sampled

only neck shot

Right Side

Left Side



Notes on next page:

Caribou/Tuttu Tissue Sampling - 2014 **Animal ID: RANG-2014-**03

(i.e., -01)

Notes:

- Gut contents remained w/in gastrointestinal system? Y or N see below
- Gunshot path **clear** of abdomen? Y or N
- Liver and muscle samples collected w/o obvious external/internal contamination? Y - see below
- Normal appearing tissue sampled? ______
- **Left Kidney fat** *(loose on left side of body, NOT attached to the liver)* (circle):
  no fat very little fat visible through the fat completely covered and not visible
- **Fetus present** (circle): Yes No or NA
- Other: ______

Extra Notes:

Intestinal system intact ~~until~~ while sampling liver, then small amount spilled from asphogus into stomach lining up. No obvious rumen contents on loin, but should be noted anyway. Loin was cut threw before able to grab the sample sample ½ inch down from cut.

SAMPLE COLLECTION CHECKLIST :

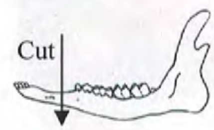
Tissues:

X **Primary liver sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Duplicate liver sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Primary muscle sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Duplicate muscle sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)

Notes: ____________________

Morphometric/Other

X **Incisor bar –** WhirlPack (label inside bag)



___ **Metatarsus –** Ziplock (label inside bag)

At the proximal end (closest to body of the caribou) of the metatarsal, there is a joint that is not readily seen. As you run your hand away from the hoof up the metatarsus towards the ankle/"hock", it will start widening close to the ankle/"hock" (Figure 24). About ½ or ¾ of a centimeter along the widened section, with a sharp knife make a cut completely around the bone and as deep as you can through the tendons. If the cut is in the right spot, you can bend the joint over your knee and the joint will break cleanly. If you are a bit off the right spot, there are 3 small bones that may come off with the metatarsus. If they aren't attached too tightly, try to take them off in the field using a sharp knife. This is easier to do when the bone is fresh, but they can be removed in the lab.

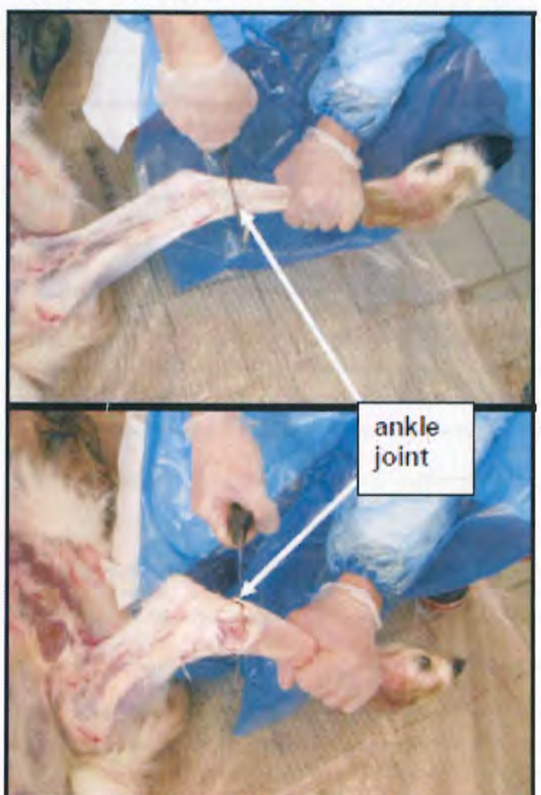


Figure 24. Removal of metatarsus

Figure 25. Removal of hoof

Caribou/Tuttu Tissue Sampling - 2014 **Animal ID: RANG-2014-03**
(i.e., -01)

X **Metatarsus marrow fat:**
Good (yellow and/or firm) Poor (pink and/or semi-solid) Very Poor (red and/or runny)
Process in lab:* **length: _______ **cm; diameter:** _______ **mm; circumference:** _______ **mm**

X **Back fat depth:** 13 **mm** 0.5" need to convert

Figure 16. Back fat depth. Left: knife showing cut angle from base of tail on skinned animal. Right: measuring depth of back fat.

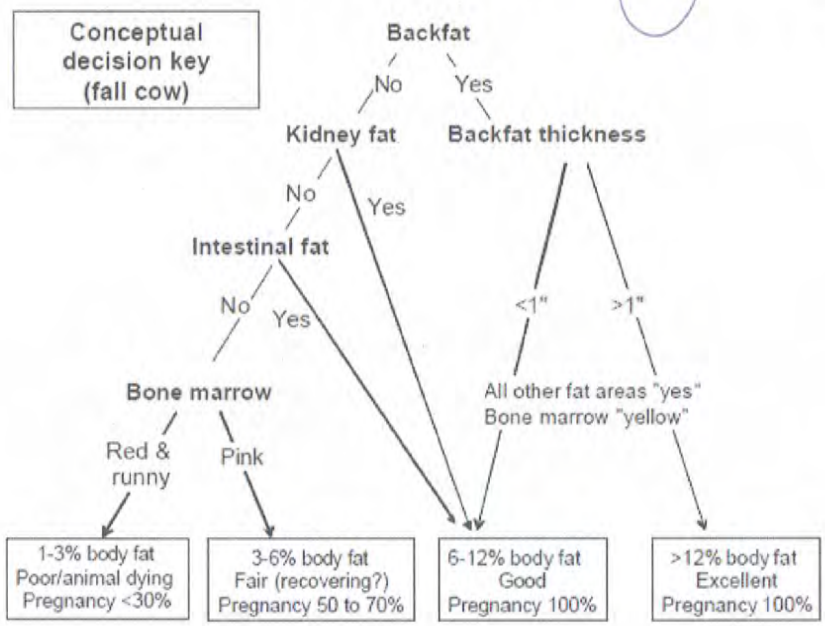
___ **Other collections (write-in):**

Notes:

Body condition (hunter assessment) (circle): poor, fair, good, excellent

- Poor (skinny) (no back fat, little or no gut or kidney fat, bone marrow red and runny)
- Fair (not too skinny) (little back fat, some gut or kidney fat, bone marrow pink and greasy)
- Good (fat) (nice layer back fat and pleny of gut or kidney fat, bone marrow a bit greasy and slightly pink)
- Excellent (very fat) (thick layer back fat all the way up the back and fat everywhere in gut and around kidney, bone marrow solid and cream colored)

Body condition (eye ball-a-metric) (circle): poor, fair, good, excellent



Notes:

Caribou/Tuttu Tissue Sampling - 2014 **Animal ID: RANG-2014-** 04
(i.e., -01)

Date of Harvest (MM/DD/YY): 07/15/~~20~~14

Time of Harvest (00:00): 2200

Harvest Location (common. name): Upstream of Niglig camp
GPS File R071521B
Lat: 70.360195 **Long:** -151.075888

Herd name (CAH, TCH, UNK): conflicting reports

Field Personnel: Davis ; O'Brien

Hunter(s) ID Number (##) (referenced in logbook): 04, 05, 06

Picture of caribou with ID label? Y / N **Photo No.** ______

Sex (circle): Male Female or ?

Lactating (circle): Yes No

Maturity class (circle): calf (<1yr) subadult adult

Antlered? (circle): Y / N **Antler** (circle): R +/or L **Velvet?** (circle): Y / N

<u>SAMPLE IDENTIFICATION (complete sample labels)</u>

Primary Liver ID (RANG–2014-##-L): RANG - 2014 - 04 - La

Time (00:00): 2300

Dup Liver Sample ID (RANG–2014-##-L): RANG - 2014 - 04 - Lb

Time (00:00): 2300

Primary Muscle Sample ID (RANG–2014-##-M): RANG - 2014 - 04 - Ma

Time (00:00): 2300

Duplicate Muscle Sample ID (RANG–2014-##-M): RANG - 2014 - 04 - Mb

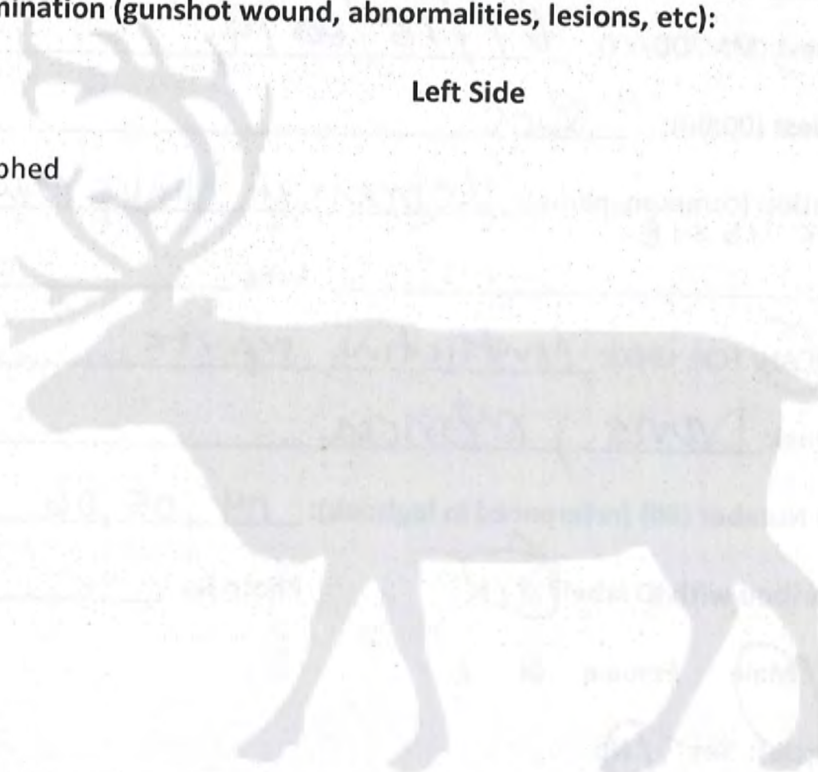
Time (00:00): 2300

Caribou/Tuttu Tissue Sampling - 2014 Animal ID: RANG-2014-04
(i.e., -01)

Gross External Examination (gunshot wound, abnormalities, lesions, etc):

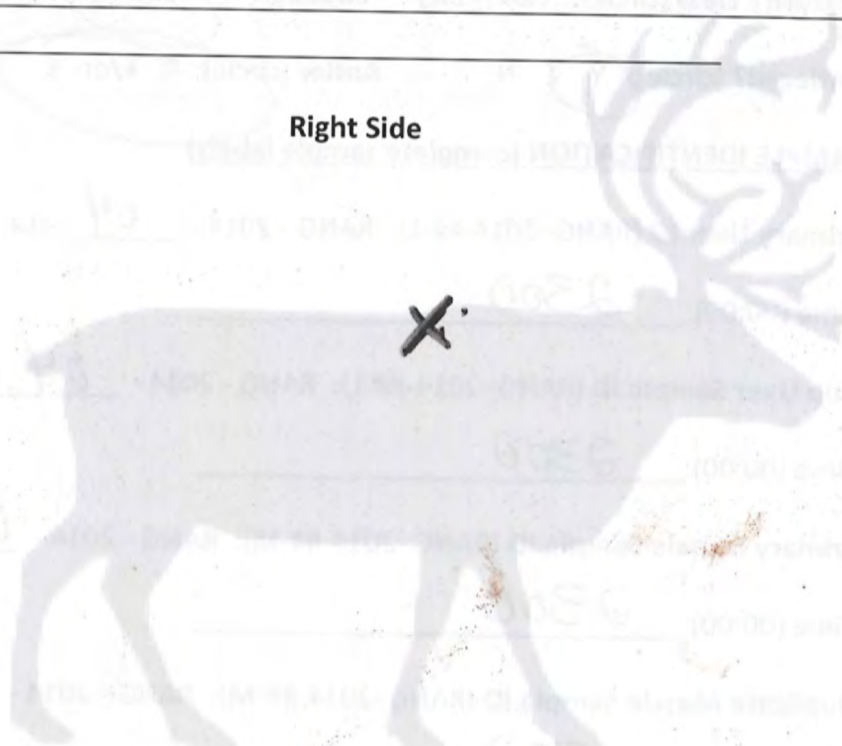
Symbols:
X =likely gunshot
O = lesion photographed
□= lesion sampled

Left Side



Notes:____________________________________

Right Side



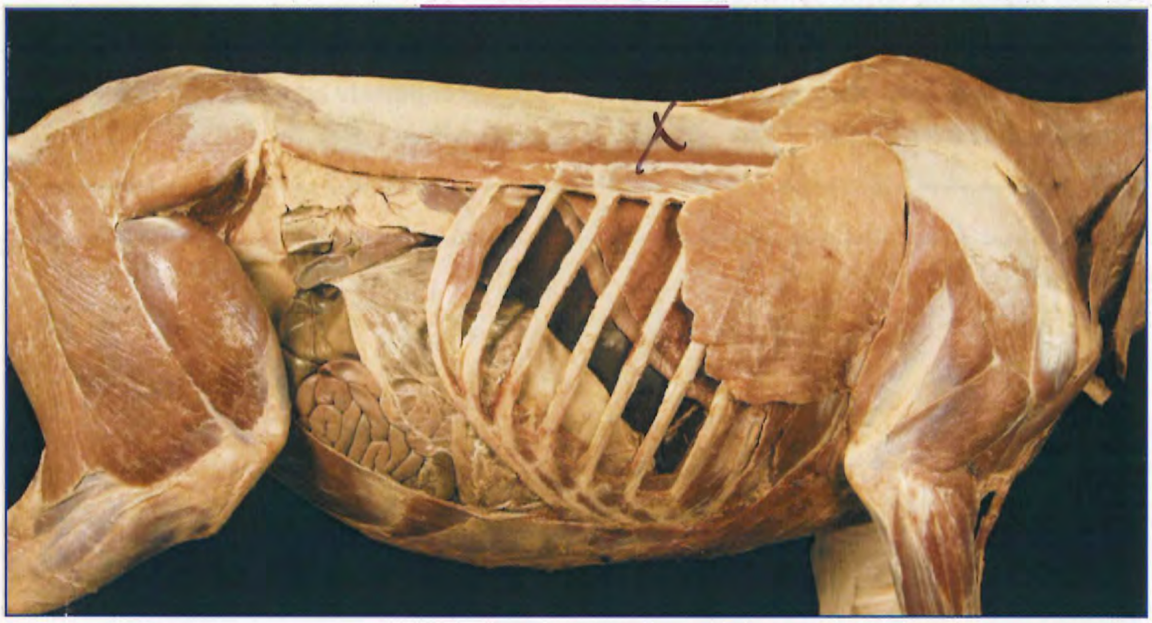
Notes:____________________________________

Gross Internal Examination (gunshot wound, abnormalities, lesions, etc) ***[RIGHT SIDE]*:**

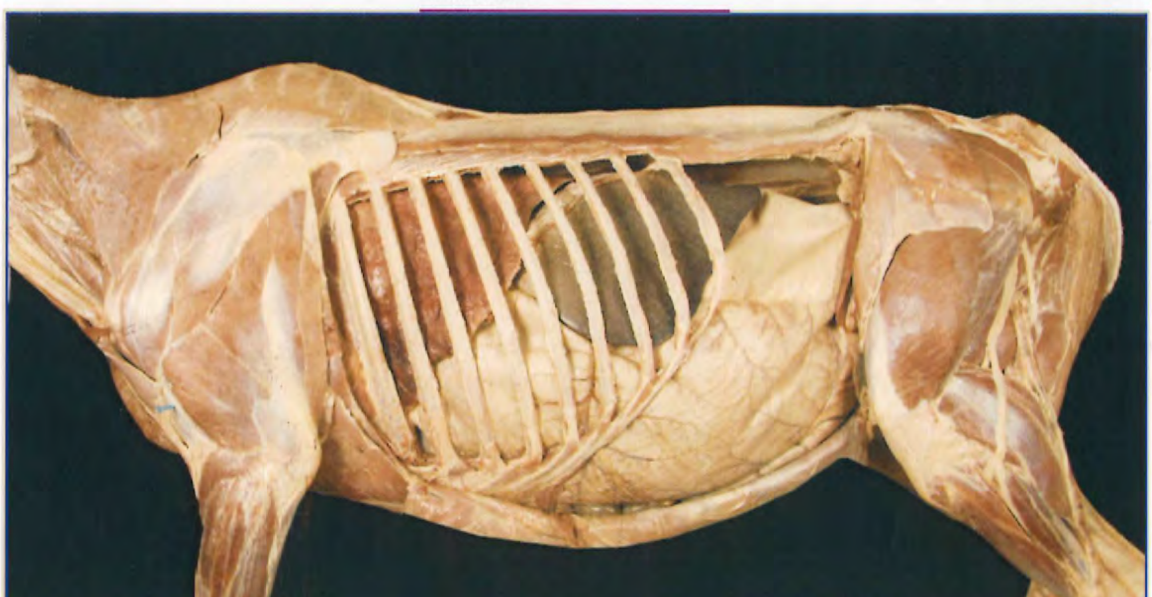
Symbols:
X =likely gunshot
O = lesion photographed
□= lesion sampled

clear of gut

Right Side



Left Side



Notes on next page:

Notes:

- Gut contents remained w/in gastrointestinal system? Y or N
- Gunshot path **clear** of abdomen? Y or N
- Liver and muscle samples collected w/o obvious external/internal contamination? Yes
- Normal appearing tissue sampled? yes
- **Left Kidney fat** *(loose on left side of body, NOT attached to the liver)* (circle):
  no fat very little fat visible through the fat completely covered and not visible
- **Fetus present** (circle): Yes No or NA
- Other: calf — male

Extra Notes:

SAMPLE COLLECTION CHECKLIST :

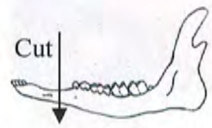
Tissues:

X **Primary liver sample –** 1˚ Teflon Bag / 2˚ Teflon Bag (Labeled) / 3˚ WhirlPac (labeled)
X **Duplicate liver sample –** 1˚ Teflon Bag / 2˚ Teflon Bag (Labeled) / 3˚ WhirlPac (labeled)
X **Primary muscle sample –** 1˚ Teflon Bag / 2˚ Teflon Bag (Labeled) / 3˚ WhirlPac (labeled)
X **Duplicate muscle sample –** 1˚ Teflon Bag / 2˚ Teflon Bag (Labeled) / 3˚ WhirlPac (labeled)

Notes: ______________________________

Morphometric/Other

X **Incisor bar –** WhirlPack (label inside bag)



X **Metatarsus –** Ziplock (label inside bag)

At the proximal end (closest to body of the caribou) of the metatarsal, there is a joint that is not readily seen. As you run your hand away from the hoof up the metatarsus towards the ankle/"hock", it will start widening close to the ankle/"hock" (Figure 24). About ½ or ¾ of a centimeter along the widened section, with a sharp knife make a cut completely around the bone and as deep as you can through the tendons. If the cut is in the right spot, you can bend the joint over your knee and the joint will break cleanly. If you are a bit off the right spot, there are 3 small bones that may come off with the metatarsus. If they aren't attached too tightly, try to take them off in the field using a sharp knife. This is easier to do when the bone is fresh, but they can be removed in the lab.

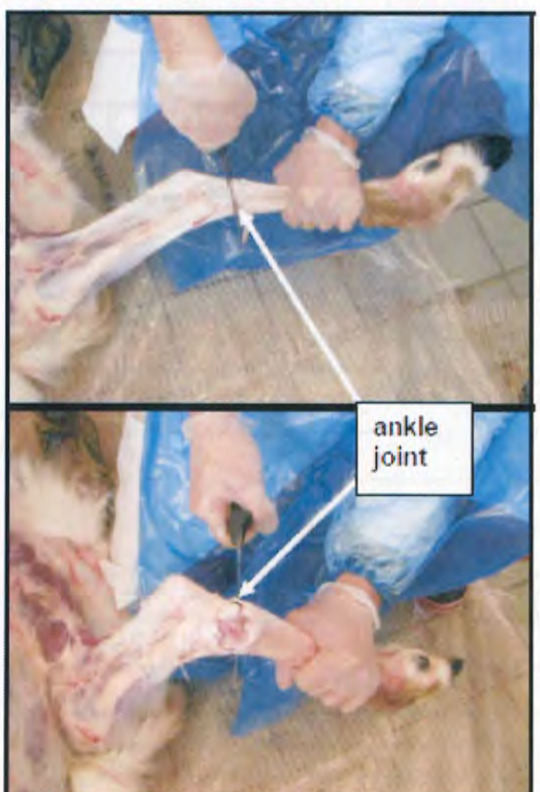


Figure 24. Removal of metatarsus


Figure 25. Removal of hoof

X **Metatarsus marrow fat:**
Good (yellow and/or firm) Poor (pink and/or semi-solid) Very Poor (red and/or runny)
Process in lab:* **length: ______ cm; **diameter:** ______ mm; **circumference:** ______ mm

X **Back fat depth:** 25 mm 0,5" , 1" on logbook n/lee

Figure 16. Back fat depth. Left: knife showing cut angle from base of tail on skinned animal. Right: measuring depth of back fat.

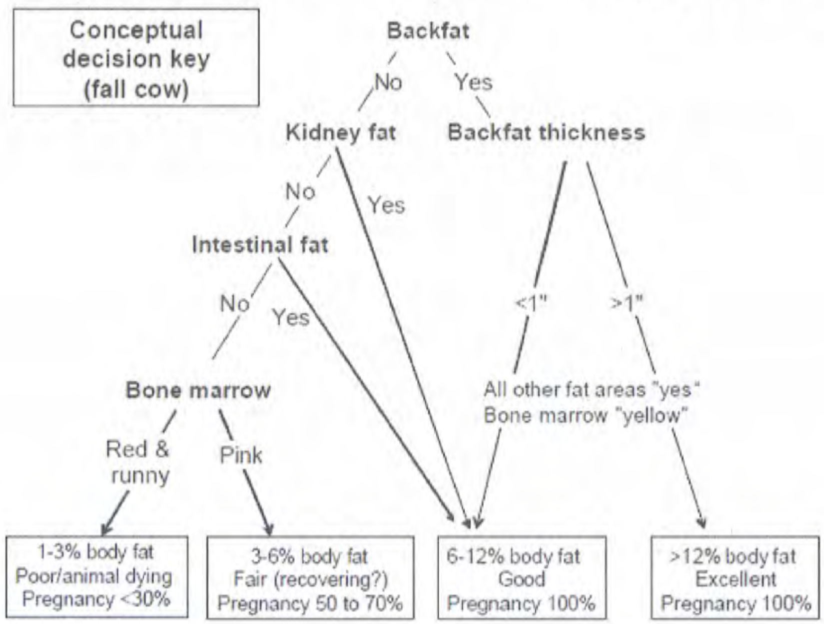
___ **Other collections (write-in):**

Notes: ______

Body condition (hunter assessment) (circle): poor, fair, good, excellent

- Poor (skinny) (no back fat, little or no gut or kidney fat, bone marrow red and runny)
- Fair (not too skinny) (little back fat, some gut or kidney fat, bone marrow pink and greasy)
- Good (fat) (nice layer back fat and pleny of gut or kidney fat, bone marrow a bit greasy and slightly pink)
- Excellent (very fat) (thick layer back fat all the way up the back and fat everywhere in gut and around kidney, bone marrow solid and cream colored)

Body condition (eye ball-a-metric) (circle): poor, fair, good, excellent



Notes:

Caribou/Tuttu Tissue Sampling - 2014 **Animal ID: RANG-2014-** 05 (i.e., -01)

Date of Harvest (MM/DD/YY): 07-15-14

Time of Harvest (00:00): 2200

Harvest Location (common. name): Upstream of Niglig camp
GPS File: R0715-21B

Lat: 70.360195 **Long:** -151.075888

Herd name (CAH, TCH, UNK): conflicting reports

Field Personnel: Davis, O'Brien

Hunter(s) ID Number (##) (referenced in logbook): 04, 05, 06

Picture of caribou with ID label? Y / N Photo No. ______

Sex (circle): Male ~~Female~~ or ? correction - Male - 1 y.o.

Lactating (circle): Yes No

Maturity class (circle): calf (<1yr) subadult adult

Antlered? (circle): Y / N **Antler** (circle): R +/or L **Velvet?** (circle): Y / N

SAMPLE IDENTIFICATION (complete sample labels) Date of collection - 7.16.14

Primary Liver ID (RANG–2014-##-L): RANG - 2014 - 05 - La

Time (00:00): 0030

Dup Liver Sample ID (RANG–2014-##-L): RANG - 2014 - 05 - Lb

Time (00:00): 0030

Primary Muscle Sample ID (RANG–2014-##-M): RANG - 2014 - 05 - Ma

Time (00:00): 0030

Duplicate Muscle Sample ID (RANG–2014-##-M): RANG - 2014 - 05 - Mb

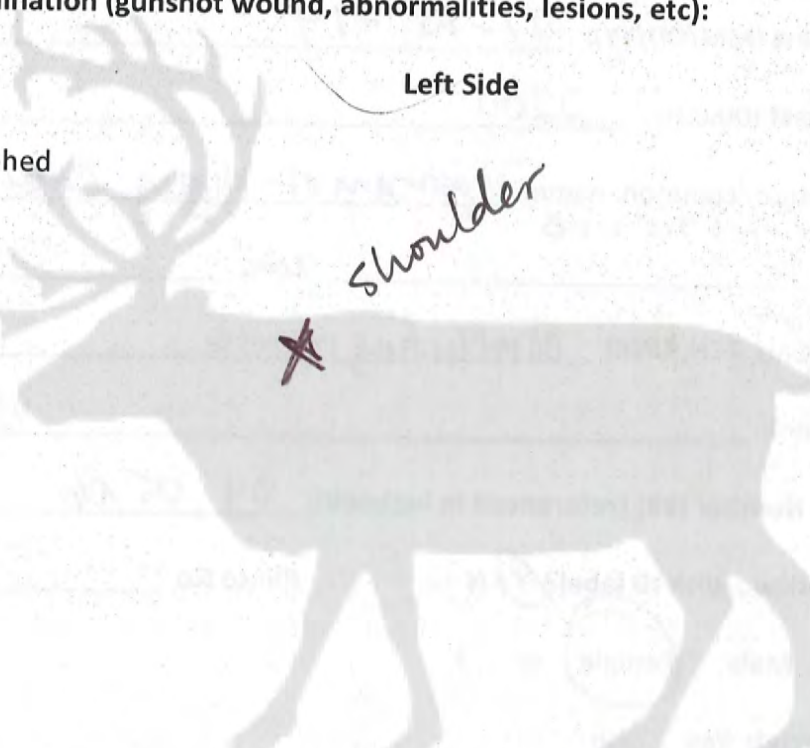
Time (00:00): 0030

Animal ID: RANG-2014-05
(i.e., -01)

Gross External Examination (gunshot wound, abnormalities, lesions, etc):

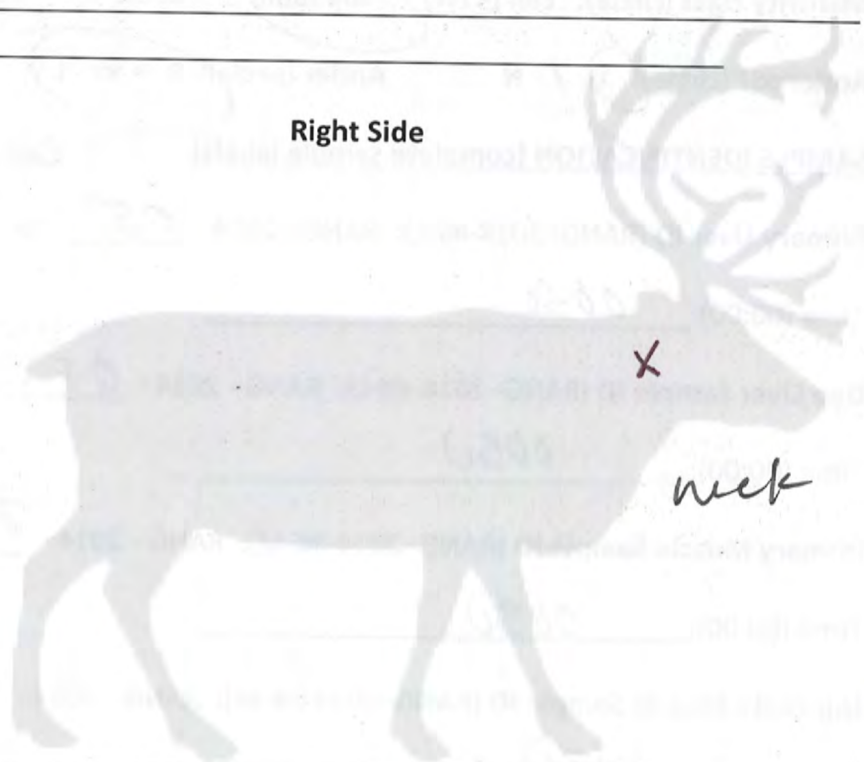
Symbols:
X =likely gunshot
O = lesion photographed
☐= lesion sampled

Left Side



Notes:____

Right Side



Notes:____

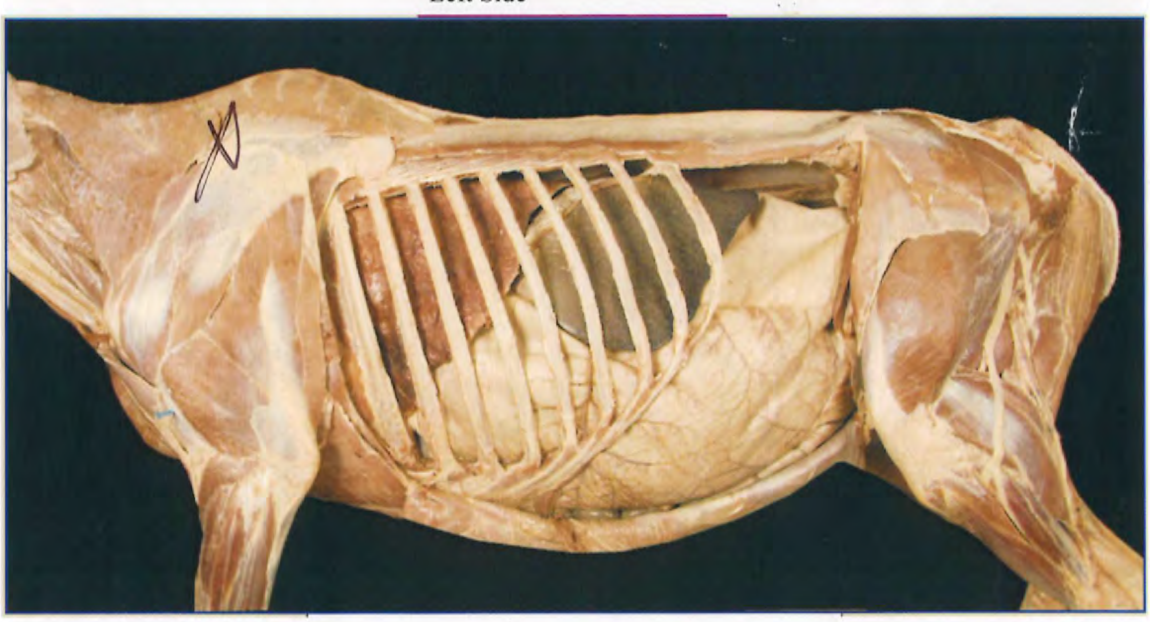
Gross Internal Examination (gunshot wound, abnormalities, lesions, etc) ***[RIGHT SIDE]***:

Symbols:
X =likely gunshot
O = lesion photographed
□= lesion sampled

Right Side

X

Left Side



Notes on next page:

Notes:

- Gut contents remained w/in gastrointestinal system? Y or N
- Gunshot path **clear** of abdomen? Y or N
- Liver and muscle samples collected w/o obvious external/internal contamination? Yes
- Normal appearing tissue sampled? Yes
- **Left Kidney fat** *(loose on left side of body, NOT attached to the liver)* (circle):
  no fat very little fat visible through the fat completely covered and not visible
- **Fetus present** (circle): Yes No or NA
- Other:

Extra Notes:

SAMPLE COLLECTION CHECKLIST :

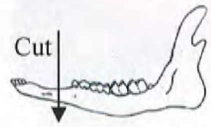
Tissues:

X **Primary liver sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Duplicate liver sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Primary muscle sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Duplicate muscle sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)

Notes: ______________________________

Morphometric/Other

X **Incisor bar –** WhirlPack (label inside bag)



X **Metatarsus –** Ziplock (label inside bag)

At the proximal end (closest to body of the caribou) of the metatarsal, there is a joint that is not readily seen. As you run your hand away from the hoof up the metatarsus towards the ankle/"hock", it will start widening close to the ankle/"hock" (Figure 24). About ½ or ¾ of a centimeter along the widened section, with a sharp knife make a cut completely around the bone and as deep as you can through the tendons. If the cut is in the right spot, you can bend the joint over your knee and the joint will break cleanly. If you are a bit off the right spot, there are 3 small bones that may come off with the metatarsus. If they aren't attached too tightly, try to take them off in the field using a sharp knife. This is easier to do when the bone is fresh, but they can be removed in the lab.

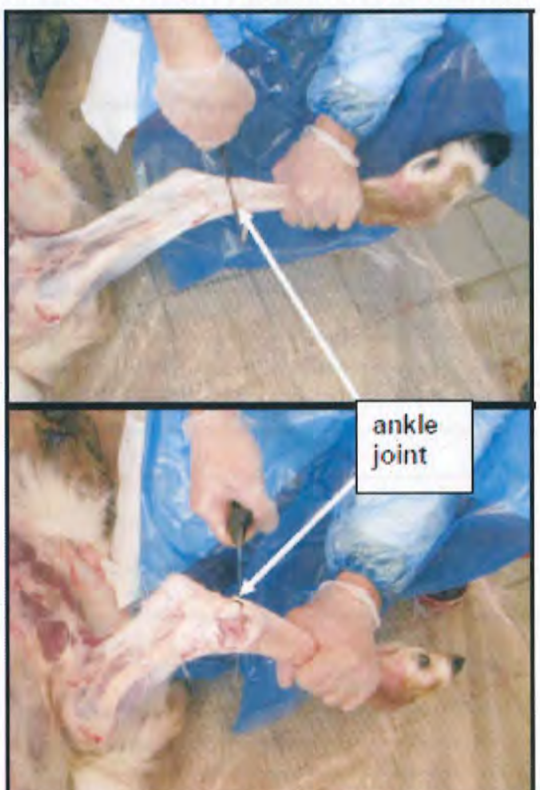


Figure 24. Removal of metatarsus

Figure 25. Removal of hoof

X **Metatarsus marrow fat:**
Good (yellow and/or firm) Poor (pink and/or semi-solid) Very Poor (red and/or runny)
******Process in lab:* **length:** _______ cm; **diameter:** _______ mm; **circumference:** _______ mm

X **Back fat depth:** 11 mm 11" on ruler on logbook

Figure 16. Back fat depth. Left: knife showing cut angle from base of tail on skinned animal. Right: measuring depth of back fat.

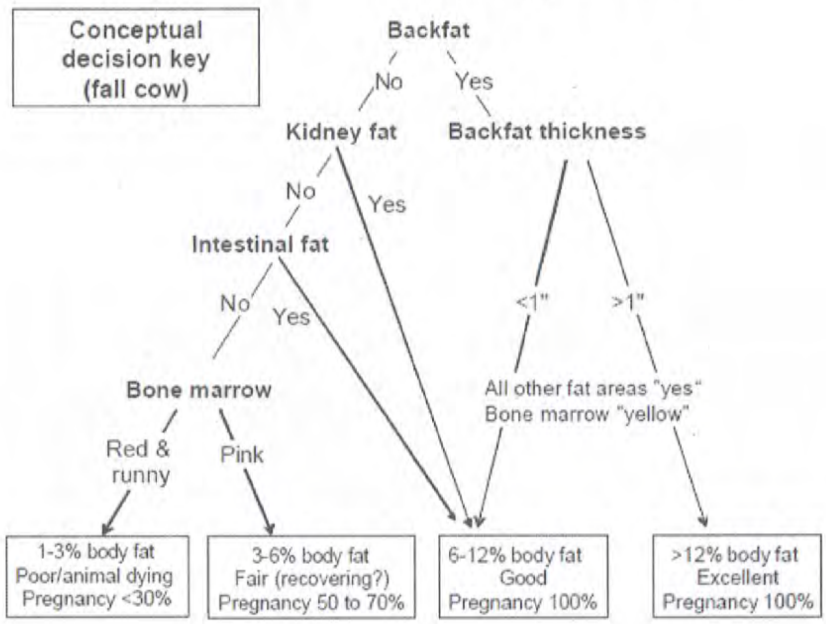
___ **Other collections (write-in):**

Notes:____

Body condition (hunter assessment) (circle): poor, fair, good, excellent

- Poor (skinny) (no back fat, little or no gut or kidney fat, bone marrow red and runny)
- Fair (not too skinny) (little back fat, some gut or kidney fat, bone marrow pink and greasy)
- Good (fat) (nice layer back fat and pleny of gut or kidney fat, bone marrow a bit greasy and slightly pink)
- Excellent (very fat) (thick layer back fat all the way up the back and fat everywhere in gut and around kidney, bone marrow solid and cream colored)

Body condition (eye ball-a-metric) (circle): poor, fair, good, excellent



Notes:

Caribou/Tuttu Tissue Sampling - 2015 **Animal ID: RANG-2015-** 01
(i.e., -01)

Date of Harvest (MM/DD/YY): 08 / 13 / 15

Time of Harvest (00:00): 21:13

Harvest Location (common. name): mi out on kuukpik road

Lat: 70.27537 **Long:** 151.116334

Herd name (CAH, TCH, UNK): ~~Porcupine~~ / UNK

Field Personnel: LD / CS

Hunter(s) ID Number (##) (referenced in logbook): [redacted]

Picture of caribou with ID label? Y / N **Photo No.** ______

Sex (circle): Male Female or ?

Lactating (circle): Yes No N/A

Maturity class (circle): calf (<1yr) subadult - according to hunter. adult

Antlered? (circle): Y / N **Antler** (circle): R +/or L **Velvet?** (circle): Y / N

SAMPLE IDENTIFICATION (complete sample labels)

Primary Liver ID (RANG–2015-##-L): RANG - 2015 - 01 - La

Time (00:00): 21:13

Dup Liver Sample ID (RANG–2015-##-L): RANG - 2015 - 01 - Lb

Time (00:00): 21:13

Primary Muscle Sample ID (RANG–2015-##-M): RANG - 2015 - — - Ma

Time (00:00): —

Duplicate Muscle Sample ID (RANG–2015-##-M): RANG - 2015 - — - Mb

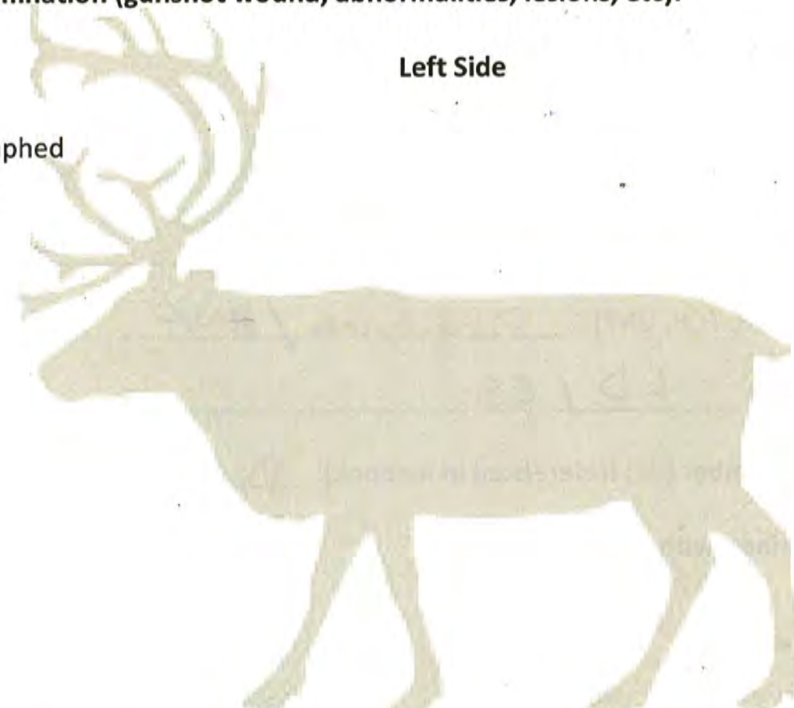
Time (00:00): —

Caribou/Tuttu Tissue Sampling - 2015 **Animal ID: RANG-2015-** 01
(i.e., -01)

Gross External Examination (gunshot wound, abnormalities, lesions, etc):

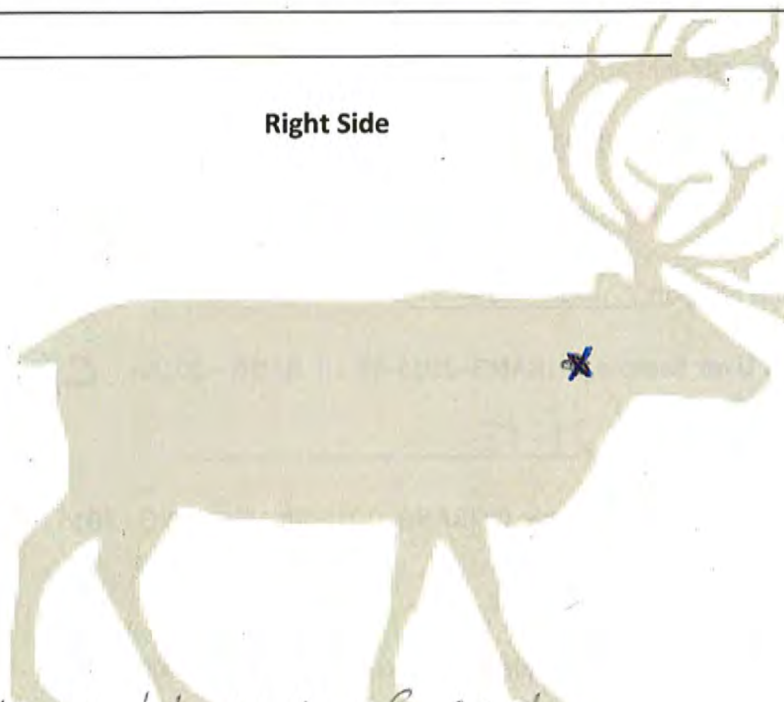
Symbols:
X =likely gunshot
O = lesion photographed
☐= lesion sampled

Left Side



Notes:

Right Side



Notes: One shot to right side of neck

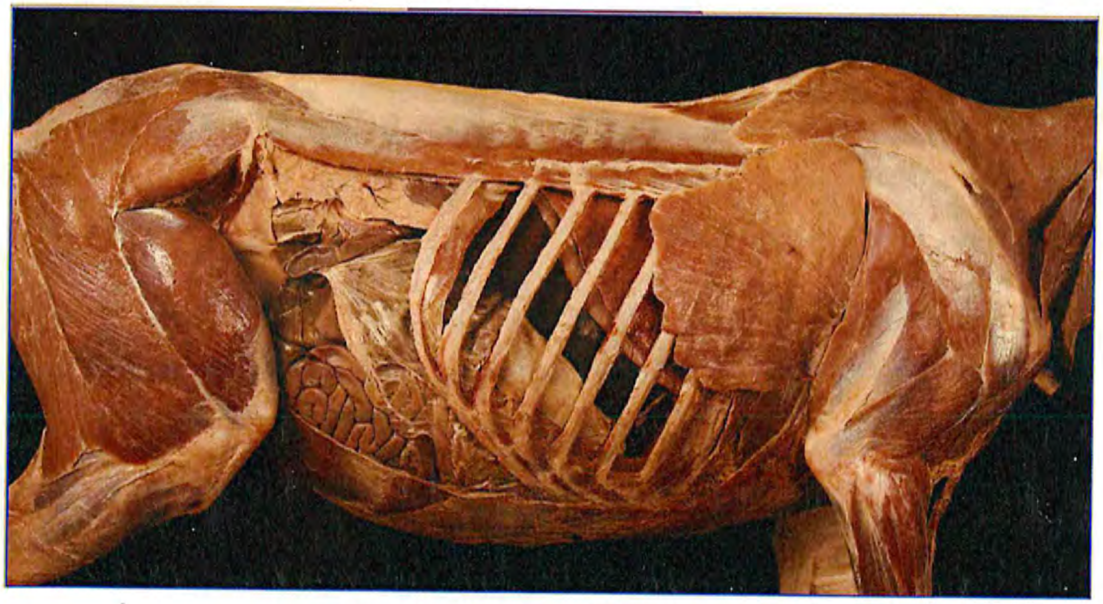
Caribou/Tuttu Tissue Sampling - 2015 **Animal ID: RANG-2015-** 01
(i.e., -01)

Gross Internal Examination (gunshot wound, abnormalities, lesions, etc) ***[RIGHT SIDE]***:

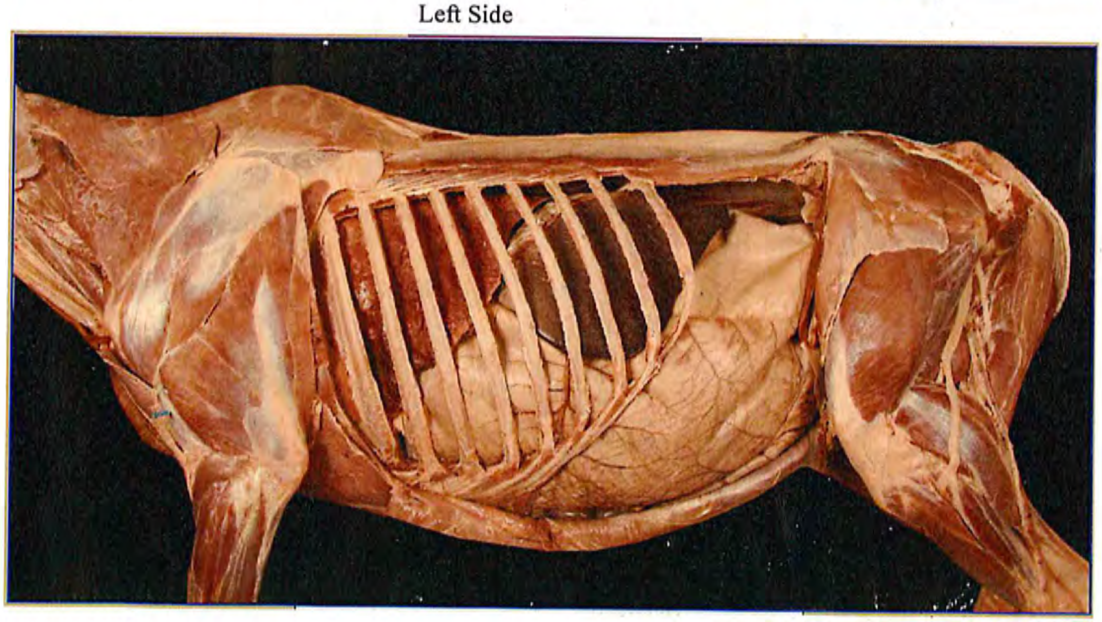
Symbols:
X =likely gunshot
O = lesion photographed
☐= lesion sampled

None reported by hunter

Right Side



Left Side



Notes on next page:

Caribou/Tuttu Tissue Sampling - 2015 **Animal ID: RANG-2015-** 01
(i.e., -01)

Notes:

No – hunter reported gut contents spilled during butchering

- Gut contents remained w/in gastrointestinal system? Y or N
- Gunshot path **clear** of abdomen? Y or N
- Liver and muscle samples collected w/o obvious external/internal contamination? Yes*
- Normal appearing tissue sampled? Yes
- **Left Kidney fat** *(loose on left side of body, NOT attached to the liver)* (circle):
  no fat very little fat visible through the fat completely covered and not visible
- **Fetus present** (circle): Yes No or NA according to hunter
- Other:

Extra Notes:

* liver was taken from tundra + placed on clean foil. Sample was taken from internal tissue only. External sides of liver sample were trimmed in field then sample placed in collection bags. No obvious contamination

No tenderloin sample collected as caribou was already cut + placed/tied to 4-wheeler.

Running 4-wheeler was near liver while sampling. Liver was also sample on road. Action Packer lid was used as table top, foil was placed on lid, then liver on foil. See photo

Animal ID: RANG-2015- 01
(i.e., -01)

SAMPLE COLLECTION CHECKLIST :

Tissues:

✓ **Primary liver sample** – 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
✓ **Duplicate liver sample** – 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
— **Primary muscle sample** – 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
— **Duplicate muscle sample** – 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)

Notes: ______________________________

Morphometric/Other

✓ **Incisor bar** – WhirlPack (label inside bag)

✓ **Metatarsus** – Ziplock (label inside bag)

At the proximal end (closest to body of the caribou) of the metatarsal, there is a joint that is not readily seen. As you run your hand away from the hoof up the metatarsus towards the ankle/"hock", it will start widening close to the ankle/"hock" (Figure 24). About ½ or ¾ of a centimeter along the widened section, with a sharp knife make a cut completely around the bone and as deep as you can through the tendons. If the cut is in the right spot, you can bend the joint over your knee and the joint will break cleanly. If you are a bit off the right spot, there are 3 small bones that may come off with the metatarsus. If they aren't attached too tightly, try to take them off in the field using a sharp knife. This is easier to do when the bone is fresh, but they can be removed in the lab.

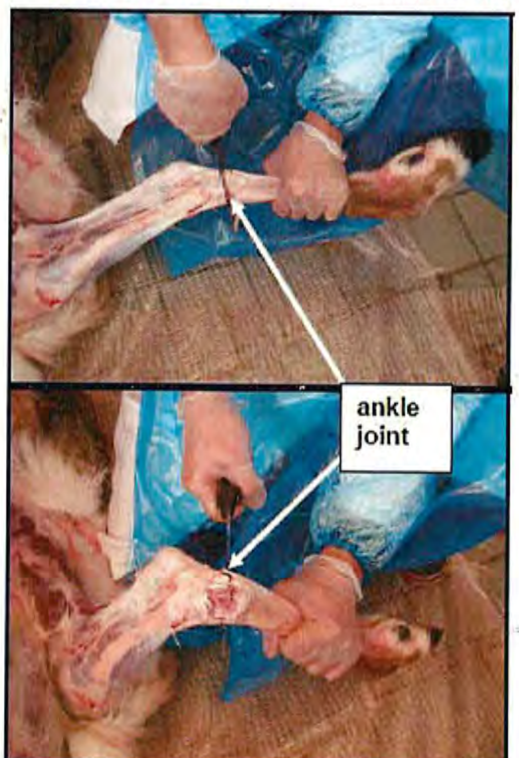


Figure 24. Removal of metatarsus

Figure 25. Removal of hoof

Animal ID: RANG-2015- 01
(i.e., -01)

___**Metatarsus marrow fat:**
Good (yellow and/or firm) Poor (pink and/or semi-solid) Very Poor (red and/or runny)
Process in lab:* **length: _______ cm; **diameter:** _______ mm; **circumference:** _______ mm

___ **Back fat depth:** 14 (top) **mm** check side 17 mm

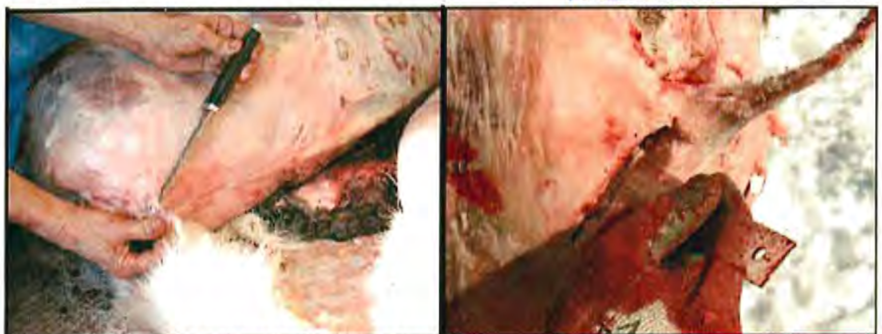


Figure 16. Back fat depth. Left: knife showing cut angle from base of tail on skinned animal. Right: measuring depth of back fat.

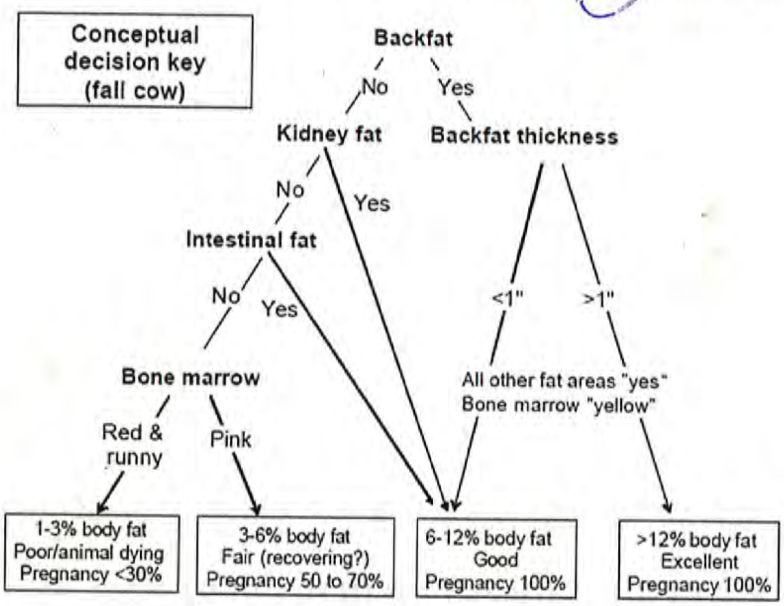
___ **Other collections (write-in):**

Notes:

Body condition (hunter assessment) (circle): poor, fair, good, excellent

- Poor (skinny) (no back fat, little or no gut or kidney fat, bone marrow red and runny)
- Fair (not too skinny) (little back fat, some gut or kidney fat, bone marrow pink and greasy)
- Good (fat) (nice layer back fat and pleny of gut or kidney fat, bone marrow a bit greasy and slightly pink)
- Excellent (very fat) (thick layer back fat all the way up the back and fat everywhere in gut and around kidney, bone marrow solid and cream colored)

Body condition (eye ball-a-metric) (circle): poor, fair, good, excellent



Notes:

Caribou/Tuttu Tissue Sampling - 2015 **Animal ID: RANG-2015-** 02
(i.e., -01)

Date of Harvest (MM/DD/YY): 08/17/15

Time of Harvest (00:00): 17:40

Harvest Location (common. name): Kuukpik Road

Road: GPS: 70°16'25.451 N 151°06'26.135 W

Caribou: **Lat:** 70.274039 N **Long:** 151.277889 W

Herd name (CAH, TCH, UNK): TCH

Field Personnel: L. Davis C. Shoemaker

Hunter(s) ID Number (##) (referenced in logbook): [redacted]

Picture of caribou with ID label? Y / N Photo No. #3151

Sex (circle): Male Female or ?

Lactating (circle): Yes No NA

Maturity class (circle): calf (<1yr) subadult adult

Antlered? (circle): Y / N **Antler** (circle): R +/or L **Velvet?** (circle): Y / N

SAMPLE IDENTIFICATION (complete sample labels)

Primary Liver ID (RANG–2015-##-L): RANG - 2015 - 02 - La

Time (00:00): 1740

Dup Liver Sample ID (RANG–2015-##-L): RANG - 2015 - 02 - Lb

Time (00:00): 1740

Primary Muscle Sample ID (RANG–2015-##-M): RANG - 2015 - 02 - Ma

Time (00:00): 1740

Duplicate Muscle Sample ID (RANG–2015-##-M): RANG - 2015 - 02 - Mb

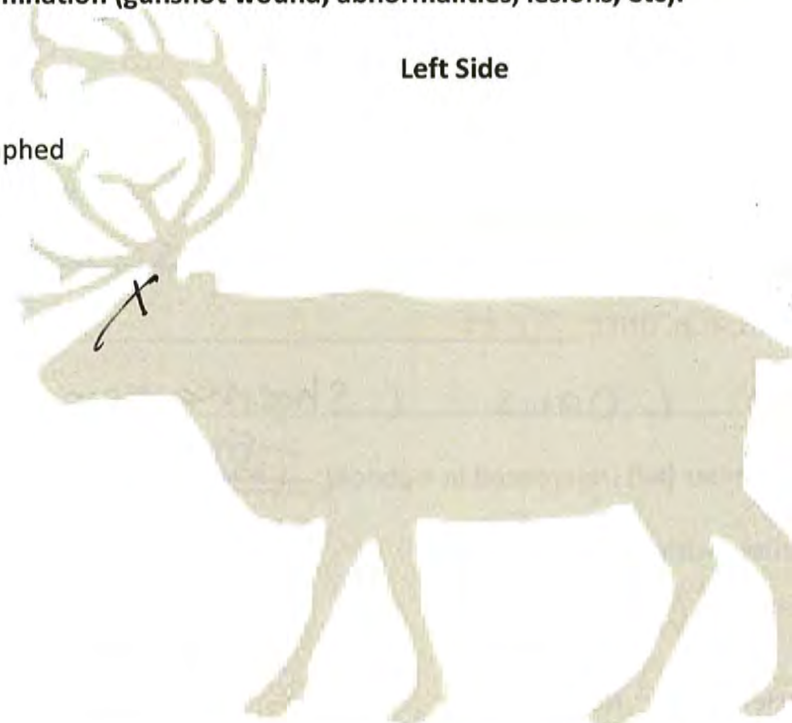
Time (00:00): 1740

Caribou/Tuttu Tissue Sampling - 2015 **Animal ID: RANG-2015-**02
(i.e., -01)

Gross External Examination (gunshot wound, abnormalities, lesions, etc):

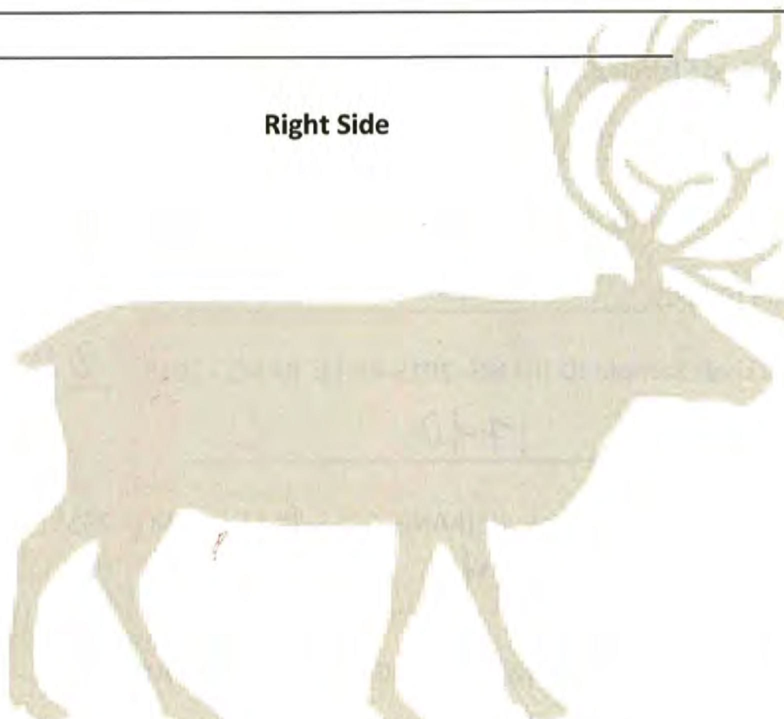
Symbols:
X =likely gunshot
O = lesion photographed
☐= lesion sampled

Left Side



Notes:____

Right Side



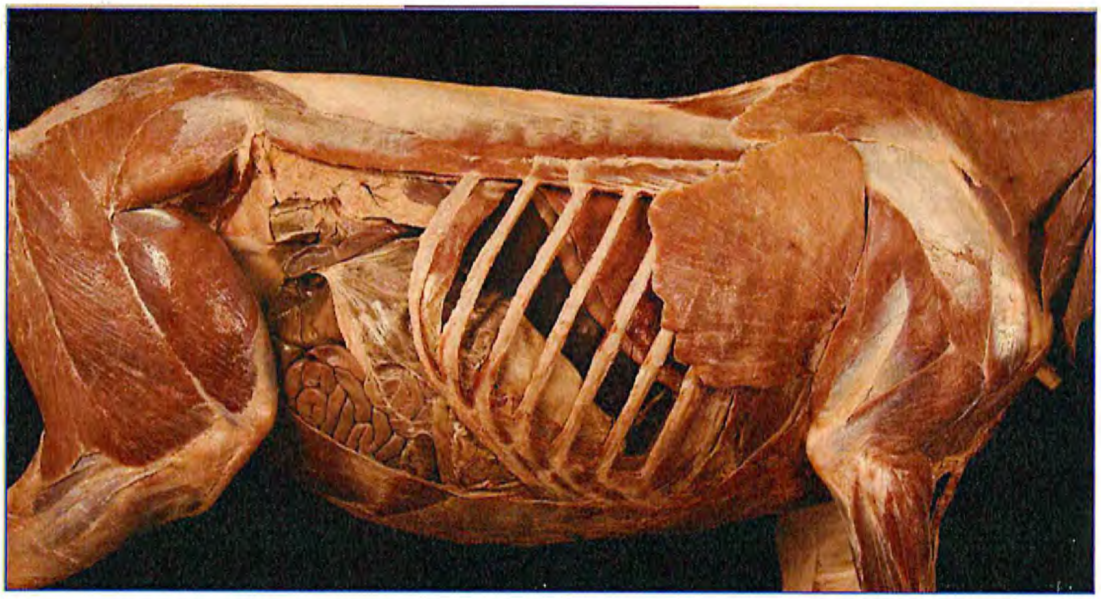
Notes:____

Gross Internal Examination (gunshot wound, abnormalities, lesions, etc) ***[RIGHT SIDE]*:**

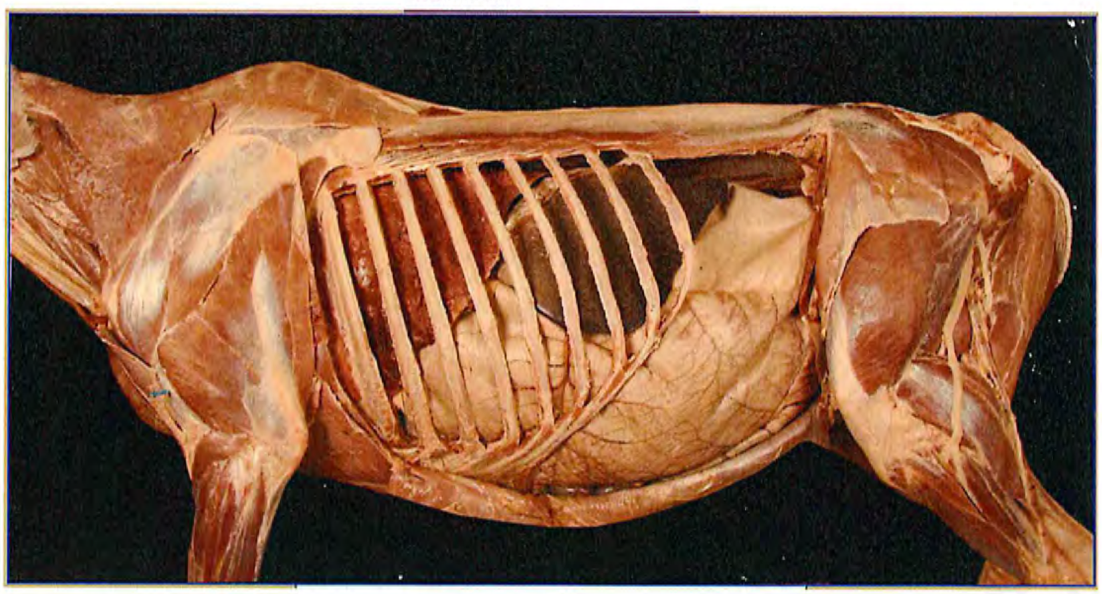
Symbols:
X =likely gunshot
O = lesion photographed
☐= lesion sampled

no abnormalities

Right Side



Left Side



Notes on next page:

Notes:

- Gut contents remained w/in gastrointestinal system? Y or N
- Gunshot path **clear** of abdomen? Y or N
- Liver and muscle samples collected w/o obvious external/internal contamination? ________
- Normal appearing tissue sampled? ________
- **Left Kidney fat** *(loose on left side of body, NOT attached to the liver)* (circle):
  no fat very little fat visible through the fat completely covered and not visible
- **Fetus present** (circle): Yes No or NA
- Other: ________

Extra Notes:

Animal ID: RANG-2015-02
(i.e., -01)

SAMPLE COLLECTION CHECKLIST :

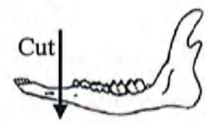
Tissues:

___ **Primary liver sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
___ **Duplicate liver sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
___ **Primary muscle sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
___ **Duplicate muscle sample –** 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)

Notes: ______________________________

Morphometric/Other

___ **Incisor bar –** WhirlPack (label inside bag)



___ **Metatarsus –** Ziplock (label inside bag)

At the proximal end (closest to body of the caribou) of the metatarsal, there is a joint that is not readily seen. As you run your hand away from the hoof up the metatarsus towards the ankle/"hock", it will start widening close to the ankle/"hock" (Figure 24). About ½ or ¾ of a centimeter along the widened section, with a sharp knife make a cut completely around the bone and as deep as you can through the tendons. If the cut is in the right spot, you can bend the joint over your knee and the joint will break cleanly. If you are a bit off the right spot, there are 3 small bones that may come off with the metatarsus. If they aren't attached too tightly, try to take them off in the field using a sharp knife. This is easier to do when the bone is fresh, but they can be removed in the lab.

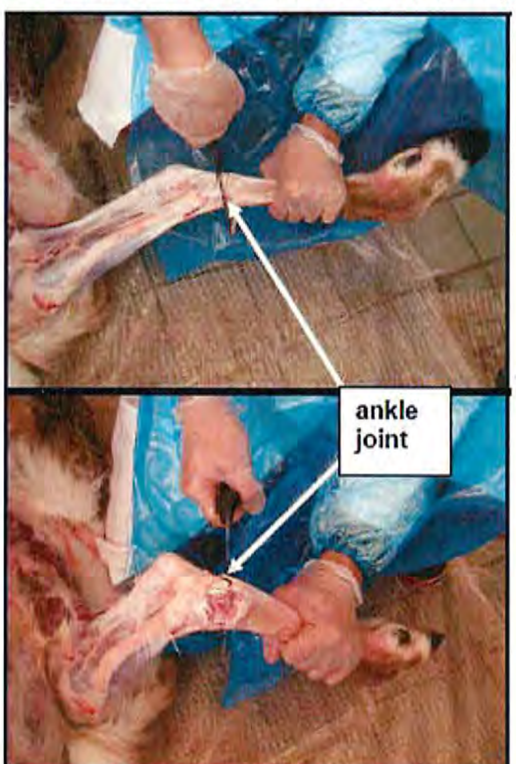


Figure 24. Removal of metatarsus


Figure 25. Removal of hoof

___**Metatarsus marrow fat:**
Good (yellow and/or firm) Poor (pink and/or semi-solid) Very Poor (red and/or runny)
Process in lab:* **length: _______ cm; **diameter:** _______ mm; **circumference:** _______ mm

___ **Back fat depth:** 8 mm

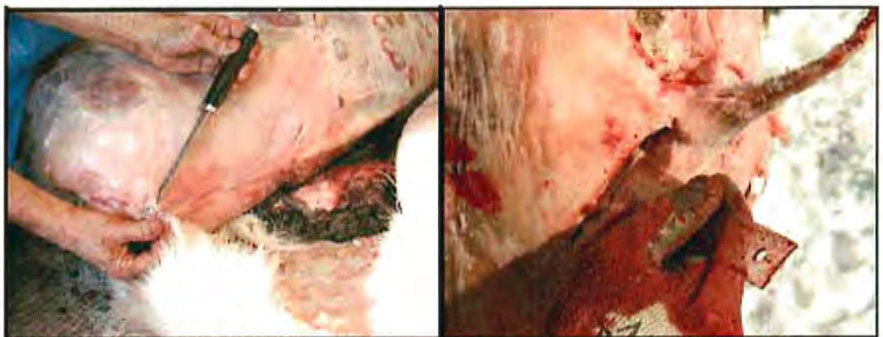


Figure 16. Back fat depth. Left: knife showing cut angle from base of tail on skinned animal. Right: measuring depth of back fat.

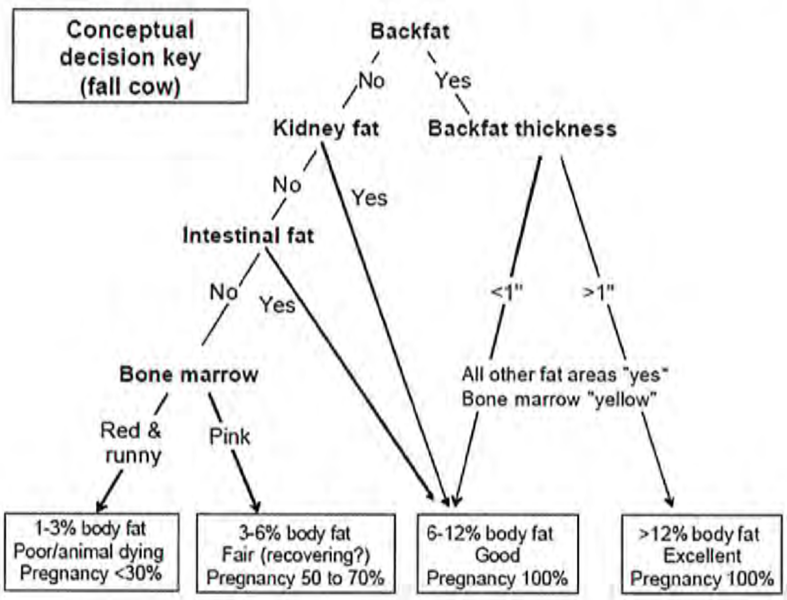
___ **Other collections (write-in):**

Notes:

Body condition (hunter assessment) (circle): poor, fair, good, excellent

- Poor (skinny) (no back fat, little or no gut or kidney fat, bone marrow red and runny)
- Fair (not too skinny) (little back fat, some gut or kidney fat, bone marrow pink and greasy)
- Good (fat) (nice layer back fat and pleny of gut or kidney fat, bone marrow a bit greasy and slightly pink)
- Excellent (very fat) (thick layer back fat all the way up the back and fat everywhere in gut and around kidney, bone marrow solid and cream colored)

Body condition (eye ball-a-metric) (circle): poor, fair, good, excellent



Notes:

RANG-2015

-02

Caribou/Tuttu Tissue Sampling - 2015 **Animal ID: RANG-2015-** 03
(i.e., -01)

Date of Harvest (MM/DD/YY): 08/17/15

Time of Harvest (00:00): 17:40

Harvest Location (common. name): Kuukpik Road

Lat: 70.274039N Sumeas -02 **Long:** ~~151~~ 151.277889 W

Herd name (CAH, TCH, UNK): TCH

Field Personnel: L. Davis C. Shoemaker

Hunter(s) ID Number (##) (referenced in logbook): [redacted]

Picture of caribou with ID label? Y / N Photo No. #3152

Sex (circle): Male Female or ?

Lactating (circle): Yes No

Maturity class (circle): calf (<1yr) subadult adult

Antlered? (circle): Y / N **Antler** (circle): R +/or L **Velvet?** (circle): Y / N

SAMPLE IDENTIFICATION (complete sample labels)

Primary Liver ID (RANG–2015-##-L): RANG - 2015 - 03 - La

Time (00:00): 1740

Dup Liver Sample ID (RANG–2015-##-L): RANG - 2015 - 03 - Lb

Time (00:00): 1740

Primary Muscle Sample ID (RANG–2015-##-M): RANG - 2015 - 03 - Ma

Time (00:00): 1740

Duplicate Muscle Sample ID (RANG–2015-##-M): RANG - 2015 - 03 - Mb

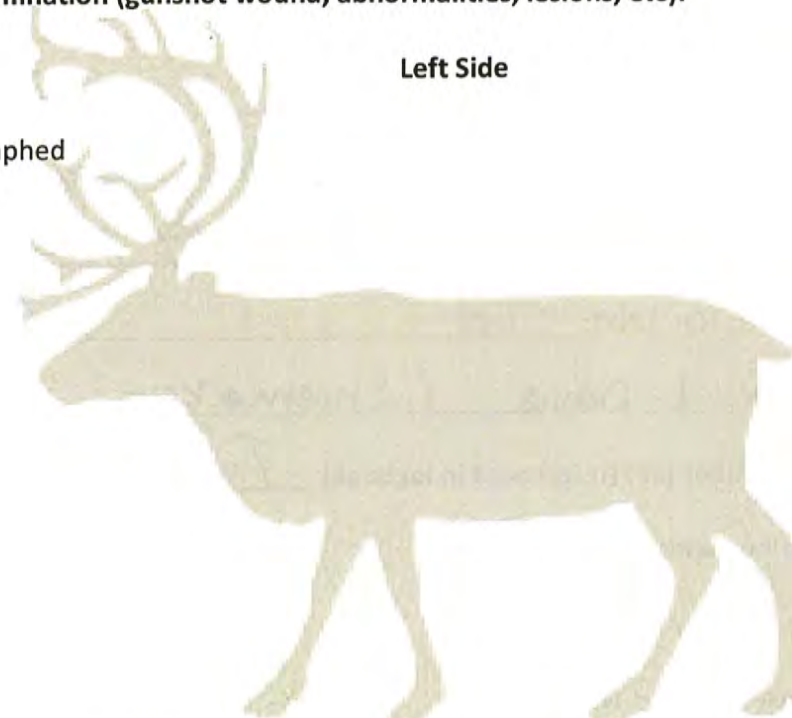
Time (00:00): 1740

Caribou/Tuttu Tissue Sampling - 2015 **Animal ID: RANG-2015-03**
(i.e., -01)

Gross External Examination (gunshot wound, abnormalities, lesions, etc):

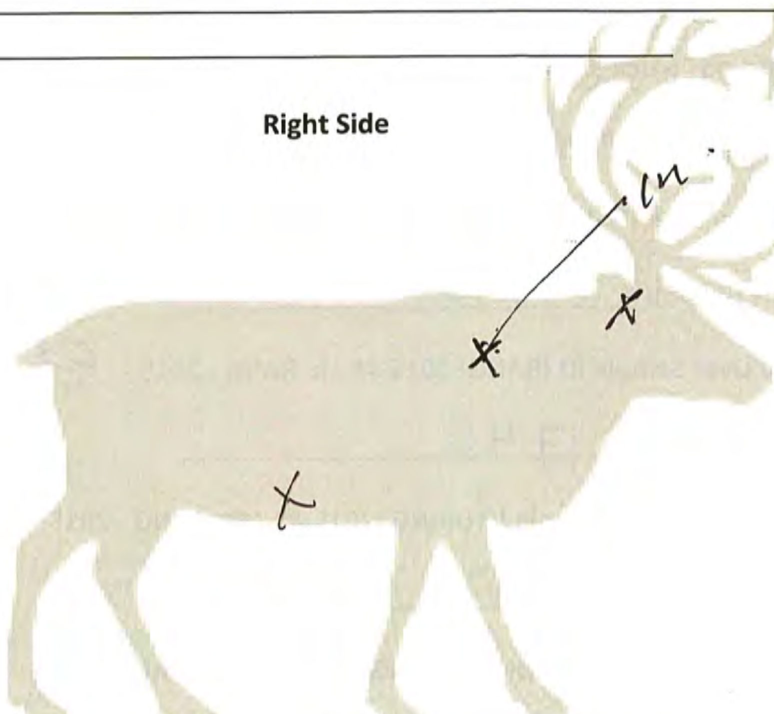
Symbols:
X =likely gunshot
O = lesion photographed
☐= lesion sampled

Left Side



Notes:____

Right Side



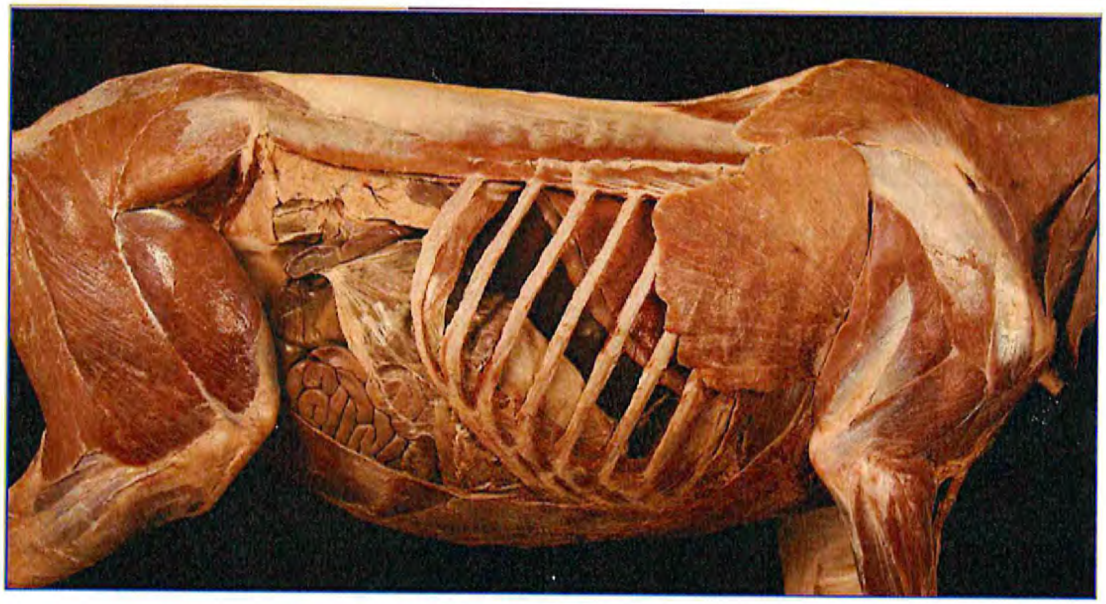
Notes:____

Gross Internal Examination (gunshot wound, abnormalities, lesions, etc) ***[RIGHT SIDE]*:**

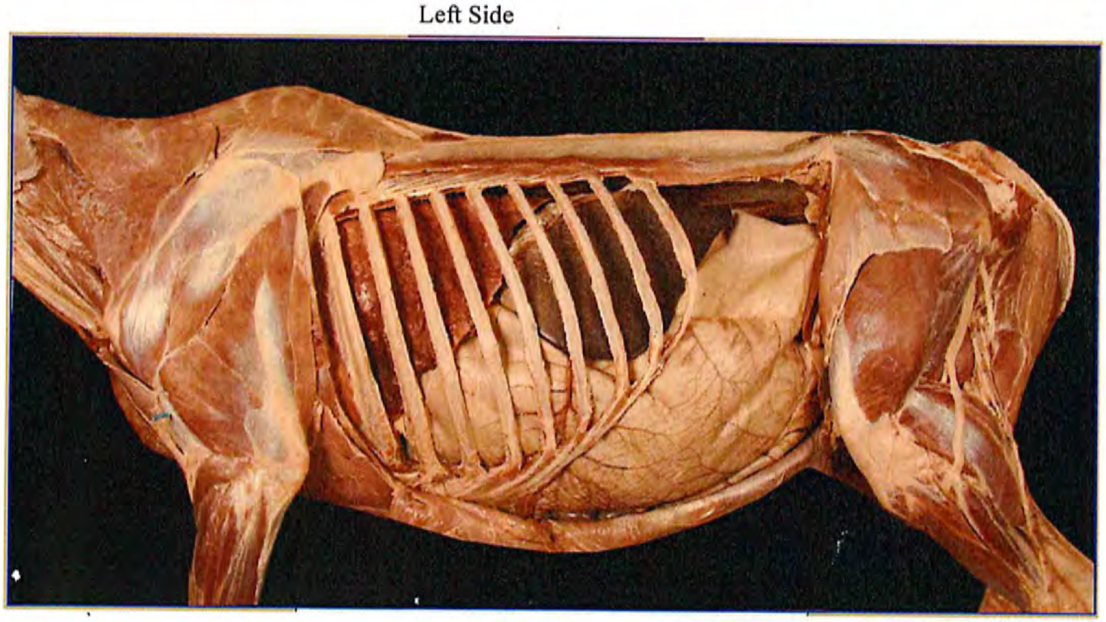
Symbols:
X =likely gunshot
O = lesion photographed
☐= lesion sampled

no abnormalities

Right Side



Left Side



Notes on next page:

Caribou/Tuttu Tissue Sampling - 2015 **Animal ID: RANG-2015-** 03
(i.e., -01)

Notes:

- Gut contents remained w/in gastrointestinal system? Y or N
- Gunshot path **clear** of abdomen? Y or N - but not break rumen
- Liver and muscle samples collected w/o obvious external/internal contamination?
- Normal appearing tissue sampled? yes
- **Left Kidney fat** *(loose on left side of body, NOT attached to the liver)* (circle):
  no fat very little fat visible through the fat completely covered and not visible
- **Fetus present** (circle): Yes No or NA
- Other:

Extra Notes:

very dry fascia, noted by Sammy
photo # 3162

Liver had some gut contents on external surface.
Sampled as cleanly as possible

Caribou/Tuttu Tissue Sampling - 2015

Animal ID: RANG-2015- 03
(i.e., -01)

SAMPLE COLLECTION CHECKLIST :

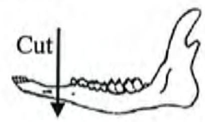
Tissues:

X **Primary liver sample** – 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Duplicate liver sample** – 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Primary muscle sample** – 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Duplicate muscle sample** – 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)

Notes: ______________________________

Morphometric/Other

X **Incisor bar** – WhirlPack (label inside bag)



X **Metatarsus** – Ziplock (label inside bag)

At the proximal end (closest to body of the caribou) of the metatarsal, there is a joint that is not readily seen. As you run your hand away from the hoof up the metatarsus towards the ankle/"hock", it will start widening close to the ankle/"hock" (Figure 24). About ½ or ¾ of a centimeter along the widened section, with a sharp knife make a cut completely around the bone and as deep as you can through the tendons. If the cut is in the right spot, you can bend the joint over your knee and the joint will break cleanly. If you are a bit off the right spot, there are 3 small bones that may come off with the metatarsus. If they aren't attached too tightly, try to take them off in the field using a sharp knife. This is easier to do when the bone is fresh, but they can be removed in the lab.

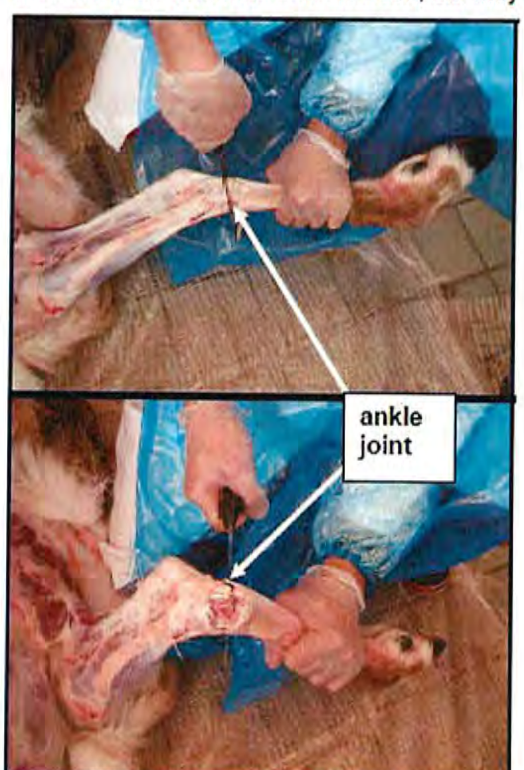


Figure 24. Removal of metatarsus

Figure 25. Removal of hoof

___Metatarsus marrow fat:
Good (yellow and/or firm) Poor (pink and/or semi-solid) Very Poor (red and/or runny)
Process in lab: **length:** ______ cm; **diameter:** ______ mm; **circumference:** _______ mm

___ **Back fat depth:** _______ **mm** unable to measure

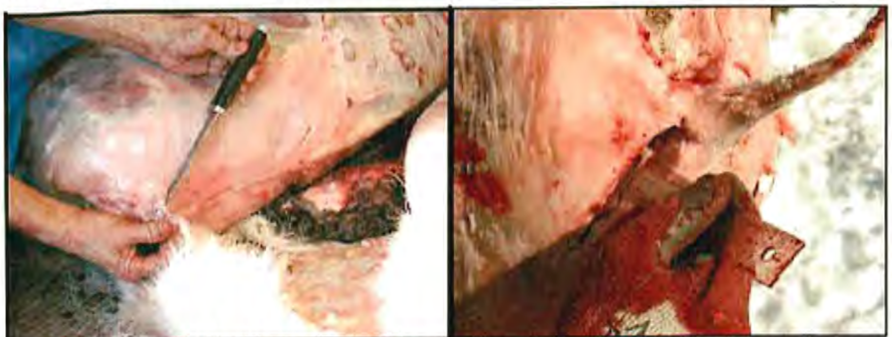


Figure 16. Back fat depth. Left: knife showing cut angle from base of tail on skinned animal. Right: measuring depth of back fat.

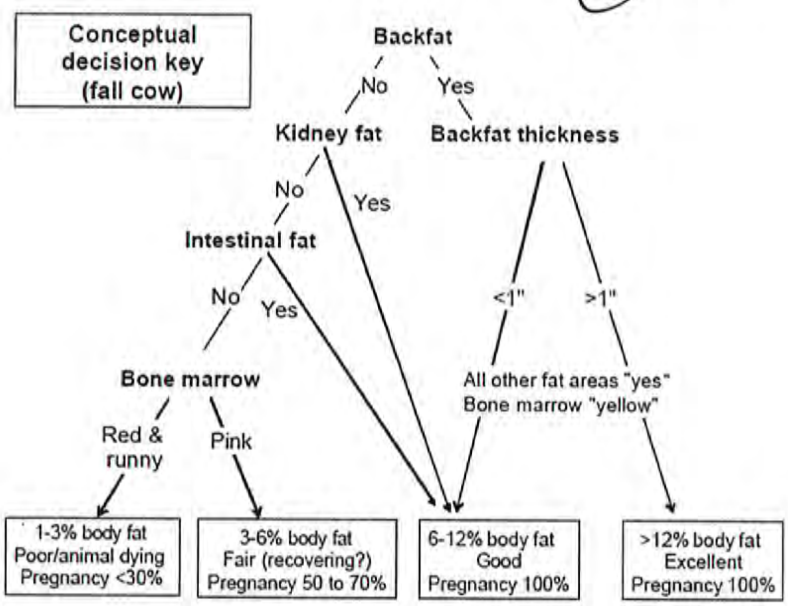
___ **Other collections (write-in):**

Notes:

Body condition (hunter assessment) (circle): poor, fair, good, excellent

- Poor (skinny) (no back fat, little or no gut or kidney fat, bone marrow red and runny)
- Fair (not too skinny) (little back fat, some gut or kidney fat, bone marrow pink and greasy)
- Good (fat) (nice layer back fat and pleny of gut or kidney fat, bone marrow a bit greasy and slightly pink)
- Excellent (very fat) (thick layer back fat all the way up the back and fat everywhere in gut and around kidney, bone marrow solid and cream colored)

Body condition (eye ball-a-metric) (circle): poor, fair, good, excellent



Notes:

RANG-2015
-03

Caribou/Tuttu Tissue Sampling - 2015 **Animal ID: RANG-2015-** 04
(i.e., -01)

Date of Harvest (MM/DD/YY): 08/17/15

Time of Harvest (00:00): 17:40

Harvest Location (common. name): Kuukpik Road

Lat: 70.274039 N Same as -02 **Long:** 151.277889 W

Herd name (CAH, TCH, UNK): TCH

Field Personnel: L. Davis C. Shoemaker

Hunter(s) ID Number (##) (referenced in logbook): [redacted]

Picture of caribou with ID label? Y / N Photo No. #3157

Sex (circle): Male Female or ?

Lactating (circle): Yes No

Maturity class (circle): calf (<1yr) subadult adult

Antlered? (circle): Y / N **Antler** (circle): R +/or L **Velvet?** (circle): Y / N

SAMPLE IDENTIFICATION (complete sample labels)

Primary Liver ID (RANG–2015-##-L): RANG - 2015 - 04 - La

Time (00:00): 1740

Dup Liver Sample ID (RANG–2015-##-L): RANG - 2015 - 04 - Lb

Time (00:00): 1740

Primary Muscle Sample ID (RANG–2015-##-M): RANG - 2015 - 04 - Ma

Time (00:00): 1740

Duplicate Muscle Sample ID (RANG–2015-##-M): RANG - 2015 - 04 - Mb

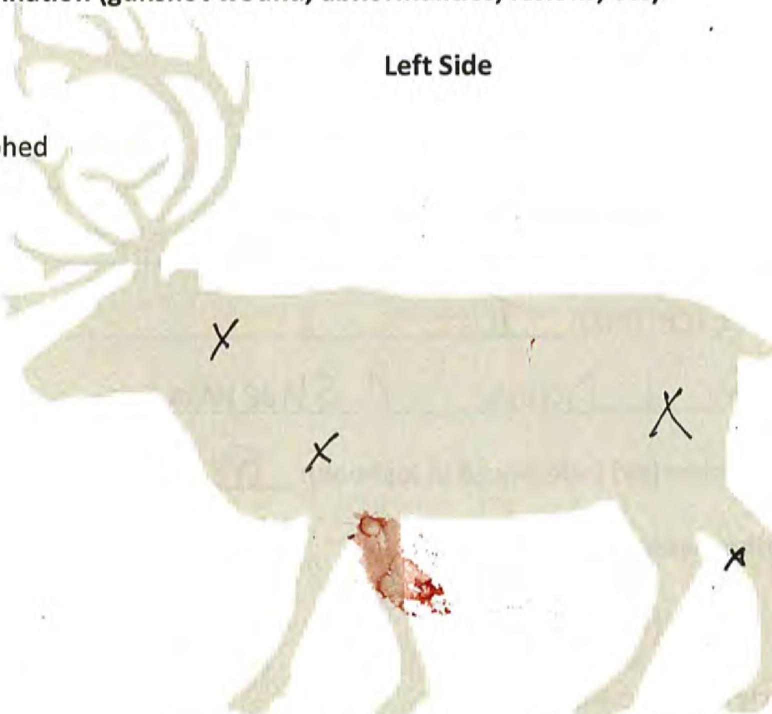
Time (00:00): 1740

Caribou/Tuttu Tissue Sampling - 2015 **Animal ID: RANG-2015-04**
(i.e., -01)

Gross External Examination (gunshot wound, abnormalities, lesions, etc):

Symbols:
X =likely gunshot
O = lesion photographed
☐= lesion sampled

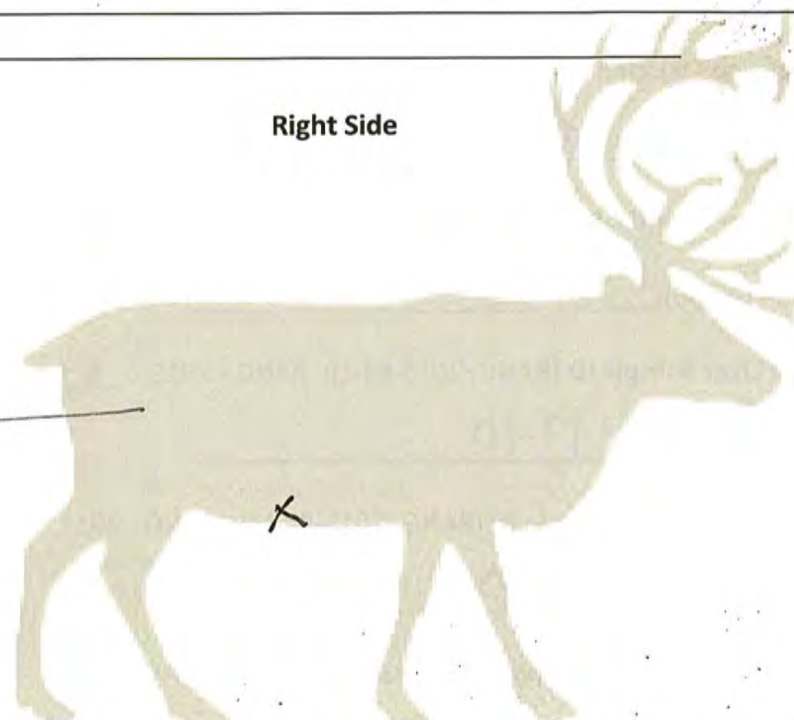
Left Side



Notes:________________________________

Right Side

exit wound



Notes:________________________________

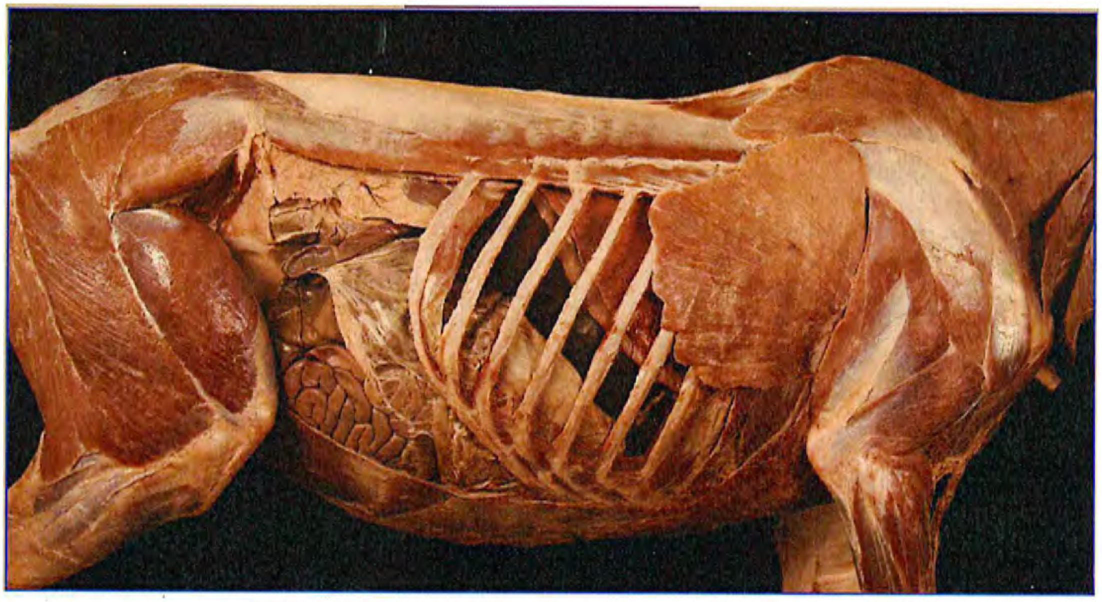
Caribou/Tuttu Tissue Sampling - 2015 **Animal ID: RANG-2015-** 04
(i.e., -01)

Gross Internal Examination (gunshot wound, abnormalities, lesions, etc) ***[RIGHT SIDE]*:**

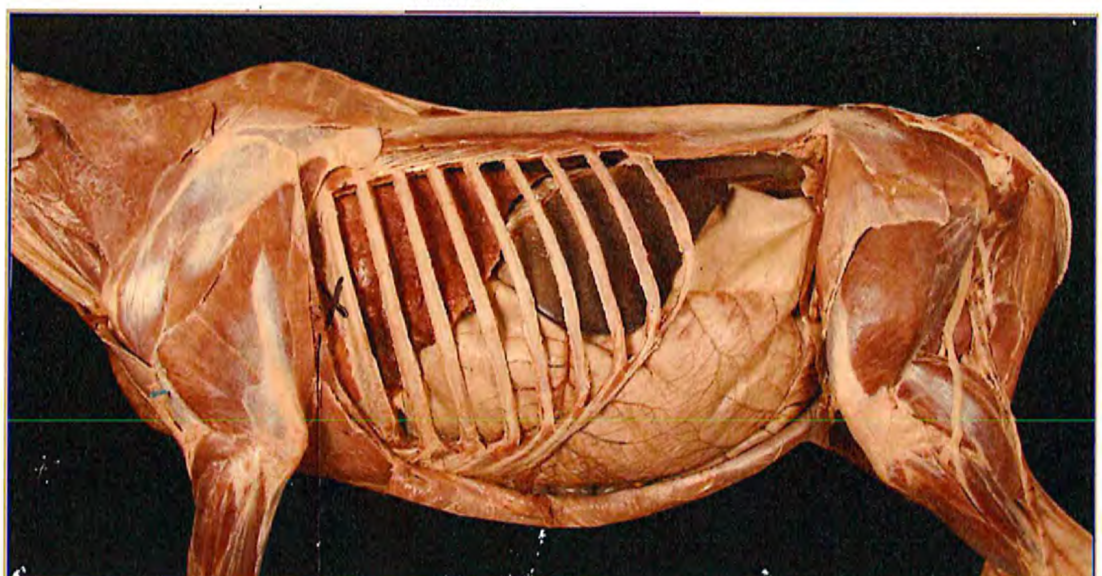
Symbols:
X =likely gunshot
O = lesion photographed
□= lesion sampled

no abnormalities

Right Side



Left Side



X

Notes on next page:

gun shot through the lungs - photo taken

Caribou/Tuttu Tissue Sampling - 2015 **Animal ID: RANG-2015-** 04
(i.e., -01)

Notes:

- Gut contents remained w/in gastrointestinal system? Y or N - some spillage, but majority removed w/ rumen.
- Gunshot path **clear** of abdomen? Y or N gunshot through lower abdomen see diagrams
- Liver and muscle samples collected w/o obvious external/internal contamination? see note *
- Normal appearing tissue sampled? yes
- **Left Kidney fat** *(loose on left side of body, NOT attached to the liver)* (circle):
  no fat very little fat visible through the fat completely covered and not visible
- **Fetus present** (circle): Yes No or NA
- Other: ______

Extra Notes:
* liver clear of any bullet fragments. some esphogeal contents + rumen contents on external surface of liver.
* muscle tissue was sample - body cavity was full of blood, pooling around tenderloin tissue.

SAMPLE COLLECTION CHECKLIST :

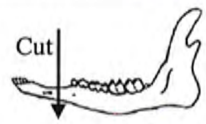
Tissues:

X **Primary liver sample** – 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Duplicate liver sample** – 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Primary muscle sample** – 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)
X **Duplicate muscle sample** – 1° Teflon Bag / 2° Teflon Bag (Labeled) / 3° WhirlPac (labeled)

Notes: ______________________________

Morphometric/Other

X **Incisor bar** – WhirlPack (label inside bag)



X **Metatarsus** – Ziplock (label inside bag)

At the proximal end (closest to body of the caribou) of the metatarsal, there is a joint that is not readily seen. As you run your hand away from the hoof up the metatarsus towards the ankle/"hock", it will start widening close to the ankle/"hock" (Figure 24). About ½ or ¾ of a centimeter along the widened section, with a sharp knife make a cut completely around the bone and as deep as you can through the tendons. If the cut is in the right spot, you can bend the joint over your knee and the joint will break cleanly. If you are a bit off the right spot, there are 3 small bones that may come off with the metatarsus. If they aren't attached too tightly, try to take them off in the field using a sharp knife. This is easier to do when the bone is fresh, but they can be removed in the lab.

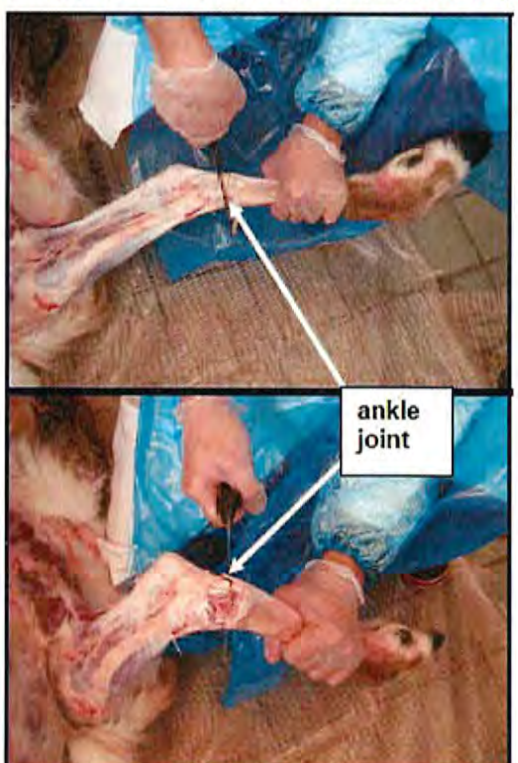


Figure 24. Removal of metatarsus

Figure 25. Removal of hoof

___**Metatarsus marrow fat:**

Good (yellow and/or firm) Poor (pink and/or semi-solid) Very Poor (red and/or runny)

Process in lab:* **length: _______ cm; **diameter:** _______ mm; **circumference:** _______ mm

___ **Back fat depth:** 11 **mm**

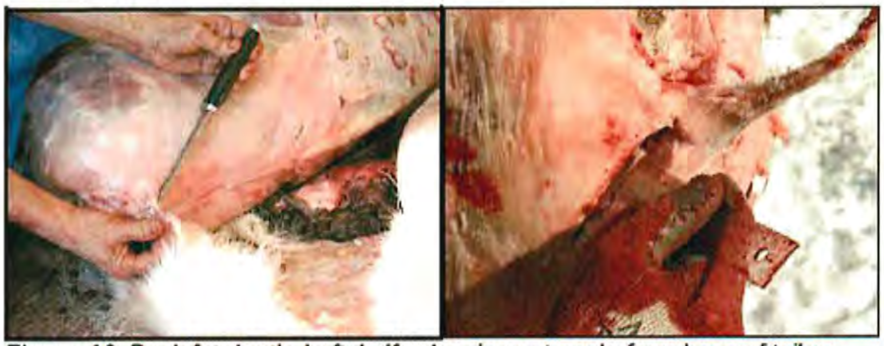


Figure 16. Back fat depth. Left: knife showing cut angle from base of tail on skinned animal. Right: measuring depth of back fat.

___ **Other collections (write-in):**

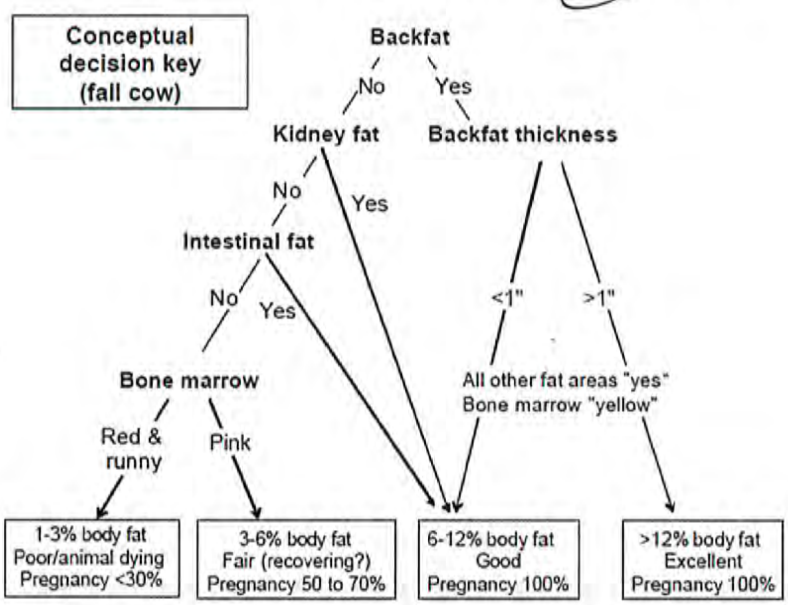
Notes:

Animal ID: RANG-2015- 04
(i.e., -01)

Body condition (hunter assessment) (circle): poor, fair, good, excellent

- Poor (skinny) (no back fat, little or no gut or kidney fat, bone marrow red and runny)
- Fair (not too skinny) (little back fat, some gut or kidney fat, bone marrow pink and greasy)
- Good (fat) (nice layer back fat and pleny of gut or kidney fat, bone marrow a bit greasy and slightly pink)
- Excellent (very fat) (thick layer back fat all the way up the back and fat everywhere in gut and around kidney, bone marrow solid and cream colored)

Body condition (eye ball-a-metric) (circle): poor, fair, good, excellent



Notes:

RANG-2015
-04

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2014-001
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 13 Nov 2014

Sample Collectors: JRR, JCS

Time sampled: 16:20

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq channel
b) River Mile and/or Camp: Nanuk lake

GPS Coordinates: 70.31020 -151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 13 Nov 14 16:20

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ______

Kill Method: ______

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_13NOV_ACIS_001

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2014-002
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 13 Nov 2014

Sample Collectors: JRR, JCS

Time sampled: 16:20

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq channel
b) River Mile and/or Camp: Nanuk Lake

GPS Coordinates: 70.31020 -151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 13 Nov 16:20

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_13NOV_ACIS_002

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2014-003
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 13 NOV 2014

Sample Collectors: JRR, JCS

Time sampled: 16:20

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq channel
b) River Mile and/or Camp: Nanuk lake

GPS Coordinates: 70.31020 -151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16:20

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_13NOV_ACIS_003

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2014-004

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Arctic Cisco

Date sampled: 13 Nov 2014

Sample Collectors: JRR, JCS

Time sampled: 16:20

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:

a) Waterbody Name: Nigliq channel

b) River Mile and/or Camp: Nanuk lake

GPS Coordinates: 70.31020 -151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16:20

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_13NOV_ACIS_004

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS 2014 005

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 13 Nov 2014

Sample Collectors: JRR, JCS

Time sampled: 16:20

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq channel

b) River Mile and/or Camp:

GPS Coordinates: 70.31020 -151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16:20

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_13NOV_ACIS_005

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS 2014 006

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 13 Nov 2014

Sample Collectors: JRR, JCS

Time sampled: 16:20

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:

a) Waterbody Name: Nigliq channel

b) River Mile and/or Camp:

GPS Coordinates: 70.31020 -151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16:20

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_13NOV_ACIS_006

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ~~2014~~ ACIS-2014-007

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Arctic Cisco

Date sampled: 13 Nov 2014

Time sampled: 16:20

Sample Collectors: JRR, JCS

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:

a) Waterbody Name: Nighq channel

b) River Mile and/or Camp: Nanuk lake

GPS Coordinates: 70.31020 -151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16:20

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_13NOV_ACIS_007

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS 2014 008

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Arctic Cisco

Date sampled: 13 Nov 2014

Sample Collectors: JRR, JCS

Time sampled: 16:20

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nighq Channel
b) River Mile and/or Camp: Nanuk Lake

GPS Coordinates: 70.31020 -151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16:20

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ______

Kill Method: ______

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_13NOV_ACIS_008

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS 2014 009 Fish species (common name): ARCTIC CISCO

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Date sampled: 13 Nov 2014 Sample Collectors: JRR, JCS

Time sampled: 16:20

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq channel GPS Coordinates: 70.31020 -151.02280

b) River Mile and/or Camp: Nanuk lake

Name of Harvester: [redacted] Approx Time of Harvest: 16:20

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ________ Kill Method: ________

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_13NOV_ACIS_009

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS 2014 010
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 13 NOV 2014

Sample Collectors: JRR, JCS

Time sampled: 16:20

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: NIGLIQ CHANNEL
b) River Mile and/or Camp: NANUK LAKE

GPS Coordinates: 70.31020 ~~70.031020~~ -151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16:20

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_13NOV_ACIS_010

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS 2014 011 Fish species (common name): ARCTIC CISCO
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Date sampled: 13 NOV 2014 Sample Collectors: JRR, JCS

Time sampled: 16:20

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: NIGLIQ CHANNEL
b) River Mile and/or Camp: NANUK LAKE

GPS Coordinates: 70.31020 ~~70.031025~~ -151.02280

Name of Harvester: [redacted] Approx Time of Harvest: 16:20

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*____ Kill Method: ____

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_13NOV_ACIS_011

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS 2014 012
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 13 NOV 2014

Sample Collectors: JRR, JCS

Time sampled: 16:20

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: NIGLIQ CHANNEL
b) River Mile and/or Camp: NANUK LAKE

GPS Coordinates: 70.31020 ~~70.031020~~ -151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16:20

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_13NOV_ACIS_012

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS 2014 013 Fish species (common name): ARCTIC CISCO

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Date sampled: 13 NOV 2014 Sample Collectors: JRR, JCS

Time sampled: 16:20

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: NIGLIQ CHANNEL GPS Coordinates: 70.31020 -151.02280

b) River Mile and/or Camp: NANUK LAKE

Name of Harvester: [redacted] Approx Time of Harvest: 16:20

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ACIS_14 NOV_ACIS_013

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS 2014 014
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 13 NOV 2014

Sample Collectors: JRR, JCS

Time sampled: 16:20

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: NIGLIQ CHANNEL
b) River Mile and/or Camp: NANUK LAKE

GPS Coordinates: 70.31020 -151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16:20

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ~~ACIS~~ 2014_13NOV_ACIS_014

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS 2014 015
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 13 NOV 2014

Sample Collectors: JRR, JCS

Time sampled: 16:20

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: NIGLIQ CHANNEL
b) River Mile and/or Camp: NANUK LAKE

GPS Coordinates: 70.31020 -151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16:20

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_13NOV_ACIS_015

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS - 2014 - 016

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 16 Nov 2014

Sample Collectors: JCS, JRR

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: Nanuq lake

GPS Coordinates: 70.31020
151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16 Nov 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_16NOV_ACIS_016

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

WE RAN OUT of data forms (THIS FORM). Thus, ACIS-2014-030 does NOT HAVE A SHEET. ALL INFO for ACIS-2014-030 IS THE SAME AS SAMPLES ACIS-2014-016 Thru -029. Photo # is 2014_16NOV_ACIS_030.

EQUIPBLANK-2014-001 INFO follows ALL info FOR samples ACIS-2014-001 Through -015.

EQUIPBLANK-2014-002 info follows ALL info for samples ACIS-2014-016 Through -029.

* Leslie Davis completed a sample sheet for ACIS-2014-030 upon receipt of sample at ERM office. LD

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS - 2014 - 017

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 16 Nov 2014

Sample Collectors: JCS, JRR

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:

a) Waterbody Name: Niglig Channel

b) River Mile and/or Camp: Nanuq Lake

GPS Coordinates: 70.31020 151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16 Nov 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_16NOV_ACIS_017

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS - 2014-018

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 16 Nov 2014

Sample Collectors: JCS, JRR

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:

a) Waterbody Name: Nigliq channel

b) River Mile and/or Camp: Nanuk Lake

GPS Coordinates: 70.31020 151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16 Nov 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify: ____

Kill Method: ____

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_16NOV_ACIS_018

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2014-019
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 16 Nov 2014

Sample Collectors: JCS, JRR

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Niglig channel
b) River Mile and/or Camp: Nanuq lake

GPS Coordinates: 70.31020
151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16 Nov 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify: ______

Kill Method: ______

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_16NOV_ACIS_019

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2014-020
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Arctic Cisco

Date sampled: 16 Nov 2014

Sample Collectors: JCS, JRR

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig channel
b) River Mile and/or Camp: Nanuq lake

GPS Coordinates: 70.31020 151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16 Nov 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_16NOV ACIS_020

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2014-021
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Arctic Cisco

Date sampled: 16 Nov 2014

Sample Collectors: JCS, JRR

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig channel
b) River Mile and/or Camp: Naning lake

GPS Coordinates: 70.31020 151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16 Nov 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_16NOV_ACIS_021

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2014-022

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 16 Nov 2014

Sample Collectors: JCS, JRR

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq channel
b) River Mile and/or Camp: Nanuq lake

GPS Coordinates: 70.31020 151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16 Nov 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ____

Kill Method: ____

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_16NOV_ACIS_022

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2014-023

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 16 Nov 2014

Sample Collectors: JCS, JRR

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq channel
b) River Mile and/or Camp: Nanuq lake

GPS Coordinates: 70.31020 151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16 Nov 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_16NOV_ACIS_023

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ~~2014-20~~ ACIS-2014-024

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Arctic Cisco

Date sampled: 16 Nov 2014

Sample Collectors: JCS, JRR

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq channel

b) River Mile and/or Camp: Nanuq lake

GPS Coordinates: 70.31020 151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16 Nov 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_16NOV_ACIS_024

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2014-025

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Arctic Cisco

Date sampled: 16 Nov 2014

Sample Collectors: JCS, JRR

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:

a) Waterbody Name: Nigliq channel

b) River Mile and/or Camp: Nanuq lake

GPS Coordinates: 70.31020 151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16 Nov 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ________

Kill Method: ________

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_16NOV_ACIS_025

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2014-026
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 16 Nov 2014

Sample Collectors: JCS, JRR

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq channel
b) River Mile and/or Camp: Nanuq Lake

GPS Coordinates: 70.31020 151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16 Nov 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_16NOV_ACIS_026

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2014-027
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 16 NOV 2014

Sample Collectors: JCS, JRR

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: Nanuq Lake

GPS Coordinates: 70.31020
151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16 Nov 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify: ______

Kill Method: ______

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_16NOV_ACIS027

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2014-028

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 16 Nov 2014

Sample Collectors: JCS, JRR

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Nigliq channel

b) River Mile and/or Camp: Nanuq Lake

GPS Coordinates: 70.31020 151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16 Nov 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify: ________

Kill Method: ________

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_16NOV_ACIS_028

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2014-029

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): ARCTIC CISCO

Date sampled: 16 Nov 2014

Sample Collectors: JCS, JRR

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:

a) Waterbody Name: Nigliq channel

b) River Mile and/or Camp: Nanuq lake

GPS Coordinates: 70.31020 151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16 Nov 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method:

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_16NOV_ACIS_029

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2014-030

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish); BURB (Burbot)

Fish species (common name): Arctic Cisco

Date sampled: 16 Nov 2014

Sample Collectors: JCS, JRR

Time sampled: 17:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: Nanuq Lake

GPS Coordinates: 70.31020 151.02280

Name of Harvester: [redacted]

Approx Time of Harvest: 16 Nov 17:00

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ________

Kill Method: ________

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: 2014_16NOV_ACIS_030

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : EQUIPBLANK-2015-01
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): ——

Date sampled: 11/2/15

Sample Collectors: John Rose, Joe Welch

Time sampled: 12:30pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq channel
b) River Mile and/or Camp: Wood's camp

GPS Coordinates: N 70.37825 W 151.09708 WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30pm

Harvest Method: ☐ Hook and Line ☑ Set Net ☐ Other specify:

Kill Method: Blunt force to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):
Samples hauled in a cooler behind snowmachine in a sled

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of ~~Fish Specimen~~: ~~EQUIPBLANK-2015-01.jpg~~
Blank ERM_2015-Equipblank_01.jpg

General condition of fish (external condition, tumors, lesions, etc.):
Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : EQUIPBLANK-2015-02 Fish species (common name): ——
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Date sampled: 11/2/15 Sample Collectors: John Rose, Joe Welch

Time sampled: 12:30pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig channel
b) River Mile and/or Camp: Wood's camp

GPS Coordinates: N70.39825 W151.09708 WGS 84

Name of Harvester: [redacted] Approx Time of Harvest: 12:30pm

Harvest Method: ☐ Hook and Line ☑ Set Net ☐ Other *specify:* ____ Kill Method: Blunt force to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Samples hauled in a cooler behind snowmachine in a sled

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ~~Eq~~ ERM_2015_Equipblank_02.jpg

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2015-01
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Arctic Cisco

Date sampled: 02 Nov 2015

Sample Collectors: John Rose, Joe Welch

Time sampled: 12:30 pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig Channel
b) River Mile and/or Camp: Wood's Camp

GPS Coordinates: N 70.398250 W 151.09708 WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30 pm

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*______

Kill Method: Blunt force trauma to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):
Samples removed from field in a cooler hauled in a sled behind a snowmachine

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM_ACIS-2015-001

General condition of fish (external condition, tumors, lesions, etc.):
Good condition

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS - 2015 - 02
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Arctic Cisco

Date sampled: 02 Nov 2015

Sample Collectors: John Rose, Joe Welch

Time sampled: 12:30 pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig Channel
b) River Mile and/or Camp: Wood's Camp

GPS Coordinates: N 70.398250 W 151.09708°
WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30 pm

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ________

Kill Method: Blunt force trauma to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):
Samples removed from field in a cooler hauled in a sled behind a snowmachine.

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM-ACIS-2015-002

General condition of fish (external condition, tumors, lesions, etc.):
Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2015-03
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): arctic Cisco

Date sampled: 02 Nov 2015

Sample Collectors: John Rose, Joe Welch

Time sampled: 12:30 pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: Wood's Camp

GPS Coordinates: N 70.39825° W 151.09708°
WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30 pm

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*________

Kill Method: Blunt force to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):
Samples hauled behind snowmachine in a cooler, in a sled.

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM-ACIS-2015-003

General condition of fish (external condition, tumors, lesions, etc.):
Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2015-04
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Arctic Cisco

Date sampled: 02 Nov 2015

Sample Collectors: John Rose, Joe Welch

Time sampled: 12:30 pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: Wood's Camp

GPS Coordinates: N 70.39825°
W 151.09708°
WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30 pm

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: Blunt force to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):
Samples hauled in a cooler behind snowmachine in a sled

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM-ACIS-2015-004

General condition of fish (external condition, tumors, lesions, etc.):
Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2015-05
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Arctic Cisco

Date sampled: 02 Nov 2015

Sample Collectors: John Rose, Joe Welch

Time sampled: 12:30 pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: Wood's Camp

GPS Coordinates: N 70.39825° W 151.09708° WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30 pm

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: Blunt force to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Samples hauled in a cooler behind snowmachine in a sled

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM_ACIS_2015_005

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2015-06
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Arctic Cisco

Date sampled: 02 Nov 2015

Sample Collectors: John Rose, Joe Welch

Time sampled: 12:30 pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig Channel
b) River Mile and/or Camp: Wood's Camp

GPS Coordinates: N 70.39825° W 151.09708° WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30 pm

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* ______

Kill Method: Blunt force to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Samples hauled in a cooler behind snowmachine in a sled.

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM_ACIS_2015-006

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2015-07
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Arctic Cisco

Date sampled: 02 Nov 2015

Sample Collectors: John Rose, Joe Welch

Time sampled: 12:30 pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: Wood's Camp

GPS Coordinates: N 70.39825° W 151.09708° WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30 pm

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:________

Kill Method: Blunt force to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Samples hauled in a cooler behind a snowmachine in a sled

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: EKM-ACIS-2015-007

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2015-08
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Arctic Cisco

Date sampled: 02 Nov 2015

Sample Collectors: John Rose, Joe Welch

Time sampled: 12:30 pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: Wood's Camp

GPS Coordinates: N 70.39825°
W 151.09708°
WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30 pm

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify: ________

Kill Method: Blunt force to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Samples hauled in a cooler behind snowmachine in a sled

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM_ACIS_2015_008

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2015-09
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Arctic Cisco

Date sampled: 02 Nov 2015

Sample Collectors: John Rose, Joe Welch

Time sampled: 12:30 pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig Channel
b) River Mile and/or Camp: Wood's Camp

GPS Coordinates: N 70.39825° W 151.09708° WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30 pm

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: Blunt force to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):
Samples hauled in a cooler behind a snowmachine in a sled

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM_ACIS_2015_009

General condition of fish (external condition, tumors, lesions, etc.):
Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2015-10
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Arctic Cisco

Date sampled: 02 Nov 2015

Sample Collectors: John Rose, Joe Welch

Time sampled: 12:30 pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: Woods Camp

GPS Coordinates: N 70.39825°
W 151.09708°
WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30 pm

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*________

Kill Method: Blunt force to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Samples hauled in a cooler behind a snowmachine in a sled

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM_ACIS-2015-010

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2015-11
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Arctic Cisco

Date sampled: 02 Nov 2015

Sample Collectors: John Rose, Joe Welch

Time sampled: 12:30 pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig Channel
b) River Mile and/or Camp: Woods' Camp

GPS Coordinates: N 70.39825° W 151.09708° WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30 pm

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:*

Kill Method: Blunt force to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Samples hauled in a cooler behind a snowmachine in a sled

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM-ACIS-2015-011

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS - 2015-12
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Arctic Cisco

Date sampled: 02-Nov-2015

Sample Collectors: John Rose, Joe Welch

Time sampled: 12:30 pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: Wood's Camp

GPS Coordinates: N 70.39825° W 151.09708° WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30 pm

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: Blunt force to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Samples hauled in a cooler behind a snowmachine in a sled

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM-ACIS-2015-012

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2015-13
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Arctic Cisco

Date sampled: 02 Nov 2015

Sample Collectors: John Rose Joe Welch

Time sampled: 12:30 pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: Woods' Camp

GPS Coordinates: N 70.398250°
W 151.09708°
WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30 pm

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: Blunt force to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):
Samples hauled in a cooler behind a snowmachine in a sled.

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM-ACIS-2015-013

General condition of fish (external condition, tumors, lesions, etc.):
Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2015-14
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Arctic Cisco

Date sampled: 02 Nov 2015

Sample Collectors: John Rose Joe Welch

Time sampled: 12:30 pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel
b) River Mile and/or Camp: Woods' Camp

GPS Coordinates: N 70.39825° W 151.09708° WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30 pm

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: Blunt force to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):
Samples hauled in a cooler behind a snowmachine in a sled.

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM-ACIS-2015-014

General condition of fish (external condition, tumors, lesions, etc.):
Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : ACIS-2015-15
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Arctic Cisco

Date sampled: 02 Nov 2015

Sample Collectors: John Rose, Joe Welch

Time sampled: 12:30 pm

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglia Channel
b) River Mile and/or Camp: Woods' Camp

GPS Coordinates: N 70.39825°
W 151.09708°
WGS 84

Name of Harvester: [redacted]

Approx Time of Harvest: 12:30 pm

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify:

Kill Method: Blunt force to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Samples hauled in a cooler behind a snowmachine in a sled

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM_ACIS_2015_015

General condition of fish (external condition, tumors, lesions, etc.):

Good

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : EQUIPBLANK-03-2015
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): —

Date sampled: 11/06/15

Sample Collectors: John Rose, Laura Gutierrez

Time sampled: 14:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Niglig Channel, Colville River
GPS Coordinates: N 70.38830 W 151.10121
b) River Mile and/or Camp: area known as Niglig

Name of Harvester: [redacted]

Approx Time of Harvest: 14:00, 11/6/15

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other *specify:* 3.0" mesh

Kill Method: ~~blow to head~~

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM_2015_Equipblank_03.jpg

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

Sample ID : EQUIP BLANK-04-2015 Fish species (common name): —

(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Date sampled: 11/06/15

Sample Collectors: John Rose, Laura Gutierrez

Time sampled: 14:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location: a) Waterbody Name: Niglig Channel, Colville River GPS Coordinates: N70.38830 W151.10121

b) River Mile and/or Camp: area known as Niglig

Name of Harvester: [redacted] Approx Time of Harvest: 14:00, 11/6/15

Harvest Method: ☐ Hook and Line ☑ Set Net ☐ Other specify: 3.0" mesh Kill Method: —

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM_2015_Equipblank_04.jpg

General condition of fish (external condition, tumors, lesions, etc.):

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y or N

Notes

Notes:

Any Deviations from protocols? Y or N If yes, explain:

→ REMOVED Ø FROM SEQUENTIAL SAMPLE ID - LP

SUBSISTENCE FOODS STUDY - FISH COLLECTION DATA SHEET

Sample Summary

LP

Sample ID : ACIS-2015-~~0~~16
(SPEC-YYYY-01) SPEC = ACIS (Cisco); BDWF (Broad Whitefish)

Fish species (common name): Arctic Cisco

Date sampled: 6 November 2015

Sample Collectors: John Rose, Laura Gutierrez

Time sampled: 14:00

Harvest Summary

Fish obtained for contaminants analysis should be intact with minimal skin lacerations or fin deterioration (edible) and be kept away from potential sources of secondary contamination (e.g. boats, outboard motors, engine exhaust).

Sample Location:
a) Waterbody Name: Nigliq Channel, Colville River
b) River Mile and/or Camp: Area known as Nigliq

GPS Coordinates: 70.38830° N 151.10121 W
~~WGS~~ WGS84

Name of Harvester: [redacted]

Approx Time of Harvest: 14:00, 6 Nov 2015

Harvest Method: ☐ Hook and Line ☒ Set Net ☐ Other specify: 3.0" mesh

Kill Method: blow to head

Note the presence of anything that may affect the sample results (gas cans, cleaning supplies, solvents, etc):

Photo No. of harvest site/methods (if allowable):

Fish Evaluation

Clean nitrile gloves should be donned prior to handling fish or sampling supplies (e.g., Al foil) to prevent cross-contamination.

Photo No. of Fish Specimen: ERM_ACIS_2015_016

General condition of fish (external condition, tumors, lesions, etc.): All fish taken as samples were very healthy, non-blemished specimens

Fish sick or not suitable for food? Y or N

Collected for other evaluation: Y of N

Notes

Notes:
Any Deviations from protocols? Y or N If yes, explain: LP

LP

All samples ACIS-2015-~~0~~16 thru ACIS-2015-~~0~~30 were collected as noted in this sample summary

Specimen photos are all labeled ERM_ACIS_2015_xxx (016, 017 → 030)

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Subsistence Foods Study

Book 1 of

Contacts:
ERM
John O'Brien 907-458-8272 / c: 907-750-5179
Leslie Davis 907-458-8278 / c: 907-750-4382
Dave Trudgen 907-264-4448 / c: 907-301-4199
VETS
Todd O'Hara 907-978-4511
Carla Willetto 907-978-4511
CPAI
Charlie Kovalsky 907-328-0818 / c: 907-750-9827
Lisa Pekich 907-265-1173
Caryn Rea 907-265-6515
NS Enviro Studies Coord
Justin Blank 907-252-7826
Rebecca Aungst 907-263-4618 or 716-860-9440
Village Outreach Liasion
Rusty Creed Brown 907-317-7492 (cell)
907-265-1383

Search + Rescue:
Winfred 480-0046
volunteer

Kuukpik hotel (Rene) 480 5550
Renita

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Fairbanks, AK 99701
Phone 907-458-8270

Project Subsistence Foods Study
Project No. 0205056

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	ACIS-13-10-14	315 mm	102-313
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JULY 2014 FIELD SAMPLING
7/11/2014
J. O'Brien
L. DAVIS

Arrived in Nuiqsut @ 1330 - TAILGATE MTG.
At Kuukpik Hotel met W [redacted] [redacted] + [redacted] @ 1415
Discussed caribou movements AND current FISHING EFFORTS/MADE TENTATIVE PLANS FOR SAMPLE collection.

CONTACTS PHONE #s

[redacted]

Checked in w [redacted] @ Kisik center @ 1500; JO met w/ [redacted] + Set up meeting for morning; LD obtained Fuel vouchers after phone call w/ [redacted].; JO obtained Cash advance after phone call w/ [redacted] ($600.00)
The plan for 7/12 is to go by river boat with [redacted] to Fish Creek looking for caribou

1/1

L. Davis

7.12.14 Sub Foods Study J.OBrien

10:00 Meeting w/ [redacted] regarding sampling caribou. Reviewed HASP + conducted tailgate meeting. [redacted] said early to mid August is best chance to get caribou, but may find straglers along Fish creek + the coast. Reviewed sampling protocols for caribou + fish.

11:30 Begun packing gear for boat trip to harvest caribou.

1200 - Field trip delayed due to inability to obtain gas for [redacted] BOAT 1630 - Able to get gas for Paul's boat w two (2) 10 gallon fuel vouchers. Plan is now to head out @ 1000 morning of 7/13. Left phone message w [redacted] to go with him on hunt/fish trip the following day (7/14). 1/1

7/13 Tailgate safety mtg @ 1300 on river @ 1315 w/ [redacted] / 1400 hrs - stopped @ Lydia's Niglig camp and caught 20 Broad white fish - $400.00 cash reimburse ment for the sharing of fish.

1830 Head upriver to Nui to drop off fish

70°23'15.888 151°06'05.410 / GPS File: R071318A feature #2: bdwf 1-20

1/2

L. Davis
J. O'Breen

7-13-14 Subs. Foods Study

1930 Return to CPAI OFFICE - Safety Debrief, put fish in freezer, re-pack Gear AND supplies for tomorrow 2/2

7-14-14

0800 Field prep

1000 Tailgate Safety meeting LD, JO, PK.

1120 LAUNCH Boat @ Nuiqsut. headed for Colville Delta - Pisk channel; Stopped @ 3 scouting points

1245 herd of caribou North of Lonely Island
GPS File: R071414A
About 25 caribou moving with the wind - Low on fuel; 1345 waiting for hunter C.W. to bring fuel from village; more caribou sighted on East side of channel headed toward our location; 1515 C.W. arrived w/ fuel see GARMIN waypoint for scouting location (w1) 1610 - 6 bull caribou near shallow channel Trying to work around to get in stalking range. 1630 within stalking range. / At least 1 maybe 2 caribou shot @ 1700 / 2 tutt killed by hunters 01 + 02. Finished sampling And butchering @ 2030; Spotted another herd of 100 downriver but called it a Day for safety reasons (knlks, cuts, fatigue, exposure)
GPS File: R071418A - Harvest location 1/1

Hunter IDs:
01 - [redacted]
02 -
03 -
0800 - Begin day. Pack Gear. Provide additional information and photos for ECS Report. LD reports scalpel nick to Workcare; Safety phone meeting with ERM Tom Beckman; follow up emails; make plan for sample collection
1100 meet w subsistence advisor, [redacted] safety tailgate meeting at office 1230. Meeting w [redacted] at his residence answer his requests concerns; confer w/client Caryn Rea. Make arrangements w/ sampling w/ [redacted] near Fish Creek, Hunters 01 and 02 preparing gear for today's effort 1500 meet w/ [redacted] (01) and boat, go fuel up
1615 Launch on river; sunny partly cloudy; heavy biting insects, Headed toward Nigliq channel.
1645 Stop @ conex on Nigliq to scout caribou. No sign. Continue

on to [redacted] camp. Arrived at [redacted] camp approx ~~17~~ 15. Group of ~75 caribou across [redacted] camp ([redacted]) harvested 5 caribou earlier in the day before the group crossed the small channel headed to coast. We will wait to see ~~what~~ if deer move closer. Decide to sample plants (forage species in the area where the caribou were harvest.
1930 Begin to collect forage samples. GPS location: R071519A PLANTS
~~4 Sampled~~ 4 forage samples collected mostly C. aquatalis, Eriophorum.
2030 Caribou spotted and moved south of camp. ~~Moved to~~ Re-located to fish camp to follow caribou. GPS: R071521A
2200 4 caribou shot. Hunter IDs:
Hunter IDs: 04 - [redacted]
05 -
06 -
Began sampling. @ 2215
Due to late hour of evening and

because hunters had to be back at Nuiqsut, they requested that we finish our sampling after 3 caribou.
Finish sampling @ 0130 on 7-16-14
~~0145 returned to CD~~
0145 returned to Nuiqsut. Demob at community center + sent trip report emails.
0245 - end of day

Lisa Davis

CD 3/3

Davis
Obrien CP Sub Foods Study 7-16-14

1100 - Meet w/ [redacted] to attempt to scout for caribou at Fish Creek. [redacted] choose to go seal hunting rather than caribou hunting. Went door to door approaching others recommended by [redacted]. All preferred to go seal hunting. Made plans w/ [redacted] to go hunting at fish creek tomorrow morning.
Today spoke w/:
[redacted]

Lisa Davis

CD 1/1

7.17.14 Sub Foods Study Davis O'Brien

10:00 Prepare to meet [redacted] for sampling trip to Fish Creek. [redacted] arrives at hotel but is "under the weather" + cancels trip.

- Attempt to contact [redacted] + others to sample, but all were reportably sleeping after long night of seal hunting.
- North Slope Borough planning meeting at community center from 1–4 p.m. Many community members/hunters choose to attend meeting rather than hunt. Spoke w/ Raphaela Stimmelmayr from NSB DWM regarding project + sampling. Would like us to collect lower jaw + send to them if caribou is determined to be TH. NSBDW would like to add our morphometric data to their dataset on TH.
- Reached out to [redacted] to hunt that evening, but unsuccessful.

1/1 CD

Davis O'Brien Sub Foods Study 7.18.14

0900 Davis to CP office to demob & QC/QA samples for shipment to FBX. Depart for Fairbanks.

Susan Davis

1/1 CD

Sub Foods Study

7.19.14 Sample Summary DAVIS

Sample ID	Date	time	Dup
RANG-2014-01-La	7.14.14	1930	
RANG-2014-01 Ma	7.14.14	1930	
RANG-2014-01 Lb	7.14.14	1930	X
RANG-2014-02-La	7.14.14	1800	
RANG-2014-02-Ma	7.14.14	1800	
RANG-2014-02-Lb	7.14.14	1800	X
RANG-2014-02-Mb	7.14.14	1800	X
RANG-2014-01-Ma	7.14.14	1930	
RANG-2014-03-Ma	7.15.14	2245	
RANG-2014-03 -La	7.15.14	2245	
RANG-2014-03 -Mb	7.15.14	2245	X
RANG-2014-03 -~~Mb~~ -Lb	7.15.14	2245	X
RANG-2014-04 -La	7.15.14	2300	
RANG-2014-04 -Lb	7.15.14	2300	X
RANG-2014-04-Ma	7.15.14	2300	
RANG-2014-04 - Mb	7.15.14	2300	X
RANG-2014 -05 - La	7.16.14	0030	
RANG-2014 -05 - Lb	7.16.14	0030	X
RANG-2014-05 - Ma	7.16.14	0030	
RANG-2014-05 - Mb	7.16.14	0030	X
EQUIPBLANK-2014-01	7.13.14	1705	
BDWF-2014-01	7.13.14	1545	
BDWF-2014-02	7.13.14	1545	

Sub Foods Study

DAVIS Sample Summary 7.19.14

Sample ID	Date	Time
BDWF-2014-03	7.13.14	1545
BDWF-2014-04	7.13.14	1545
BDWF-2014-05	7.13.14	1545
BDWF-2014-06	7.13.14	1545
BDWF-2014-07	7.13.14	1545
BDWF-2014-08	7.13.14	1600
BDWF-2014-09	7.13.14	1600
BDWF-2014-10	7.13.14	1600
BDWF-2014-11	7.13.14	1630
BDWF-2014-12	7.13.14	1630
BDWF-2014-13	7.13.14	1630
BDWF-2014-14	7.13.14	1630
BDWF-2014-15	7.13.14	1630
BDWF-2014-16	7.13.14	1630
BDWF-2014-17	7.13.14	1630
BDWF-2014-18	7.13.14	1630
BDWF-2014-19	7.13.14	1630
BDWF-2014-20	7.13.14	1630

* Duplicates were not sent to lab. Placed in temporary tissue bank (ie dedicated freezer at ERM office) until analyses are received.

Leslie Davis

8.12.14 Sub Foods Study Davis Beckman
8:00 Daily tailgate safety meeting. Go to CP office + organize gear, sample kits, prep for sample trip w/
[redacted]
Stop by Kuukpik to pick up more gas vouchers.
Used charge code
WCP. WAS. P0003. DF95PM07
Approver: clrea
Wind continued to pick up. No reports of boats heading out.
Break for lunch. After lunch went back to CP office + monitored radio. Visited w/ [redacted] to put another call out + see who was going boating.
Film crew for NPR-A orientation showed up. We were asked to stay + listen to interview. Interview lasted ~2 hrs. Went
LD
1/2

back to camp for dinner. Was asked to participate in video. Sent daily report email to Clrea + JO'Brien. Received ok to participate in video + made arrangements to start filming at 9:30 am next day.

Leslie Davis

2/2
LD

0800 Began day. Performed daily tailgate safety meeting.

0930 - Sat down w/ NPR-A film crew for interview regarding project and experiences working within & near NPR-A

1115 Tried to visit w/ [redacted] knocked on door - No answer. Walked down to [redacted] house. Knocked on door but younger son said they did not want to participate in the Sub Foods Study. Asked if there was a reason he said "yes there's a reason" then closed door. Walked toward city office to talk to [redacted] about possible offenses to the [redacted]. Everyone at lunch. Went to lunch ourselves. back @ hotel.

1300 - met w/ [redacted] to go boating up river. Said he wanted to wait until more boats were going. Said newphew, [redacted] + brother [redacted] would be going out after 3:00pm. Said he would make calls to his brother-in-law, [redacted] to see when they were going. ERM crew gathered gear from office & loaded into [redacted] boat in preperation for field sampling. Back to hotel to collect snacks & tea for field food. Went to CP office to monitor radio. Updates included dust storms at the dock. ERM texted [redacted] Ipalook to inquire about hunting. He said he had company coming in on the plane and would likely go hunting in the next few days. ERM will check back in w/ him on Friday (8.15.14.)

Texted [redacted]

He said he'd be very interested in taking us out, but not too many caribou up river. He is thinking of going to Cape ~~Halkett~~ Halket or Atigaruk area.

0530 Dinner break

Spoke w/ [redacted] again regarding timing of trip. There is a small craft advisory in effect until Thursday (8.14.14). Will have to play it by ear. [redacted] also monitoring what [redacted] + [redacted] see upriver.

Jolie Davis

0800 Daily tailgate safety meeting performed. Strong winds. Small craft advisory in effect. [redacted] did not want to go to the coast. Spoke w/ [redacted] She just got a boat + may go out Saturday if winds die down. Ran into [redacted] in hotel cafeteria. He was heading out but said did not have room in boat. Did not seem interested in taking us out. Spoke w/ John OBrien regarding lack of interest in community.

Jolie Davis

Davis
8.15.14 Sub Foods Study Beckman

0800 Begin day. Preform daily tailgate meeting. Sent email to J. OBrien regarding possibility of paying hunters to take us out. Decided to collect forage plants near Freshwater Lake @LD based on recommendation from [redacted] [redacted] of carbon use area.

0930 [redacted] offered to use his truck rather than us walk due to safety concerns w/ bears + the long distance to lake. Packed sampling gear + headed out.

10:00 Arrived at sample location + collected 5 forage samples consisting of primarily C. aquatilis

Sample IDs: + sample time:

FORAGE-2014-05 @ 10:30
FORAGE-2014-06 @ 10:30
FORAGE-2014-07 @ 10:30
FORAGE-2014-08 @ 10:30
FORAGE-2014-09 @ 10:30.

LD

1/2

Davis
Beckman Sub Foods Study 8.15.14

Samples were collected as grab samples of above-ground biomass. See datasheet for locations. (GPS pts).

11:15 - returned to CP office + secured samples in freezer.

11:45 - return [redacted] truck + give 10-gal gas voucher. + receipt. *NOTE: Vouchers from July trip have expired

Leslie Davis

Rite in the Rain

2/2

10:00 - Tailgate Safety Meeting
Go to CP office & inventory
and pack gear for departure.
Monitor radio. Weather
begins to improve.
1800 Weather good. [redacted] calls
& says boaters going up &
down river. Mobilize to
go out w/ [redacted] &
[redacted].
1845 - depart Nuiqsut, head down
river. Stop at Nukagipak camp
(near conex) + look for caribou.
Going down Nigliq channel
Stop at [redacted] camp (same as
[redacted] camp) Look for caribou
no luck. Decide to head up
river past Nuiqsut to look.
On way up a call comes over
the radio that a boat
broke down up river. [redacted]
is needed on a rescue boat.
We head back to Nuiqsut.
2100 - arrive back in Nuiqsut

1/2

Take gear back to CP office
2200 End of Day

Leslie Davis

2/2

Davis
Beckman

8.17.14 Subsistence Foods Study

0800 Inventory + pack gear for departure to FBX & ANC (Bobby). QA + QC forage samples.

1100 Depart Nuiqsut

1530 Arrive in FBX. Samples received in good condition + stored in freezer at ERM office.

Leslie Davis

1/1

LD

Davis Sub Foods Study

FORAGE SAMPLE SUMMARY 8.20.14

Sample ID	Date	Time
FORAGE-2014-01	7.15.14	1930
FORAGE-2014-02	7.15.14	1930
FORAGE-2014-03	7.15.14	1930
FORAGE-2014-04	7.15.14	2040
FORAGE-2014-05	8.15.14	1030
FORAGE-2014-06	8.15.14	1030
FORAGE-2014-07	8.15.14	1030
FORAGE-2014-08	8.15.14	1030
FORAGE-2014-09	8.15.14	1030

Samples are on hold at the ERM Fairbanks office until analysis. Samples are stored frozen @ -20°C.

ERM Field to Fairbank COC #

2014-02 LD

2014-01

Leslie Davis

LD

1/1

Rite in the Rain

13 NOV 2014 ARCTIC CISCO COLLECTION

	TIME
ACIS-2014-001	16:20
ACIS-2014-002	16:20
ACIS 2014 003	
ACIS 004	
ACIS 005	
ACIS 006	
ACIS 007	
ACIS 008	
ACIS 009	
ACIS 010	
ACIS 011	
ACIS 012	
ACIS 013	
ACIS-2014-014	
ACIS-2014-015	16:20

ALL SPECIMENS TAKEN FROM A 3.0" MESH GILLNET. CATCH WAS FOR 24 HRS SET.
LOCATION - Nigliq CHANNEL OF COLVILLE DELTA.
N 70.31020° × W 151.02280°

John R Rose
John C Seigle

~~15~~ 16 NOVEMBER 2014 ARCTIC CISCO

	TIME
ACIS-2014-016	1700
ACIS-2014-017	1700
-018	
-019	
-020	
-021	
-022	
-023	
-024	
-025	
-026	
-027	
-028	
-029	
ACIS-2014-030	1700

ALL SPECIMENS TAKEN FROM THE SAME GILLNET USED ON 13NOV14 - (PREVIOUS PAGE)
GILLNET WAS SET FOR 48 HRS THIS TIME

John R Rose
John C Seigle

SUBSISTENCE
FOODS
STUDY

Rite in the Rain
ALL-WEATHER
JOURNAL
№ 393N

Book 2 of

0205056

Rite in the Rain
ALL-WEATHER WRITING PAPER

IF FOUND PLEASE MAKE COPIES
& RETURN/MAIL TO:

Name John O'Brien or
Leslie Davis w/ ERM.

Address 748 Gaffney Road
Fairbanks, Alaska 99701

Phone 907-458-8270

Project Nuiqsut Subsistence Foods
Study.

Rite in the Rain — A patented, environmentally responsible, all-weather writing paper that sheds water and enables you to write anywhere, in any weather. Using a pencil or all-weather pen, *Rite in the Rain* ensures that your notes survive the rigors of the field, regardless of the conditions.

CONTENTS

PAGE	REFERENCE	DATE

1200 ERM team (Leslie Davis + Carissa Shoemaker) arrive in Nuiqsut for 2015 caribou + broad whitefish sample collection. Robyn McGhee (CPAI) picked team up at airstrip. Go to KSOP to pick up rental truck. Continue to hotel to check in. Had lunch w/ Robyn to discuss field event + project status. Robyn updated team on spur road and CD5 progress. Advised not to drive on new spur road. It is accessible to Nuiqsut residents but restricted access for CPAI personnel. Drilling has started at CD5 but no oil flowing yet.

1400 Return w/ Robyn to KSOP to complete truck paperwork. Vehicle on fire outside the building so office was closed. Will return next day to complete paperwork

1430 Robyn departs for Alpine. LD + CS return to hotel to gather coolers + supplies.

1500. Team transports coolers + gear

2

8.10.15 SUB FOODS STUDY LD/CS

to CPAI office. Met briefly w/ Sam Kunaknana to check in at City office (community center). Team unpacks gear. Review datasheets + protocols w/ CS. Begin to mobilize field gear.

1700 Fire alarm in building. Team leaves CPAI office and returns to hotel. Talked with Charlie Kovalsky. He will try to find interested parties to take the team hunting. Informed us [redacted] is at moose camp.

1800 End of day.

2/2 Leslie Davis

LD/CS SUB FOODS STUDY 8.11.15 3

0900 Update field notes and send progress report. Head to KSOP to finish truck paperwork. Elizabeth Ipalook (KSOP) not there. Will return later. Stop at Kuukpik to pick up gas vouchers. Rusty's contact, Bibianna, not there. Talked w/ Nellie Kaigelak. She will get gas vouchers printed in the afternoon. Informs us [redacted] is at moose camp. Should return today or tomorrow.

1100 Return to City office/CPAI office to continue to mobilize field gear. Talk w/ Sam K. + Joseph Aikpuk. They will find someone to take us out to check their nets in the afternoon. Ready field gear for boat trip.

1200 return to hotel for lunch + to get boat gear + clothing.

1300 return to City office + meet w/ [redacted]. He will take us along to check his net. Mobilize gear to truck.

Rite in the Rain 1/2

1330 meet [redacted]. along Niglig channel to check net. Head down river.

1400 Only one broadwhitefish in net. Sampled/collected fish. Sample ID: BDWF-2015-01 Date: 8.11.15 TIME: 1400. Collected trip blank: ID: EQUIPBLANK-2015-01

1500 Return to CPAI office. Secure fish in freezer. Return to KSOP to complete Truck paperwork w/ [redacted] She will ask her brothers + others if they will participate in study. Go to Kuukpik office to obtain gas vouchers. Recieved 9-10gal vouchers + 2-5gal vouchers. Billed to CPAI. Returnd to city office to compensate [redacted] for gas + fish. Unable to find him.

1615 Returned to hotel. Update field notes

1715 End of day

2/2

0900 Prepare to meet w/ [redacted] in morning. Trouble shoot ~~GPS~~ @ GPS. Tailgate safety meeting. Charlie K. has talked w/ [redacted] + he is to come to camp to talk w/ us. [redacted] is scheduled to meet us @ 2pm at camp to discuss fish. [redacted] did not make it back to town last night.

1030 Stop by KSOP to check in w/ [redacted] regarding harvesters + possible 4-wheeler rental. Said she would ask harvestors today. Her family just got back from seal hunting. She will help them butcher process this afternoon.

1100 Back to city office. Give [redacted] his gas voucher (10-gal) + \$20- for fish collected yesterday (8-11-15). Talk w/ people in + out of city office.

1200 Back to camp for lunch. Try to reach [redacted] but no

luck. [redacted] is meeting @ 2pm.
1400 No sign of [redacted]
[redacted] called and will set his nets
again. Will get back to us
by 3 pm today regarding getting
out on boat.
1430 - Head out to set net w/ [redacted]
Set net just across Niglig channel
from Nuiqsut. Continued upriver
to look for caribou. Located a
couple on the bank of river but
went out of sight before shots
could be fired. Continued upriver
past Ocean pt. Spotted a bull
laying down on gravel bar.
[redacted] attempted to shot. Four
shots fired but missed.
1830 turned around and headed
back to Nuiqsut.
2030 Back in Nuiqsut, unloaded
gear + went back to
hotel. Will meet up w/ [redacted]
[redacted] tomorrow around 2pm.
to check net + possibley go
out again. Gave [redacted]

15 gal in gas vouchers for boat trip.
2100 End of Day

[signature]

8

8.13.15 SUB FOODS STUDY LD/CS

1000 Catch up on field notes. Tailgate safety meeting. Attempt to go by [redacted] house to check in. He was "busy on the phone." Looked for [redacted] to check his net, no luck. Looked for [redacted]'s boat/residence but no luck.

1215 Return to hotel for lunch. Foggy weather today.

1300 Head to [redacted] house. Talk w/ [redacted] regarding caribou herd movements

1400 Meet [redacted] at boat ramp to check net. Sample LD Collect 9 broad whitefish from net. Sample IDs: BDWF-2015-02 through BDWF-2015-10. Date: 8.13.15 Time: ~~1425~~ LD 1325

Return to City office/CPAI office and store fish samples in secure freezer.

1700 Return to camp for dinner. Talk w/ [redacted] Put study announcement on Facebook.

1/3

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LD/CS SUB FOODS STUDY 8.13.15

Drive to potential harvesters houses w/ Charlie to ask for participation. Talk w/ [redacted] at search + rescue office. Two boats missing. [redacted] is out as part of search party. [redacted] is willing to take us out hunting w/ him this weekend after work. Continue w/ Charlie up Kuukpik road to see if any hunters are out. Come across 2 hunters that just recently shot a young bull. Had already removed stomach. Decided to go ahead and sample liver. Tenderloin had already been cut + animal quartered. Sample liver by cutting away surface areas + taking internal sample. Possible cross contamination from rumen tear during butchering noted on datasheets.

Sample ID: ~~CARI~~ RANG-2015-01-~~1~~a LD

Date 8.13.15 time: 21:13

Collected jaw + metatarsus. Completed datasheet w/ assistance from

hunters. Took duplicate sample
ID: RANG-2015-01-Lb
Date 8.13.15 Time: 21:13.
[redacted] was harvester.
Will come by camp to receive
5-gal gas voucher tomorrow.
~~2200~~ 2200 - Return to camp. City office
closed so store sample in cooler
full of ice packets + lock in truck
cab. End of Day

10:00 Review + QC data sheets from
yesterday. Daily tailgate
meeting. Catch up on field
notes. Take samples to CRAI
office for storage. Plan is to
check net w/ [redacted] + go
hunting w/ Sam K. after 5pm.
J.O. to mail extra large bags
for fish collection. + ammunition
requested by [redacted]. [redacted]
will take us hunting once
ammunition arrives.
11:30 Ammunition due to arrive
Sunday aftern via Raven.
Go to City Center/office. Checks
are being distributed so
stayed there + talked w/ people.
[redacted] + [redacted] have to
go ~~up~~ down river to recover
search + rescue boat that
was stuck in shallow water.
Sam. K has meeting at 3pm.
Will go to get boat after.
They said they'd go back out
if they spotted caribou.

12:30 return to camp for lunch.
1:15 Back to city center/office to talk w/ harvesters. [redacted]? says his cousin is planning on going out. Gave card & he said he'll let us know.
14:30 Picked up more 5-gallon gas vouchers from Kuukpik to reimburse 4-wheelers that help sample caribou.
15:30 [redacted] is ready to check his net. Collect 11 broad whitefish samples. Sample ID: BDWF-2015-11 through BDWF-2015-21. Date 8.14.15 Time: ~~17~~00.
1800 return to CPAI office to store/secure fish samples. Continue to scout for caribou via truck. Talk w/ [redacted] & [redacted]. Give [redacted] his 6-gal voucher for sample collection on 8.13.15. They say they do not plan to hunt tonight, but maybe this

weekend depending on weather. Return to camp to clean sampling supplies + tote that were dirtied from fish sampling. Talked w/ [redacted] regarding ~~fish~~ LP hunting on Sunday pending ammunition. Decide to get gas tomorrow (Saturday) b/c gas pump is closed on Sundays. [redacted] will borrow gas tank + leave in our truck to fill.
2100 End of Day

Sofia Davis

Rite in the Rain

8.15.15 SUB FOODS STUDY LD/CS

10:00 Catch up on field notes. QC data sheets. Tailgate safety meeting. Complete/review timesheets. Plan for today is to get gas, check fish net + see if anyone is hunting. Temps are dropping + getting foggy in town. Will work on trip report + send email update to client.

1500 Make Plan w/ [redacted] to check nets. Fuel up at gas station. Richard receives 5 gal gas voucher

1645 Sample fish from the net. Sample IDs: BDWF-2015-22 through BDWF-2015-30. Date: 8.15.15 Time: 1645

1800 return to CPAI office to store + secure fish. Not enough room in freezer for all fish. Decide to store a few fish and a trip blank on a taped + sealed cooler in the deep freezer locker at Kuukpik hotel. Fish IDs

of fish stored in cooler are: BDWF-2015-22, 23, 24, 25, & 29. EQUIPBLANK-2014-04 also stored w/ fish. Will QA/QC, complete COC, + ship to FBX on Monday via Ravn.

1900 Talk w/ [redacted] regarding caribou sampling. He is going to family's house tonight + will ask around for participants

1915 END OF DAY

8.16.15 SUB FOODS STUDY LO/CS

10:45 [redacted] texts + says he + [redacted] can take us out tonight @ 6:30 pm. Can't stay out too late though. We get 15 gal of gas from Nanuq garage guys since pump station is closed. Mobilize gear for sampling. Tailgate safety meeting preformed. Ammo should come in on 3:00pm plane. Catch up on field notes QC datasheets from yesterday. Continue updating field report.

~~1500~~ 1700 Prepare for field trip w/ [redacted]

1700 Picked up ammo. Fill up [redacted] boat w/ approx 10 gal of gas. Leslie returns gas cans + remaining 5 gallons to Nanuq garage

1830 Depart on boat w/ [redacted] [redacted] + [redacted] ? down river on Nigliq channel. Scouting for caribou. Spot caribou on bank of side

1/3

LO/CS SUB FOODS STUDY 8.16.15

channel downriver from new bridge. The guys depart boat + attempt to stalk/shoot caribou. 3 large bulls reported to be in their sights but pipeline was beyond caribou so they decided against shooting. We continued downriver to Nigliq cabins where we met w/ [redacted] + Company. They were scouting large bulls on west side of Nigliq channel towards fish creek. Fog kept rolling in. We head to [redacted] camp on west side of Nigliq to watch bulls to see if they move closer. Appear to be staying near the lake in distance so ~~sea~~ hunting from their is not possible. Winds are too strong to boat through the ocean to get to fish creek. Decide to head back up River. No caribou spotted along route back to

Nuiqsut. Return safely to Nuiqsut. Head back to hotel.

23:00 End of Day

0900 Team takes cooler of fish from hotel/camp freezer to CPAI office to QC/QA ~~shipment~~ LD samples for shipment via Ravn to the Fairbanks office. Frozen fish are packed in cooler w/ gel ice. COC completed. COC # 2015-01. Sample IDs are: ~~BDWF-22, 23, 24, 2~~ LD BDWF-2015-22, -23, -24, -25, -29. Date on all samples is: 8.15.15, time on all samples is: 1645. COC is placed in cooler. Cooler is taped closed + custody seals in place.

1120 Cooler is hand delivered to Ravn aircraft bound for deadhorse then to FBX. Rena Flint from ERM FBX office will pick up sample upon arrival.

1500 [redacted] texts that there are caribou near river bank, likely same as seen last night. Text [redacted] the info.

8.17.15 SUB FOODS STUDY LP/CS

ERM team heads to City office to see if we can locate [redacted] to go via boat. Repsol is preparing for a meeting held tonight at 5-8. While there [redacted] calls again that there are caribou along Kuukpik road. We share info w/ [redacted] + [redacted] while at city building. [redacted] agrees to go. He needs to get 5 caribou. We get ready to go. He gets gun from [redacted] house. We inform them of the caribou + our plans. They will be along shortly. ERM team + [redacted] head up Kuukpik road. Come across [redacted] as he is getting off work. He points out where caribou are. Approx. 2.5 miles up Kuukpik road we spot caribou. [redacted] gets off road and takes 3 caribou down. ERM samples all

LP/CS SUB FOODS STUDY 8.17.15

three caribou. Sample IDs:

RANG-2015-02-La, Lb
RANG-2015-02-Ma, Mb
RANG-2015-03-La, Lb
RANG-2015-03-Ma, Mb
RANG-2015-04-La, Lb
RANG-2015-04-Ma, Mb

Date on all samples: 8.17.15
Time on all samples: 1740

All samples collected according to protocols. [redacted] + [redacted] [redacted] assisted in sampling. They also butchered the caribou while [redacted] warmed up in vehicle. Provided 5 gal gas vouchers to [redacted], [redacted], + [redacted] on site for help w/ sampling. Provided [redacted] an additional 10 gal voucher as he was the hunter that shot all 3 caribou. Returned to village, dropped Fred off + returned to hotel. Put samples in taped up cooler in camp's/cafeteria's deep freezer (walk in freezer) for storage overnight

22 8.17.15 SUB FOODS STUDY LD/CS
b/c CPAI office building was locked.
2100 END of Day

Annie Davis

4/4

LD/CS SUB FOODS STUDY 8.18.15 23
1000 Complete field notes from yesterday. QA/QC data sheets. Tailgate safety meeting. Clean up sampling kits/utensils Continue work on field trip report. Store gel ice in Kuukpik hotel freezer for shipping. CPAI office freezer too full.
1500 [redacted] texts that caribou are along the road in same spot as yesterday. ERM reaches out ~~Richard Tukle~~ LD [redacted] He is on the river and will text when he returns. ERM goes to CPAI office to organize more sampling kits.
1800 Talk w/ [redacted] he didn't see any caribou on his drive back from work.
2000 [redacted] texts and asks if we still want to go out. [redacted] agrees to go as well. ERM, [redacted] and [redacted] head up Kuukpik road to scout caribou. Come across Brian ?

Rite in the Rain 1/3

who is scoping/watching ~~2~~ 2 females and 2 calves near same spot as yesterday. [redacted] states that 1 female is mother to two calves - has observed both calves suckling from single female. The other female is believed to be a yearling. [redacted] decides to continue back to Nuiqsut to scout elsewhere. We watch the 2 females then continue down the road to Kuukpik Pad & turn around. On the way back we watch the 2 females again. Also spot large bulls in the distance heading toward the road. [redacted] decides he'll take the smaller female for dried meat. Caribou remained to far out of range. Waited for approx. 1 hr but the caribou just bedded down. Head back on the road to get better view of bulls. ~~But~~ We were not able to spot bulls

from the road. Decided to head back to Nuiqsut. Drop [redacted] at house and return to camp w/ [redacted]

2400 END OF DAY

[signature]

 8.19.15 SUB FOODS STUDY 20/CS

1100 Tailgate meeting. Catch up on field notes. Touch base w/ [redacted] Head to CPAI office to organize, inventory + demob gear. Begin to QC/QA sample + pack for shipment. Some gel ice not frozen so pack up 1/2 samples today + will let gel ice freeze overnight. We will pack rest of samples tomorrow morning prior to flight. Fuel up rental truck w/ ~22 gal of gas; $123.80. Talk w/ Elizabeth @ K80P. She will give us ride to airstrip tomorrow @ 9:45. Break for dinner then catch up on field trip report.

1915 END OF DAY

1/1

APPENDIX D

Quality Assurance Reports

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1. QUALITY ASSURANCE REVIEW – 2014 CARIBOU AND BROAD WHITEFISH SAMPLES

Laboratory Quality Assurance/Quality Control (QA/QC) data associated with the analysis of project samples was reviewed to evaluate the integrity of the analytical data generated during the July 2014 caribou and fish tissue sampling at Nuiqsut, Alaska.

A completeness check and data review was performed by an ERM Alaska, Inc. project chemist. All data were reviewed for completeness in accordance with United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA 2008), US EPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (USEPA 2010). This data review focuses on criteria for QA/QC parameters and their effect on the quality of data and usability.

ERM qualifiers were added to provide further detail to the report tables in order to provide the reader/reviewer with easy access to additional details on why the result was estimated, rejected or considered not detected.

Metals results are considered usable for project objectives. PAH results were reported with reporting limits above the data objectives and may be of limited use. No results were rejected. The completeness for this project is 76%. The detail of this review and qualification of the data are summarized in the following sections.

1.1. Sample Collection & Chain of Custody

All samples were collected as per method requirements.

Tissue samples were analyzed for the following:

- Polycyclic Aromatic Hydrocarbons (PAH), USEPA Method 8270D SIM;
- Metals (Arsenic, Barium, Cadmium, Copper, Nickel, Vanadium, Zinc) by USEPA Method SW6020A;
- Selenium by USEPA Method SW7742; and
- Mercury by USEPA Method SW7471B.

Thirty tissue samples and one equipment blank sample were delivered to ALS Environmental in Kelso, Washington and results were reported in service request K1407865.

Chain of custody information was completed, signed and dated (including released/received by). All correct analyses were requested.

The chain of custody included selenium in the method SW602A metals list. The laboratory requested that method SW7742 be used for selenium in order to avoid interferences that common in the tissue analysis by method SW6020A.

1.2. Sample Receipt

Sample coolers were delivered with custody seals in place, unbroken and intact, with proper documentation, and within the specified temperature range. Tissue samples were frozen before shipment and shipped with gel ice packs to keep cool during shipment. The cooler temperatures were between -0.2 and -4.6 upon receipt at ALS. All of the tissue samples were frozen upon receipt.

1.3. Laboratory Sample Preparation & Holding Times

All samples were prepared within the laboratory as per method requirements. All samples were extracted, digested, and/or analyzed within the holding time criteria for the applicable analytical methods.

1.4. Field QA/QC

Field QA/QC protocols are designed to monitor for possible contamination during collection and transport of samples collected in the field. For this project, equipment blanks were submitted for analysis.

1.4.1. Equipment Blanks

For tissue sampling, the equipment blank consisted of a representative sample of the foil used to wrap the samples. It was submitted to the laboratory in the same manner as tissue samples, in a plastic bag. The laboratory was instructed to analyze a rinsate of the foil sample. The equipment blank results were non-detect (ND) for all analytes, with one exception.

- Naphthalene was detected at a concentration above the method reporting limit (MRL) in the equipment rinse blank. Since the tissue sample results were all below the MRL for naphthalene, the data was not qualified.
- Benzo(a)anthracene was detected at a trace concentration below the method reporting limit (MRL) in the equipment rinse blank. Since the tissue sample results were all below the MRL for benzo(a)anthracene, the data was not qualified.

1.5. Laboratory QA/QC

1.5.1. Method Blanks

Method blanks were analyzed concurrent with a batch of 20 or fewer primary samples for each of the analytical procedures performed for this project. Method blanks were analyzed at the required frequency and target analytes were not detected (ND) in the blanks at concentrations above the MRL.

- Anthracene, benzo(a)anthracene, benzo(g,h,i)perylene, dibenz(a,h)anthracene indeno(1,2,3-cd)pyrene, and phenanthrene were detected at a trace concentrations below the method reporting limit (MRL) in the method blanks. Since the tissue sample results were all below the MRL for these PAHs, the data was not qualified. Sample results with trace concentrations detected below the MRL were flagged J as estimated concentrations. Results for benzo(a)anthracene detected at trace concentrations below the MRL in tissue samples and in the equipment blank may be biased high due to laboratory contamination.

1.5.2. Calibration

Calibrations were performed according to the methods and met QC requirements. Calibration blanks and calibration verification standards were within method QC requirements.

1.5.3. Laboratory Duplicate Samples

Laboratory duplicates were analyzed for metals analyses on samples BDWF-2014-01 and BDWF-2014-11. Two sample aliquots of the same sample are taken in the analytical laboratory and analyzed separately with identical procedures. Analyses of the sample and duplicate give a measure of the precision associated with laboratory procedures but not with sample collection, preservation or storage procedures. Precision is expressed as relative percent difference (RPD). Laboratory duplicates met QC goal, with the following exception.

- The RPD for barium in the duplicate analysis of sample BDWF-2014-11 was greater than 20%. The barium result in this sample was flagged J to indicate increased imprecision due to sample non-homogeneity. The RPD was acceptable for all other metals in this sample. The RPD was acceptable for the other tissue sample.

1.5.4. Internal Standard Recovery

Internal standards are chemical substances that are added in a constant amount to samples, the blank and calibration standards and are used for instrumentation calibration. Internal standard recoveries met QC requirements.

1.5.5. Laboratory Control Samples

Analysis of laboratory control samples (LCS) and LCS duplicates (LCSD) for target analytes met laboratory and project QC goals for target analytes. The LCS/LCSD percent recoveries (%R) and relative percent differences (RPDs) were within limits

1.5.6. Matrix Spikes

Matrix spike samples were performed for metals analyses on samples BDWF-2014-01 and BDWF-2014-11. Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed for PAH analyses on samples BDWF-2014-01 and BDWF-2014-11. Matrix spikes have a known quantity of target analytes are added (spiked) to field samples. Spike recoveries are calculated and are used to evaluate both site conditions and laboratory quality control. MS/MSD %R and RPDs were within limits.

1.5.7. Surrogates

System Monitoring Compounds (Surrogates) are specified for organic chromatographic analytical procedures. Surrogates are compounds similar to target analytes. These compounds are added to each sample prior to collection or extraction. Subsequent surrogate recovery indicates overall method performance. Surrogate recoveries were within prescribed control limits for all primary samples.

1.5.8. Laboratory Method Reporting Limits (Sensitivity)

Method Reporting Limits (MRL) met established method criteria, with the following exceptions.

- The reporting limits for PAHs did not meet the project data quality objectives.
- 8270D SIM: The MRLs were elevated for benzo(a)pyrene in samples Rang-2014-01-La, Rang-20140-02-La, and Rang-20140-04-La. The chromatograms indicated the presence of non-target background components. The results were flagged UJ to indicate elevated reporting limits due to matrix interference.

Sample results with trace concentrations of analytes detected above the method detection limit (MDL), but below the MRL were flagged J as estimated values.

1.6. Precision and Accuracy

Precision criteria monitor analytical reproducibility. Accuracy criteria monitor agreement of measured results with "true values" established by spiking applicable samples with a known quantity of analyte or surrogate. Precision and accuracy were evaluated by comparing laboratory duplicates, LCS/LCSDs and MS/MSDs for this project. Recoveries and RPDs were within required limits, with the exceptions noted above.

1.7. Completeness

Data completeness is defined as the percentage of usable data (usable data divided by the total possible data). The overall project completeness goal is 90%:

$$\%\ \text{completeness} = \frac{\text{number of valid (i.e., non-R flagged) results (840)}}{\text{number of possible results (1,110)}}$$

All requested methods were performed as requested on the chain of custody. None of the reported sample results were rejected. However, method 8270D SIM PAH analysis was not performed in accordance with work plan specifications. Only 18 of the 27 PAHs listed in work plan were reported. The following nine PAHs were not reported: 1-methylphenanthrene, 2,3,5-trimethylnaphthalene, 2,6-dimethylnaphthalene, 2-methylnaphthalene, benzo(e)pyrene, biphenyl, carbazole, dibenzothiophene, and perylene. Completeness for this project is 76%; the completeness goal was not met.

Re-analysis of the July tissue samples for PAHs was requested using the low level extraction procedure in December 2014. The high oil content of these tissues caused matrix interference when using the low level extraction procedure. The re-analysis could not be completed due to instrument limitations.

1.8. Data Summary

In general, the overall quality of the reported data was acceptable. The USEPA National Functional Guidelines (USEPA 2008, 2010) were used to evaluate the acceptability of the data. Data quality for metals analysis met the Data Quality Objectives established for this project. The expected reporting limits were not achieved for PAH samples and the reported target analytes were incomplete. The associated PAH sample results are of limited usability for the purpose of this tissue sampling event.

2. REFERENCES

USEPA. 2008. *Contract Laboratory Program National Functional Guidelines for Organic Superfund Data Review*. June. (USEPA-540-R-08-01).

USEPA. 2010. *Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review*. January. (USEPA-540-R-10-011).

1. QUALITY ASSURANCE REVIEW

Laboratory Quality Assurance/Quality Control (QA/QC) data associated with the analysis of project samples was reviewed to evaluate the integrity of the analytical data generated during the November 2014 fish tissue sampling at Nuiqsut, Alaska.

A completeness check and data review was performed by an ERM Alaska, Inc. project chemist. All data were reviewed for completeness in accordance with United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA 2008), US EPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (USEPA 2010). This data review focuses on criteria for QA/QC parameters and their effect on the quality of data and usability.

ERM qualifiers were added to provide further detail to the report tables in order to provide the reader/reviewer with easy access to additional details on why the result was estimated, rejected or considered not detected.

Metals results are considered usable for project objectives. PAH results were reported with reporting limits above the data objectives and may be of limited use. No results were rejected. The completeness for this project is 100%. The detail of this review and qualification of the data are summarized in the following sections.

1.1. Sample Collection & Chain of Custody

All samples were collected as per method requirements.

Tissue samples were analyzed for the following:

- Polycyclic Aromatic Hydrocarbons (PAH), USEPA Method 8270D SIM;
- Metals (Arsenic, Barium, Cadmium, Copper, Nickel, Vanadium, Zinc) by USEPA Method SW6020A;
- Selenium by USEPA Method SW7742; and
- Mercury by USEPA Method SW7471B.

Thirty tissue samples and two equipment blank samples were delivered to ALS Environmental in Kelso, Washington and results were reported in service request K1413791.

Chain of custody information was completed, signed and dated (including released/received by). All correct analyses were requested.

The following discrepancy was found between the analyses requested and the reported results. The two equipment rinse blank samples were put on hold by ALS for later analysis. Analysis of equipment blanks was requested by ERM on February 4, 2015. The laboratory performed analysis on the equipment blank labeled EQUIPBLANK-2014-03 for PAHs only.

1.2. Sample Receipt

Sample coolers were delivered with custody seals in place, unbroken and intact, with proper documentation, and within the specified temperature range. Tissue samples were frozen before shipment and shipped with gel ice packs to keep cool during shipment. The cooler temperatures were between -3.5 and -3.2 upon receipt at ALS. All of the tissue samples were frozen upon receipt.

1.3. Laboratory Sample Preparation & Holding Times

All samples were prepared within the laboratory as per method requirements. All samples were extracted, digested, and/or analyzed within the holding time criteria for the applicable analytical methods.

1.4. Field QA/QC

Field QA/QC protocols are designed to monitor for possible contamination during collection and transport of samples collected in the field. For this project, equipment blanks were submitted for analysis.

1.4.1. Equipment Blanks

For tissue sampling, the equipment blank consisted of a representative sample of the foil used to wrap the samples. It was submitted to the laboratory in the same manner as tissue samples, in a plastic bag. The laboratory was instructed to analyze a rinsate of the foil sample. Two equipment blanks were submitted and analyses for metals and PAHs was requested on the chain of custody. ALS analyzed one equipment blank for PAHs only in this service request. Target PAH analytes were not detected (ND) in the blank at concentrations above the MRL.

- Benzo(a)anthracene, biphenyl, dibenzofuran, fluorene, fluoranthene, naphthalene, and phenanthrene were detected at a trace concentrations below the method reporting limit (MRL) in the equipment rinse blank. The concentrations detected were similar to those in the method blank. In addition, the lab noted the fluoranthene result was biased high due to no-target background concentrations. Since the tissue sample results were all below the MRL for these compounds, the data was not qualified. Sample results with trace concentrations detected below the MRL were flagged J as estimated concentrations. Results for these compounds detected at trace concentrations below the MRL in tissue samples may be biased high due to laboratory contamination.

1.5. Laboratory QA/QC

1.5.1. Method Blanks

Method blanks were analyzed concurrent with a batch of 20 or fewer primary samples for each of the analytical procedures performed for this project. Method blanks were analyzed at the required frequency and target analytes were not detected (ND) in the blanks at concentrations above the MRL.

- Acenaphthene, anthracene, benzo(a)anthracene, biphenyl, dibenzofuran, 2,6-diphenylnaphthalene, fluorene, fluoranthene, 1-methylphenanthrene, naphthalene, phenanthrene, pyrene and lead were detected at a trace concentrations below the method reporting limit (MRL) in the method blanks. Since the tissue sample results were all below the MRL for these compounds, the data was not qualified. Sample results with trace concentrations detected below the MRL were flagged J as estimated concentrations. Results for these compounds detected at trace concentrations below the MRL in tissue samples may be biased high due to laboratory contamination.

1.5.2. Calibration

Calibrations were performed according to the methods and met QC requirements. Calibration blanks and calibration verification standards were within method QC requirements, with the following exceptions.

- Indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene were below the control criterion for Continuing Calibration Verification (CCV) MS14\12310F002.D. Associated results were flagged J or UJ as estimated with a low bias in the method blank, LCS and LCSD for batch KWG1416321.
- Acenaphthylene was above the control criterion for CCV MS14\0123F014.D. Detected results were flagged J as estimated with a high bias in samples ACIS-2014-001, ACIS-2014-002, ACIS-2014-003, and ACIS-2014-004.
- 2,6-Dimethylnaphthalene and carbazole were above the control criterion for CCV MS14\0127F002.D. Detected results were flagged J as estimated with a high bias in the LCS and LCSD for batch KWG1416350.
- Indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene were below the control criterion for CCV MS14\0129F002.D. Associated results were flagged J or UJ as estimated with a low bias in the following samples: ACIS-2014-021, ACIS-2014-022, ACIS-2014-023, ACIS-2014-024, ACIS-2014-025, ACIS-2014-026, ACIS-2014-027, ACIS-2014-028, ACIS-2014-029, and ACIS-2014-030.

In accordance with the EPA Method 8270D SIM, 80% or more of the CCV analytes must have passed within 20% of the true value. The remaining analytes are allowed a 40% difference as per the ALS SOP. The CCV met these criteria. No further corrective action was required.

1.5.3. Laboratory Duplicate Samples

Laboratory duplicates were analyzed for metals analyses on samples ACIS-2014-001, ACIS-2014-010, and ACIS-2014-021. Two sample aliquots of the same sample are taken in the analytical laboratory and analyzed separately with identical procedures. Analyses of the sample and duplicate give a measure of the precision associated with laboratory procedures but not with sample collection, preservation or storage procedures. Precision is expressed as relative percent difference (RPD). Laboratory duplicates met QC goal.

1.5.4. Internal Standard Recovery

Internal standards are chemical substances that are added in a constant amount to samples, the blank and calibration standards and are used for instrumentation calibration. Internal standard recoveries met QC requirements, with the following exceptions.

- The retention time for PAH internal standard perylene-d12 was outside the acceptance criteria for the following samples: ACIS-2014-007, ACIS-2014-008, ACIS-2014-009, ACIS-2014-010, ACIS-2014-011, ACIS-2014-012, ACIS-2014-013, ACIS-2014-014, ACIS-2014-015, ACIS-2014-016, ACIS-2014-017, ACIS-2014-018, ACIS-2014-019, ACIS-2014-020, ACIS-2014-026, ACIS-2014-027, ACIS-2014-028, ACIS-2014-029, and ACIS-2014-030. Results in these samples for the following PAHs were flagged J or UJ as estimated due to matrix interference: benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(e)pyrene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene and benzo(g,h,i)perylene.

1.5.5. Laboratory Control Samples

Analysis of laboratory control samples (LCS) and LCS duplicates (LCSD) for target analytes met laboratory and project QC goals for target analytes. The LCS/LCSD percent recoveries (%R) and relative percent differences (RPDs) were within limits with the following exceptions.

- LCS %R were below control limits and LCSD/LCSD RPD were above control limit for several PAHs in one batch. The preparation notes indicated this LCS sample had gone dry during the evaporation step. LCSD recoveries were acceptable for all PAHs in this batch. Since the associated project samples did not go dry, data qualifers were not added to the results.

1.5.6. Matrix Spikes

Matrix spike samples were performed for metals analyses on samples ACIS-2014-001, ACIS-2014-010, and ACIS-2014-021. Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed for PAH analyses on samples ACIS-2014-001 and ACIS-2014-021. Matrix spikes have a known quantity of target analytes added (spiked) to field samples. Spike recoveries are calculated and are used to evaluate both site conditions and laboratory quality control. MS/MSD %R and RPDs were within limits, with the following exceptions.

- For sample ACIS-2014-001, MS/MSD %R were below the control limits for the following PAHs: 1-methylphenanthrene pyrene, chrysene, benzo(k)fluoranthene, benzo(e)pyrene and benzo(g,h,i)perylene. In addition, the MS/MSD RPD was high for pyrene. Results for these PAHs in sample ACIS-2014-001 were flagged J or UJ to indicate estimated results with a low bias due to matrix interference.

- For sample ACIS-2014-021, the MSD %R was below the control limit for benzo(b)fluoranthene. The result for this PAH in sample ACIS-2014-021 was flagged UJ to indicate an estimated result with a low bias due to matrix interference.

1.5.7. Surrogates

System Monitoring Compounds (Surrogates) are specified for organic chromatographic analytical procedures. Surrogates are compounds similar to target analytes. These compounds are added to each sample prior to collection or extraction. Subsequent surrogate recovery indicates overall method performance. Surrogate recoveries were within prescribed control limits for all primary samples. The following exceptions were noted for laboratory QC samples.

- Surrogate fluorene-d10 recovery was below the control limit in a method blank and a LCS. The preparation notes indicated these samples had gone dry during the evaporation step. Since the surrogate recoveries were acceptable in all other samples, no additional flags were added to project sample results.

1.5.8. Target Compound Identification

PAH compounds could not be correctly identified due to inadequate peak resolution in several samples.

- Benzo(a)anthracene and chrysene peaks could not be adequately resolved in samples ACIS-2014-001, ACIS-2014-003, ACIS-2014-004, ACIS-2014-005, ACIS-2014-006, ACIS-2014-009, ACIS-2014-012, ACIS-2014-014, and ACIS-2014-016. The results were reported as benzo(a)anthracene and are flagged NJ as estimated concentrations with uncertain compound identification. The chrysene results are reported as UJ and are estimated with uncertain compound identification.
- Benzo(b)fluoranthene and benzo(k)fluoranthene peaks could not be adequately resolved in samples ACIS-2014-004, ACIS-2014-005, ACIS-2014-006, and ACIS-2014-008. The results were reported as benzo(b)fluoranthene and are flagged NJ as estimated concentrations with uncertain compound identification. The benzo(k)fluoranthene results are reported as UJ and are estimated with uncertain compound identification.

1.5.9. Laboratory Method Reporting Limits (Sensitivity)

MRLs met established method criteria, with the following exceptions.

- The reporting limits for PAHs did not meet the project data quality objectives. The laboratory indicated that the high fat content of the fish resulted in ten-fold and twenty-fold dilutions of the samples. All results for PAHs were reported with elevated MRLs.

- The chromatograms for PAHs in several samples indicated the presence of non-target background components. The results were flagged UJ to indicate elevated MRLs and/or method detection limits (MDL) due to matrix interference. MRLs were elevated for anthracene in samples ACIS-2014-015, ACIS-2014-022, ACIS-2014-024, and ACIS-2014-027. MDLs were elevated for the PAHs listed in the following samples.
    - ACIS-2014-001: benzo(a)pyrene, carbazole and perylene;
    - ACIS-2014-004: benzo(e)pyrene;
    - ACIS-2014-009: fluorene;
    - ACIS-2014-011: carbazole;
    - ACIS-2014-014: benzo(a)pyrene; benzo(e)pyrene; benzo(k)fluoranthene
    - ACIS-2014-015: perylene, benzo(k)fluoranthene
    - ACIS-2014-021: carbazole;
    - ACIS-2014-023: anthracene;
    - ACIS-2014-025: anthracene;
    - ACIS-2014-026: anthracene;
    - ACIS-2014-028: anthracene;
    - ACIS-2014-029: anthracene;
    - ACIS-2014-030: anthracene, phenanthrene.

Sample results with trace concentrations of analytes detected above the method MDL, but below the MRL were flagged J as estimated values.

1.6. Precision and Accuracy

Precision criteria monitor analytical reproducibility. Accuracy criteria monitor agreement of measured results with "true values" established by spiking applicable samples with a known quantity of analyte or surrogate. Precision and accuracy were evaluated by comparing laboratory duplicates, LCS/LCSDs and MS/MSDs for this project. Recoveries and RPDs were within required limits, with the exceptions noted above.

1.7. Completeness

Data completeness is defined as the percentage of usable data (usable data divided by the total possible data). The overall project completeness goal is 90%:

$$\% \text{ completeness} = \frac{\text{number of valid (i.e., non-R flagged) results}}{\text{number of possible results}}$$

All requested analyses were performed in accordance with work plan specifications. No sample results were rejected. Completeness for this project is 100%.

1.8. Data Summary

In general, the quality of the data was acceptable. The USEPA National Functional Guidelines (USEPA 2008, 2010) were used to evaluate the acceptability of the data. Data met most of the Data Quality Objectives established for this project. However, the expected reporting limits were not achieved for PAH samples and sensitivity requirements were not achieved due to matrix interference. The associated PAH sample results are of limited usability for the purpose of this tissue sampling event.

2. REFERENCES

USEPA. 2008. *Contract Laboratory Program National Functional Guidelines for Organic Superfund Data Review*. June. (USEPA-540-R-08-01).

USEPA. 2010. *Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review*. January. (USEPA-540-R-10-011).

1. QUALITY ASSURANCE REVIEW

Laboratory Quality Assurance/Quality Control (QA/QC) data associated with the analysis of project samples was reviewed to evaluate the integrity of the analytical data generated during the August 2015 caribou and fish tissue sampling at Nuiqsut, Alaska.

A completeness check and data review was performed by an ERM Alaska, Inc. project chemist. All data were reviewed for completeness in accordance with United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA 2008), US EPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (USEPA 2010). This data review focuses on criteria for QA/QC parameters and their effect on the quality of data and usability.

ERM qualifiers were added to provide further detail to the report tables in order to provide the reader/reviewer with easy access to additional details on why the result was estimated, rejected or considered not detected.

Metals results are considered usable for project objectives. PAH results were reported with reporting limits above the data objectives and may be of limited use. No results were rejected. The completeness for this project is 100%. The detail of this review and qualification of the data are summarized in the following sections.

1.1. Sample Collection & Chain of Custody

All samples were collected as per method requirements.

Tissue samples were analyzed for the following:

- Polynuclear Aromatic Hydrocarbons (PAH), USEPA Method 8270D SIM;
- Metals (Arsenic, Barium, Cadmium, Copper, Nickel, Vanadium, Zinc) by USEPA Method SW6020A;
- Selenium by USEPA Method SW7742; and
- Mercury by USEPA Method SW7471B.

Thirty fish tissue samples, seven caribou tissue, and four equipment blank samples were delivered to ALS Environmental in Kelso, Washington and results were reported in service requests K1510416 and K1510418.

Chain of custody information was completed, signed and dated (including released/received by). All correct analyses were requested.

The following discrepancy was found between the analyses requested and the reported results. The equipment rinse blank samples were put on hold by ALS for later analysis. The metals analyses requested on the equipment blanks were not performed. ALS performed a solvent rinse for PAHs only on the foil samples submitted for equipment rinse blanks. There was not adequate foil remaining to perform the correct water rinsate procedure for the metals analysis. ERM was not notified until after the analysis was completed.

1.2. Sample Receipt

Sample coolers were delivered with custody seals in place, unbroken and intact, with proper documentation, and within the specified temperature range. Tissue samples were frozen before shipment and shipped with gel ice packs to keep cool during shipment. The cooler temperatures were between -0.1 and -11 upon receipt at ALS. All of the tissue samples were frozen upon receipt.

1.3. Laboratory Sample Preparation & Holding Times

All samples were prepared within the laboratory as per method requirements. All samples were extracted, digested, and/or analyzed within the holding time criteria for the applicable analytical methods. Holding times for tissue samples were not applicable to the equipment rinse samples.

1.4. Field QA/QC

Field QA/QC protocols are designed to monitor for possible contamination during collection and transport of samples collected in the field. For this project, equipment blanks were submitted for analysis.

1.4.1. Equipment Blanks

For tissue sampling, the equipment blank consisted of a representative sample of the foil used to wrap the samples. It was submitted to the laboratory in the same manner as tissue samples, in a plastic bag. The laboratory was instructed to analyze a rinsate of the foil sample. Four equipment blanks were submitted with the samples. Analyses for both metals and PAHs were requested on the chain of custody. ALS performed solvent rinses on the foil and analyzed the equipment blanks for PAHs. Target PAH analytes were not detected (ND) in the blank at concentrations above the method detection limit (MDL).

ALS did not analyze equipment blanks for metals with this sample delivery group. No evaluation can be made of metals contamination. The analyses of equipment blanks for trace metals in earlier sample delivery groups indicated that there is no contamination from the foil.

1.5. Laboratory QA/QC

1.5.1. Method Blanks

Method blanks were analyzed concurrent with a batch of 20 or fewer primary samples for each of the analytical procedures performed for this project. Method blanks were analyzed at the required frequency and target analytes were not detected (ND) in the blanks at concentrations above the MRL. Several compounds were detected at trace concentrations above the MDL.

- The following PAH were detected at trace concentrations below the method reporting limit (MRL) in the method blanks: acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, biphenyl, dibenzofuran, 2,6-diphenylnaphthalene, fluorene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, phenanthrene, and 2,3,5-trimethylnaphthalene. Tissue sample results that were all below the MRL for these compounds were not qualified. Sample results with trace concentrations detected below the MRL were flagged J as estimated concentrations.
- The following metals were detected at trace concentrations below the method reporting limit (MRL) in a method blank: copper and lead. Sample results with trace concentrations detected below the MRL were flagged J as estimated concentrations. Sample results detected for lead that were detected above the MRL, and within ten times the method blank concentration, were flagged B as estimated. Sample results detected for copper were all detected at concentrations greater than ten times the method blank concentration and were not affected by the high bias.

Results for these compounds in tissue samples with J flags and B flags may be biased high due to laboratory contamination.

1.5.2. Calibration

Calibrations were performed according to the methods and met QC requirements. Calibration blanks and calibration verification standards were within method QC requirements, with the following exceptions.

- Benzo(k)fluoranthene was above the control criterion for Continuing Calibration Verification (CCV) MS14\1021F003.D. Associated results for this compound in analysis batch KWG1510236 were not detected and not affected by the high bias. No qualifiers were added to these results.

In accordance with the EPA Method 8270D SIM, 80% or more of the CCV analytes must have passed within 20% of the true value. The remaining analytes are allowed a 40% difference as per the ALS SOP. The CCV met these criteria. No further corrective action was required.

1.5.3. Laboratory Duplicate Samples

Laboratory duplicates were analyzed for metals analyses on samples BWDF-2015-03 and BWDF-2015-02. Two sample aliquots of the same sample are taken in the analytical laboratory and analyzed separately with identical procedures. Analyses of the sample and duplicate give a measure of the precision associated with laboratory procedures but not with sample collection, preservation or storage procedures. Precision is expressed as relative percent difference (RPD). Laboratory duplicates met QC goal, with the following exception.

- The RPD for barium in the duplicate analysis of sample BDWF-2015-02 was greater than 20%. The barium result in this sample was flagged J to indicate increased imprecision due to sample non-homogeneity. The RPD was acceptable for all other metals in this sample. The RPD was acceptable for the other tissue sample.

1.5.4. Internal Standard Recovery

Internal standards are chemical substances that are added in a constant amount to samples, the blank and calibration standards and are used for instrumentation calibration. Internal standard recoveries met QC requirements, with the following exceptions.

- The retention time for PAH internal standard perylene-d12 was outside the acceptance criteria for the following samples: BDWF-2015-28, BDWF-2015-27, BDWF-2015-30, BDWF-2015-20, BDWF-2015-26, BDWF-2015-05, BDWF-2015-01, BDWF-2015-13, and BDWF-2015-19. As corrective action, the samples were re-analyzed at higher dilution. Results in these samples for the following PAHs were reported off the higher dilution with elevated reporting limits due to matrix interference: benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(e)pyrene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene and benzo(g,h,i)perylene.

1.5.5. Laboratory Control Samples

Analysis of laboratory control samples (LCS) and LCS duplicates (LCSD) for target analytes met laboratory and project QC goals for target analytes. The LCS/LCSD percent recoveries (%R) and relative percent differences (RPDs) were within limits.

1.5.6. Matrix Spikes

Matrix spike samples were performed for metals analyses on samples BWDF-2015-03 and BWDF-2015-02. Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed for PAH analyses on samples BWDF-2015-03 and BWDF-2015-02. Matrix spikes have a known quantity of target analytes added (spiked) to field samples. Spike recoveries are calculated and are used to evaluate both site conditions and laboratory quality control. MS/MSD %R and RPDs were within limits, with the following exceptions.

- For sample BDWF-2015-003, MS/MSD %R were above the control limits for dibenzothiophene and 1-methylphenanthrene. In addition, the laboratory noted that the chromatogram indicated the presence of non-target background components that prevented adequate resolution of the target analytes 1-methylphenanthrene and benzo(a)anthracene. The result for dibenzothiophene was not detected and not affected by the high bias. The results for 1-methylphenanthrene and benzo(a)anthracene were reported as not detected with elevated reporting limits due to matrix interference.

- For sample BDWF-2015-002, the MS/MSD %R were above the control limit for 1-methylphenanthrene. In addition, the laboratory noted that the chromatogram indicated the presence of non-target background components that prevented adequate resolution of the target analytes. The result for this PAH was reported as not detected with an elevated reporting limit due to matrix interference.

1.5.7. Surrogates

System Monitoring Compounds (Surrogates) are specified for organic chromatographic analytical procedures. Surrogates are compounds similar to target analytes. These compounds are added to each sample prior to collection or extraction. Subsequent surrogate recovery indicates overall method performance. Surrogate recoveries were within prescribed control limits for tissue samples, with the following exceptions.

- Surrogate fluoranthene-d10 recoveries were above the control limit in samples BDWF-2015-28, BWDF-2015-01, RANG-2015-01-La, RANG-2015-02-La, RANG-2015-03-La, RANG-2015-03-Ma, and RANG-2015-04-La. Surrogate fluorene-d10 recoveries were above the control limit in sample RANG-2015-04-La. The laboratory case narrative noted that the presence of non-target background components prevented adequate resolution of the surrogate. Results detected for PAHs in these samples were flagged J to indicate estimated results with a high bias due to matrix interference.

1.5.8. Target Compound Identification

PAH compounds could not be correctly identified due to inadequate peak resolution in several samples. The following results were reported flagged J as estimated concentrations with a high bias due to the presence of non-target background components.

- Acenaphthene peaks could not be adequately resolved in samples BDWF-2015-08, BDWF-2015-04, BDWF-2015-17, BDWF-2015-10, BDWF-2015-06, BDWF-2015-27, BDWF-2015-20, BDWF-2015-30, BDWF-2015-02, BDWF-2015-24, BDWF-2015-22, BDWF-2015-15, BDWF-2015-18, and RANG-2015-04-Ma.
- The fluorene peak could not be adequately resolved in sample BDWF-2015-20.
- The anthracene peak could not be adequately resolved in sample RANG-2015-04-Ma.
- The carbazole peaks could not be adequately resolved in samples BDWF-2015-09, BDWF-2015-17, BDWF-2015-10, BDWF-2015-06, BDWF-2015-14, BDWF-2015-28, BDWF-2015-27, BDWF-2015-20, BDWF-2015-26, BDWF-2015-05, BDWF-2015-01, BDWF-2015-13, BDWF-2015-07, BDWF-2015-21, BDWF-2015-23, BDWF-2015-29, BDWF-2015-25, RANG-2015-02-La, and RANG-2015-03-La.

1.5.9. Laboratory Method Reporting Limits (Sensitivity)

MRLs met established method criteria, with the following exceptions.

- The reporting limits for PAHs did not meet the project data quality objectives. The laboratory indicated that the high fat content of the tissues resulted in from five-fold to fifty-fold dilutions of the samples. All results for PAHs were reported with elevated MRLs with the exception of samples BWDF-2015-15 and RANG-2015-04-Ma.
- The chromatograms for PAHs in several samples indicated the presence of non-target background components. The results were flagged UJ to indicate elevated MRLs and/or method detection limits (MDL) due to matrix interference. MRLs were elevated for 1-methylphenanthrene in all samples, with the exception of RANG-2015-04-Ma. MDLs and or/MRLs were elevated for the PAHs listed in the following samples.
  - BDWF-2015-03: benzo(a)anthracene MRL; chrysene MDL;
  - BDWF-2015-09: pyrene MDL; chrysene MRL;
  - BDWF-2015-08: chrysene MRL;
  - BDWF-2015-04: pyrene MDL; chrysene MRL;
  - BDWF-2015-17: pyrene MDL; chrysene MDL;
  - BDWF-2015-10: pyrene MDL; chrysene MRL;
  - BDWF-2015-06: pyrene MDL;
  - BDWF-2015-14: benzo(a)anthracene MDL; chrysene MRL;
  - BDWF-2015-28: chrysene MRL;
  - BDWF-2015-27: chrysene MRL;
  - BDWF-2015-30: pyrene MDL; benzo(a)anthracene MDL; chrysene MDL;
  - BDWF-2015-20: pyrene MDL; chrysene MRL;
  - BDWF-2015-26: chrysene MRL;
  - BDWF-2015-05: chrysene MRL;
  - BDWF-2015-01: chrysene MRL;
  - BDWF-2015-13: chrysene MRL;
  - BDWF-2015-07: chrysene MRL;
  - BDWF-2015-19: chrysene MRL;
  - BDWF-2015-24: chrysene MRL;
  - BDWF-2015-15: carbazole MDL; fluoranthene MDL; benzo(a)anthracene MDL;

- RANG-2015-04-Ma: carbazole MDL; fluoranthene MDL.

1.6. Precision and Accuracy

Precision criteria monitor analytical reproducibility. Accuracy criteria monitor agreement of measured results with "true values" established by spiking applicable samples with a known quantity of analyte or surrogate. Precision and accuracy were evaluated by comparing laboratory duplicates, LCS/LCSDs and MS/MSDs for this project. Recoveries and RPDs were within required limits, with the exceptions noted above.

1.7. Completeness

Data completeness is defined as the percentage of usable data (usable data divided by the total possible data). The overall project completeness goal is 90%:

$$\% \text{ completeness} = \frac{\text{number of valid (i.e., non-R flagged) results}}{\text{number of possible results}}$$

All requested analyses for tissue samples were performed in accordance with work plan specifications. No tissue sample results were rejected. Completeness for tissue samples for this project is 100%.

Equipment blanks were not analyzed for metals. The completeness goal for equipment blanks was not met.

1.8. Data Summary

In general, the quality of the data was acceptable. The USEPA National Functional Guidelines (USEPA 2008, 2010) were used to evaluate the acceptability of the data. Data met most of the Data Quality Objectives established for this project, with the following exceptions. Equipment blanks were not evaluated for metals contamination during this sampling event. Previous sampling events using the same procedure did not show significant metals contamination from equipment rinse blanks. The expected reporting limits were not achieved for PAH samples and sensitivity requirements were not achieved due to matrix interference. The associated PAH sample results are of limited usability for the purpose of this tissue sampling event.

2. REFERENCES

USEPA. 2008. *Contract Laboratory Program National Functional Guidelines for Organic Superfund Data Review*. June. (USEPA-540-R-08-01).

USEPA. 2010. *Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review*. January. (USEPA-540-R-10-011).

1. QUALITY ASSURANCE REVIEW

Laboratory Quality Assurance/Quality Control (QA/QC) data associated with the analysis of project samples was reviewed to evaluate the integrity of the analytical data generated during the November 2015 fish tissue sampling at Nuiqsut, Alaska.

A completeness check and data review was performed by an ERM Alaska, Inc. project chemist. All data were reviewed for completeness in accordance with United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA 2008), US EPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (USEPA 2010). This data review focuses on criteria for QA/QC parameters and their effect on the quality of data and usability.

ERM qualifiers were added to provide further detail to the report tables in order to provide the reader/reviewer with easy access to additional details on why the result was estimated, rejected or considered not detected.

Metals results are considered usable for project objectives. PAH results were reported with reporting limits above the data objectives and may be of limited use. No results were rejected. The completeness for this project is 100%. The detail of this review and qualification of the data are summarized in the following sections.

1.1. Sample Collection & Chain of Custody

All samples were collected as per method requirements.

Tissue samples were analyzed for the following:

- Polynuclear Aromatic Hydrocarbons (PAH), USEPA Method 8270D SIM;
- Metals (Arsenic, Barium, Cadmium, Copper, Lead, Nickel, Vanadium, Zinc) by USEPA Method SW6020A;
- Selenium by USEPA Method SW7742; and
- Mercury by USEPA Method SW7471B.

Thirty fish tissue samples, and four equipment blank samples were delivered to ALS Environmental in Kelso, Washington and results were reported in service requests K1513236 and K1513238.

Chain of custody information was completed, signed and dated (including released/received by). All correct analyses were requested.

1.2. Sample Receipt

Sample coolers were delivered with custody seals in place, unbroken and intact, with proper documentation, and within the specified temperature range. Tissue samples were frozen before shipment and shipped with gel ice packs to keep cool during shipment. The cooler temperatures were between -1.5 and -2.5 upon receipt at ALS. All of the tissue samples were frozen upon receipt.

1.3. Laboratory Sample Preparation & Holding Times

All samples were prepared within the laboratory as per method requirements. All samples were extracted, digested, and/or analyzed within the holding time criteria for the applicable analytical methods. Holding times for tissue samples were not applicable to the equipment rinse samples.

1.4. Field QA/QC

Field QA/QC protocols are designed to monitor for possible contamination during collection and transport of samples collected in the field. For this project, equipment blanks were submitted for analysis.

1.4.1. Equipment Blanks

For tissue sampling, the equipment blank consisted of a representative sample of the foil used to wrap the samples. It was submitted to the laboratory in the same manner as tissue samples, in a plastic bag. The laboratory was instructed to analyze a rinsate of the foil sample. Four equipment blanks were submitted with the samples. Analyses for metals on two samples and PAHs on two samples were requested on the chain of custody. ALS performed clean lab water rinses on the foil and analyzed the equipment blanks for metals and PAHs. Target analytes were not detected (ND) in the equipment blanks at concentrations above the method reporting limit (MRL). Several compounds were detected at trace concentrations above the MDL.

- The following PAH were detected at trace concentrations below the method reporting limit (MRL), similar to the method blank, in one or more equipment blanks: acenaphthene, benzo(a)anthracene, biphenyl, dibenzofuran, 2,6-diphenylnaphthalene, fluorene, fluoranthene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, perylene, phenanthrene, and pyrene. Tissue sample results that were below the MRL for these compounds were not qualified. Sample results with trace concentrations detected below the MRL were flagged J as estimated concentrations. No additional flags were added for equipment blank detections.
- The following metals were detected at concentrations at or below the method reporting limit (MRL) in one or more equipment blanks: barium, copper, lead, vanadium and zinc. Sample results for lead and vanadium with trace concentrations detected below the MRL were flagged J as estimated concentrations. Sample results detected for barium, copper and zinc were all detected at concentrations greater than ten times the MRL and were not affected by the trace detections in the equipment blanks. No additional flags were added for equipment blank detections.

1.5. Laboratory QA/QC

1.5.1. Method Blanks

Method blanks were analyzed concurrent with a batch of 20 or fewer primary samples for each of the analytical procedures performed for this project. Method blanks were analyzed at the required frequency and target analytes were not detected (ND) in the blanks at concentrations above the MRL. Several compounds were detected at trace concentrations above the MDL.

- The following PAH were detected at trace concentrations below the method reporting limit (MRL) in the water method blank: acenaphthene, acenaphthylene, benzo(a)anthracene, biphenyl, dibenzofuran, 2,6-diphenylnaphthalene, fluoranthene, fluorene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, phenanthrene, and 2,3,5-trimethylnaphthalene. Equipment blank sample results that were all below the MRL for these compounds were not qualified. Sample results with trace concentrations detected below the MRL were flagged J as estimated concentrations.
- The following PAH were detected at trace concentrations below the method reporting limit (MRL) in the tissue method blanks: benzo(a)anthracene, naphthalene, phenanthrene, and pyrene. Tissue sample results that were all below the MRL for these compounds were not qualified. Sample results with trace concentrations detected below the MRL were flagged J as estimated concentrations.
- The following metals were detected at trace concentrations below the method reporting limit (MRL) in one or more tissue method blanks: copper and lead. Sample results for lead with trace concentrations detected below the MRL were flagged J as estimated concentrations. Sample results detected for copper were all detected at concentrations greater than ten times the method blank concentration and were not affected by the high bias.

Results for these compounds in tissue samples with J flags may be biased high due to laboratory contamination.

1.5.2. Calibration

Calibrations were performed according to the methods and met QC requirements. Calibration blanks and calibration verification standards were within method QC requirements, with the following exceptions.

- Indeno(1,2,3-cd) was above the control criterion for Continuing Calibration Verification (CCV) MS14\1205F002.D and MS14\1205F030.D. Associated results for this compound in analysis batches KWG1511849 and KWG1511863 were not detected and not affected by the high bias. No qualifiers were added to these results.

In accordance with the EPA Method 8270D SIM, 80% or more of the CCV analytes must have passed within 20% of the true value. The remaining analytes are allowed a 40%

difference as per the ALS SOP. The CCV met these criteria. No further corrective action was required.

1.5.3. Laboratory Duplicate Samples

Laboratory duplicates were analyzed for metals analyses on samples ACIS-2015-01 and ACIS-2015-21. Two sample aliquots of the same sample are taken in the analytical laboratory and analyzed separately with identical procedures. Analyses of the sample and duplicate give a measure of the precision associated with laboratory procedures but not with sample collection, preservation or storage procedures. Precision is expressed as relative percent difference (RPD). Laboratory duplicates met QC goal, with the following exception.

- The RPD for barium in the duplicate analysis of sample ACIS-2015-01 was greater than 20%. The barium result in this sample was flagged J to indicate increased imprecision due to sample non-homogeneity. The RPD was acceptable for all other metals in this sample. The RPD was acceptable for the other tissue sample.

1.5.4. Internal Standard Recovery

Internal standards are chemical substances that are added in a constant amount to samples, the blank and calibration standards and are used for instrumentation calibration. Internal standard recoveries met QC requirements.

1.5.5. Laboratory Control Samples

Analysis of laboratory control samples (LCS) and LCS duplicates (LCSD) for target analytes met laboratory and project QC goals for target analytes. The LCS/LCSD percent recoveries (%R) and relative percent differences (RPDs) were within limits.

1.5.6. Matrix Spikes

Matrix spike samples were performed for metals analyses on samples ACIS-2015-01 and ACIS-2015-21. Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed for PAH analyses on samples ACIS-2015-01 and ACIS-2015-21. Matrix spikes have a known quantity of target analytes added (spiked) to field samples. Spike recoveries are calculated and are used to evaluate both site conditions and laboratory quality control. MS/MSD %R and RPDs were within limits.

1.5.7. Surrogates

System Monitoring Compounds (Surrogates) are specified for organic chromatographic analytical procedures. Surrogates are compounds similar to target analytes. These compounds are added to each sample prior to collection or extraction. Subsequent surrogate recovery indicates overall method performance. Surrogate recoveries were within prescribed control limits.

1.5.8. Target Compound Identification

PAH compounds could not be correctly identified due to inadequate peak resolution in several samples. The following results were reported flagged J as estimated concentrations with a high bias due to the presence of non-target background components.

- Fluoranthene peaks could not be adequately resolved in samples ACIS-2015-02, ACIS -2015-12, ACIS -2015-13, and ACIS -2015-26.
- The fluorene peaks could not be adequately resolved in all samples except ACIS-2015-29.
- The phenanthrene peaks could not be adequately resolved in samples ACIS-2015-03, ACIS-2015-04, ACIS-2015-05, ACIS-2015-06, ACIS-2015-07, ACIS-2015-08, ACIS-2015-09, ACIS-2015-10, ACIS-2015-11, ACIS-2015-13, ACIS-2015-14, ACIS-2015-17, ACIS-2015-18, ACIS-2015-19, ACIS-2015-20, ACIS-2015-21, ACIS-2015-23, ACIS-2015-27, and ACIS-2015-29
- The pyrene peaks could not be adequately resolved in samples ACIS-2015-24, ACIS-2015-25 and ACIS-2015-26.

1.5.9. Laboratory Method Reporting Limits (Sensitivity)

MRLs met established method criteria, with the following exceptions.

- The reporting limits for PAHs did not meet the project data quality objectives. The laboratory indicated that the fat content of the fish tissues does not allow for the use of the low-level extraction procedure.
- The chromatogram for PAHs in sample ACIS-2015-22 indicated the presence of non-target background components. The result for benzo(a)anthracene was flagged UJ to indicate method detection limit (MDL) due to matrix interference.

1.6. Precision and Accuracy

Precision criteria monitor analytical reproducibility. Accuracy criteria monitor agreement of measured results with "true values" established by spiking applicable samples with a known quantity of analyte or surrogate. Precision and accuracy were evaluated by comparing laboratory duplicates, LCS/LCSDs and MS/MSDs for this project. Recoveries and RPDs were within required limits, with the exceptions noted above.

1.7. Completeness

Data completeness is defined as the percentage of usable data (usable data divided by the total possible data). The overall project completeness goal is 90%:

% completeness = <u>number of valid (i.e., non-R flagged) results</u>

number of possible results

All requested analyses for tissue samples were performed in accordance with work plan specifications. No tissue sample results were rejected. Completeness for tissue samples for this project is 100%.

1.8. Data Summary

In general, the quality of the data was acceptable. The USEPA National Functional Guidelines (USEPA 2008, 2010) were used to evaluate the acceptability of the data. Data met most of the Data Quality Objectives established for this project, with the following exception. The expected reporting limits were not achieved for PAH samples and sensitivity requirements were not achieved due to matrix interference. The associated PAH sample results are of limited usability for the purpose of this tissue sampling event.

2. REFERENCES

USEPA. 2008. *Contract Laboratory Program National Functional Guidelines for Organic Superfund Data Review*. June. (USEPA-540-R-08-01).

USEPA. 2010. *Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review*. January. (USEPA-540-R-10-011).

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APPENDIX E

Annotation Research Report

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Review of Contaminant Research

Document/Agency	**Alaska Department of Conservation (ADEC) – Fish Tissue Monitoring Program (FTMP)**
Link	http://dec.alaska.gov/eh/vet/FMP.html
Research/Program summary	The ADEC FTMP characterizes and tracks contaminant levels in fish tissue from across the State. This program works to ensure these resources are safe and to provide relevant information to users to make informed decisions. Multiple species important to commercial, sport, and subsistence users are tested. Supported by funding from EPA, NOAA and BOEMRE (formerly MMS), FTMP is analyzing salmon (all five species), as well as marine and freshwater fish species for trace metals. A subset is also analyzed for dioxins and furans, organochlorine pesticides, PCB congeners and brominated fire retardants.
Confounding Issues	Fish tissues analyzed varies from fillet to whole body.
Chemical Compounds Analyzed	Total Hg, As, Cd, Cr, Cu, Pb, Ni, Se,
Key Species	Freshwater fish: Northern Pike *Esox lucius* Rainbow Trout *Oncorhynchus mykiss* Lake Trout *Salvelinus namaycush* Grayling *Thymallus arcticus* Arctic Char *Salvelinus alpinus* Dolly Varden *Salvelinus malma* Sheefish *Stenodus leucichthys* Arctic Cisco *Coregonus autumnalis* Least Cisco *Coregonus sardinella* Broad Whitefish *Coregonus nasus* Humpback Whitefish *Coregonus pidschian* Round Whitefish *Prosopium cylindraceum* Burbot *Lota lota* Longnose Sucker *Catostomus catostomus* Arctic Lamprey *Lampetra japonica*
Geographic Region	State of Alaska

Document/Agency	**cANIMIDA Study 10: Task 5, October 2009: Integrated Biomonitoring and Bioaccumulation of Contaminants in Biota of the cANIMIDA Study Area (OCS Study MMS 2009-037)**
Link	http://www.boem.gov/BOEM-Newsroom/Library/Publications/2009/2009_037.aspx
Research/Program summary	cANIMIDA, Task 5 was an assessment of petroleum hydrocarbons concentrations of, petroleum biomarkers, and 13 to 19 metals in soft tissues of representative species of marine bivalve mollusks, crustaceans, and fish from the offshore areas in the Alaskan Beaufort Sea near ongoing or planned oil and gas development activities. This report describes the results of chemical and biochemical monitoring of marine animals collected from the study area during the summers of 2004, 2005, and 2006.
Confounding Issues	Marine, offshore, already impacted area, very limited sample number by year for our specific fish species of interest, many fish species analyzed as composites (pooled) comprising many individuals, for some assessments data presented as "fish" with up to 8 species lumped together. Our study will not combine data from different species. Comparisons should only be made with a significant amount of caution. We see no value in using year to year data from cANIMIDA for BDWF and arctic cisco because of the very low sample number. We do not suggest comparison of Northstar and Liberty Total PAHs since many fish species are lumped together and based on the caveats/confounding variables we described above.
Chemical Compounds Analyzed	Many elements of interest and petroleum hydrocarbons (including PAHs)
Key Species	Broad whitefish and arctic cisco were addressed. Limited representation. Whole fish were used with no apparent processing (no removal of viscera); thus not directly comparable.
Geographic Region	North Slope of Alaska; offshore industrialized area.

Document/Agency	**Durell, G and J Hardin. Monitoring of Hydrocarbons in Sediment and Biota Related to Oil and Gas Development in Near- and Off-Shore Areas of the Arctic Beaufort Sea, Alaska**
Link	https://agu.confex.com/agu/os16/preliminaryview.cgi/Paper91309.html
Research/Program summary	They summarized the fish findings as stated below but presented no data; thus we need to refer to the cANIMIDA study that is reviewed above. "The bioaccumulation of trace substances, including anthropogenic contaminants, was investigated in five species of fish: Arctic Cod, Arctic Cisco, Four Horn Sculpin, Broad Whitefish and Humpback Whitefish (6). Two fish biomarkers of contaminant exposure were also evaluated: P450 in liver hepatocytes and gut epithelial cells and bile hydrocarbon metabolites. Slight elevations of high molecular weight (pyrogenic) PAH and a few metals (e.g., arsenic), and some P450 induction, was observed in, primarily, some of the Four Horned Sculpin and Arctic Cisco caught in different coastal locations. These subtle signals appear to be more related to boat and other human activities than oil and gas development and production, and possibly also long-range transport and deposition. However, the PAH residue and biological marker data indicate a low level of exposure to PAH."
Confounding Issues	The report was a summary of fish findings, but presented no new data.
Chemical Compounds Analyzed	PAH, TPAH
Key Species	Aquatic biota
Geographic Region	Near and offshore Arctic Beaufort Sea, Alaska

Document/Agency	**Dhananjayan, V. and S. Muralidharan. 2012. Polycyclic Aromatic Hydrocarbons in Various Species of Fishes from Mumbai Harbour, India, and Their Dietary Intake Concentration to Human. International Journal of Oceanography Volume 2012, Article ID 645178**
Link	http://dx.doi.org/10.1155/2012/645178
Research/Program summary	This study reports the concentrations of 15 PAHs in 5 species of fish samples collected along the harbor line, Mumbai, between 2006 and 2008. Among 5 species of fish investigated, Mandeli, Coilia dussimieri, detected the maximum concentration of PAHs ($P < 0.05$) followed by Doma, Otolithes ruber. The concentration of total and carcinogenic PAHs ranged from 17.43 to 70.44 ng/g wet wt. and 9.49 to 31.23 ng/g wet wt, respectively, among the species tested. The lower-molecular-weight PAHs were detected at highest levels.
Confounding Issues	Not relevant species, outside of North America, impacted location, etc. Only value may be in comparing concentrations to impacted site in a study focused on human exposure.
Chemical Compounds Analyzed	Total and carcinogenic PAHs
Key Species	None
Geographic Region	Mumbai

Document/Agency	**Heavy metals and persistent organic pollutants in sediments and fish from lakes in Northern and Arctic regions of Norway. (Skotvold et al. 1997)**
Link	http://www.miljodirektoratet.no/old/klif/publikasjoner/overvaking/1427/ta1427.pdf

Research/Program summary	Presents levels and distribution of contaminants in lake sediments and fish in Northern Norway. Samples were analyzed for: heavy metals, persistent organic pollutants (POPs: PCBs and organochlorine pesticides) and PAHs. The study serves as a baseline. The chosen contaminants analyzed, as well as the methods used for field sampling and analysis, were in accordance with AMAP recommendations.
Confounding Issues	Not species of interest, pooling of individuals for chemical analyses, muscle sample for Hg only, outside of North America, high level of uncertainty of PAHs analyses due to low concentrations at or below levels of reporting or detection. PAH data were not reliable for comparison to Nuiqsut fish results.
Chemical Compounds Analyzed	Heavy metals (only Hg in fish reported), persistent organic pollutants (POPs: PCBs and organochlorine pesticides) and PAHs
Key Species	Whitefish (Coregonus lavaretus L.), Arctic char (Salvelinus alpinus L.), perch (Perca fluviatilis L.), and pike (Esox lucius L.)
Geographic Region	Norway

Document/Agency	**Vallette-Silver, N., M.J. Hameed, K.W. Efurd and A. Robertson. 1999. Status of the contamination in sediments and biota from the Western Beaufort Sea (Alaska). Marine Pollution Bulletin 38(8)702-722**
Link	http://dx.doi.org/10.1016/S0025-326X(99)00034-X
Research/Program summary	Surficial sediments in the western Beaufort Sea contained generally high concentrations of arsenic (up to 58 ppm as corrected for grain size), very low amounts of organochlorine compounds and concentrations of total polycyclic aromatic hydrocarbons (PAHs) ranging from 160 to 1100 ng/dry weight. Invertebrates contained higher concentrations of total PAHs than fish, with naphthalene being the largest contributor. Diagnostic ratios of various PAH compounds in our samples do not suggest crude oil as the main source of PAHs. Other sources of PAHs to the region include rivers outflow, coastline erosion, oil seeps, diagenesis, and long-range atmospheric transport.
Confounding Issues	Fish of interest to Nuiqsut study are not represented. Not useful for comparison.
Chemical Compounds Analyzed	Total PAHs analyzed but not in matrices relevant for our purposes. Radioisotopes, organochlorines and some elements.
Key Species	Species for many biota sampled not identified. No useful fish species.
Geographic Region	North Slope region offshore included.

Document/Agency	**cANIMIDA Study 10: Task 5, October 2009: Integrated Biomonitoring and Bioaccumulation of Contaminants in Biota of the cANIMIDA Study Area (OCS Study MMS 2009-037)**
Link	http://www.boem.gov/BOEM-Newsroom/Library/Publications/2009/2009_037.aspx
Research/Program summary	cANIMIDA, Task 5 was an assessment of petroleum hydrocarbons concentrations of, petroleum biomarkers, and 13 to 19 metals in soft tissues of representative species of marine bivalve mollusks, crustaceans, and fish from the offshore areas in the Alaskan Beaufort Sea near ongoing or planned oil and gas development activities. This report describes the results of chemical and biochemical monitoring of marine animals collected from the study area during the summers of 2004, 2005, and 2006.

Confounding Issues	Marine, offshore, already impacted area, very limited sample number by year for our specific fish species of interest, many fish species analyzed as composites (pooled) comprising many individuals, for some assessments data presented as "fish" with up to 8 species lumped together. Our study will not combine data from different species. Comparisons should only be made with a significant amount of caution. We see no value in using year to year data from cANIMIDA for BDWF and arctic cisco because of the very low sample number. We do not suggest comparison of Northstar and Liberty Total PAHs since many fish species are lumped together and based on the caveats/confounding variables we described above. If interpreted cautiously, we can compare Nuiqsut fish to the data in this study.
Chemical Compounds Analyzed	Many elements of interest and petroleum hydrocarbons (including PAHs)
Key Species	Broad whitefish and arctic cisco were addressed. Limited representation.
Geographic Region	North Slope of Alaska; offshore industrialized area.

Document/Agency	**Allen-Gil SM, Martynov VG. Heavy metal burdens in nine species of freshwater and anadromous fish from the Pechora River, Northern Russia. Sci Total Environ 1995; 160: 643 –654.**
Link	http://www.sciencedirect.com/science/article/pii/004896979593634T
Research/Program summary	For nine species of freshwater and anadromous fish from the Pechora River cadmium (Cd), copper (Cu), lead (Pb), and zinc (Zn) were analyzed in muscle [not whole body]. Cu and Zn concentrations were within normal physiological ranges. Cd and Pb concentrations in Pechora River fish muscle were not elevated relative to other freshwater arctic fish and were below thresholds associated with toxicological effects and U.S. regulatory limits for human consumption.
Confounding Issues	Only 4 elements of interest measured, muscle not whole body, not in North America. Summary statistics only provided for Cd and Pb.
Chemical Compounds Analyzed	A few elements
Key Species	Sampled 1 broad whitefish and 13 arctic cisco
Geographic Region	Pechora River, Northern Russia

Document/Agency	**Allen-Gil, S.M., C.P. Gubala, D.H. Landers, B.K. Lasorsa, E.A. Crecelius and L. R. Curtis. 1997. Heavy metal accumulation in sediment and freshwater fish in US Arctic lakes. Environmental Toxicology and Chemistry, Vol. 16, No. 4, pp. 733–741, 1997**
Link	http://lib.gig.ac.cn/local/ejournal/ETC/ETC1997/1604/ETC-1997-16(4)-733-741.pdf
Research/Program summary	Metal concentrations in sediment and two species of freshwater fish; lake trout (Salvelinus namaycush) and grayling (Thymallus arcticus) were examined in four Arctic lakes in Alaska.
Confounding Issues	Lake trout and grayling are not species we use in our Nuiqsut study. Arctic lakes in Alaska. We assessed fish in the Colville River (e.g., anadromous). Assessed muscle and liver, not whole body. Used d.w. Units of measure are not reported with the data table.
Chemical Compounds Analyzed	Some elements of interest
Key Species	Lake trout and grayling
Geographic Region	Arctic Alaska

Document/Agency	**Allen-Gil, S.M., J. Ford, B.K. Lasorsa, M. Monetti, T. Vlasova, D.H. Landers. 2003. Heavy metal contamination in the Taimyr Peninsula, Siberian Arctic. The Science of the Total Environment 301 (2003) 119–138**
Link	https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=65224&CFID=6572339&CFTOKEN=99758287
Research/Program summary	Taimyr Peninsula is directly north of the world's largest heavy metal smelting complex (Norilsk, Russia). They analyzed heavy metal concentrations in lichen (Cetraria cucullata), moss (Hylocomium splendens), soils, lake sediment, freshwater fish (Salvelinus alpinus, Lota lota and Coregonus spp.) and collared lemming (Dicrostonyx torquatus) from 13 sites between 30 and 300 km from Norilsk.
Confounding Issues	Not Alaska. Outside North America. Represents impacted site. Fish collected by genus only for Coregonus spp. or "whitefish" [unlikely to be broad whitefish]. Used liver and muscle; not whole body. Reported in d.w.
Chemical Compounds Analyzed	Traditional suite of elements.
Key Species	Freshwater fish (Salvelinus alpinus, Lota lota and Coregonus spp.)
Geographic Region	Norilsk region (western Russia)

Document/Agency	**Amundsen, PA, FJ. Staldvik, AA. Lukin, NA. Kashulin, OA. Popov, YS. Reshetnikov. Heavy metal contamination in freshwater fish from the border region between Norway and Russia. The Science of the Total Environment (1997) 211-224**
Link	http://www.sciencedirect.com/science/article/pii/S0048969797840582
Research/Program summary	The contents of Cd, Cu, Cr, Hg, Ni and Zn in muscle, liver and gills were studied in whitefish (claim it is Coregonus lavaretus s.l.) [European whitefish (common whitefish)], perch, pike, brown trout, burbot and vendace from three lake localities in a watercourse in the border region between Norway and Russia, in the vicinity of mining activity and several metallurgic smelters.
Confounding Issues	Data reported in a manner that made comparison to our Nuiqsut data difficult. Not whole body (analyzed specific tissues), different species from those used in Nuiqsut study, outside of North America, impacted sites studied, etc. This study has limited comparability to the Nuiqsut study.
Chemical Compounds Analyzed	Cd, Cu, Hg, Ni, Zn, Cr
Key Species	Densely and sparsely rakered whitefish, perch, pike, brown trout, burbot and vendace.
Geographic Region	Norway-Russia

Document/Agency	**Carrie, J., F. Wang, H. Sanei, RW MacDonald, PM Outridge, GA Stern. 2010. Increasing Contaminant Burdens in an Arctic Fish, Burbot (Lota lota), in a Warming Climate. Environ. Sci. Technol. 44, 316–322**
Link	http://pubs.acs.org/doi/abs/10.1021/es902582y
Research/Program summary	They assessed concentrations of Hg and PCBs in Mackenzie River burbot (Lota lota) noting they have increased significantly over the last 25 years despite falling or stable atmospheric concentrations. Strong temporal correlations between increasing primary productivity and biotic Hg and PCBs as reflected by burbot suggest that warming temperatures and reduced ice cover may lead to increased exposure to these contaminants in high trophic level Arctic freshwater biota.

Confounding Issues	Sampled burbot (not species relevant). Hg in liver and muscle; not whole body. No other elements analyzed. Not important for comparing to Nuiqsut data but should likely be considered as a factor in long term monitoring of subsistence foods.
Chemical Compounds Analyzed	Hg and PCBs
Key Species	Burbot
Geographic Region	Mackenzie River (Canada)

Document/Agency	**Evans, MS and A. Talbot 2012. Investigations of mercury concentrations in walleye and other fish in the Athabasca River ecosystem with increasing oil sands developments. Journal of Dynamic Environmental Monitoring (DOI: 10.1039/c2em30132f)**
Link	https://www.ceaa-acee.gc.ca/050/documents_staticpost/59540/82534/Journal_of_Environmental_Monitoring_Article.pdf
Research/Program summary	Mercury increase due to expanding oil sands developments in the region suspected. They compiled an extensive database for walleye, lake whitefish (Coregonus clupeaformis), northern pike (Esox lucius) and lake trout (Salvelinus namaycush). Evidence for increasing trends in mercury concentrations were examined for each species by location and year also considering fish weight and length.
Confounding Issues	Addresses Hg only. Not species specific relevant. Also note "Analyses are on fillet except where noted." with Table 2; as some were "whole body". This study may be useful when multiyear data are collected and possible trends assessments considered.
Chemical Compounds Analyzed	Hg
Key Species	Walleye (Sander vitreus), lake whitefish (Coregonus clupeaformis), northern pike (Esox lucius) and lake trout (Salvelinus namaycush)
Geographic Region	Athabasca River, north eastern Alberta (Canada)

Document/Agency	**Gray, J.E., P.M. Theodorakos, E.A. Bailey, R.R. Turner. 2000. Distribution, speciation, and transport of mercury in stream-sediment, stream-water, and fish collected near abandoned mercury mines in southwestern Alaska, USA. The Science of the Total Environment 260. 21-33**
Link	http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1404&context=usgsstaffpub
Research/Program summary	Concentrations of total Hg, Hg (II), and methylmercury were measured in stream-sediment, stream-water, and fish collected downstream from abandoned mercury mines in SW Alaska to evaluate environmental effects to surrounding ecosystems. These mines are found in a broad belt covering several tens of thousands of square kilometers, primarily in the Kuskokwim River basin. Collected fish were dissected and muscle fillets and liver samples were saved for chemical analysis.
Confounding Issues	Various forms of Hg only, not fish species relevant, very high mining associated scenario, cinnabar rich area, etc. This is an example of regional and abandon mines Hg rich sources that clearly contaminate local fish.
Chemical Compounds Analyzed	Various forms of Hg

Key Species	Arctic grayling (Thymallus arcticus), Dolly Varden (Salvelinus malma), Chum salmon (Oncorhynchus keta), Coho salmon (Oncorhynchus kisutch), Chinook salmon (Oncorhynchus tshawytscha) and Northern pike (Esox Lucius). (3-8 sampled per species)
Geographic Region	Southwest Alaska

Document/Agency	**Laliberte´, D. and Tremblay, G., 2002: Metal, PCB, dioxin and furan concentrations in fish and sediments from four lakes in Northern Que´bec in 2001. Ministe`re de l_Environnement, Gouvernement du Que´bec, Que´bec, Canada.**
Link	http://www.mddelcc.gouv.qc.ca/eau/eco_aqua/chibougamau/rapport-en.pdf
Research/Program summary	Metal, PCB, dioxin and furan concentrations in fish and sediments from four lakes in Northern Que´bec in 2001.
Confounding Issues	Addressed lakes. For elements focused on Hg. Species not relevant to our study.
Chemical Compounds Analyzed	Metal, PCB, dioxin and furan
Key Species	lake trout, walleye, northern pike, lake whitefish, burbot
Geographic Region	Four lakes in Northern Que´bec

Document/Agency	**Matz, A. 2012. Mercury, Arsenic, and Antimony in Aquatic Biota from the Middle Kuskokwim River Region, Alaska, 2010-2011**
Link	https://dec.alaska.gov/eh/docs/mercury/Mercury%20Kuskokwim%20River.pdf
Research/Program summary	Small, sedentary fish (slimy sculpin, juvenile Dolly Varden and juvenile Arctic grayling) and insects from Red Devil and Cinnabar Creeks had significantly greater mercury concentrations than the same fish in other Tributaries. Northern pike, burbot (lush), and Arctic grayling collected in Rivers had variable mercury levels across the area. Sheefish too.
Confounding Issues	Do not address broad whitefish or arctic cisco. Muscle and liver were sampled in larger fish. Tributary species included slimy sculpin Cottus cognatus, juvenile Dolly Varden Salvelinus malma, juvenile Arctic grayling, and macroinvertebrates. These smaller Tributary fish were analyzed as whole body or composite whole body samples. Not applicable to the Nuiqsut study.
Chemical Compounds Analyzed	Mercury, arsenic, and antimony
Key Species	Slimy sculpin Cottus cognatus, juvenile Dolly Varden Salvelinus malma, juvenile Arctic grayling, and macroinvertebrates
Geographic Region	Middle Kuskokwim River Region, Alaska

Document/Agency	**Moiseenko, TI, and Kudryavtseva, LP. 2001. Trace metal accumulation and fish pathologies in areas affected by mining and metallurgical enterprises in the Kola Region, Russia. Environ Pollut. 114(2):285-97.**
Link	http://www.ncbi.nlm.nih.gov/pubmed/11504351

Research/Program summary	Throughout the Kola region of Russia there has been a substantial increase of metal concentrations in water, which are related to local discharges from metallurgical and mining industry, transboundary transmissions as well as indirect leaching of elements by acid precipitation. This study presents data on the levels of Ni, Cu, Sr, Al, Zn, Co, Mn, Pb, Cd, Hg in the organs and tissues of fish, and evaluates relationships with water chemistry. In general we observed a large number of lakes that are heavily contaminated by Ni and Cu. Fish in these lakes contain high concentrations of Ni and Cu and display frequent pathologies, mostly associated with the kidneys. In lakes contaminated with Sr, there also are high Sr levels in fish and pathologies associated with skeletal tissues. Exposure to acidified water appears to increase the transport of metals (including Al, Ni and Cu) into fish and hence the toxic effects.
Confounding Issues	Not species of interest. Impacted site studied. Many tissues assessed but not whole body. Focused on adverse effects (pathology). The fish in this study were clearly impacted by contamination, so it is not recommended to compare to the Nuiqsut study.
Chemical Compounds Analyzed	Ni, Cu, Sr, Al, Zn, Co, Mn, Pb, Cd, Hg
Key Species	Whitefish (C. lavaretus; not broad), brown trout, and char
Geographic Region	Kola Region, Russia

Document/Agency	**Moses, SK. AV. Whiting, GR. Bratton, RJ. Taylor, TM. O'Hara. 2009. Inorganic nutrients and contaminants in spotted seals (Phoca largha) and sheefish (Stenodus leucicthys) of NW Alaska: Linking the health of arctic wildlife and subsistence users. International Journal of Circumpolar Health 68(1):53–74**
Link	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2713769/
Research/Program summary	Determined inorganic nutrient and contaminant concentrations in subsistence foods consumed by Alaska Natives, concentration changes related to common preparation methods and provide a basic risk-benefit analysis for these foods. Eleven essential and six non-essential elements were measured in sheefish. Cooking altered nutrient and contaminant concentrations.
Confounding Issues	Not species of interest, not whole body assessment, limited sample number
Chemical Compounds Analyzed	Essential and non-essential elements
Key Species	Sheefish
Geographic Region	Northwest Alaska, Kotzebue Sound

Document/Agency	**Mountouris, A.; Voutsas, E.; Tassios, D., 2002. Bioconcentration of heavy metals in aquatic environments: the importance of bioavailability. Mar. Pollut. Bull. 44, 1136–1141**
Link	http://www.sciencedirect.com/science/article/pii/S0025326X02001686
Research/Program summary	The importance of heavy metal bioavailability on the bioconcentration in aquatic biota is examined. To this purpose, mono- and multivariate statistical techniques are applied to develop correlations between heavy metal bioconcentration factor and sediment characteristics, that are expected to affect bioavailability, using a database of heavy metal concentrations in biota and sediment along with the available physicochemical characteristics. The statistical analysis shows that satisfactory correlations are obtained only when factors that affect bioavailability, such as metal oxides concentration and organic carbon content in the sediment, are taken into account.
Confounding Issues	The study is not comparable to Nuiqsut fish.

Chemical Compounds Analyzed	Heavy metals
Key Species	Aquatic species
Geographic Region	Unknown

Document/Agency	**Heavy metals and persistent organic pollutants in sediments and fish from lakes in Northern and Arctic regions of Norway. (Skotvold et al. 1997)**
Link	http://www.miljodirektoratet.no/old/klif/publikasjoner/overvaking/1427/ta1427.pdf
Research/Program summary	Presents levels and distribution of contaminants in lake sediments and fish in Northern Norway. Samples were analyzed for: heavy metals, persistent organic pollutants (POPs: PCBs and organochlorine pesticides) and PAHs. The study serves as a baseline. The chosen contaminants analyzed, as well as the methods used for field sampling and analysis, were in accordance with AMAP recommendations.
Confounding Issues	Muscle sample for Hg only
Chemical Compounds Analyzed	Heavy metals (only Hg in fish reported)
Key Species	Whitefish (Coregonus lavaretus L.), Arctic char (Salvelinus alpinus L.), perch (Perca fluviatilis L.), and pike (Esox lucius L.)
Geographic Region	Norway

Document/Agency	**Uthe and Bligh. 1971. Preliminary survey of heavy metal contamination of Canadian freshwater fish. J. Fish. Res. Bd. Canada 28:786-i88.**
Link	http://www.nrcresearchpress.com/doi/abs/10.1139/f71-114?journalCode=jfrbc#.V1IbIZjVypo
Research/Program summary	The concentration of 13 toxic elements in dressed fish from a non-industrialized and heavily industrialized freshwater area have been measured. With the exception of mercury, in no instance did levels exceed limits set by regulatory agents for lead, arsenic, copper, and zinc. Indeed in the majority of instances the levels from the industrialized area did not differ significantly from those of the non-industrialized area.
Confounding Issues	Rather old data (methods may not be comparable), fish species not relevant. Used composite and dressed fish. Represent freshwater fish of North America (Manitoba). No summary statistics as composite samples were run only providing a single value for an element per species at each location.
Chemical Compounds Analyzed	Pb, Ni, As, Cu, Sb, Cd, Zn, Ur, Hg, Mn, Se, Cr, Sn
Key Species	Lake whitefish, pike, rainbow smelt, yellow perch
Geographic Region	Moose Lake, Man., 54"N, 100"W) and Lower Great Lakes Basin (Canada)

Document/Agency	**Vallette-Silver, N., M.J. Hameed, K.W. Efurd and A. Robertson. 1999. Status of the contamination in sediments and biota from the Western Beaufort Sea (Alaska). Marine Pollution Bulletin 38(8)702-722.**
Link	http://dx.doi.org/10.1016/S0025-326X(99)00034-X

Research/Program summary	Surficial sediments in the western Beaufort Sea contained generally high concentrations of arsenic (up to 58 ppm as corrected for grain size). Surficial sediments in the western Beaufort Sea contained generally high concentrations of arsenic (up to 58 ppm as corrected for grain size), very low amounts of organochlorine compounds and concentrations of total polycyclic aromatic hydrocarbons (PAHs) ranging from 160 to 1100 ng/dry weight. Invertebrates contained higher concentrations of total PAHs than fish, with naphthalene being the largest contributor. Diagnostic ratios of various PAH compounds in our samples do not suggest crude oil as the main source of PAHs. Other sources of PAHs to the region include rivers outflow, coastline erosion, oil seeps, diagenesis, and long-range atmospheric transport.
Confounding Issues	Fish of interest to Nuiqsut study are not represented
Chemical Compounds Analyzed	Total PAHs analyzed but not in matrices relevant for our purposes. Radioisotopes, organochlorines and some elements.
Key Species	Species for many biota sampled not identified. No useful fish species.
Geographic Region	North Slope region offshore included.